Impact of Artificial Intelligence in Yoga Personal Training: Need for Enhanced Presence and Scalable Reach for Independent Instructors

By

ABIRAMI SUKUMARAN

DISSERTATION

Presented to the Swiss School of Business and Management Geneva

In Partial Fulfilment Of the Requirements For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

2024

Impact of Artificial Intelligence in Yoga Personal Training: Need for Enhanced Presence and Scalable Reach for Independent Instructors

Abirami Sukumaran, DBA Research Scholar

Supervised by

Dr. Francesco Derchi, PhD

APPROVED BY

Dr. Vasiliki Grougiou _____

Dissertation Chair

RECEIVED / APPROVED BY:

Table of Contents

Executive

Executive Summary

The scope of this work (DBA) aims to investigate the impact of physiological factors (Melinda B. Abbott, 2018, Melton, Maguire, J. S. 2001) and Artificial Intelligence (AI) on the business potential of freelance yoga instructors (Brown, 2015, Horn Jr.,2005, Ahtinen et al., 2008, Moniz & Slutzky, 2016)). in Bangalore, India. The study utilizes a mixed-methods approach, combining quantitative data from surveys and qualitative data from semi-structured interviews and content analysis. At a high level, the research seeks to address the following questions:

- Do physiological factors limit freelance yoga instructors' ability to provide personalized yoga instruction?
- Does AI augment or replace traditional yoga instructors, impacting their business opportunities?

The study reveals that a significant number of freelance yoga instructors (91%) face negative impacts on their business due to physiological factors, including fatigue, stress, injuries, time constraints, and a perceived need for physical presence. It also finds that while the majority of instructors (77%) perceive AI as a potential threat to their business, 80% also acknowledge its potential to enhance their virtual presence and client relevance. The research highlights the importance of AI in reaching a wider audience through virtual training, offering a solution to the limitations of physical presence. However, it also emphasizes the need to strike a balance between AI's technological capabilities and the human touch that instructors provide. The study concludes that the future of freelance yoga instruction lies in a human-centric AI approach that augments instructor capabilities without replacing them.

I first started by analyzing the current context of understanding the scope of business for freelance Yoga instructors and the physiological and AI factors impacting their businesses as part

of the literature review that explores in detail the exponentially growing field of AI-powered yoga personal training, examining its potential to enhance market expansion and professional reach for independent instructors. While recent research highlights the potential of AI to automate pose recognition, personalize instruction, and objectively evaluate performance, this review specifically addresses a crucial gap within this field, which is to focus on the potential impact of physiological factors and AI-driven yoga instruction on the businesses of freelance yoga instructors, a segment often overlooked in the broader discussion surrounding AI integration. In Annex 1, I have collected the metadata that governs the research and analysis covered in the Literature Review of this research, in terms of keywords used for the research, distribution / importance of keywords in the literature, the criteria governing the importance of the keywords, search databases used and the approach. Based on these criteria, I narrowed down to 96 papers as the foundation for literature review. Following this, I grouped the research papers into 5 categories: The rise of hyper-personalization in wellness technologies, Personalized Yoga instruction as complementary and alternative medicine, The potential of AI in transforming Yoga instruction and personal training, Ethical and social implication of AI in Yoga, Landscape of research in Yoga, Meditation and AI. A visual representation of distribution of search keywords is in Annex 2. I have covered the co-relation of keywords with literature in Annex 3. To summarize, these researches, I have concentrated on two distinct domains: first, substantiating the significance of practices like Yoga, mindfulness, and meditation for holistic well-being, and second, the integration of Artificial Intelligence (AI) technologies to enhance scalability, automation, user experiences and its business implications. However, a crucial gap remains regarding the potential adverse effects of AI-driven Yoga instruction on the business opportunities for human freelance Yoga instructors. While the goal is not to hinder the use of AI

in Yoga, it's imperative to investigate the challenges faced by freelance Yoga instructors and explore a human-centric AI approach. This approach could both mitigate negative impacts (if identified as possible) and amplify opportunities for instructors to expand their presence and reach within the personal Yoga training landscape. I have added the visual summary of literature review in Annex 4. This research aims to address this gap. From the literature review, 2 broad areas of research problem statements has opened up:

RESEARCH QUESTION 1 (RQ1):

Part A) Impact of physiological factors on freelance personal Yoga instructors

Do freelance Yoga instructors experience a decrease in business opportunities due to their inherent physiological limitations (e.g., time and energy constraints) in providing individualized personal training at a huge scale?

Part B) Impact of AI on Yoga personal instruction:

B1. Does AI impact (reduce) traditional freelance Yoga instructors' opportunities with automated self-paced practice instead of augmenting the presence of these Yoga instructors?

B2. Can AI advancements augment presence of freelance Yoga instructors for Yoga personal training and scale their market potential?

RESEARCH QUESTION 2 (RQ2):

Can AI advancements focus on augmenting instructors' capabilities rather than purely replacing them, subsequently enhancing business and physiological well-being for freelance Yoga instructors?

Based on the literature review and initial problem statements framed above, I have derived the criteria for which we want to evaluate the hypothesis under research question 1 (RQ 1); it is

summarized in Annex 5. This criteria determines the 9-element ecosystem that would foster our research questions and analysis, this is represented in a tabular format in Annex 6. Analysis of the row-wise, column-wise and diagonally stacked elements of the ecosystem is done in order to familiarize with the focus areas of the research and to identify the initial research questions. The horizontal, vertical, and diagonal analyses provide distinct perspectives, enabling us to explore the multifaceted relationship between AI advancement and potential to augment the business opportunities for freelance Yoga instructors comprehensively. Image representing this 3-dimensional intersection of the 9-element ecosystem (as an intersection of entities, key areas of research and impact of AI in personal Yoga instruction) is represented in Annex 7.

With this, we have informed context about the elements from which the questions should be addressed and the literature review has given us the background to these questions (that were surfacing in those papers but not necessarily delved deeper in data or analysis), which I have further evolved to study as part of this research. By now we are also equipped with the choice of Research Methodology to conduct the research. The research best aligns with the Post-Postivism (Per Eagleton, 2003: 135) paradigm, following a deductive approach (while ensuring the open ended understanding of the complex nature of the area being studied), is taken for the research starting with a specific hypothesis development based on the literature review, and testing of the hypothesis to check if it holds in particular contexts and the mixed-methods research design to provide a comprehensive understanding of the complex relationships between AI, physiological factors, and the business of freelance yoga instructors. The image representing research methodology and the research components is represented in Annex 8. The layers of the Research Onion are interconnected and influence each other. The research philosophy (post-positivism) guides the approach (deductive) and strategy (mixed methods), which in turn inform the specific

choices regarding data collection and analysis. The core of the onion (KAR) represents the central focus of this research, shaping the entire methodological design.

The details of questions for RQ1 (Part A) with their key metrics are in Annex 9. The key metrics are aligned with the questions as an approximation, to help with processing and analyzing the results. Of course they are more than just data points, some are detailed open ended questions that are much more than metric driven data. The details of questions for RQ1 (Part B) with their key metrics are in Annex 10. Once the stages, components, research elements, questions (a good combination open ended and data oriented) and key metrics have been organized, the subsequent steps were to conduct the research (research procedure) and analyze results.

The research procedure for the 2 enquiries in this thesis can be summarized as follows: This research investigates the impact of physiological factors and AI on the reach and business potential of freelance yoga instructors in Bangalore. The study employs a mixed-methods approach, combining quantitative data from surveys and qualitative data from semi-structured interviews and content analysis. There is a summary of the population, sampling strategy, and research procedures employed to ensure robust and reliable findings in Annex 11.

For organizing and analyzing the findings, I followed the following steps: Analyze the survey data using the statistical tests outlined (correlation). Create tables, charts, and figures to visually represent the findings and highlight significant correlations. Conduct thematic analysis on the interview transcripts and content analysis. Identify key themes, patterns, and recurring ideas that emerge from the data. Identify connections between quantitative and qualitative results and answer: Where do they confirm or challenge each other?

The summarized answers to these questions in visualization are available in Annex 12, 13, 14 respectively. To summarize in words, a strong negative correlation is found between physiological strain and business performance stating that if physiological strain increases, business performance decreases. The study also examines the potential of AI to enhance or replace freelance yoga instructors. While a significant majority of instructors (77%) perceive AI as a potential threat to their opportunities, 80% also acknowledge its potential to enhance their virtual presence and client relevance. A weak negative correlation is found between instructors perceiving AI as a threat and believing that AI will enhance their business opportunities stating that there is NO correlation between the instructors perceiving AI as a threat and believing that AI will enhance reach and relevance (business opportunities) for freelance Yoga instructors. While the data suggests that AI may pose a threat to freelance personal yoga instructors, it also highlights its potential for expanding reach and market relevance. Further investigation into the specific applications, the role of human interaction, and the potential evolution of business models will be critical in understanding the true impact of AI on freelance yoga instructors' future. This validates Hypothesis of Research Question 1 Part B 1 and B2.

The qualitative analysis provides valuable insights into the physiological challenges and opportunities faced by freelance private yoga instructors in a rapidly changing world. The data in the Venn Diagram depicting the overlap between Physiological Strain and Business Performance Annex 15, clearly demonstrates that physiological factors play a significant role in their ability to establish and maintain sustainable businesses. The human element of yoga, including personal connection, empathy, and a deep understanding of individual needs, will likely continue to be paramount in ensuring the long-term success of freelance yoga instructors.

The qualitative data in Annex 16 addressing the AI impact on business potential of freelance Yoga instructors reveals that freelance yoga instructors in Bangalore view AI as a powerful tool with the potential to augment their presence and business opportunities, particularly in virtual training. However, they also highlight the critical importance of human connection and personalized instruction, suggesting that AI should not replace the role of the instructor. While instructors recognize AI's potential to enhance their virtual presence and business opportunities, they also express concern about AI replacing their opportunities and replacing the human element of their profession. The data suggests that the instructors value the personal connection and personalized instruction they provide. They believe AI should complement, not replace, their role. This analysis points to a key issue in the adoption of AI. While AI can offer efficiency and reach, it must be carefully integrated to avoid replacing the human touch that is often essential for freelance private Yoga instructors' opportunities and also customer satisfaction.

To make sense of the fact that 95% of instructors who see it as a threat also perceive it to enhance business opportunities as observed in the quantitative and qualitative study, I proposed a Problem Statement Analysis that will likely address how instructors perceive the balance between AI and human interaction, providing insights for the future of this industry. The hypothetical statement was aligned to find out if an AI-powered virtual yoga instructor can effectively replicate personalized training, allowing instructors to scale their reach while maintaining client satisfaction? This system would ideally capture an instructor's unique style, preferences, and expertise to deliver customized sessions, even without the instructor being present. The problem statement is detailed in Annex 17 and the response details in Annex 18.

The gist is that Yoga instructors are generally optimistic about the potential of AI to expand their reach and improve client personalization. However, significant concerns remain about the technology's ability to fully replicate the human element of yoga instruction, as well as practical considerations like pricing, quality control, and ethical implications. While many see AI as a valuable tool for business growth, others are cautious about its potential impact on their role and the authenticity of the client experience.

Since our Research Question 1 results are validated to be inclined to our initial hypotheses, there is potential future research opportunity for Research Question 2: Exploring a Human-Centric AI Approach to Augment Instructor Capabilities

Future research should focus on developing an instructor-augmented, hyper-personalized AI-assisted yoga platform, addressing concerns about AI replacing instructors and exploring strategies for seamless integration of human interaction within the AI-powered platform.
The overall research summary is visualized in Annex 19.

1. Concept Paper

1.1 Introduction

The fitness space is constantly changing. Sometimes it seems like it is booming its way out of the league of its contemporary industries and areas of focus. For example, the rise of biohacking (the process of improving one's body and mind facilities using diet, exercise, mind, technology etc.), wearable technology, home gyms, fitness apps, and personalized diets has led to exponential growth in the health and wellness industry, positioning it as a major economic force with significant market potential (based on: 1) The 2024 Wellness Market Research conducted by Global Wellness Institute on Wellness Market Growth from 2019 to 2023, and 2) Health Happiness and the Wellness Economy, An Empirical Analysis by Shun Wang). Significant investments in these areas and the resulting increase in consumer spending further highlight the industry's growing economic significance (based on Future of the 1.5 Trillion Wellness Market by McKinsey & Company, 2021, 2022). However if you are looking closely, you will see there are major gaps, silos and cries for attention. People who take it on themselves to deliver fitness as a service AKA small businesses end up in this second category even in this phase of the market with all its whim and fancy. Small fitness businesses and independent instructors, while integral to the industry, often face significant challenges even amidst the market's growth and innovation. There is more than one reason this is stated with conviction based on some of the references that include Budler, Marko & Božič, Katerina. (2024), Akpan et al. (2021), Sean Greeley (2023), Alexandra Rada, Ágnes Szabó (2022) and Puccinelli et al., (2021):

1. Lack of business business guidance, direction and motivation per Sean Greeley (2023)

2. Mainly increasing competition from digital fitness platforms, the plethora of health and fitness apps that pose a deep threat, per Alexandra Rada, Ágnes Szabó (2022)

To a certain extent the following factors have been implied, even though not explicitly stated (which is why it will also be covered in the scope of this research) by some parts of the research by Deana I. Melton, Jeffrey A. Katula and Karen M. Mustian, 2008:

3. "Characteristics clients look for when they want to hire a trainer. These characteristics represent trainers' perceptions of client knowledge and values regarding the trainer before hiring him/her. The major themes subsumed under this global theme were physique appearance, gender/race, niche, and referral.".
4. This by extension of understanding demands a lot from the instructors in terms of appearance, fitness levels, reputation etc. given that since they are freelance personal Yoga instructors, they must also be available despite some physiological factors we can imagine - like fatigue from a marathon of classes, distance and travel exertion and difficulty providing personalized instruction due to geographical limitations (not being physically present at multiple locations at one time for personalized instruction)

and the study conducted by Moh H. Malek, David P. Nalbone, Dale E. Berger and Jared W. Coburn on Importance of Health Science Education for Personal Fitness Trainers stresses on the awareness and need for knowing the clients in detail which imposes:

5. The demand for understanding their clients personally and objectively in the areas of nutrition, fitness level, exercise scope, interest and more.

Not every day is the 1st of January that makes people so motivated and resolution-centric that they dress up and march towards these silo Yoga instructors and trainers. All these technological advancements and home gyms are still not enough to get us out of those night suits and couches on a cold morning leaving our beloved instructors out of work by late March or early April pretty much. A personalized version of the same instructor at the comfort of your own home, who knows you more than you do, most certainly will do.

This is the whole premise of my discussion in this paper. Leveraging data, AI and Machine Learning (ML) to advance the market potential and presence for these Yoga instructors and small scale fitness business owners in addition to getting a far better understanding of their clients. In other words this research centers on the idea of making the Yoga instructor or the Personal Trainer (taking one persona for reference) of choice available to a wide variety of fitness clients, customized according to each one of their needs at their preferred time and locations whilst offering the same level of personal attention and prescription. Also this research emphasizes the importance of persona (Yoga instructors) using these areas of technology to better the business and that technology doesn't replace them and leave them with very limited opportunities.

1.2 Exploring the Yoga Personal Training Space: A Preliminary Review

1.2.1 Need for more personalized Yoga Training

Personal trainers are fitness professionals paid to design and facilitate customized exercise programs (Maguire, 2001). Personal trainers are part of the fitness industry in a manner that

connects health promotion, disease prevention, and consumer culture (Maguire, 2001). In 2011, there were approximately 51 million health club members in the US, a 24% increase over 6 years (Storer et al., 2014).

Most gym/health club members list overall health and wellness along with progression towards individual goals as reasons for membership (Storer et al., 2014). Despite active gym memberships and multiple benefits to physical activity and exercise, almost 40% of adults do not engage in any activity during their leisure time, rather they are sedentary (Melton et al., 2008). This trend is said to result in over $23 billion dollars in health expenditures (Melton et al., 2008). Of those who do adopt an exercise program, an estimated 50% will discontinue it after 6 months (Melton et al., 2008).

Personal trainers are meant to be experts in design and execution of fitness and conditioning programs, helping their clients achieve their fitness and wellness goals. A well rounded exercise program would ideally contain elements of balance, strength, flexibility and endurance, tailored to fit the needs of the individual (Cress et al., 2006). This balanced and tailored approach can optimize adherence to physical activity as a lifestyle choice rather than a singular event. Adherence to exercise has been argued to be a result of the influence of the exercise leader (Melton et al., 2008). Adherence is related to self-efficacy, specifically mastery experiences, social modeling, social persuasion and states of psychological or mental readiness (Melton et al., 2008).

In 2014, research was done using random assignment to create an experimental group alongside a control group to determine the impact of supervised training with a personal trainer versus self-directed training within a health club setting (Storer et al., 2014). Limitations of this study include a small and non-representative sample. Despite its limitations, researchers showed

significant differences in fitness levels based on the presence of a qualified personal trainer supervising the exercise program. Those participants working with trainers experienced greater gains in various fitness assessments compared to those who self-directed their programs (Storer et al., 2014). The self-directed group was not able to fully grasp the complexity and nuances of the variables within the exercise program that need to be manipulated in order to see quantifiable results (Storer et al., 2014).

There is evidence demonstrating that having a trainer can help clients achieve goals that otherwise may avoid them if they choose to exercise unsupervised. Both Storer (2014) and McClaran (2003) demonstrated that personal trainers' involvement with a client's exercise program is an effective way to enact change, as shown via physical fitness assessments or by way of measuring attitudes towards increasing physical activity.

1.2.2 Problems independent (freelance) Yoga instructors face

There is the "Client Selection Rationale" (as defined by Deana I. Melton, Jeffrey A. Katula and Karen M. Mustian, 2008) which is the trainers' notions of what characteristics clients look for when they want to hire a trainer. These characteristics represent trainers' perceptions of client knowledge and values regarding the trainer before hiring him/her. The major themes subsumed under this global theme were physique appearance, gender/race, niche, and referral. According to the results of the analysis conducted by the authors Deana I. Melton, Jeffrey A. Katula and Karen M. Mustian with a set of focus group participants, it is agreed that the appearance of one's physique was a critical consideration for clients hiring a personal trainer. When asked how much of an influence a trainer's physique has on a client in choosing his/her trainer, one trainer replied: "I think it's, unfortunately, huge. I think it's a very big deal just because I've talked to so many

people who have, you know—I work out in a gym where there are a lot of trainers. I don't work there, but there are a lot of different trainers and I had so many people say, 'I'm going to go to her because she looks great' or 'I wouldn't go to him because he doesn't look that great'."

This in fact puts a lot of pressure on small business owners and individual personal trainers because of the pressing need to have their physique and fitness on point in addition to training enough clients to make their ends meet. Also training and staying fit physically and mentally is difficult given the amount of travel, talking and focus involved in each of their sessions. The simple fact that they are also subject to fatigue and disinterest is enough to explain the problems faced by independent Yoga instructors and small business owners.

Then the topic of understanding all the attributes of the clients' physical status and condition that contribute their level of participation, effort and continuity in their engagement whether it is Yoga or other forms of Personal Training (PT). This is simply not possible by looking at the client or asking them a few questions. There has to be a systematic way and study to come up with what will suit a specific type of body, fitness level, interest and their nature to list a few attributes. Once the trainers are made aware of these, it is easy and sustainable to acquire, engage and grow their client base. But it is not a straightforward process and not all of them have the information of what it takes to understand health science.

According to the study conducted by Moh H. Malek, David P. Nalbone, Dale E. Berger and Jared W. Coburn on Importance of Health Science Education for Personal Fitness Trainers using the FIKA questionnaire (a questionnaire developed for the study, the Fitness Instructors Knowledge Assessment, they examined relations between commonly used indicators of knowledge (training and experience) and actual knowledge in the five areas of (a) nutrition, (b) health screening, (c) testing protocols, (d) exercise prescription, and (e) general training knowledge regarding special

populations. FIKA provided reliable measures of knowledge in these areas, which are of critical importance in developing an optimal fitness program for the client and for avoiding unnecessary injuries), the fitness instructors who actually had “Yes” one of these 2 questions (a)

‘‘Do you have a college degree in exercise science?’’; (b) ‘‘Are you certified by ACSM or NSCA?’’ actually fared well in the FIKA questionnaire compared to the ones who answered “No” to both. Not all of the Yoga instructors who are owning small businesses are having sufficient information in this area and that hinders their potential of attracting and identifying the right clients and provisioning them with the right program / plan which eventually turns them into loyal customers.

1.3 Discussion of Problems

Now, revisiting all these factors, based on existing references and some hypothesis of my opinion, we can discuss that some of the ongoing problems for freelance Yoga Instructors fall into one or more of the below (not restricting to the list):

1. Fatigue due to travel and multiple sessions to make ends meet.
2. The need to be present individually to give personalized attention and correction (whether physical or virtual).
3. The pressure of being in shape combined with lack of time, interest and energy to focus on self.
4. Lack of enough information to target the right audience.

5. Not enough information to make the best plan of program for each client based on a wide variety of realistic variables.

We need to prove the hypothesis and find a solution that addresses these issues and helps these instructors and trainers to Acquire, Engage, Retain, Impact and Grow the right audience.

1.3.1 Current Available Solutions:

While the fitness industry has embraced technology, current AI-driven solutions primarily focus on automating yoga instruction and personalization per the researches Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), Bhavana & Kumar (2017), Mishra (2020), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Jang et al. (2015), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022). While these solutions offer convenience and some degree of customization, they tend to overlook the unique value that independent yoga instructors bring to the table. By prioritizing automation, these platforms may inadvertently displace instructors, limiting their professional opportunities rather than enhancing them.

1.3.2 Gap in Current Solutions:

A crucial gap remains regarding the potential adverse effects of AI-driven Yoga instruction on human instructors. While the goal is not to hinder the use of AI in Yoga, it's imperative to investigate the challenges faced by freelance Yoga instructors and explore a human-centric AI approach. This approach could both mitigate negative impacts and amplify opportunities for instructors to expand their presence and reach within the personal Yoga training landscape.

To address this gap, it's crucial to develop AI-powered solutions that empower independent instructors instead of replacing them. These solutions should leverage AI to enhance the instructor's capabilities, expand their reach, and create new avenues for growth.

1.4 Possible Solutions:

This is exactly where Data, ML and AI will hand hold the beneficiaries and result in tremendous impact in the individual focus fitness businesses. In my work, I will explore some possible solutions based on my perspectives:

1) Engaging Computer Vision and Artificial Intelligence in building intelligent and context-aware applications that present personalized instructors' knowledge to their clients in their instructors' own style, language and nature. The app actually guides, corrects and practices along with the individual just like the actual instructor would, even if the instructors are not physically present in the location of the practicing individual. This would ensure the essence of having a real-life Yoga instructor is not lost.

2) To use Machine Learning models to identify if an individual practitioner is a potential customer for a selected instructor and for the instructors to understand the patterns and progress of the individual practitioners thereby enhancing the market availability and relevance for freelance Yoga instructors.

1.5 Scope for Research

In the discussion so far, we have referenced various studies and focus areas from the current and recent past that cover the need for hyper-personalized Yoga instruction and how the AI can make this happen and also automate Yoga instruction. While these existing discussions talk about AI offering convenience and some degree of customization, they tend to overlook the unique value that independent yoga instructors bring to the table. By prioritizing automation, these platforms may inadvertently displace instructors, limiting their professional opportunities rather than enhancing them. Also there is an evident gap in the literature in stating that the physiological factors impact freelance Yoga instructors' business negatively and how digital transformation and AI advancements can be used for augmenting their opportunities rather than replacing them. This is exactly what we have as scope for this research. We need to

1. Assess the hypothesis of physiological factors
2. AI advancements being seen as a threat
3. And assess the proposed solution hypothesis that addresses these issues and helps freelance personal Yoga instructors and trainers to acquire, engage, retain, impact and grow the right audience.

1.5.1 Phase 1

Research if the problems faced by freelance Yoga instructors as mentioned in section 1.3 (physiological factors impacting personal Yoga instructors and AI advancements replacing their opportunities as a threat) are in fact applicable with Yoga personal training in the present day scenario and if yes, evaluate at a high level if the solution stated above could possibly create more presence and business opportunities for freelance Yoga instructors.

This step of the research targets to study the available data and positively survey more information in the area of enhancing presence for freelance Yoga instructors in the locality of Bangalore by utilizing Artificial Intelligence for creating instructor-specific personalized instructions. It is intended to cover:

1) A quantitative assessment of the "physiological factors" problem statement discussed above and if the reasons mentioned actually impact the Yoga Instructors in enhancing their personal training business, negatively

2) A qualitative assessment of the possible characteristics, variables and derived attributes that contribute to individuals' interest in fitness and association with a specific instructor

3) A quantitative and qualitative assessment that AI advancements are a threat as perceived by the instructors and a feasibility check if virtual presence enhancement, personalized instructions and plans for relevant individual clients in terms of exercise compositions are perceived as possible solutions and acceptable by freelance Yoga instructors.

1.5.2 Phase 2 (Extended, post-doctoral research)

Research if the second solution stated above could create business opportunities for freelance Yoga instructors utilizing ML and AI research (This is an extended concept. Could be covered exhaustively in a post-doctoral research):

Use Machine Learning models to identify and match individual practitioners with freelance Yoga instructors, thereby enhancing the market availability and relatability for freelance Yoga instructors. At this stage, the research will cover some of the Machine Learning methods, models and possible data sets to:

1) To create samples of personalized exercise set from small businesses like individual fitness trainers and Yoga instructors participating in the research study for each category and area of focus from the list above
2) To collect data set (exercise data mentioned above) that covers at least 5 clients for the participating instructors
3) To include posture specification, benefits, breathing techniques and other proactive corrective actions for each of those exercises ensuring that the specification is relevant to the personal styles and recommendations of each of the instructors
4) Research the dataset to create methods and training models using Machine Learning and Artificial Intelligence systems to predict trainer-customer match score and possible areas of collaboration and businesses for the trainers
5) To close the cycle, collect results after the sample clients practice the devised customized instructions for Yoga personal training and report the instructor's feedback and corrective results to the client post practice asynchronously

1.6 Concept in Summary

This study intends to engage people from Yoga background like Personal Trainers, Yoga instructors and Yoga practitioners and enthusiasts who form the clients for these trainers for addressing both problem statement (data collection) and solution. Historical data and basic health science related to fitness and exercises will also be engaged in the process of establishing the 3 phases listed in this section above. The last phase of the study also includes evaluating existing ML and AI models and innovating new methods to document the method of implementing the learning collected through the initial phases into an application that can be purposeful for beneficiaries intended in the research, i.e. the independent Yoga Instructors and Personal Trainers so they can avoid the problems that limit their potential to engage more clients and gives their talent a chance to be omnipresent.

1.7 References

Research Paper/Artifact	**Section**
Deana I. Melton, Jeffrey A. Katula and Karen M. Mustian, 2008. The Current State of Personal Training: an Industry Perspective of Personal Trainers in a Small Southeast Community https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4021014/	1.2.2

Moh H. Malek, David P. Nalbone, Dale E. Berger and Jared W. Coburn, 2002. Importance of Health Science Education for Personal Fitness Trainers (pages 22 - 24) https://www.researchgate.net/profile/Dale-Berger/publication/11526901_Importance_of_Health_Science_Education_for_Personal_Fitness_Trainers/links/59e51bbba6fdcc1b1d8d28ae/Importance-of-Health-Science-Education-forPersonal-Fitness-Trainers.pdf	1.2.2
Melton, D. I., Katula, J. A., & Mustian, K. M. (2008). The current state of personal training: An industry perspective of personal trainers in a small Southeast community. Journal of Strength and Conditioning Research,22, 883–889. https://doi.org/10.1519/JSC.0b013e3181660dab	1.2.1
Heyward, V. Advanced Fitness Assessment and Exercise Prescription (3rd ed.). Champaign, IL: Human Kinetics, 1997.	1
Hilgenkamp, K. Ethical behavior and professionalism in the business of health and fitness. ACSM Health Fit. J. 2(6). 1998.	1
Howley, E.T., and B.D. Franks. Health Fitness Instructor's Handbook. Champaign, IL: Human Kinetics, 1997.	1
Idea. IDEA/ASD Personal Fitness Training Survey: The Consumer Perspective. http://www.ideafit.com/prasdsurvey.cfm (17 Feb. 2000)	1

Maguire, J. S. (2001). Fit and flexible: The fitness industry, personal trainers and emotional service labor. Sociology of Sport Journal, 18, 379-402	1.2.1
Walter R. Thompson, Ph.D., FACSM, 2021. Worldwide Survey of Fitness Trends for 2021 https://ig-fitness-schweiz.ch/wp-content/uploads/2021/05/Worldwide_Survey_of_Fitness_Trends_for_2021.6-1.pdf	1
Storer, T. W., Martin, J. L., & Davis, G. A. (2014). The effect of personal training on physical fitness outcomes. Journal of Strength and Conditioning Research, 28(5), 1367–1373. https://doi.org/10.1519/JSC.0000000000000369	1.2.1
McClaran, R. J., & Panton, L. B. (2003). Motivational interviewing to increase physical activity. Journal of Consulting and Clinical Psychology, 71(1), 122-132.	1.2.1
Cress, M. E., & Smith, B. D. (2006). Exercise prescription for health and fitness. In Exercise Physiology for Health, Fitness, and Performance (pp. 529-591).	1.2.1
Melton, D. I., Katula, J. A., & Mustian, K. M. (2008). The current state of personal training: An industry perspective of personal trainers in a small Southeast community. Journal of Strength and Conditioning Research, 22, 883–889.	1.2.1

The 2024 Wellness Market Research conducted by Global Wellness Institute on Wellness Market Growth from 2019 to 2023 https://globalwellnessinstitute.org/industry-research/wellness-real-estate-market-growth-2019-2023-and-future-developments/	1.1
Health Happiness and the Wellness Economy, An Empirical Analysis by Shun Wang) https://www.researchgate.net/publication/369974813_Health_Happiness_and_the_Wellness_Economy_An_Empirical_Analysis	1.1
Future of the 1.5 Trillion Wellness Market by McKinsey & Company, 2021, 2022 https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/feeling-good-the-future-of-the-1-5-trillion-wellness-market https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/still-feeling-good-the-us-wellness-market-continues-to-boom	1.1

2. Literature Review

2.1 Introduction

The integration of artificial intelligence (AI) into diverse domains has revolutionized human interactions and capabilities, and the area of personal fitness and well-being is no exception. This

literature review explores in detail the exponentially growing field of AI-powered yoga personal training, examining its potential to enhance market expansion and professional reach for independent instructors. While recent research highlights the potential of AI to automate pose recognition, personalize instruction, and objectively evaluate performance, this review specifically addresses a crucial gap within this field.

Our research focuses on the potential impact of AI-driven yoga instruction on the livelihood of freelance yoga instructors, a segment often overlooked in the broader discussion surrounding AI integration. We aim to explore the challenges faced by independent instructors due to inherent physiological limitations, such as time and energy constraints, which may hinder their ability to scale their business and reach a wider audience.

This review critically examines the current literature addressing AI applications in yoga, focusing on two primary areas of questions:

1. Do freelance yoga instructors experience a decrease in business opportunities due to their inherent physiological limitations in providing individualized personal training at a large scale?
2. Can AI advancements focus on augmenting instructors' capabilities, rather than purely replacing them, subsequently enhancing business and psychological well-being for freelance yoga instructors?

By synthesizing insights from various research studies on AI, yoga, and the broader landscape of personal wellness, this review aims to contribute to a more nuanced understanding of AI's role in the future of yoga training. Ultimately, we seek to explore how AI can be leveraged not only to

enhance the accessibility and effectiveness of yoga practice but also to empower freelance instructors and contribute to the continued growth and evolution of this ancient practice.

2.2 Metadata

This section contains the metadata that governs the research and analysis covered in the Literature Review of this research.

Table 2.2.1t

A table of literature metadata and their values and descriptions.

S.No.	Metadata	Value
1	Keywords used for the research	Yoga, Yoga instruction as a profession, Personal instructor in Yoga, Freelance Yoga instructor, Personal trainer, Personalized instruction, Yoga instructor, Health science, health education, Fitness industry, Fitness market, Fitness market growth, Yoga professionals growth and scale, Artificial Intelligence, Machine Learning, AI for Yoga, AI for fitness, AI for Yoga instructors, Responsible AI, Personalized Yoga instruction, Social pressure for Yoga instructors, Fitness assessments, Client selection, Computer Vision for movement tracking
2	Distribution %	There is a detailed visual (Graph 2.2.1g) below this table that represents the distribution of keywords based on their impact on the

		topic of research. The chart shows the distribution of search keywords used in research. The X axis lists the keywords, and the Y axis the percentage of importance of each keyword. The orange line shows the cumulative percentage of importance. This means that the first few keywords account for the majority of the research. For example, the first 10 keywords account for about 90% of the research.
3	Importance criteria	Yoga and Yoga instruction as a profession are the most crucial keywords, reflecting the central focus of the research. The keywords Personal instructor in Yoga and freelance Yoga instructor are closely tied to Yoga and the focus of this research, indicating the specific target audience. AI for Yoga and AI for fitness demonstrate the core research interest in application of AI within the yoga and fitness sector. Health science and Fitness industry are also important keywords next in line because they highlight the broader context of the research and how health science status plays an important role in impacting freelance professional Yoga instructors. Keywords related to AI technology (Artificial Intelligence, Machine Learning, Computer Vision) are all very critical to the focus on applying AI for impact in market growth and presence of Yoga instructors rather than their technical details.
4	Search	Scopus, Google Scholar, Web of science, Ebaco

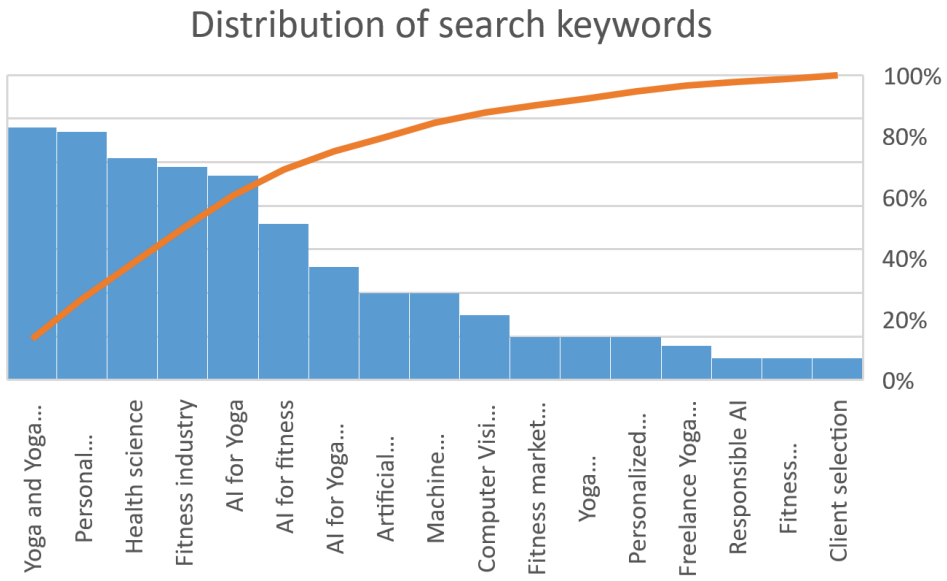
	databases	
5	Systematic approach	1. Defined the research topic and open question that is specific, measurable, achievable, relevant, and time-bound (SMART) 2. Develop search strategy: identified search databases, framed the keywords based on the SMART research question definition, refined inclusion and exclusion words, filtered based on timeline, language and area covered, screen based on titles and abstracts first 3. Extract data: get full-text articles of relevant resources, record the reasons and importance criteria for including and excluding results 4. Analyze the literature: identify patterns and themes in literature identified, assess the strength and inclination to the research topic, categorize the findings and the understanding, orchestrate summaries and recommendations 5. Report the study: document the analysis results in structured, categorized and organized / modular text, visual representations and groups. Identify any bias or gaps and reiterate the above steps to reduce bias and improve relevance

Note: These are the metadata keywords and their values and description.

Distribution of the metadata mentioned in Table 2.2.1t point 2:

Graph 2.2.1g

A graph representing the distribution of search keywords



Note: This chart represents the list of search keywords and their distribution.

Here is the list of full keywords in this chart above in the order they appear:

Yoga and Yoga instruction, Personal instructors, Health science, Fitness industry, AI for Yoga AI for fitness, AI for Yoga instructors, Artificial Intelligence, Machine Learning, Computer Vision for movement tracking, Fitness market, Yoga professionals growth and scale, Personalized Yoga instruction, Freelance Yoga instructor, Responsible AI, Fitness assessments, Client selection.

The chart shows the distribution of search keywords used in research. The X axis lists the keywords, and the Y axis the percentage of importance of each keyword. The orange line shows the cumulative percentage of importance. This means that the first 10 keywords account for about 80% of the research.

2.3 Key Areas, Words and Definitions

Before moving on to the detailed Literature Review, I would like to address some of the key terms and phrases and their high level definitions as they are referenced repeatedly throughout this research.

Table 2.3.1t

A table representing the keyword area, its context of implication and the corresponding citation

Area	Context	Implication Citation
Yoga	“A format of exercise that people do to keep their mind healthy and balanced in addition to keeping their body healthy.”. “A system of healing practice known as mind-body medicine to stimulate the mind-body-soul connection, which promotes both emotional and physical well-being.”.	Sharma, Agarwal & Rajpoot (2022), Sawni, A. and Breuner, C.C., 2017
Computer Vision	A field of AI that allows computers to "see" and interpret images and videos.	Sharma, Agarwal & Rajpoot (2022) and Dittakavi et al.,

		(2022), Shetty et al., (2022
Personalized Instruction	Tailored fitness programs designed to meet the specific needs and goals of each individual client.	Pheng & Husain (2010), Seppala & Nykanen (2011), and Jang et al ., (2015)
Yoga Instructor	A qualified professional who teaches yoga poses, breathing techniques, and mindfulness practices.	Jamatia (2022), April et al., (2020)
Personal Trainer	A fitness professional who designs and facilitates customized exercise (Yoga) programs for their clients.	Na, Choi & Park (2009), Dittakavi et al., (2022), and Agarwal, Sharma & Rajpoot (2022)
Freelance Yoga Instructor	An independent yoga instructor who works for themselves, offering their services to clients directly.	Swan (2011) and Huh et al., (2013
Client Selection Rationale	The factors clients consider when choosing a yoga instructor or personal trainer.	Huh et al., (2013) and Lu et al., (2011

Health Science Education	The study of health-related topics, including exercise physiology, nutrition, and injury prevention.	Mattila et al., (2008), Chronaki & Chiarugi (2005), and Yumak & Pu (2013)
Fitness Industry	The businesses and organizations involved in promoting physical fitness and wellness.	Farseev & Chua (2017), Pheng & Husain (2010), and Ahtinen, Mantyjarvi & Hakkila .(2008)
Market Expansion	The growth and development of a market, in this case, the market for personalized fitness services.	Swan (2011) and Huh et al., (2013)
Professional Reach	The ability of a professional, such as a yoga instructor, to connect with and serve clients effectively.	Lu et al., (2011), Huh et al., (2013), and Vuong, Chan, & Lau (2011)
Data	Information collected and processed for analysis.	Behara et al., (2014), Akbari, Liqiang & Chua (2016), and Farseev & Chua (2017

Context-Aware Applications	Software that adapts its behavior based on the user's current situation, preferences, and context.	Jang et al ., (2015)
Adherence	The consistency with which a client follows their prescribed exercise program.	Platt et al., (2016), Roberts et al (2020), and Mishra (2020)
Self-Efficacy	An individual's belief in their ability to succeed in a particular task.	April et al., (2020)
Mastery Experiences	Successes that build confidence and self-efficacy.	Jang et al ., (2015) and Agarwal, Sharma & Rajpoot (2022)
Social Modeling	Observing others successfully engage in a particular behavior.	Huh et al., (2013), Lu et al., (2011), and Jang et al ., (2015)
Social Persuasion	Encouragement and support from others to engage in a particular behavior.	Jang et al ., (2015), Agarwal, Sharma & Rajpoot (2022), and Dittakavi et al., (2022)

Fitness Assessments	Evaluations used to measure a client's current fitness levels and progress. The fitness activity referenced here is Yoga.	Sharma, Agarwal & Rajpoot (2022), Dittakavi et al., (2022), and Shetty et al., (2022)
Artificial Intelligence (AI)	The simulation of human intelligence processes by computer systems, especially the ability to learn and solve problems.	Even though not explicitly stated, this context is consistent with the concept of AI explored throughout the reviewed literature.
Machine Learning (ML)	A type of AI that allows computers to learn from data without being explicitly programmed.	Even though not explicitly stated, this context is consistent throughout the reviewed literature.

Note: The table represents the keyword areas of search, the contexts and the corresponding references.

Before getting into the details of each of the references, I would like to present a categorization of the intents and contexts covered in the literature reviewed in this research.

2.3 Categorized References and Topics

This categorization prioritizes the intent and context of each reference within the literature review, aiming to demonstrate a strong understanding of the research landscape and its relevance to the study's focus. As listed in the metadata section, the keywords that were taken into account for the search are also correlated with the corresponding literature referenced towards the end of this section.

2.3.1 The Rise of Hyper-Personalized Healthcare and Wellness Technologies

Intent:

Establish the broader context of the research, highlighting the growing emphasis on hyper-personalized healthcare with personal trainers (Personalized Yoga Instructors).

References:

Swan (2011), Behara et al. (2014), Akbari et al. (2016), Farseev & Chua (2017), Yumak & Pu (2013), Losardo et al. (2015), Doyle & Walsh (2015), Kotz et al. (2016), Platt et al. (2016), Teyhen et al. (2018), Mishra (2020), Hardin & Kotz (2021), Chronaki & Chiarugi (2005), Mattila et al. (2008), Na, Choi & Park (2009), Pheng & Husain (2010), Seppala & Nykanen (2011), Vuong et al. (2011), Sorber et al. (2011), Chan, Zhao & Tsui (2017), Kang et al. (2017), Bhavana & Kumar (2017), Bray et al. (2018), Orlov et al. (2021), Huh et al. (2013), Bi et al. (2017), Agarwal, Sharma & Rajpoot (2022), Dittakavi et al. (2022), Shetty et al. (2022)

Areas of focus:

a. The shift from disease treatment to proactive wellness management.

b. The role of data, self-tracking, and sensors in personalized health.

c. The development of mHealth technologies and applications for wellness.
d. Challenges in data security and privacy related to mHealth.
e. Cloud-enabled platforms and frameworks for personalized wellness management.
f. The use of wearable technologies for health monitoring and behavior analysis.
g. The growing acceptance of AI-enabled fitness coaches and wearable devices.

2.3.2 Personalized Yoga Instruction as Complementary and Alternative Medicine

Intent:

Introduce personal training and care in Yoga and meditation as established practices with potential health benefits (Jamatia (2022), April et al. (2020), Grober & Thethi (2003), Wu et al. (2015), Birdee et al. (2009), more in bibliography), particularly in addressing chronic conditions and promoting overall well-being.

Areas of focus:

a. The effectiveness of yoga and meditation for managing chronic conditions, including pain, stress, and sleep disorders.
b. The potential benefits of yoga for improving flexibility, balance, and functional capacity.
c. The use of yoga as a complementary therapy for cancer patients, particularly those experiencing side effects from aromatase inhibitors.
d. The integration of yoga and meditation into healthcare systems and pain management strategies.
e. The growing interest in mind-body medicine and its applications in healthcare.

References:

Jamatia (2022), April et al. (2020), Grober & Thethi (2003), Wu et al. (2015), Birdee et al. (2009), Mak & Faux (2010), Gonçalves et al. (2011), Macfarlane et al. (2012), Galantino et al. (2012, both papers), Menas et al. (2012), Bryce et al. (2012), Jones et al. (2012), Longacre et al. (2012), Young & Kemper (2013), Klatt et al. (2013), Brown (2015), Jang et al. (2015), Peppone et al. (2015), Benning (2016), Niravath (2016), Mehl-Madrona et al. (2016), Satija & Bhatnagar (2017), Richer (2017), Vergeer et al. (2017, both papers), Dowling et al. (2017), Sawni & Breuner (2017), Roberts et al. (2017, both papers), Voigt et al. (2018), Macinko & Upchurch (2019), Singla et al. (2019), Bravo et al. (2019), Taylor et al. (2019), Goldsmith et al. (2020), Tsai et al. (2021), Chen et al. (2021), Manjula & Ananda (2021), Luo et al. (2021), Warren et al. (2022), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Selvamurthy et al. (1998), Brosseau et al. (2004), Meehan et al. (2004), Li et al. (2005), Mouridsen (2006), Ospina et al. (2008), Luskin et al. (1998)

2.3.3 The Potential of AI in Transforming Yoga Instruction and Personal Training

Intent:

Introduce the research focus on exploring how AI can enhance yoga instruction, particularly for freelance instructors, and analyze the potential impact on market expansion (Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), more in bibliography) and professional reach.

Areas of focus:

a. AI-driven pose recognition and feedback for personalized yoga practice.
b. The development of AI-powered yoga trainers for at-home practice.
c. The potential for AI to enhance the efficiency and scalability of yoga instruction.
d. The role of AI in creating more accessible and engaging yoga experiences.
e. The impact of AI on the role of human yoga instructors and the future of yoga training.

References:

Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), Bhavana & Kumar (2017), Mishra (2020), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Jang et al. (2015), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022)

2.3.4 Addressing Ethical and Social Implications of AI in Yoga

Intent:

Highlight the need for further research on the potential ethical and social implications of AI in yoga, particularly focusing on the impact on freelance instructors.

Areas of Focus:

a. The potential for bias in AI-powered yoga tools and the need for equitable access.
b. The impact of AI on the role of human instructors and the potential for job displacement.

c. The importance of considering the psychological and social implications of AI in yoga.
d. The need for user-centered research to understand the acceptance and usability of AI-enabled yoga tools.

References:

Brown (2015), Horn Jr. (2005), Ahtinen et al. (2008), Moniz & Slutzky (2016)

2.3.5 Analyzing the Landscape of Research in Yoga, Meditation, and AI

Intent:

Provide a comprehensive overview of the existing research on yoga, meditation, and AI, highlighting key areas of inquiry and identifying gaps in the literature.

Areas of focus:

a. The breadth and depth of research on yoga, meditation, and their health benefits.
b. The evolution of research on AI in yoga and its applications.
c. The need for further research on the impact of AI on freelance yoga instructors.

References:

Most references, particularly those focusing on the integration of AI in yoga, contribute to this section.

2.3.6 Keyword Correlation and Importance: A Structured Representation

To provide a clear and concise overview of the keyword landscape, we present a structured, visual representation of the keywords discussed in the literature. A detailed version of this can be found in the annex Table 2.3.2t. The following key themes emerge from the literature:

Theme 1: Artificial Intelligence and Machine Learning in Healthcare

Keywords: Artificial Intelligence (AI), Machine Learning, AI for Health

Literature: Swan (2011), Behara et al., (2014), Chronaki & Chiarugi (2005), Vuong, Chan, & Lau (2011), Sorber et al., (2011), Kotz et al., (2016), Zhang (2010), Lu et al., (2011), Bhavana & Kumar (2018), Hardin & Kotz (2021), Roy & Nahid (2022), Mishra (2020)

Theme 2: AI for Personalized Fitness and Yoga

Keywords: AI for Fitness, AI for Yoga, AI for Yoga Instructors, Personal Trainer, Computer Vision for Movement Tracking

Literature: Akbari, Liqiang & Chua (2016), Farseev & Chua (2017), Jamatia (2022), April et al., (2020), Mattila et al., (2008), Na, Choi & Park (2009), Pheng & Husain (2010), Seppala & Nykanen (2011), Yumak & Pu (2013), Losardo et al., (2015), Doyle & Walsh (2015), Platt et al., (2016), Teyhen, Robbins & Ryan (2018), Coates et al., (2019), Kettunen, Kari & Critchley (2019), Lau & Soh (2020), Ahtinen, Mantyjarvi & Hakkila (2008), Huh et al., (2013), Farseev & Chua (2017), Bi et al., (2017), Chan, Zhao & Tsui (2017), Kang et al., (2017), Bray et al., (2018), Orlov, Strizhakova & Fetisov (2021), Seo et al., (2014), Jang et al., (2015), Peppone et al., (2015), Benning (2016), Niravath (2016), Mehl-Madrona, Mainguy & Plummer (2016), Moniz & Slutzky (2016), Satija & Bhatnagar (2017), Richer (2017), Vergeer et al (2017), Roberts et al (2017), Voigt, Cho & Schnall (2018), Vergeer et al., (2018), Singla et al., (2019), Bravo et al.,(2019), Taylor et al., (2019), Goldsmith et al.,(2020), Roberts et al (2020), Tsai et al., (2021), Chen et al., (2021), Manjula & Ananda (2021), Luo,Wang & Song (2021), Warren et al.,(2022),

Pardeshi et al., (2022), Sharma , Agarwal & Rajpoot (2022), Vishnu et al., (2022), Agarwal, Sharma & Rajpoot (2022), Dittakavi et al., (2022), Shetty et al., (2022).

Theme 3: Yoga and its Impact on Health and Fitness

Keywords: Yoga, Personal Instructor in Yoga, Freelance Yoga Instructor, Health Science, Fitness Industry, Fitness Market Growth, Yoga Professionals Growth and Scale

Literature: Jamatia (2022), April et al., (2020), Grober & Thethi (2003), Horn (2005), Luskin et al., (1998), Selvamurthy et al., (1998), Brosseau et al., (2004), Meehan, Eisenhut & Stephens (2004), Li et al., (2005), Mouridsen (2006), Kruger and Malaka (2006), Ospina et al., (2008), Birdee et al., (2009), Mak & Faux (2010), Gonçalves et al., (2011), Macfarlane et al., (2012), Galantino et al., (2012), Menas et al., (2012), Bryce, Bauer & Hadji (2012), Jones et al., (2012), Longacre et al., (2012), Galantino et al., (2012), Young & Kemper (2013), Klatt et al., (2013), Brown (2015), Wu et al., (2015), Jang et al ., (2015), Peppone et al., (2015), Benning (2016), Niravath (2016), Mehl-Madrona, Mainguy & Plummer (2016), Moniz & Slutzky (2016), Satija & Bhatnagar (2017), Richer (2017), Vergeer et al (2017), Dowling, McDonagh & Meade (2017), Sawni & Breuner (2017), Roberts et al (2017), Voigt, Cho & Schnall (2018), Vergeer et al., (2018), Macinko & Upchurch (2019), Singla et al., (2019), Bravo et al.,(2019), Taylor et al., (2019), Goldsmith et al.,(2020), Roberts et al (2020), Tsai et al., (2021), Chen et al., (2021), Manjula & Ananda (2021), Luo,Wang & Song (2021), Warren et al.,(2022), Pardeshi et al., (2022), Sharma , Agarwal & Rajpoot (2022), Vishnu et al., (2022), Agarwal, Sharma & Rajpoot (2022), Dittakavi et al., (2022), Shetty et al., (2022), Duffy et al., (2021)

The next section covers the intents and contexts of the related literature in detail.

2.4 Detailed Review

The integration of AI technologies in yoga, an ancient practice rooted in holistic well-being, is prompting a paradigm shift in how individuals approach their personal health journeys. This literature review explores the expanding market for AI in yoga personal training, detailing its potential to enhance professional reach and address the unique needs of independent instructors.

Swan (2011)

The present era of greater data, better tools, and community computing powered by collective intelligence is driving progress in numerous fields, including artificial intelligence, knowledge creation, and public health. Data quantities in the healthcare industry are increasing as a result of data streams such self-tracking, microbiomic, phenotypic, and genomic data. In addition, a variety of technologies are emerging, such as personal health tracking devices, mobile health applications, and personal electronic medical records, to enable people and groups to actively interpret these data. “Through health social networks and crowdsourced health research investigations, new forms of health community computing are being developed to facilitate both individual activity and large-scale group cooperation”. Participatory health initiatives promise significant advantages in terms of scope and speed. Studies may be conducted with cohorts of thousands rather than just a few hundred, and conclusions from recently published studies may be applied very instantly. As of January 2012, multiple crowdsourced health research studies on vitamin insufficiency, aging, mental performance, and epistemology were open for enrollment, according to DIYgenomics, one operator of interventional crowdsourced health research projects. “Personal health dashboards, ongoing personal health information climates, personal

virtual coaches (like Siri 2.0), and an effective health frontier of dynamic, personalized health recommendations and action-taking" could all be part of the more distant future of intelligent health community computing.

Behara et al., (2014)

Personal wellbeing is receiving much more attention as a healthcare preventive measure. In the United States, chronic illnesses account for seven out of ten fatalities, making them the leading cause of mortality. The expenditures of treating chronic illnesses are relatively significant as well. Therefore, it's important to support improved management of chronic diseases as well as greater personal wellness maintenance. Clinical decision support systems built on predictive analytics must be created to assist patients and healthcare professionals in managing chronic or wellness-related illnesses. Two separate classifiers are being studied to predict both the development of a chronic illness and overall well being (diabetes). "The models' overall accuracy, root mean squared error, and area under the ROC all underwent evaluation". The models are created using "national CDC-NHANES data" that is based on "the health and nutritional status of people in the United States".

Akbari, Liqiang & Chua (2016)

Due to the domain-specific nature of personal wellness events, which is characterized by a great deal of "noise and diversity in data, inadequate samples, and inter-relationship between events", existing algorithms for event extraction are not suitable to these events. It is suggested that an optimal learning framework that makes use of "the content information of microblogging messages as well as the relationships between event categories is used to address these issues". One may also address issues brought on by noise and variety in microblogging messages by

placing a sparse restriction on the learning model. The framework's higher performance has been shown through experimental findings on a real-world Twitter dataset.The most widely used method for consumers to communicate what is happening around is social media. Social media's popularity and widespread use have produced a sizable archive of user postings, which may be used as a stethoscope to assess a person's lifestyle and general wellbeing. Users' social media profiles inherently reflect their behaviors, interests, and moods; therefore, it is possible to track and comprehend their wellbeing by gathering social media data in order to lead a healthy lifestyle. It is suggested to “automatically extract wellness occurrences from users' published social media as a first step toward achieving this aim”.

Farseev & Chua (2017)

“Fitness and self-help products and services” frequently use the term "wellness" in their marketing. Numerous applications in the “personal and public” well being domains depend critically on the inference of personal wellness-related properties, such as “body mass index or illness propensity”, as well as comprehension of “global dependencies between wellness attributes and users' behavior”. “Meanwhile, the development of social media platforms and wearable sensors” has made it possible to profile a user's wellbeing from a variety of angles. However, there hasn't been a lot of research on the “integration of social media and sensor data” with wellness profiles, and “this study is one of the first steps in that direction”. In particular, the "TweetFit" multi-source individual user profile learning architecture is suggested to “infer personal wellness traits”. Inferring wellness qualities from sensor and social media data at the same time, "TweetFit" can manage missing data. The outcomes of the experiment demonstrate that the performance of wellness profiling may be significantly improved by combining data from sensors and other social media sources.

Jamatia (2022)

Yoga and meditation are now generally recognised as non-pharmacologic methods for improving overall health and reducing stress and anxiety. For students who have completed their 12th grade, “the School of Health Sciences at Indira Gandhi National Open University (IGNOU)” introduced the “six-month Certificate Programme in Yoga (CPY) in July 2019”. This study's goal was to determine how online yoga training affected how students participating in “the CPY programme during the academic year 2021” perceived their own levels of stress. Between March and December 2021, this study—which included pre- and post-tests—was conducted on the CPY program's pupils. There were 69 and 81 students respectively each from the classes of January 2021 and July 2021 combined to participate. A tool called “The Perceived Stress Scale (PSS)”, was employed to gauge the stress level. To measure one's own perception of stress, Google Forms supplied a well-structured, short questionnaire. For students from the January 2021 batch, the overall mean PSS score declined from “18 + 5.9 SD in the pretest to 13.7 + 6.5 SD in the post-test”; “for students from the July 2021 batch”, it decreased from “17.4 + 5.8 SD in the pre-test to 13.1 + 5.6 SD in the post-test”. After completing online yoga training, both batches of students' pre- and post-test mean values differed significantly (p value 0.0001). The Certificate Program in Yoga students' subjective stress levels were successfully reduced by the online yoga instruction (CPY). Commonwealth of Learning, 2022.

April et al., (2020)

The most typical kind of arthritis in children is juvenile idiopathic arthritis (JIA). JIA recommendations for physical activity (PA) state that organized PA programmes have a positive impact on health outcomes. Despite being popular among young people, several PA activities, like yoga and aerobic dancing, have not been researched in this demographic. Online PA

programmes could provide patients easily accessible and reasonably priced therapies. The proposed pilot “randomized controlled trial (RCT)” has two main objectives: (1) to determine the viability of carrying out “a full-scale RCT” to assess the efficacy of “two common types of PA—a yoga training programme and an aerobic dance training program—in female adolescents (aged 13 to 18) with JIA” in comparison to “a control group receiving an electronic pamphlet”; and (2) to “determine the acceptability of these interventions”. Methods: “A parallel group design, three-arm prospective randomized open-label trial will be employed”. “25 female teenagers with JIA who are also in pain will be randomly assigned in a ratio of 2:1:1 to one of three groups”: (1) “an online yoga training programme” (“group A: n=10”); (2) “an online aerobic dance training programme” (“group B: n=10”); or (3) “an electronic booklet control group” (“group C: n=5”). “For a 12-week period, participants in groups A and B will engage in three separate, one-hour sessions each week utilizing online workout videos as well as one weekly virtual group session using a videoconferencing platform”. All participants will gain access to the Arthritis Society's downloadable instructional brochure on PA for arthritis. Additionally, each participant will participate in “weekly online meetings with a study coordinator and Facebook conversations with others in their own group”. At the conclusion of the programme, Facebook and the videoconferencing platform will be evaluated for feasibility, acceptability, and usefulness (i.e., “recruitment rate, self-reported adherence to the interventions, dropout rates, and percentage of missing data”). Self-administered electronic surveys will be used to gauge “pain severity, general PA participation, morning stiffness, functional status, exhaustion, self-efficacy, patient global evaluation, disease activity, and adverse events” at baseline and then every week until the 12-week programme is through.

Chronaki & Chiarugi (2005)

The promise of universal access to high-quality healthcare, a decrease in medical mistakes, and cost control through ICT advancements has reignited “interest in electronic health record (EHR) standards and led to extensive EHR adoption projects in several European countries”. “Health cards, especially the European Health Insurance Card”, offer “the chance for immediate cross-border access to emergency health information such as prescription interactions, allergies, and even a reference ECG”. Meanwhile, advancements in wearable medical sensors and miniature medical gadgets promise to make continuous health monitoring convenient, adaptable, and stylish. These changes demand that “medical devices and intelligent wearables be seamlessly integrated into an operational EHR, utilizing the wealth of information available to advance medical knowledge and create individual wellness profiles”. Interoperability has a significant influence on consumer trust in “a mobile connected world with empowered health consumers and dissolving boundaries between health and healthcare”. The traditional standardization process is now being expanded by contemporary interoperability projects to include implementation, validation, and conformance testing.

Mattila et al., (2008)

Health issues linked to lifestyle are spreading quickly. Many of these might be avoided or treated by getting adequate exercise, rest, and a healthy diet. The primary responsibility for “managing one's own health and welfare in daily life rests with the individual citizen”. Modern technologically based motivational aids can help people with this job. A concept for managing personal wellbeing called Vivago Personal Wellness Manager (PWM) relies on “continuous activity monitoring using a wrist-worn gadget and fast feedback on daily activities, such as sleep

and physical exercise". The idea enables "long-term activity pattern tracking" and comes with PC software for in-depth long-term data analysis.

Mattila et al., (2008)

The "majority of health risks and diseases in the modern world" are caused by lifestyle factors, such as being overweight, eating poorly, being inactive, not getting enough sleep, and stress. The key to preventing and managing these risks is behavioral change toward healthy lifestyles, but there are few early and effective treatments available. The "Nuadu Concept proposes a wellness toolbox with ICT (Information and Communication Technologies) support for the management of diverse, behavior-based health concerns". The idea is founded on "psychological models, which offer strategies and inspiration for altering behavior". The "person is regarded as the foremost authority on his or her own health". The "Nuadu Concept therefore offers a range of personal health technologies and services, from which the user may freely select the most appropriate resources for themselves". This strategy has the "potential to offer a large number of individuals" effective, palatable, accessible, and cheap wellness management help.

Na, Choi & Park (2009)

The fitness robot serves as a personal health trainer, supervising and directing individual activity with its understanding of health issues and communication skills. It is anticipated that the interactive and comforting qualities of the robot would encourage and boost the effectiveness of individual fitness routines in a u-health setting.

Pheng & Husain (2010)

The idea of health in today's society has changed from the "treatment of diseases" to the "prevention of health" issues as a result of growing knowledge of personal wellbeing. Actually, this has to do with the "health" approach to complementary and alternative medicine. "Wellness

is an active process by which people become aware of, and make decisions toward, a more prosperous living, according to the National Wellness Institute Inc. in the United States of America (USA)". The therapist, masseuse, "psychiatrist, and wellness specialist" are among the "professionals in wellness consulting" in a normal wellness approach. They are certified professionals that can assess a person's overall wellbeing and choose the best wellness therapy for them. For consumers and wellness professionals with busy daily schedules, the usual consultation technique is time-consuming and cumbersome. In order to assess users' wellbeing conditions and offer the best wellness therapies for them, "an intelligent wellness recommendation system is required". Implementing a "knowledge-based strategy" that permits speedy and accurate decision making is one way to address the problem of conventional consultation. The "recommendation tasks for individualized wellness therapy advice and monitoring are addressed using a hybrid case-based architecture".

Seppala & Nykanen (2011)

The healthcare paradigm is shifting toward proactive services and preventative treatment with a comprehensive and individualized perspective on health and wellness. This all-encompassing strategy for health and well-being has been labeled as wellness. To manage and maintain personal wellness, many wellness tools have previously been established, and there are also some wellness applications accessible. The variety of wellness systems will rapidly expand as a result of technological advancements like ubiquitous computing. Semantic interoperability is required to fully realise the benefits of the new healthcare paradigm and wellness systems. A personal wellness ontology is therefore required in order to facilitate information exchange across all players in the wellness ecosystem.

Vuong, Chan, & Lau (2011)

Some physically healthy but mentally challenged people could have trouble using public transit or a propensity for wandering. Intelligent assistive devices would significantly improve “the freedom and safety of the individual” and “ease the burden on family members and carers by learning the individual's travel behavior” and “alerting anomalous situations, such as when the person deviates from predicted destinations”.

Sorber et al., (2011)

Mobile technology offers a great deal of promise to transform healthcare delivery and individual wellness. Caretakers and patients themselves can benefit from using “mobile phones, wearable sensors, and home-based telemedicine technologies” to better monitor and manage their health. Better health, more efficient healthcare, and lower costs are some of the potential advantages of this "mHealth" technology, but it also presents serious security and privacy problems.

Yumak & Pu (2013)

In the upcoming years, it is anticipated that healthcare costs would rise significantly. Better technological self-monitoring and autonomous aging tools are needed, as well as a stronger focus on wellness, which is defined as leading a balanced, disease-free lifestyle at all stages of life, in order to reduce these expenses to a minimum. Wellness has so far been impossible to assess objectively, in contrast to traditional medical science, which examines patients in labs. Due to the availability of body-worn sensors, cellphones, and other body-worn gadgets that can track and infer users' actions, the situation is changing. The pace of technological development in this field is accelerating. The variety of techniques and health-related fields where sensors have been utilised for monitoring are expanding. This has given rise to a rare chance to comprehend wellbeing within an integrated and balanced framework. This study aims to highlight the most

recent advancements in sensor technology and to provide “the state-of-the-art in personal wellness management systems” in order to throw light on the direction in which this discipline is headed and the potential areas for future research.

Losardo et al., (2015)

Recent years have seen a fast expansion of sophisticated personal tracking technology. These items are mostly home medical sensors that can track the most critical physiological variables. The ability to “detect information directly connected to the user's health” is provided by these smart gadgets. Despite these instruments' usefulness, such methods do not enable the identification of a person's overall state of wellbeing. According to this viewpoint, user behavior analysis can provide more information. Changes in behavior, particularly in the case of senior users, may be signs of unease or a deterioration in health. At the University of Parma's Information Engineering Department, behavioral analytic tools and methodologies have been created to facilitate the monitoring of wellness conditions (ITALY).

Doyle & Walsh (2015)

The number of older persons has been rising in all nations at an unprecedented rate. The elements that may assist the maintenance of independent living and “quality of life in older individuals” have drawn more attention as a result. Innovative technology “plays a significant role” in supporting the monitoring, early identification, and treatment of health and wellness in the home. Few health diagnostic and treatment strategies have focused on enhancing self-management of wellbeing utilizing cutting-edge in-home ICT (information communication technology) based intervention systems. The majority of health diagnostic and treatment strategies are concentrated in clinical settings. It is possible to “predict changes in wellbeing and

to give feedback and interventions to promote personal wellness management using combinations of ambient sensor data gathering, telehealth, and ICT".

Kotz et al., (2016)

Mobile health technology offers enormous potential to raise healthcare standards, widen service access, lower costs, and enhance individual and societal wellness. However, there are substantial privacy and security issues with mHealth as well.

Platt et al., (2016)

In order to assist people maintain better health while reducing rising healthcare costs, mHealth technologies are a viable resource. Since many people struggle to achieve their particular wellness objectives, mHealth apps that are designed to boost compliance may be a crucial part of enabling people to take charge of their health.

Teyhen, Robbins & Ryan (2018)

There needs to be a focus on "how people, communities, and the system need to adapt to promote and sustain health rather than treat illness and disability reactively in the midst of the national discussion on the future of healthcare". It is necessary to shift from a patient-focused to a person-focused viewpoint in order to "transform a health care system" into a "System for Health". A system that focuses on enhancing individual choices on exercise, diet, sleep, and quitting smoking could have a significant impact on "one's health and well-being". "Delivering health, as opposed to just providing health care, implies more than just avoiding illness and disability"; it necessitates putting an emphasis on enhancing individual wellbeing, resiliency, and endurance. We can reduce expenses and enhance health outcomes by encouraging each individual to adopt a better lifestyle through education, rewards, and technology.

Coates et al., (2019)

The market for wearable neurotechnology lures customers in by promising mental benefits and overall wellbeing. For educated decision-making and public trust, as well as to support claims of utility, safety, and efficacy, scientific evidence is crucial.

Kettunen, Kari & Critchley (2019)

“University-aged students have been discovered to have a significant risk of quitting physical activity, thus it's crucial to promote exercise to this target population”. “Since modern students are accustomed to various forms of digital technology, it is important to incorporate personal wellness gadgets in campaigns to encourage physical activity”.

Lau & Soh (2020)

Recently, there has been a lot of interest in the use of conductive fabrics (CF) in the creation of wearables for joint sensing in a variety of applications, including “robotics, rehabilitation, personal wellness, sports, and entertainment”. A new wearable gadget prototype for measuring joint extension includes an implanted CF strain-voltage sensor as part of an inverted slider-crank mechanism. In contrast to an existing approach, this offers the advantage of not requiring anthropometric data from the user to “match the joint parameters to the fabric strain readings”. It describes an available CF's electromechanical characteristics. In order to create an inverted slider-crank linkage, “the CF is designed and introduced as an RPR chain”, which is how the geometric synthesis technique for the joint sensing device is formulated.

Mishra (2020)

“The potential benefits of mobile health technology include better healthcare, wider service access, lower costs, and better individual and societal wellness”. “One of the most promising applications for mobile computing technologies is online m-health monitoring and management”. The demand of today's hospitals is for “online health monitoring and control employing medical sensors, environmental sensors, clouds, Internet of Things (IoT), and fuzzy logic-based methods” to create unbreakable and infinite connection between medical experts and patients. The medical and healthcare industries have both widely used “Wireless Medical Sensor Networks and Radio Frequency Identification”. Mobile health monitoring solutions do, however, provide substantial privacy and security risks. The results of early experiments point to a significant potential for deploying wireless sensor networks (WSNs), which can effectively use inexpensive environmental and medical sensors to monitor patient health and diagnose patients online. “Combining ubiquitous computing with m-health systems and using wireless medical sensors & smartphones to continuously monitor the wellbeing of chronic patients is very wanted”. In this case, patient monitoring may be done with their consent or the consent of the patient's family. “Using wearable or non-wearable sensors”, the patients can be observed and their actions can be followed. Modern WSN technology improvements have contributed to the “development of Wireless Body Area Networks (WBAN)”, “a new level of patient-friendly online health monitoring, guidance, and control systems”. WBAN is being integrated with m-health systems. Because a “patient's physiological data from medical sensors” are exceedingly sensitive, Therefore, protecting patient data from unauthorized access is a very serious responsibility. Therefore, security is a crucial area of research for m-health applications, particularly in patients with distressing conditions. With the aid of extensive radio frequency

services and global mobile communication systems, “healthcare services have been further expanded to become mobile healthcare services”.

Hardin & Kotz (2021)

Apps and gadgets for mobile health (mHealth), which allow for continuous monitoring of many elements of a person's health as they go about their daily lives, are becoming more and more common in the fields of clinical treatment, personal wellness, and health research. “Combining the data generated by these mHealth devices could improve patient care, lower operational costs, and provide healthcare providers with a more comprehensive understanding of a patient's health”. However, because “mHealth devices are implemented with various technologies and maintained by many organizations, it is challenging to create a trusted and secure data exchange environment for these devices”. “Amanuensis, a design for a secure, integrated healthcare data system that makes use of Blockchain and Trusted Execution Environment (TEE) technologies to achieve information provenance for mHealth data, was offered as a solution to these problems”. It is no longer necessary to rely on a single party to gate-keep “the health data by using a blockchain to record and enforce data-access regulations”. Instead, the consortium of participating firms takes on “the task of ensuring data integrity and implementing access rules for information kept in private data silos”. To protect “data confidentiality and to produce a verifiable attestation report that may be maintained on the blockchain for the purpose of information provenance, data accesses and computations are performed inside TEEs”. Amanuensis' prototype implementation has been assessed, and it can accommodate “up to 14,256,000 mHealth data sources at $0.07 per data source per day using Intel SGX trusted execution hardware and the VeChain Thor blockchain platform”.

Grober & Thethi (2003)

Only 40% of people with osteoarthritis (OA) who use complementary therapies including magnets, acupuncture, yoga, t'ai chi, special diets, and nutritional and herbal supplements let their doctors know. At least symptomatic alleviation can be obtained from glucosamine and chondroitin sulphate; additionally, glucosamine (1500 mg/d) may grow or stabilize cartilage in osteoarthritic knees. “Patients should be informed about the potential toxicity of numerous herbal medicines, the dangers of negative drug interactions, and any potential toxins or impurities”. Yoga poses may help with knee OA, while t'ai chi may lessen joint pain and swelling while improving mobility. Applying pulsed electromagnetic fields has been proven to alleviate pain and enhance function in those with persistent knee OA, according to small trials. In modest studies, acupuncture has also been demonstrated to reduce OA pain. Recently, autologous chondrocyte transplantation was authorized as a treatment for OA of the knee. Different forms of gene therapy are now being assessed for their effectiveness and safety.

Horn (2005)

What type of society do we want to become as we usher in the new millennium is a crucial topic that has to be raised. This question assumes that society will change and that the current state of affairs won't be sustained. The term "desire" in this question suggests that we might be able to plan our society's future or, at the very least, utilize design principles to influence how society develops. Obviously, the most crucial question is: What can we do to create the society we desire? “As long as we develop an evolutionary vision for the future and the will and the skills to realize it in our own lives, in our families, in the systems in which we live, in our communities

and societies, and in the global system of humanity, we are not at the mercy of evolutionary forces". Instead, "we have the potential and the opportunity to direct societal evolution by design. p. 313, Banathy, 1996 Both of these issues are addressed by Banathy's proposal for conscious evolution". Because "we have yet to build a unity of consciousness," Banathy (1996) believes that our current society is experiencing "a crisis of awareness" (pp. 315- 316). According to Banathy, "we caused this problem, and we are accountable for responding to it" (p. 316). Promoting the evolution of "evolutionary learning" as opposed to "maintenance learning" is one of the possible actions (Botnik & Maltiza, 1979). In order to deal with known events and repeated situations, maintenance learning "involves the acquisition of fixed outlooks, techniques, and norms" (Banathy, 1996, p. 318). However, "evolutionary learning" helps us foresee and deal with unforeseen circumstances. It will aid in our transition from unconsciously adjusting to our environment to consciously innovating, coevolving, and co-creating with it as well as the growth of our capacity to manage and drive change (Banathy, 1996, p. 318). Banathy (1996) describes evolution as a multidimensional unfolding that needs to be planned for and implemented in all of our human systems (p. 324). His evolutionary guidance system, which would allow this to unfold, consists of dimensions for social and economic justice, social and ecological ethics, physical, mental, emotional, and spiritual wellness, a scientific and technological dimension that promotes human and social advancement, aesthetics in relation to beauty, as well as cultural and spiritual values, and a political dimension for self-determination, genuine participation in self-government, and peace development (Banathy, 1996, pp. 324-325). Barbara Marx Hubbard is another proponent of conscious evolution in addition to Banathy. According to Hubbard (1998), conscious evolution is "an evolving conception of the nature of reality that might direct us towards the next stage of human evolution through the ethical and imaginative use of our

power" (p. 2) Since "we entered a phase of confusion-a loss of vision and direction," Hubbard believes that the creation of a conscious evolution is essential (p. 9). She states that "Throughout the previous 30 years, despite numerous warnings that the status quo, particularly in the developed world, was no longer viable, our fundamental social and economic structures have attempted to retain the status quo. Numerous times, our current systems are inhumane; hundreds of millions of people die from hunger, disease, and poverty, while the environment continues to deteriorate " (p. 11). Hubbard (1998) asserts that the answer entails a transition from the human potential movement—exemplified by the humanistic works of Abraham H. Maslow, Victor Frankl, Robert Assogioli, and others—to a "social potential movement that builds on the human potential movement" (p. 17). This action "identifies social creativity peaks and promotes social wellness in a similar manner as how the human potential movement fosters personal wellness. It looks for social breakthroughs and creates social systems that contribute to a society that improves quality of life for all people " (p. 17). Many concepts serve as the foundation for Hubbard's vision, including syntony, which is a "spiritual resonance with the rhythms of creation" (p. 71).

She believes that the metamorphosis of our memes—"ideas woven into sophisticated thinking systems that organize human activities according to a precise pattern"—will enable conscious development (p. 77). The social potential movement, which seeks to transform these memes, "designs new social systems that lead towards a regenerative and life-improving global society while seeking out innovations currently working in health, environment, communication, education, government, economics, and other fields of human endeavor" (pp. 97-98). Humanity can evolve into co-creators in this fashion, with the "most essential step on the path of the

co-creator being a new spirituality in which we alter our relationship with the creative process from creature to co-creator-from unconscious to conscious progression".

“We learn to assume responsibility for our part in the construction of our own evolution through resonance with the metapattern that unites us all” (p. 99). The evolutionary views of Banathy and Hubbard are shared because they are fundamentally about having alternative ways of thinking and experiencing. It concerns “language and the politics of communication as well as the creation of a new knowledge base that incorporates both new knowledge and old knowledge perceived in a new, more critical context”. New ways of thinking, feeling, knowing, and speaking result in new attitudes and behaviors. We in the United States must once more decide how we will see this issue in the context of education as we consider a country that most people still believe to be in danger. “What techniques will we use to analyze the situation and evaluate the suggested course of action?”. “What sort of conversation can assist us comprehend the importance of our efforts?”. “The purpose of this chapter is to make a specific recommendation” for discourse that might both lead our significant activity and operate as a lens through which we might perceive things differently. Post-formal discourse, it will be argued, can aid in the advancement of theories like Banathy's and act as a reaction against the “established dominant culture that obstructs the creation of an evolutionary consciousness”. “The explanation of the post-formal discussion that follows will be set in the perspective of S. J. Goerner's (1999) ideas on the developing science and culture of integral society as well as Banathy and Hubbard's theories of conscious evolution”. “These situations will not only place post-formal conversation in relation to the discussions that must take place and the actions that must be taken, but they will also provide us a chance to demonstrate post-formal conversation's characteristics”. “Goerner (1999) examines the burgeoning science and culture of integrated society in her book After the

Clockwork Universe". She makes a thorough case against the contemporary era's clockwork science and culture and contends that a web-based society is beginning to take its place. It is necessary to understand that all systems are complicated as well as chaotic and complex "in order to fully comprehend her use of the metaphor of a web". The order that results from interweaving is what is meant by complexity "(Goerner, 1999, p. 135)". According to "Goerner (1999)", the gaps between system components (i.e., "the gaps between individuals in a system of human activity") are actually filled with intricacy-the patterns, structure, and order produced by interdependence (p. 136). Her stance supports the assertion that "The majority of conventional techniques are inadequate for complexity. If someone tries to simplify complexity, they will overlook the organization's organization. If someone uses statistics, they may momentarily observe order but have no concept what generated it or how it functions " (Goerner, 1999, p. 137) The notion that human systems are self-organizing and that it is necessary to have the power to influence these processes in order to comprehend and support a system's evolution is also a key component of her theory. So how can we decipher the complex organization, processes, and patterns of a human system in order to steer it in a different direction? This is an important question for anyone who wants to help their society, neighborhood, community, or family reach its full potential. This topic can also be rephrased more traditionally as: "How can we effect and sustain change that is not simply just and loving, but change that fosters the formation of a web of relationships that are defined by an evolutionary consciousness?" Post-formal conversation will be put forth as a change-oriented philosophy, a way to uncover the underlying structures and patterns of human organizations, and a continuous evaluation of the self-organizing process. "The first step will be to locate post-formal inquiry in relation to other post positivist paradigms including postmodernism, poststructuralism, and critical theory". "An

explanation of post-formal discussion will then be given, including what it is, when and where it should be used, as well as how to participate in it". It will be argued that post-formal dialogue is a "complex process that can help us comprehend a web world that has hidden patterns and processes that are crucial to comprehending self-organizing human systems". "The role of post-formal dialogue in the conscious evolution of human thinking, feeling, knowledge, and language will be further discussed. Springer Science + Business Media, Inc".

Ahtinen, Mantyjarvi & Hakkila .(2008)

We describe a "user study of the heart rate monitors (HRM)", a popular "personal wellness gadget", in this article. Over the years, HRMs have been used to modify the intensity of exercise and, in more sophisticated versions, to track users' fitness improvement. Over 860 current or past HRM users participated in a survey and user interviews as part of the user study. Based on their present usage patterns and how they perceive their motivation to use HRMs to progress through time, four different categories of HRM users have been identified. Their opinions of the benefits and drawbacks of HRMs have also been contrasted. The results offer important data for "comprehending end-user requirements and background knowledge for advancing personal wellness technology and apps".

Zhang (2010)

"Assistive technology (AT)" is defined as "any product or service designed to facilitate independence for impaired or elderly people" in a definition that was developed in 2001. "ZigBee will play a significant role in the adoption of assistive technology by enabling wireless low-power communication between devices and services that promote safe, healthy, and

independent living conditions for the disabled or elderly". This definition was adopted by the authors of the European Union (EU). This paper's focus is solely on ZigBee applications for tracking illnesses, maintaining personal wellbeing, and tracking physical activity. It also includes commissioning information "based on three different deployment scenarios, including service provider, in-home, and consumer situations".

Lu et al., (2011)

In the majority of countries in the world, the expense of healthcare represents a sizable portion of GDP. The goal of this study is to create a cloud-enabled framework that makes it easier to collect personal wellness data (PWD) and manage it continuously through social interaction. First, suggest a lifestyle sensing technology that uses a network of interconnected sensors to "sense" both people and their surroundings. The used sensing technology may then "feel" the connection between individuals so that we can use the connection status as a crucial cue to deliver prompt and "attentive services to engage interactions through the power of social networks". "More specifically, the framework aims to support proactive daily wellness management and wellness management through social interactions".

Huh et al., (2013)

Our goal was to comprehend how various stakeholders, specifically those involved in the personal wellness of older persons, perceived the usage of self-monitoring instruments. The development of personal health records and the use of self-monitoring devices for tracking one's own health present intriguing potential for patient support. Although methods used by physicians to monitor older persons have been investigated, little is known about how these patients might

“self-monitor their wellness and health and how their healthcare professionals might view such use”. We held four focus groups with senior citizens living in the community (n=31) and “three focus groups” with healthcare professionals (n=10). The unfamiliarity of self-monitoring to older adult participants led to a focus on a smaller range of “wellness self-monitoring instruments”. “On the other hand, the health care professional participants were open-minded about the use cases for older individuals' wellness monitoring systems and brainstormed them”. “In terms of perceived uses, stakeholder interests, information ownership and control, and sharing of wellness monitoring technologies, the two participant groups displayed divergent perceptions”. Our study offers “implications and recommendations” for how “wellness self-monitoring” technologies for older persons can improve communication “between patients and healthcare professionals, patient education, and wellness in general”.

Farseev & Chua (2017)

“Fitness and self-help products and services” frequently use the term "wellness" in their marketing. “Applications in the personal and public wellness domains require the inference of personal wellness-related qualities, such as body mass index (BMI) category or illness predisposition, as well as an understanding of global relationships between wellness attributes and users' behavior”. “The rise of social media platforms and wearable sensors has also made it possible to undertake wellness profiling for users from a variety of angles”. However, there is a dearth of research on “wellness profiling and the integration of sensor and social media data”. One of the first initiatives in this area was this study. Our suggested “multisource multitask wellness profile learning system, WellMTL, which can handle data incompleteness and execute wellness characteristics inference from sensor and social media data simultaneously, is specifically used to infer personal wellness attributes”. “We also look at correlations between

first-order data representations and personal wellness characteristics to acquire global insights into the data". Our test findings demonstrate how far better individual wellness profiling may perform when sensor data and data from various social media sources are combined.

Bi et al., (2017)

"In order to provide diets and interventions" that can assist people in achieving and maintaining a healthy weight, recovering from eating disorders, or managing their food and nutrition for personal wellness, researchers work to understand eating behavior. Understanding the when, where, what, and how of eating behavior is a significant difficulty for eating-behavior research. In this study, we assess sensors and eating activity detection algorithms, specifically when people eat. We contrast two well-liked techniques for identifying food (based on auditory and electromyography (EMG) sensors) separately and in tandem. Using two commercially available sensors, we constructed a data-acquisition system and recruited 20 volunteers for our study. According to our first findings, the system we developed can accurately detect eating with a sensitivity of more than 90.9% regardless of how crunchy the food is. In order to detect eating in real-time, we are designing a wearable system that can gather, analyze, and categorize sensor data.

Chan, Zhao & Tsui (2017)

Individual health monitoring tools and procedures have been developed as a result of the quick advancements in information and sensor technologies. "By monitoring the physiological changes in the target population, which includes the elderly and patients with chronic conditions, these strategies enhance older health management". "To illustrate the application of electronic

wearable wellness devices and a station-based, all-in-one health monitoring device at the community level in Hong Kong, two pilot studies were carried out". Key vital sign changes occurring in real time and on a regular basis in "older individuals recruited from nursing homes and geriatric daycare facilities were gathered". The "management of healthcare services may profit from the preliminary analysis of the data obtained, which revealed insights into the peculiarities of the elderly's vital signs from two centers". By combining historical daily vital signs, a tailored "wellness forecasting system" was also developed to pinpoint the elements affecting an aged person's particular wellness.

Kang et al., (2017)

We introduce a "semi-automatic wellness management software platform called WellnessHumanCare". It has the capabilities of "complex wellness data acquisition (mental, physical, and environmental ones) with smart wearable devices, complex wellness condition analysis, private-aware online/offline recommendation, real-time monitoring apps (Smartphone-based, Web-based), and more". We have also demonstrated a wellness management service with 79 participants.

Bhavana & Kumar (2018)

"Any product or service designed to increase independence for those who are disabled or older is considered assistive technology". "By providing wireless low-power communication between the tools and services that support the safe, healthy, and independent living circumstances for the elderly or those with disabilities, ZigBee will play a crucial role in the adoption of assistive technology (AT)". The focus of this paper is on using zigbee technology to monitor personal

wellness, fitness, and chronic diseases. It also shows the relevant points of interest in relation to various scenarios, such as: “episodic monitoring scenario, sensor activity scenario, and observing and tracing aptness level scenario”.

Bray et al., (2018)

To calculate the impact on worker performance of a “workplace initiative to prevent work-family conflict”. a multi-site controlled experiment involving group randomization and long-term monitoring. a business that provides information technology. Employees were “randomly assigned to the intervention condition (n = 348) or the control condition (n = 345)”. "Start. Transform. Achieve. Results" is an intervention designed to improve “employees' control over their work time, boost supervisors' support for the transformation, and sharpen both parties' attention to results”. Using a “difference-in-differences” strategy and generalized “linear mixed models”, we calculated “the impact of the intervention on nine self-reported employee performance metrics”. “Actual and anticipated hours spent, absenteeism, and presenteeism” were all considered performance indicators. This study showed scant evidence that work-family conflict intervention had any effect on worker performance. The intervention's one and only notable result was a roughly 1-hour decrease in the amount of time workers were anticipated to work. “The intervention effect is marginally significant at 12 and 18 months after Bonferroni adjustment and slightly negligible at 6 months”. The intervention decreased the amount of work that was anticipated to be done by 1 hour per week; nevertheless, it had statistically minor effects on the majority of other employee-reported performance metrics. “This intervention may be helpful for enhancing employee views of more access to personal leisure or personal wellness without compromising performance when combined with the other favorable wellness and

company results". "Contradictory evidence to recent negative headlines on work-family and flex work programmes is provided by the null effects on performance".

Orlov, Strizhakova & Fetisov (2021)

In the late 20th and early 21st centuries, Russia's deteriorating demographic situation and public health issues have taken on grave proportions. In this regard, it has become clear that the healthcare system needs to be improved, that a culture of health needs to be created, and that citizens have a duty to protect their health and ability to perform well. "Design and development of a system for remote monitoring and improvement of a person's health reserves and performance", based on a pre nosological examination, a numerical assessment of a person's body systems reserves, and the implementation of suitable individual health improvement programmes. The development of the Health Navigator technology with the numerical assessment of health and performance reserves of people of different ages was made possible by a targeted population survey conducted from 2000 to 2020 that included the measurement of 18 morphofunctional indices and created a database (760 thousand subjects). This technology served as the foundation for the construction of the system for remote population health monitoring and improvement, which involved processing, storing, and analyzing findings on both local and remote servers. A browser-based telemedicine system was created to track the population's health and performance reserves. It entails a series of sequential tasks (operations) that patients and healthcare professionals must carry out, including: 1) a focused physical examination; 2) computer processing of the findings utilizing a software and information complex; 3) presentation to the patient and discussion of a codified "Health Reserve Profile" and a draught personal wellness programme; 4) Implementing a 100–150 day health improvement

programme using natural therapy techniques. The effectiveness of the remote monitoring system and the significant public and professional interest in its use were validated by evaluations of the system conducted in a number of rural areas. The created system enables healthcare professionals to operate more quickly and consistently, establish ongoing communication with patients, improve their commitment to good health, and increase their resistance to developing diseases.

Duffy et al., (2021)

At the beginning of their practicum classes, “eleven counselors-in-training (CITs) were exposed to four live computer-projected natural scenes and sounds (running stream, snowy mountain landscape, campfire in the forest, and ocean setting)”. “This qualitative and phenomenological study examined their experiences”. “At the start of four successive practicum meetings, the researchers aimed to investigate the CITs' subjective reactions to the technologically advanced surroundings”. “The results suggest that technology can be used to facilitate many of the same advantages that earlier research on counselor education has shown can be gained from interaction with nature, including a decrease in the negative emotional states that inhibit learning and engagement, an increase in a student's sense of connection to their classmates, and a better understanding of the significance of self-care and personal wellness”. The investigations include implications involved in counseling students, counselor educators, and counseling programmes.

Roy & Nahid (2022)

The purpose of this study is “to conduct a systematic review of the literature on cloud-based Internet of Medical Things (IoMT) in healthcare”, “to summarize the contexts and research

topics" that have been explored, "to identify gaps in the literature", and to suggest "new research directions". For articles on (IoMT) and cloud technologies, "the authors examined electronic databases such Scopus, Elsevier, the ACM Library, IEEE Xplore, Emerald, and ScienceDirect". They also manually searched journals in "Google Scholar, PMC, and ResearchGate". Combining quantitative and qualitative methods, 442 papers were looked at in all. The qualitative investigation included a thorough mapping study. "The study identified and categorized modern IoMT devices and applications that have been used in healthcare over time, such as remote monitoring apps, diagnostic tool apps, personal wellness and healthy living apps, consolidated healthcare apps, medication adherence apps, appointment scheduling and reminder apps, and various types of critical decision-making systems applications". Future research topics, such as "the influence of cloud-based IoMT devices and the difficulties in implementing IoMT in healthcare", were also recognised. The review concentrates on how doctors and patients use IoMT. The acceptance, efficacy, and usefulness of "cloud-based IoMT in healthcare" should be further investigated from the viewpoints of many stakeholders, including families, carers, "healthcare institutions, researchers, policy actors, payors, and buyers".

Seo et al., (2014).

We demonstrate "how a web-based system for individual wellness planning and self-management can be supported by the SES construction, pruning, and model generation processes". Our attention is on the procedure for integrating modeling and simulation kernels into other web application layers. The personal wellness plan online application is implemented using the "System Entity Structure (SES)", "Pruned Entity Structures (PES)", and "libraries for pruning procedures" from the "MS4 MeTM platform technology". The method used to handle

user graphics and “web service requirements for interfaces to the embedded SES/PES kernels” is discussed in this study. In order to increase their application within information technology systems, DEVS and SES are integrated with information technology systems in the final section of our discussion.

Luskin et al., (1998)

Stanford University reviewed “the research on complementary and alternative therapies”, including “mind-body practises”. The review's objectives were to create a thorough literature evaluation and to offer justification for upcoming studies on good aging. “MEDLINE, PsychInfo, the Stanford Library, Dissertation Abstracts, Lexus-Nexus, the Internet, and practitioner interviews” were all used in computerized searches. Studies that looked at mind-body therapies for cardiovascular problems in the elderly that were published after 1990 were all included. “Social support, cognitive-behavioral therapy, meditation, the placebo effect, hope, faith, visualization, spiritual healing, music therapy, hypnosis, yoga, and aikido” were among the mind-body techniques that were examined. Priority was given to studies published after 1990, however earlier studies that included randomized, controlled trials were considered when there was a dearth of more current research. For disorders connected to cardiovascular disease, mind-body therapies have been demonstrated to be effective largely as complementary and occasionally as stand-alone alternative treatments. Studies showed that the treatments were effective, but it was clear that more controlled research was required. Few randomized, controlled research papers that were carried out in the US were discovered by reviewers. Due to this, it is difficult to determine the most effective therapy dosage and the mechanisms underlying many of the procedures. Further research should be prioritized due to “the compelling anecdotal

evidence, the existence of some controlled research, overall cost effectiveness, and the absence of negative effects from mind-body therapies".

Selvamurthy et al., (1998)

This study, which involved "20 male patients with Essential Hypertension (EH)", sought to "determine whether the condition could be treated or controlled by restoring baroreflex sensitivity" to normal levels through either "postural tilt stimulation on a tilt table or through the equivalent yogic postural exercise (Yogic asanas)". Drug therapy was gradually discontinued from patients on a therapeutic regimen, and then they were split into two groups of ten each. "While group II (age 50 3.3 years) received particular yogic exercises equating to head-up or head-down tilt for the same period, group I (age 34 1.7 years) had a 3-week course of 700 head-up tilts for 30 minutes each day". A series of assays, including "cardiovascular reactions to head up tilt, the cold pressor response in 4°C water", "the alpha index of EEG", "the level of blood catecholamines, and plasma renin activity", were used to measure the progressive autonomic re-adjustments (PRA). Both groups' blood pressure significantly decreased "(P 0.001) at the end of the three-week period". "During a 3-week course of tilt and yogic practices", progressive improvements in BP and HR response to tilt clearly demonstrated "a gradual improvement in baroreflex sensitivity". "Changes in other indices", including "CPR, AI, CA, and PRA", also showed a steady decline in renin-angiotensin and sypatho-adrenal activity. All of these alterations, along with the drop in blood pressure, strongly imply a connection between the causes of "EH and baroreflexes", on the one hand, and "the regulation of the sympatho-adrenal and renin-angiotensin systems by the latter", on the other. Additionally, it sheds light on "the

physiological processes" that underlie "the effectiveness of a few specific yogic postures in the treatment of EH".

Brosseau et al., (2004)

Most of the population is impacted by osteoarthritis (OA). In order to "reduce pain and enhance functional status in OA patients", aerobic exercise has long been used as a rehabilitation technique. This meta-analysis was conducted to "determine whether aerobic exercise is effective for people with OA". The Cochrane Collaboration's protocol of methodology was followed in order to perform a systematic review. "A literature search of Medline, Embase, and the Cochrane Controlled Trials Register turned up eligible trials". "There were 12 trials totaling 1363 patients" who participated in a variety of aerobic physical activities, including yoga, T'ai Chi, water jogging, aquatic exercises, and walking programmes. The overall findings of this investigation show that many types of" aerobic exercise, including walking programmes, water jogging, yoga, and T'ai Chi", can have statistically significant impacts on "pain, joint discomfort, functional status, and respiratory capacity in OA patients". Although "the best effective exercise programme" is yet unknown, "aerobic exercise in general" is better for OA patients than "no exercise at all and is superior to or on par with strengthening exercises". According to "the research", in order to "ensure that the health benefits of aerobic exercise continue over the long term", it is necessary to further investigate long-term impacts and incorporate behavioral techniques.

Meehan, Eisenhut & Stephens (2004)

"A recent evaluation of 69 randomized controlled studies for the treatment of tinnitus found that none of the traditional approaches were judged to be well established in terms of producing repeatable long-term tinnitus impact reduction over and above placebo effects". Many patients

are now focusing on complementary therapies as “the search for new, more efficient treatments continues”. In this research, we have compiled the information on the efficacy of alternative tinnitus therapies, such as “Ginkgo biloba, acupuncture, laser therapy, ultrasound, ear-canal magnets, electromagnetic therapy, homeopathy, and hypnosis, from 23 randomized placebo-controlled trials”. “Yoga, t'ai chi, and other kinds of psychological therapy, including meditation”, that cannot be controlled using a placebo were not included in our review even though they may still be highly beneficial to patients. There have been some reported positive outcomes of hypnosis.

Li et al., (2005)

The high degree of genetic similarity between “humans and other species” prompted us to look for “genes” governed by characteristics that make people distinctive, such as the interplay between the mind and body. The benefit of DNA microarray technology is the ability to examine “thousands of genes” at once, with the potential to identify positive “phenotypic changes in gene expression”. The purpose of this study was to “compare the neutrophils' genetic makeup and function in healthy volunteers and practitioners of the ancient Chinese Qigong practise known as Falun Gong (FLG)”. Topics and layout: For our study, we included “6 Asian FLG practitioners and 6 Asian normal healthy controls”. The practitioners have at least one year of FLG experience “(range, 1-5 years)”. “Daily reading of FLG books” and one to two hours of exercise are part of the routine. Selected healthy individuals in their natural state did not engage in “Qigong, yoga, t'ai chi, or any other form of mind-body practise”, and they had not engaged in any “regular physical activity for at least a year”. “Fresh blood neutrophils” were extracted and their gene expression, function (phagocytosis), and survival assessed using “microarrays and RNase

protection assay (RPA)" (apoptosis). Compared to typical, healthy controls, FLG practitioners' gene expression was altered in a way that promoted a quick resolution of inflammation, downregulated cellular metabolism, and boosted immunity.

According to FLG practitioners' findings from an enzyme-linked immunosorbent assay, whereas inflammatory neutrophils showed increased cell death, normal neutrophils lived longer. Neutrophil phagocytosis was markedly elevated in Qigong practitioners, which is consistent with the improved immunity shown by microarray data. RPA provided confirmation for some of the changed genes identified by microarray. The practice of qigong may influence transcriptional levels of immunity, metabolism, and cell death. Our pilot study offers the first proof that Qigong practice might influence genomic transcriptional regulation. The study of how genes are governed by characteristics that make humans special, such as consciousness, intellect, and spirituality, requires new methodologies.

Mouridsen (2006)

As adjuvant therapy, "third-generation aromatase inhibitors (AIs)" are efficient and typically well-tolerated. "These AIs are now being used as an adjuvant therapy for postmenopausal individuals with early-stage breast cancer that has estrogen receptor positivity". However, concerns regarding their long-term security persist. In addition to providing commentary on "the proper management of these drug-induced adverse events in patients", this study provides an overview of "the adverse events documented in third-generation AI trials". Medline searches were used to locate papers on anastrozole, exemestane, and letrozole. The "proceedings of recent oncology symposia" were also examined to gather pertinent new information. "Hot flushes and musculoskeletal complaints/arthralgia" are the two side effects linked to adjuvant AI therapy that

are most frequently reported. With an AI compared to tamoxifen, endometrial cancer and thromboembolic events are much less common. The risk of osteoporosis and fractures does, however, somewhat but significantly increase with AI medication. It has not been proven beyond a reasonable doubt that there is “a potential adverse effect on the cardiovascular system, specifically on lipid metabolism”. Studies contrasting AIs with tamoxifen or placebo did not find any appreciable differences in overall quality of life”. The majority of postmenopausal individuals with hormone-responsive breast cancer” can benefit from “adjuvant endocrine therapy” with AIs alone or in combination with tamoxifen. “Tamoxifen reduces the likelihood of various side effects, including endometrial cancer, stroke, and pulmonary embolism”. Trials now underway target “the monitoring and control of bone loss” brought on by “AI therapy”. To better understand the impact of “AIs on lipid metabolism and cardiovascular health”, additional research with longer follow-up is necessary.

Kruger and Malaka (2006)

There are 46 papers in the proceedings. Fuzzy user satisfaction in games, an assessment of how well game footage can help players improve their skills, “the e-motion system, a motion capture and movement-based biofeedback game”, “the incorporation of kinematic analysis into computer games for exercise”, “the need for fewer kinematic controllers in a full posture yoga gaming application”, and “a dual-channel optical brain-computer interface” in a gaming environment are some of the topics covered.

Ospina et al., (2008)

To offer a brief summary of the clinical research “evaluating the benefits of meditation for health. comprehensive analysis of the literature”. Through September 2005, “thorough searches were carried out in 17 electronic bibliographic databases”. Hand searches, reference tracking, speaking with experts, and searches of gray literature were additional methods of locating potentially pertinent studies. Studies that used any kind of meditation, included ten or more adult participants, were published in English, and provided quantitative information on health-related outcomes. “The methodological quality of the investigations was evaluated by two independent reviewers, who also evaluated the relevance of the studies and the data extraction”. The review includes 400 clinical trials on meditation, with 72% of them characterized as randomized (publication years 1956-2005). Mantra meditation, mindfulness meditation, and yoga were the five main kinds of meditation techniques found. Hypertension, various cardiovascular illnesses, and substance abuse were the three clinical conditions that were most extensively researched. The results that were most frequently reported were psychosocial measures. “Psychological and psychiatric symptom outcome measures predominate in the outcomes of interest”. “Clinical trials' methodological quality” is generally subpar, but it has “significantly improved over time” by “0.014 points” “(95% CI, 0.005, 0.023)” annually. The majority of meditation clinical trials are typically characterized by “poor methodological quality”, with “considerable threats to validity in every relevant quality dimension evaluated”. Even though the methodological quality has steadily improved, future studies on meditation must still be meticulous in their planning, implementation, analysis, and reporting of results.

Birdee et al., (2009)

“T'ai chi and qigong, two mind-body practises that originated in Asia”, are not widely known in the United States. The goal is to describe how people use “t'ai chi and qigong for health”, taking into account “sociodemographics, health status, medical conditions, helpfulness perceptions, and disclosure of usage to medical experts”. Using cross-sectional data from the “Alternative Medicine Supplement of the National Health Interview Survey (NHIS)” from “2002 (n=31,044)”, we examined relationships between the usage of “t'ai chi and qigong for health”. The 2002 NHIS projected that “2.5 million and 0.5 million people”, respectively, “practised t'ai chi and qigong” for health. For analysis, we combined the use of “t'ai chi and qigong into a single group (TCQ)”, which corresponds to “2.8 million people”. We discovered that TCQ consumption was not influenced by either gender or age. “TCQ users were less likely to reside in the Midwest (OR 0.64, 95% CI 0.42-0.96)” or “the southern United States (OR 0.51, 95% CI 0.36-0.72)” than the West, and more likely to be “Asian than white (odds ratio [OR] 2.02”, “95% confidence interval [CI] 1.30-3.15)”, college educated “(OR 2.44, 95% CI 1.97-3.03)”, and college educated “(OR 2.44, 95%”. Use of TCQ was independently linked to more reports of asthma “(OR 1.50, 95% CI 1.08-2.10)”, severe sprains “(OR 1.65, 95% CI 1.14-2.40)”, and musculoskeletal problems “(OR 1.43, 95% CI 1.11-18.3)”. In the previous 12 months, half of TCQ users also practised yoga for health. Only 25% of TCQ users acknowledged their practise to a medical professional, despite the majority of users reporting it to be crucial for maintaining health. A wide range of people in the United States utilise TCQ for health, and users report benefits for preserving health. “To establish efficacy and safety for target populations, such as individuals with “musculoskeletal and pulmonary disease”, as well as for preventive health, more study is required”.

Mak & Faux (2010)

Patients with osteoporosis use “complementary and alternative medicine (CAM)” therapies often both in Australasia and “around the world”. The purpose of this study was to “identify the prevalence and usage trends of CAM in an osteoporosis clinic in Australia”. Participants, “setting, and design An academic osteoporosis clinic in Sydney”, “Australia”, saw 202 patients for this prospective, cross-sectional questionnaire-based investigation. Subjects were “79.7% female, with a mean age of 68.5 10.9 years”, and were 55.9% foreign-born. Using the liberal definition of CAM, 104 patients (51.5%) and 62 patients (30.7%) reported using them. “Multivitamins (24.0%), acupuncture (19.2%), t'ai chi (14.4%), and yoga (12.5%)” were the CAMs most frequently used. “Seventy-three percent (73%)” did not seek medical advice before using “CAM”, and “23.1%” reported that their medical providers were not aware of their use. Utilizing CAM was most frequently done for holistic reasons (53.0%) and insufficient pain management (29.0%). “More frequent clinic visits over a 12-month period (1.8 against 1.5 times, p=0.03), a trend for a worse lumbar spine T-score (-2.35 compared -2.20 SD, p=0.05), and higher rates of university education (26.0% versus 14.3%, p=0.05)” were all related with CAM users (23.1% versus 12.2%, p=0.03). It is estimated that each year, osteoporosis patients spend $696 million on CAM. Osteoporosis patients regularly make use of CAM. “To guarantee better screening for potential harmful clinical interactions, doctors may need to frequently ask patients about their history of CAM usage”.

Gonçalves et al., (2011)

“This study sought to evaluate the flexibility, functional autonomy, and quality of life of older yoga practitioners”. The subjects underwent “flexibility tests using goniometry, the LADEG autonomy protocol, and QoL using the WHOQOL-Old questionnaire”. The subjects were split into two groups: “the yoga group (YG; n=52; age = 66.79 3.30 years; BMI = 24.77 3.18)” and the “control group (CG; n=31; age = 69.33 4.84 years; BMI = 24.32 3.71)”. Repeated actions Increases in articular range of motion were seen in the “YG compared to the CG” in the following areas: “shoulder abduction (14.11%; p=0.0001)”, “horizontal shoulder extension (33.90%; p=0.0001)”, “lumbar spine flexion (50.74%; p=0.0001)”, “hip flexion (35.75%; p=0.0001)”, “hip extension (10.93%; p=0.021)”, “knee flexion (3.90%; p=0.0001)”, and the “GDLAM In the YG compared to the CG”, “the Mann-Whitney test showed improvements in Facet 1 QoL scores (%Fac1 = 9.04%; p= 0.043)”, “Facet 5 QoL scores “(%Fac5 = 51.06%; p= 0.0001)”, and overall QoL ratings “(%OqoL = 8.13%; p= 0.046)”. There were no significant intergroup variations in the remaining variables. Accordingly, the study's findings imply that frequent yoga practise may increase an elderly woman's range of motion when performing daily chores.

Macfarlane et al., (2012)

To evaluate the research on the efficacy and usefulness of alternative therapies provided by practitioners for people with “osteoarthritis”. “T'ai chi or acupuncture” was not included because they had recently been the focus of reviews. “Using methodical searches of bibliographic databases and reference lists, randomized controlled trials that had been published in English up to May 2011 were located”. Data on results, “statistical significance in comparison to alternative

therapies, and reported adverse effects were retrieved". Using the Jadad rating system, "the methodological caliber of the identified studies was evaluated". Global patient evaluation and pain were outcomes taken into consideration. There were found to be 16 qualifying trials totaling 12 treatments. Due to the fact that the majority of therapies had only one randomized controlled trial, there was generally insufficient data to determine if any of the treatments were beneficial in "reducing pain or improving overall health/quality of life". Positive results were frequently compared between active interventions and no interventions where they were recorded. Multiple trials on therapies either produced no results "(biofeedback)" or inconsistent outcomes "(magnet treatment)", or the trials' quality was subpar (chiropractic). In the trials, there were not many negative occurrences reported. "There is not enough data to endorse any of the practitioner-based complementary therapies discussed here for the management of OA, but there is also not enough data to draw any firm conclusions about their effectiveness or efficacy". "Published on behalf of the British Society for Rheumatology by Oxford University Press".

Galantino et al., (2012)

"Postmenopausal breast cancer survivors (BCSs)" using "aromatase inhibitors" experience arthralgia "(AIs)". The purpose of this study is to determine whether it is feasible to investigate the "effects of yoga on pain, functional outcomes, and health-related quality of life (HR-QOL)" in patients with "AI-associated arthralgia (AIAA)". A single-arm pilot study included "postmenopausal women with stage I to III breast cancer who reported AIAA". For eight weeks, "a yoga programme was offered twice a week". As primary outcomes, "the Functional Reach (FR) and Sit and Reach (SR) were assessed". Secondary outcomes included "functional assessment of cancer therapy-breast (FACT-B)", the "self-reported Patient Specific Functional

Scale (PSFS)", and "the Brief Pain Inventory (BPI)", which measures pain. "90% of the participants provided data for evaluation at the conclusion of the intervention", which was analyzed using paired t tests. "Balance, as determined by FR, and flexibility, as determined by SR, significantly improved for participants". "The PSFS increased from 4.55 to 7.21, and the FACT-B-measured HR-QOL also increased"; "both improvements were P.05". "The BPI's Pain Severity subscale score decreased". No negative side effects, lymphedema development, or worsening were noted. 80% of participants followed the home programme in total. According to preliminary research, yoga may help BCSs with AIAA feel less discomfort while also increasing their flexibility and balance. "The conclusive effectiveness of yoga for objective functional improvement in BCSs associated with AIAA requires a randomized controlled trial".

Menas et al., (2012)

"Aromatase inhibitors (AIs) are frequently used as the initial adjuvant therapy for postmenopausal women with hormone receptor positive tumors who have breast cancer". The current recommendation for an AI treatment course is five years. Arthralgias have frequently been listed as the main cause of stopping AI therapy. Although many different treatment plans have been put forth in the literature, no consistent therapy methodology has been developed. This study's initial objective was "to outline the prevalence and treatment of AI-induced arthralgias in patients receiving care at Kellogg Cancer Center (KCC)". The creation and application of "a therapy algorithm and electronic medical record (EMR) documentation tools followed further analysis". "206 adult patients with hormone receptor-positive breast cancer who were undergoing adjuvant therapy with an AI were included in the retrospective chart study". To create a standard treatment algorithm and associated EMR documentation tool, "a

multidisciplinary treatment team made up of pharmacists", "collaborative practice nurses", and doctors got together. "In order to more effectively track and proactively treat patients with AI-induced arthralgias, a treatment algorithm and documentation tool were created following the trial". At KCC, arthralgias occurred 48% of the time (n98/206). Within the first six months after starting medication, 32% of these individuals had arthralgias reported. Patients who reported having arthralgias brought on by "AI were younger than those who did not (61 vs. 65 years, 0.002)". "There was no statistically significant difference between patients who had previously undergone chemotherapy (including taxane therapy) and those who had not in terms of the frequency of arthralgias (p 0.352)". "41% of patients who presented with AI-induced arthralgias had no records of doctor-managed care in the electronic medical record". The multidisciplinary team then created a standard treatment protocol and computerized chart documentation tools.

Bryce, Bauer & Hadji (2012)

For postmenopausal women who have undergone surgery for "hormone receptor-positive breast cancer", adjuvant treatment with an "aromatase inhibitor (AI)" is advised to "lower the chance of recurrence". Compared to tamoxifen, AIs are linked to better disease-free survival. The negative effects of AIs, including "bone density loss and musculoskeletal problems", are comparable to menopausal symptoms. In this case study, a postmenopausal woman with "estrogen and progesterone receptor positive (ER and PgR+) breast cancer received anastrozole", a nonsteroidal AI, as adjuvant therapy after undergoing surgery. After undergoing a right-inferior quadrantectomy, "a 58-year-old postmenopausal lady with ER and PgR+ breast cancer was given anastrozole as adjuvant therapy". She was given prescriptions for "paracetamol and a topical nonsteroidal anti-inflammatory medicine" after complaining of stiffness and joint pain. She

received advice on non-pharmacological therapies as well. Nevertheless, she claimed that she was not taking anastrozole on a daily basis and that she was still experiencing symptoms. Finally, “the case study patient” experienced relief after “switching to the aromatase inhibitor letrozole”. Recent research exploring the advantages of switching tactics between aromatase drugs to treat symptoms of arthralgia/myalgia support this strategy. For AI therapy to be as clinically effective as possible, “adherence and methods for controlling aromatase inhibitor-associated arthralgia are both essential”. Changing aromatase inhibitors can be a practical choice for minimizing side effects and improving medication compliance.

Jones et al., (2012)

Arthralgia, the most frequent cause of treatment termination, is connected to “third-generation aromatase inhibitors (AIs) used in the management of hormone-responsive breast cancer”. This review defines the observed arthralgia and discusses how it has been defined differently in significant clinical trials, as well as the condition's usual “onset and course”, “symptom-management techniques”, and “symptom remission”. The clinical indications of “AI-associated arthralgia” might start anywhere between two and six months following the start of treatment. The hands and wrists are typically involved in bilateral, symmetrical aromatase inhibitor-associated arthralgia. Knees, hips, lower back, shoulders, and feet are other typical sites. We suggest a “diagnostic approach for the treatment of patients who get AIs and experience arthralgia or increasing symptoms from preexisting joint pain in order to improve care standardization and patient quality of life”. We come to the conclusion that while arthralgia is frequently linked to AI therapy, early detection and treatment of musculoskeletal complaints may ensure the continuation of AI therapy and enhance quality of life.

Longacre et al., (2012)

Torture and refugee trauma survivors frequently require more mental and physical healthcare. The complicated effects of trauma, such as “persistent pain, major depressive disorder, posttraumatic stress disorder (PTSD), and somatization”, are partly to blame for this. The effectiveness and viability of various “complementary and alternative medicine (CAM) modalities, including meditation, Ayurveda, pranayama/yogic breathing, massage/bodywork, dance/movement, spirituality, yoga, music, Traditional Chinese Medicine and acupuncture, qigong, t'ai chi, chiropractic, homoeopathy, aromatherapy, and Reiki, with regard to torture survivors and refugees with trauma is reviewed in this article”. “We report that preliminary research indicates that specific CAM modalities may prove successful as a component of a comprehensive treatment programme for torture and refugee trauma survivors”. More investigation is required.

Galantino et al., (2012)

“Postmenopausal breast cancer survivors (BCS) taking aromatase inhibitors (AI) experience arthralgia, which may have negative effects on their long-term health and ability to perform”. “This exploratory, qualitative study of BCS participants in a yoga-based programme aims to better understand how a yoga programme affects joint pain and many areas of quality of life (QOL)”. “Through the following sources of effectiveness information—performance accomplishment, organized experience, verbal encouragement from the instructor and group, and physical feedback—yoga intervention was developed on the basis of social cognitive theory”. “Ten postmenopausal women with stage I–III breast cancer and AI-associated arthralgia (AIAA)” underwent 90-minute sessions of yoga twice weekly for eight weeks. They were also

given instructions to continue their yoga practice at home. “We designed a yoga intervention as a regular physical activity to control joint pain and function using the social cognitive theory (SCT)”. Participants got weekly phone calls and completed journals detailing their experiences. The methodologies used “for data collection and analysis” were qualitative. To guarantee the accuracy and authenticity of the data, member checks were done, and emerging topics were examined and approved by the research team. “The Value of Companionship, Community, and Sharing; Pain Relief; Improved Physical Fitness (Energy, Flexibility, and Function); Relieved Stress/Anxiety; and Transferability of Yoga through Breathing were some of the themes that emerged”. These patterns were discovered through participant and instructor observation, as well as “weekly phone call documentation”.

The “eight-week yoga intervention” was well received by the participants as a physical exercise and support group that promoted numerous enhancements in “quality of life (QOL) and a decrease in AIAA”. “The participants were strongly motivated to increase their level of physical fitness and lessen suffering”. This study showed the value of other types of exercise, like yoga, in providing a framework that may be used in various contexts. To encourage physical activity for BCS enduring pain, it is vital to provide information, “systematic physical assistance in yoga postures, support, and feedback”. According to the findings of this qualitative investigation, “BCS with AIAA” support interventions are necessary. Yoga seems to have a good influence on certain hormone therapy adverse effects. The creation of other therapies would benefit from more research.

Young & Kemper (2013)

“Although complementary therapies are frequently used by paediatric patients with chronic pain, little is known about these patients' experiences when they seek academic integrative paediatric care”. “The study's design included the abstraction of medical information and intake forms from brand-new patients whose top concern was pain”. An academic paediatric clinic served as the study's location between “January 2010 and December 2011”. Of the “110 new patients”, 20 reported headaches as their main issue, 18 had gastrointestinal pain, and 49 (45%) had musculoskeletal pain as their main concern (11). There were 37% men and a 134 year average age. Parents experienced an “average of 7 health complaints per kid”, including “exhaustion (47%), mood or anxiety (45%), constipation/diarrhea (41%), and/or sleep problems (35%), with patients reporting an average pain level of 6 on a 10-point scale”. The majority of “patients (57%) were referred by doctors”, “71% were using prescription drugs”, and “53%” were supplementing their diets at the time of their visit. Most of those examined (61%) had low levels of vitamin D. All families desired further counselling on stress management (81%), sleep (58%), exercise (66%), and/or food (76%). “Frequent recommendations included maintaining or starting dietary supplements such vitamins/minerals (80%), omega-3 fatty acids (67%), and probiotics (31%), in addition to urging continued medical care (100%) and referring to additional medical professionals (16%). Biofeedback (33%), gratitude diaries (16%), and yoga/t'ai chi (8%) were suggested as ways to reduce stress”. Other referrals included massage (20%) and acupuncture (24%) treatments. “Patients with chronic pain who visit an integrative clinic” usually need extensive treatment for complicated diseases. They are motivated to use specific complementary therapies, encourage a healthy lifestyle, and lessen stress. “The kind of coordinated, integrated,

comprehensive care offered in a medical home may be beneficial to patients with chronic pain who seek integrative treatment".

Klatt et al., (2013)

The "Move-Into-Learning (MIL) programme", an "eight-week mindfulness-based intervention (MBI)" aimed at improving behavior in elementary pupils at risk, was evaluated by teachers as part of this feasibility study. "A pretest to posttest single group design was used to administer MIL with two classrooms of third-grade students (n = 41) in a low income, urban community". An evaluation of the outcomes' sustainability over a two-month period was done in one of the two classrooms (n = 20). The curriculum featured breathing exercises, mindfulness meditation, yoga poses, and "Appreciative Inquiry (AI)" activities that encouraged "students to express themselves through the written and visual arts. Semi-structured teacher interviews and the Conners Behavior Rating Scale were used to assess MIL". Pre/post intervention results revealed a "highly significant difference in the attention-deficit/hyperactivity disorder index (t[1,39] = 5.42; p 0.001)" and "cognitive/inattentiveness (t[1,39] = 5.56; p 0.001) subscales", as well as a significant improvement in behaviors like "hyperactivity (t[1,39] = 3.1; p = 0.002)". These conclusions suggested that MIL is a workable and "acceptable MBI that can be applied in a third-grade classroom", and the teacher interview data confirmed these suggestions.

Brown (2015)

This article makes the case that many "integrative" medical practices (IM) provided in "contemporary hospitals are secular and religious". "Yoga, t'ai chi, acupuncture, mindfulness meditation, biofeedback, chiropractic, homeopathy, aromatherapy, Reiki, Therapeutic Touch, and Healing Touch" are examples of practises that are predicated on "metaphysical beliefs about

spiritual energy that are deeply influenced" by "Western metaphysical spirituality" and religions like Hinduism, Buddhism, and Daoism. "In the medical setting, religious, spiritual, and secular terminology, objectives, and methods frequently overlap—not unintentionally, but as a result of deliberate marketing and rhetorical strategies". The "energetic medicine" case serves as an example of the strategies used by IM proponents to acquire access to medical facilities by passing off metaphysics as medicine. Through a lack of informed consent, purposeful blurring of the "lines between medical and religious interventions produces biomedical ethical and legal quandaries".

Wu et al., (2015)

One of the issues that elderly persons most frequently experience is sleep disturbances. Older persons with sleep issues may benefit from "meditative movement interventions (MMIs), a novel type of exercise that combines physical activity and meditation (such as t'ai chi, yoga, and qigong)". "The evidence about the impact of MMIs on older people's sleep quality was compiled in this systematic review". From "1950 to March 2014", randomized "controlled trials" were looked up in "PubMed, EMBASE, CINAHL, PsycINFO, Scopus, the Cochrane Library, the China Science and Technology Journal Database (CSTJ), and the China National Knowledge Infrastructure (CNKI)". Two researchers screened and chose the articles. Utilizing predetermined forms, data were gathered from the listed studies. The caliber of each paper was independently assessed by the same researchers. To evaluate the "pooled effect of MMI on sleep quality to the control groups, a meta-analysis was done". Of the 1049 studies, 14 with 1225 participants were considered. Interventions lasted 12 to 24 weeks and included "t'ai chi, yoga, qigong, and multicomponent MMI". "A low risk of bias existed for ten studies". In comparison to "active therapy or usual care/wait list controls, the interventions significantly improved sleep quality

scores (standardized mean difference, -0.70; 95% confidence interval, -0.96 to-0.43)". Subgroup analyses showed that the kind or length of the intervention had no bearing on "the effect of MMI on sleep quality". "The results of research with intervention frequency of less than three times per week as a whole, however, did not demonstrate a beneficial impact on sleep quality". "Studies of lower quality exhibited larger effect sizes than studies of higher quality". Negative incidents were not reported. The current review showed that MMI improved sleep quality for elderly persons who had sleep issues in a moderately positive way. However, because of the inconsistent study quality and MMI techniques, the evidence is unclear. This study emphasizes the requirement for more thorough implementation of the intervention and higher-quality randomized, controlled trials in order to verify the findings. It also emphasizes the necessity to evaluate how well MMI works for various older demographic groupings.

Jang et al ., (2015)

There is little engagement for fitness and wellness activities when using "digital video content from broadcast television, the Internet, and other content distribution networks". The content is only sent in one direction, and "the pace, programming, and progression of the user's exercise programme are not personalized". The content must also be watched solely on a screen, making it unpleasant and unsuitable for full-body exercises like yoga, pilates, and tai chi. Here is a Cloud Mat, a solution enabling cloud-enabled linked surfaces to contextually personalize workout content. "Real-time closed-loop feedback between the user's condition on the actual mat and the condition of the content in the cloud service is provided by Cloud Mat".

Actuation signals are used to tag content and direct events from "the screen to show on a layer of electroluminescent lighting on the mat, giving the user spatial cues". "The physical interface

records the pose and timing of the user's activity through the sensor layer incorporated into the mat and transmits it to the Context-aware Personalization cloud service". "This service creates pose templates and metadata files about the exercise programme to be sent to the user, coordinating sensing and actuation between the content stream and mat". The tempo and programming are continuously adjusted to preserve the intended user experience "through this interaction process between the physical mat and the content service". This input is "provided by the person executing the routine". Using a "case study on interactive yoga", we show the system's usefulness and assess the system's performance.

Peppone et al., (2015)

"Musculoskeletal symptoms, such as joint and muscular pain, are reported by up to 50% of breast cancer survivors on aromatase inhibitor therapy, which has a major impact on treatment adherence and discontinuation rates". A countrywide, "multi-site, phase II/III" randomized, "controlled, clinical trial" assessing the effectiveness of yoga for reducing "musculoskeletal symptoms among breast cancer survivors taking hormone therapy was the subject of our secondary data analysis (aromatase inhibitors [AI] or tamoxifen [TAM])". "Breast cancer survivors who were randomized into 2 arms—standard care monitoring and standard care plus the 4-week yoga intervention (2x/week; 75 min/session)—and who were currently receiving AI (N = 95) or TAM (N = 72) for their condition—were included in this analysis". "The UR Yoga for Cancer Survivors (YOCAS®) programme, which consists of breathing exercises, 18 gentle Hatha and restorative yoga postures, and meditation, was used in the yoga intervention". Pre- and post-intervention assessments of musculoskeletal symptoms were made. At baseline, "more general pain, muscle pains, and overall physical discomfort" were reported by AI users than "TAM users (all P 0.05)". "Participants in the yoga group showed larger decreases in

musculoskeletal complaints such as general pain, muscular aches, and overall physical discomfort from pre- to post-intervention than the control group among all breast cancer survivors on hormone therapy (all P 0.05)". "When compared to TAM users, AI users had more severe musculoskeletal problems". "The brief community-based YOCAS® intervention significantly decreased overall pain, muscular pains, and physical discomfort among breast cancer survivors receiving hormone therapy".

Benning (2016)

In "the current article", "the mind-body dualism that characterizes modern psychiatry is questioned". It is said that this dualism is evidenced by psychiatrists' comparatively poor treatment of the body, or soma. According to the paper, this situation has a number of negative effects, including psychiatrists' lack of understanding of somatic symptoms of "mental illnesses and the therapeutic potential of somatic or body-based therapies". "The fact that a variety of somatic therapies, such as yoga and t'ai chi, are increasingly being proved to be effective in the treatment of a variety of mental disorders, as well as empirical data, witness to the relationship between a range of mental illnesses and somatic pathologies". The following article uses historical as well as cross-cultural viewpoints to contextualize contemporary Western psychiatry's relative disregard for the body. Diverse theoretical stances in Western psychiatry, such as phenomenology, Reichian and associated schools, psychoanalytical psychosomatics, and Jungian thought, have attempted to dispel the mind-body duality in psychiatry, albeit their overall impact has been modest. "The principles of many non-Western medical schools, which uphold a far more integrated conception of the relationship between mind and body than is evident in contemporary Western psychiatry", have also not been absorbed into psychiatry. General psychiatry's bifurcated mind-body relationship may be able to be reversed with the help

of the field of psychosomatics, “but that field's increasingly” constrained scope and “organizational separation” from that of “general psychiatry” work against any convincing or long-lasting integration of the latter's conceptual or practical advances.

Niravath (2016)

Breast cancer survivors and their doctors continue to face a serious clinical problem with “aromatase inhibitor-induced arthralgia (AIA)”. Joint discomfort is a “common side effect of aromatase inhibitors (AIs) for women, and it frequently impairs everyday activities and quality of life. Many women discontinue taking the AI because of the side effects, but we don't really understand “what causes AIA or how to properly treat it”. “This article” first provides a brief overview of the AIA syndrome before examining various potential treatment options for this recurrent clinical conundrum. Springer Science+Business Media, New York, 2016.

Mehl-Madrona, Mainguy & Plummer (2016)

Opioids are no longer regarded as the best approach to managing chronic pain over the long run. Despite this, patients who have become dependent on doctors continue to ask for care. CAM therapies have been proven to be efficient, however they are not frequently covered by insurance, accessible to underprivileged populations of the medical community, or publicly available. “Group medical visits (GMVs) taught mindfulness practices, movement, guided imagery, relaxation training, yoga, qigong, and t'ai chi” in addition to providing information about “non-pharmacological approaches to pain management”. Prospectively matched patients getting conventional care were matched with 42 patients who had been “attending GMVs for at least six months”. No one took more opiates than usual. Seven persons stopped using opiates, while

seventeen people reduced their dosage. “Reductions in pain ratings reached statistical significance (p = 0.001)” on a scale of 1 to 10. “With a 95% confidence interval [CI] of 0.12-0.60” and a p value of 0.01 the average reduction was 0.19. “On the My Medical Outcome Profile, 2nd version, the primary symptom improved on average by -0.42 (95% CI -0.31 to -0.93; p = 0.02)”. A statistically significant increase in “the quality of life rating was seen (p = 0.007), with a change of -1.42 (95% CI = -0.59 to -1.62)”. Over the course of the project's two years, no patients receiving conventional therapy decreased their opiate usage, and 48.5% increased their dosage. Patients who received GMVs with CAM therapy were able to cut back on their opiate consumption. While some patients were able to get the opiates they wanted from other doctors, those who persisted in a respectful and accepting setting considerably reduced their opiate intake compared to patients receiving traditional care. The majority of patients eventually learned to accept and recognise the value of CAM therapy, despite their initial resistance. GMVs were helpful in integrating CAM therapies that weren't covered by insurance into routine medical care.

Moniz & Slutzky (2016)

Understanding mindfulness's origins is crucial before applying it to education and library science. “Understanding the traditional and later scientific applications of mindfulness through initiatives like mindfulness-based stress reduction is crucial to this goal (MBSR)”. It is necessary to present both complex and straightforward practises since practical experience is essential for practicing mindfulness every day.

Satija & Bhatnagar (2017)

Patients with cancer frequently experience several symptoms, which distressingly lowers their quality of life (QOLs). Although traditional management offers sufficient symptom control, it has several drawbacks. Complementary therapies (CTs) have demonstrated positive outcomes for symptomatic alleviation in cancer patients. This article's objective is to present an evidence-based assessment of frequently utilized CTs for cancer symptom treatment. “There is encouraging evidence that hypnosis can be used to treat symptoms including pain, nausea and vomiting brought on by chemotherapy, distress, exhaustion, and hot flashes”. The use of guided imagery as a psycho-supportive therapy can boost comfort. The quality of life and psychological function are all significantly enhanced by meditation. Cognitive behavioral therapies successfully lessen discomfort, fatigue, anxiety, and depressive symptoms; they also enhance mood and quality of life (QOL), as well as subjective sleep outcomes. “For anxiety, depression, exhaustion, perceived stress, QOL, and well-being, yoga provides immediate positive impacts”. “T'ai Chi and qigong are helpful supplementary therapy for supportive cancer care”, however it is not clear whether they have any effect on cancer pain. Pain and exhaustion from medical treatments can be effectively treated with acupuncture. Other treatments, including massage methods, energy therapy, and spiritual interventions, have also shown promise in reducing the symptoms of cancer and enhancing general health. Due to the weak quality of the data, it is impossible to “determine the therapeutic usefulness of these therapy for cancer patients' symptom management. However, they are comparatively risk-free and can be used in conjunction with traditional treatments”. The best patient-centered holistic treatment can only be given by adjusting these therapies in accordance with the patient's views and preferences. Indian Journal of Palliative Care, 2017.

Richer (2017)

Due to the nature of contemporary battles, the U.S. military has observed a sharp rise “in traumatic brain injuries (TBIs) among military personnel”. “Due to the subpar success rates of conventional TBI therapy for secondary brain injuries, patients, families, and medical professionals are increasingly turning to alternative medical therapies”. “There are currently no known effective treatments for the secondary damage cascades that follow a primary brain trauma”. “Reducing oxidative stress, excitotoxicity, and inflammation while promoting mitochondrial activities and the repair of membranes, synapses, and axons are the objectives of effective therapy options for subsequent TBI damage”. The acceptance and popularity of functional medicine, a novel approach to healthcare, are rising. Functional medicine integrates traditional medical procedures with alternative, nutritional, holistic, and genetic therapies. In order to restore balance and optimal health, the treatment strategy involves evaluating “the patient as a whole person, taking into account the body's interconnection” and each individual's response to sickness, injury, and illness. “The use of acupuncture, Ayurveda, chiropractic adjustments, detoxification programmes, herbal and homeopathic supplements, specific diets, massage, meditation and mindfulness exercises, neurobiofeedback, nutritional supplements, t'ai chi, and yoga” are frequently recommended as functional medicine treatment options. Currently, some of these alternative therapies seem to be helpful, but additional research is required to verify stated results. There isn't much clinical research that supports the efficacy of complementary treatments for TBIs. Nevertheless, additional clinical trials and empirical studies are necessary due to some reported encouraging findings “from research studies, case studies, anecdotal evidence, and the general acceptance of some methods”. “Only nutritional treatments

and hyperbaric oxygen therapy have, to now, demonstrated the greatest promise and possibility for better treatment outcomes for secondary TBI injuries".

Vergeer et al (2017)

"The benefits of holistic movement activities like yoga and t'ai chi for both physical and mental health have gained more and more recognition in recent decades". As a result, research into the patterns and prevalence of these activities' participation is important for the field of public health. However, very few studies have assessed participation rates at the population level, and even fewer have concentrated on trends through time. This study looked "specifically at sex and age to assess participation prevalence and trends in yoga/Pilates and t'ai chi/qigong over a ten-year period in a nationally representative sample of Australians aged 15 and older". The comparison of these results with trends in traditional physical activity participation over the same time period served as a secondary goal. Data were gathered "through the Exercise, Recreation and Sport Survey (ERASS), a series of independent cross-sectional Australia-wide surveys carried out yearly between 2001 and 2010". It included questions about age and sex, physical activity levels and types, and other characteristics. Weighted population estimates for practitioners of "yoga/Pilates, t'ai chi/qigong, and fitness activities" were derived for each year (e.g. aerobics, calisthenics). The differences between the sexes and the "age (15-34; 35-54; 55+ years)" groups were examined using multiple logistic regression and linear regression, respectively. Between 2001 and 2010, the prevalence rates for "yoga/Pilates, t'ai chi/qigong, and fitness activities" were respectively 3.0% (95% CI 2.9-3.1), 0.6% (95% CI 0.5-0.6), and 19.2% (95% CI 18.9-19.4). "Yoga/Pilates, t'ai chi/qigong", and total participation rates were essentially steady throughout the course of the decade while linear increases were seen in fitness activities. "Involvement in

fitness activities grew for both sexes and in all three age groups", however only the "55+ age group" saw a substantial increase in "yoga/Pilates participation", while the "two younger age groups" saw a significant reduction in t'ai chi/qigong participation. "In Australia, participation rates in t'ai chi/qigong and yoga/Pilates were modest and largely consistent". Holistic movement techniques did not gain in popularity over the course of the decade as fitness activities did. These results highlight the need for more research into intrapersonal, interpersonal, organizational, and environmental barriers to engagement as well as facilitators.

Dowling, McDonagh & Meade (2017)

Women with postmenopausal breast cancer must take "aromatase inhibitors (AIs)" and the "selective estrogen receptor modulator tamoxifen (Nolvadex®)" to lengthen their "survival". They might, however, cause excruciating arthralgia. "CINAHL®, Cochrane Database of Systematic Reviews, EMBASE, Google Scholar, MEDLINE®, PsycINFO®, PubMed, Scopus, and Sociological Abstracts" were among the databases searched for appropriate publications (ProQuest). "16 studies made up the final sample for this integrative review. 11,511 women made up the total sample of women in all studies". The research results were summarized using content analysis. Compared to tamoxifen, AIs had a greater incidence of arthralgia. Before starting AI medication, "all breast cancer survivors should get a baseline evaluation" to see if their risk of developing arthralgia has increased. Before starting an AI and then once a year after that, all women who are using an AI should have their vitamin D levels evaluated. It's possible that many women will require higher vitamin D supplemental doses than are often advised. All women taking AIs should receive advice on pain-relieving self-care techniques like yoga and walking. To conduct a baseline evaluation before AI therapy, oncology nurses are in the best

possible position. “Nurses might take use of this occasion to inform women about their risk of AI-related arthralgia and to advise them on taking vitamin D supplements”. Additionally, nurses are crucial in teaching women self-help techniques.

Sawni & Breuner (2017)

“Yoga, art/music therapy, prayer, t'ai chi, guided imagery, hypnosis, biofeedback, meditation/relaxation training, and psychological therapies” like cognitive behavioral therapy are all included in the system of healing practices known as mind-body medicine. For the teenage patient, clinical hypnosis is a crucial mind-body tool that works in conjunction with traditional medical care. “In particular, self-directed therapeutic suggestions are used in clinical hypnosis to stimulate the imagination and promote the mind-body connection, which promotes both emotional and physical well-being”. Clinical hypnosis and other mind-body/self-regulation techniques that combine experiential learning and processes for change, like biofeedback, mindfulness meditation, yoga, and visual imagery, have a lot in common.

They can all be thought of as variations on the hypnotic experience, and they all use trance as the gateway to self-initiated changes in physiologic and psychological states. “Health care professionals can utilize clinical hypnosis to teach teenagers coping mechanisms for a wide range of illnesses, including chronic headaches, recurrent stomach pain, anxiety, melancholy, sorrow and loss, phobias, aggression, familial stressors, sleep disturbances, or enuresis”. The effectiveness of hypnosis on teenagers is illustrated with the use of clinical vignettes.

Roberts et al (2017)

“For the adjuvant treatment of hormone receptor positive breast tumors in the post-menopausal population, aromatase inhibitors (AI) are frequently employed. Significant joint and muscular complaints, often known as aromatase inhibitor-associated musculoskeletal syndrome, are frequently linked to AI (AIMSS)”. “AIMSS lowers AI compliance and has a negative influence on many patients' quality of life in terms of their health”. “Although there are informal practise recommendations, the lack of formal guidelines for the management of AIMSS for breast cancer patients using aromatase inhibitors has made this requirement difficult to fill”. “The evidence for all pharmacological and non-pharmacological approaches in the treatment of AIMSS, including physical therapy, acupuncture, and complementary therapies, is being taken into account for the first time in this systematic review.”

Voigt, Cho & Schnall (2018)

“People with HIV (PLWH) who engage in physical activity (PA) are better able to manage the side effects of multimorbidity and antiretroviral medication”. However, PLWH frequently fall short of prescribed PA recommendations. We conducted this review to find out if supervised PA enhanced functional ability in PLWH. We adhered to “the Preferred Reporting Items for Systematic Reviews and Meta-Analyses”. “We looked through five databases for randomized controlled studies that used supervised PA interventions and participants who were at least 18 years old. 8,267 articles were found in the database, of which 15 were suitable for evaluation”. “A low risk of bias was discovered both within and between trials”. “Yoga or yoga/meditation revealed no differences in outcomes, while t'ai chi improved cardiovascular and flexibility outcomes”. Aerobic therapies alone did not significantly enhance outcomes. “Progressive

resistance training (PRT) improved strength outcomes". In PLWH, supervised PA enhanced functional capacity, while self-report was proven to be an unreliable measurement.

Vergeer et al., (2018)

"The purpose of this study was to contrast the features of Australians who engaged in holistic movement practices with those of physically active individuals who did not". "The comparison of user traits in the holistic movement disciplines of yoga, Pilates, and t'ai chi/qigong was a secondary goal". From 2001 to 2010, we collected and analyzed secondary data from "a nationally representative physical activity survey (n = 195,926)". "Exercise, Recreation, and Sport Survey for Australia (ERASS)". "Using descriptive statistics, chi square, and multiple logistic regression analyses, a variety of socio-demographic and participation characteristics were recorded and contrasted between practitioners of holistic movement practises and non-practitioners as well as between practitioners of yoga/Pilates and t'ai chi/qigong". "Users of holistic movement practices (n = 6826) had significantly greater levels of education, socioeconomic background, and participation in physical activity than non-users (p 0.001) and were significantly more likely to be female, older, have fewer children at home, and be female". "Users of t'ai chi/qigong (n = 947) and yoga/Pilates (n = 5733)" were also discovered to differ on a variety of traits, such as "age, sex, socioeconomic level, and marital status". Australians who engage in holistic movement practices as a whole differ from those who engage in other forms of physical activity in a number of ways. "Users of yoga/Pilates and t'ai chi/qigong appear to draw relatively diverse subpopulations, on the other hand". Future study needs to investigate whether these variances are primarily caused by variations in delivery-related aspects or by traits inherent to the practices themselves.

Macinko & Upchurch (2019)

“There is a paucity of information regarding the forms of meditation practiced or how access to treatment and health issues may simultaneously affect its use”. In this article, “the prevalence of meditation is discussed”, along with important individual and health-system-related elements related to its use”. 2019 will examine the “cross-sectional descriptive analysis of the 2017 National Health Interview Survey”. the adult, non-institutionalized, civilian U.S. population. Self-reported participation in “yoga or t'ai chi”, or “any sort of meditation” (including “mantra, mindfulness, spiritual, guided imagery, and progressive relaxation”) over the course of the previous year. Demographic traits, health status, risky behaviors, and aspects of the healthcare system (self-reported access barriers and facilitators) were used as controls for the variables that were hypothesized to be connected to increased “meditation use”. “Over 46 million individuals” (about “19% of the population”). “Existence of a health issue” (“chronic illness, pain, anxiety/depression, and sleeping issues”), financial or logistical impediments to receiving “conventional medical care”, and personal traits are the three main predictors of meditation use (“younger age, female sex, and sexual minority status”). “One of the most popular supplementary and alternative medical practices” in the United States right now is meditation. “Public health practitioners and clinicians should be aware of the growing use of these therapies to treat common health issues, their relatively low prevalence among some groups that could benefit from them (such as older people, those with less healthy lifestyles, and men), and their higher use among those who face barriers to receiving conventional care”. This is true even though research on their health benefits is still in its early stages.

Singla et al., (2019)

A serious long-term emotional wellness condition is schizophrenia. It results in a wide range of different mental expressions. It is a true abnormal activity that affects many parts of the brain and results in symptoms like delusions and hallucinations. Schizophrenia is more prevalent in urban than rural locations. “In the treatment of depression and anxiety” in schizophrenia patients, yoga can be very helpful. It decreases stress, discouragement, and uncomfortable interactions connected to pregnancy. The application of AI can help us understand schizophrenia better. The goal of the study was to demonstrate awareness among schizophrenia patients in India.

Bravo et al.,(2019)

Fibromyalgia is a chronic illness that produces “widespread pain and is acknowledged as one of the main causes of disability”. Pharmacological and non-pharmacological therapies are both part of the standard clinical recommendations for fibromyalgia. In the latter, many interventions are used, including body awareness (BA) therapies, strength training, flexibility exercises, and aerobic exercises. The objectives of this review were to summarize movement and BA treatments for fibromyalgia patients and to contrast the various treatments in terms of their effects. From its commencement until October 2018, the search approach was conducted using the databases “PubMed, Cinahl, PEDro, PsychoInfo, and The Cochrane Library”. “Articles were considered eligible if they compared” movement and BA therapy to other interventions in randomized controlled trials (RCTs). When 418 papers were searched for, 22 of them satisfied the criteria for inclusion. Two writers then independently collected the data and evaluated the quality of the trials. “With movement and BA therapies such emotional self-awareness, t'ai chi, yoga, belly dance, strengthening programmes, and Resseguier technique, pain symptoms were

reduced". Short-term forest plot analysis indicates a positive trend in favor of BA; nonetheless, there was significant variation between trials. This comprehensive "review and meta-analysis" supports the use of movement and BA treatments in addition to standard medical management for fibromyalgia patients. It is important to carry out more research to determine the exact mechanism by which BA treatments improve results.

Taylor et al., (2019)

"Some alternative and integrative health (CIH) therapies are now advised for chronic musculoskeletal pain, a prevalent illness presented in primary care, in an effort to attenuate the opioid crisis". "The Veterans Health Administration (VHA), the largest integrated health care system in the country, has been in the forefront of this trend as a result of which healthcare systems are progressively providing CIH therapy". "The uptake of CIH among individuals" with persistent "musculoskeletal pain", however, is not well understood. So, among a sizable patient group "suffering from chronic musculoskeletal pain, we carried out" the first investigation of the utilization of "a variety of nonherbal CIH therapy". "Using administrative data for a sizable retrospective cohort of younger veterans with chronic musculoskeletal pain who used the VHA between 2010 and 2013 (n = 530,216)", we investigated the prevalence and correlates of CIH therapy utilization. We worked for two years to analyze administrative and CPT4 codes, "natural language processing data mining techniques", and nine different types of CIH to discover how they were used. "We defined chronic musculoskeletal pain as either (1) having two or more visits with musculoskeletal diagnosis codes that are likely to represent chronic pain separated by 30 to 365 days, or (2) having two or more visits with musculoskeletal diagnosis codes within 90 days and with two or more numeric rating scale pain scores that are below four". "Younger veterans with chronic musculoskeletal pain used CIH therapies" at a rate of 27%, along with "15%

meditation, 7% yoga, 6% acupuncture, 5% chiropractic, 4% guided imagery, 3% biofeedback, 2% t'ai chi, 2% massage, and 0.2% hypnosis". "Women, single patients, those with three of the six pain disorders, and those with any of the six pain comorbid conditions were more likely to use any CIH therapy". Given that 27% of patients adopted some form of CIH strategy, patients seem willing to use it. "Low rates of some particular CIH, however, raise the possibility of increasing CIH usage".

Goldsmith et al.,(2020)

In light of the scarcity of other pain treatments and their lack of awareness, "long-term opioid therapy for chronic pain emerged". "The use of complementary and integrative health (CIH) and non-drug therapies for chronic pain is widespread", but little is known about how often persons who are prescribed opioid analgesics also utilize CIH and non-drug therapies. This study's goal was to identify trends and correlates of self-reported "CIH/nondrug therapy use for chronic pain among US military veterans who had received long-term opioid prescriptions for the condition". Survey data from an electronic medical record mixed with "a national two-stage stratified random sample". Latent class analysis and logistic regressions were used to analyse the data. Veterans of the US armed forces in the VA's primary care who took opioid analgesics for about 6 months. "Brief Pain Inventory-Interference (BPI-I) scale as a measure of pain-related function; self-reported use of each of 10 CIH/nondrug therapies to treat or cope with chronic pain in the previous year: meditation/mindfulness, relaxation, psychotherapy, yoga, t'ai chi, aerobic exercise, stretching/strengthening, acupuncture, chiropractic, and massage". Of the 13,660 invitees, 8891 (65%) finished the survey. Eighty percent of veterans said they had "used at least one non-drug pain treatment in the previous year". Most non-drug therapy were used more frequently by

people who were younger and of feminine sex. Lower utilization of exercise/movement therapy was linked to higher pain interference. Use patterns for non-drug therapy were reflected in the functional categories of manual, exercise/movement, and psychological/behavioral. Patients receiving long-term opioids frequently used CIH or other non-drug pain management techniques. Future studies will look at how non-drug therapies are used in connection to quality of life and pain outcomes throughout time.

Roberts et al (2020)

The prognosis for “women with hormone receptor-positive, stage I to III breast cancer has significantly increased over time thanks to developments in screening, surgery, and adjuvant therapy”. “The quality of life for breast cancer survivors” is worsened by the severe treatment-related toxicities associated with many adjuvant medicines. Aromatase inhibitors (AI) are now routinely recommended to “postmenopausal women with hormone receptor-positive breast cancer”, with prolonged treatment periods of up to 10 years being taken into consideration for some women. “A high incidence of AI-induced musculoskeletal symptoms (AIMSS)”, which are frequently reported as “symmetrical joint pain and soreness, musculoskeletal pain, and joint stiffness, is linked to AI treatment”. “AIMSS decreases compliance with AI therapy in up to 50% of women receiving adjuvant AI therapy”, perhaps impairing “the prognosis for breast cancer”. “Although exercise has been studied for the prevention and treatment of AIMSS”, its impact is yet unknown. determining the impact of “exercise interventions on the management or prevention of aromatase inhibitor-induced musculoskeletal symptoms (AIMSS) in women with hormone receptor-positive breast cancer stages I to III”. Up until December 13, 2018, we combed through the “Cochrane Breast Cancer Specialized Register, CENTRAL, MEDLINE,

Embase, and CINAHL databases". Additionally, in August 2019, we looked through two clinical trials registries and two conference proceedings portals for active or unpublished trials, or both. We also looked over the included studies' reference lists. We compared exercise to a control group in randomized controlled studies. The comparator arm, which may have involved a different kind of "exercise, no activity, or a waiting list control, was left unrestricted". The studies could have been peer-reviewed or published. Utilizing the GRADE approach, two review authors independently gathered data, evaluated bias risk, and determined the certainty of the evidence. Investigated outcomes included "pain, stiffness in the joints, grip strength, health-related quality of life, cancer-specific quality of life, adherence to AI medication, adverse events, occurrence of AIMSS, and overall and breast cancer-specific survival". We used the mean difference (MD) for "continuous outcomes that were assessed using the same instrument, and the standardized mean difference (SMD) for continuous outcomes that were examined using separate instruments". "We reported outcomes as an odds ratio for dichotomous events (OR). One study evaluated exercise for preventing AIMSS, while six studies evaluated treating AIMSS". In total, we considered seven trials with 400 randomly assigned individuals. The lone trial found "no difference in pain levels, grip strength, or compliance with taking AI medication across groups for avoiding AIMSS". The study did not offer data values, and no additional results were disclosed. We observed that "the evidence for the impact of exercise therapy on overall decrease in worst pain scores for controlling AIMSS was very low-certainty (SMD -0.23, 95% confidence interval (CI) -0.78 to 0.32; 4 trials, 284 women)". According to "the evidence (Western Ontario McMasters Universities Osteoarthritis Index (WOMAC) stiffness score MD -0.76", "95% CI -1.67 to 0.15 and Visual Analogues Scale (VAS) stiffness score MD -0.42, 95% CI -2.10 to 1.26"; 1 study, 53 women; low-certainty evidence), exercise therapies have little to

no difference in the overall change in stiffness scores". "Overall change in grip strength (MD 0.30, 95% CI -0.55 to 1.15"; 1 study, 83 women; very low-certainty evidence); overall change in health-related quality of life (SF-36 tool subscales ranged from least benefit of MD 1.88, 95% CI -2.69 to 6.45 to most benefit of MD 9.70, 95% CI 1.67 to 17.73; 2 studies, 123 women; very low-certainty evidence); and overall change in cancer". In any of the four investigations, there were no adverse events in "either arm (0 events reported; 4 studies; 331 participants; low-certainty evidence)". AIMSS incidence, breast cancer-specific survival, or overall survival data were not provided. "It was surprising that this analysis found no conclusive evidence of benefit for exercise therapy in women with early breast cancer using AIMSS, given the extensive benefits of exercise for cancer patients". Only seven qualifying studies with a total of 400 individuals were found for this review, which probably underpowered the conclusions. Due to the trials' significant heterogeneity, which included a variety of exercise regimens and follow-up times, the meta-analysis proved difficult. "Exercise needs to be a regular part of care for people with breast cancer despite these mixed results because of its many advantages". "Further knowledge of the AIMSS mechanism, a single, precise definition of the disease, and phase III randomized controlled trials with sufficient power to test focused exercise therapies on the important clinical outcomes in this condition will all improve future research in this field".

Tsai et al., (2021)

"Aromatase inhibitors (AIs) are standard adjuvant therapy for postmenopausal women with estrogen receptor-positive, early-stage, and metastatic breast cancer". "Although effective, the risk of falls due to AI-associated knee joint pain significantly increased". "The aim of this study was to evaluate the therapeutic effects of yoga and massage on AI-associated knee joint pain".

“Breast cancer survivors were randomly assigned to a 6-week yoga intervention-2-week rest-6-week massage exposure (Yoga first, n = 30) or a 6-week massage intervention-2-week rest-6-week yoga exposure (Massage first, n = 30)”. “Evaluations of the treatment efficacy were made at baseline, post-intervention, and post-exposure using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scale, plasma cytokine levels, and changes in meridian energy”. The WOMAC pain score revealed that yoga, as opposed to massage treatments, significantly decreased knee joint discomfort caused by AI. “Improvements following the yoga intervention were also linked to modifications in plasma cytokine levels and meridian energy”. “This study concludes by offering solid proof that yoga is superior to massage for easing knee discomfort brought on by AI”. “Meridian energy alterations may offer another objective, non-invasive, scientific technique to track yoga's therapeutic effects and research complementary, alternative medicine”.

Chen et al., (2021)

In programmes for treating various balance issues, the one-leg posture is widely employed for balance training. In Tai Chi (TC) and yoga, there are some common one-leg stance positions that are typically utilised to increase balance. However, little is known about the mechanism. Additionally, it is still unclear how “one-leg stance postures” used in “TC and yoga” to train balance differ from one another. The current study's objectives were to examine “the postural demands during one-leg stance postures between TC and yoga”, as well as to investigate brain activation, “rambling and trembling trajectories” to understand the potential “mechanism of enhancing one-leg stance balance”. To practise two “TC one-leg stance postures”, the “right heel kick (RHK) and left lower body and stand on one leg (LSOL)”, “two yoga postures”, “the

one-leg balancing and Tree", and standard "one-leg standing", 32 healthy young people were selected (OLS). Functional near-infrared spectroscopy was used to assess the activation of "the primary motor cortex, supplementary motor area (SMA), and dorsolateral prefrontal cortex (DLPFC)". Using a force platform, the centre of pressure was simultaneously recorded and split into trembling and rambling components. For the main effects, a "one-way repeated-measures analysis of variance was employed". In SMA, "the relative oxygenated haemoglobin (HbO) concentration changes were larger during RHK, LSOL, and Tree than they were during OLS (p 0.001)". In the medial-lateral direction, "RHK (p 0.001), LSOL (p = 0.003), and Tree (p = 0.006)" all demonstrated considerably more "root mean square rambling (RmRMS) than that during OLS". In comparison to the Tree, OLB, and OLS postures, the right DLPFC activity was substantially "higher during the RHK (p = 0.023), OLB (p 0.001), and OLS (p = 0.013)". In conclusion, individuals with poor balance may benefit from training exercises like the RHK, LSOL, and Tree. Additionally, compared to Tree and OLB in yoga, the "RHK in TC might offer more cognitive training in postural regulation". The information "from this study could be put to use and applied in one-leg stance balance training".

Manjula & Ananda (2021)

The alternative or all-encompassing medical system known as Ayurveda combines natural remedies with a highly individualized approach to disease treatment. Over 5,000 years have passed since it was first used in India. Individuals are thoroughly screened in the Ayurvedic diagnosis process by determining their "dosha, or metabolic type, and treatment plans are created" that may include, "among other things, appropriate dietary adjustments, exercise, yoga, meditation, massage, herbal tonics, as well as counseling a patient and recommending meditation

and a daily dietary routine". Therefore, according to "Ayurveda, a healthy individual is one who has balanced doshas, which are linked to the body, mind, and soul". A life that is unhealthy and unhappy is the result of an unbalanced schedule of daily activities, an unhealthy diet, a lack of regular exercise, a lack of social activities, and an unhealthy lifestyle that does not balance work pressure with daily obligations. Thus, in this essay, "we examine the diseases brought on by a bad lifestyle, social interactions, junk food consumption, and stress in the early stages", as well as the effects of all these factors in the later stages, which result in a number of chronic diseases that cause excruciating suffering and pain. Additionally, a survey is conducted on "how to overcome these factors in the Ayurvedic diagnosis process and various treatments for these disorders". "The best technology, including artificial intelligence (AI), various machine learning, and deep learning algorithms, are investigated for disease analysis". Thus, "the general goal of this study is to investigate the analysis of diseases brought on by the impact of lifestyle utilizing the best Ayurvedic technology". "Saving people time during the diagnosis process and enabling successful diagnosis and treatment without altering the foundation of Ayurveda are two of the key objectives of combining current medical technologies with Ayurveda".

Luo,Wang & Song (2021)

In order to fully comprehend the historical development and future direction of international aquatic training research from a macro perspective, the paper analyzes the periodical distribution, discipline characteristics, research hotspots evolution, and frontier trend of international aquatic training research topics in the last 40 years using the method of literature analysis, visualization software, and mathematical statistics. The 1980–2020 period covered by the Web of Science Core Collection database was obtained. The results are presented in the form of a "Article" in

English and include the terms "training in water," "exercise in water," "rehabilitation in water," "recovery in water," "water therapy," "water exercise," "aquatic training," "water strength training," "strength training in water," "water aerobics training," "aqua jogging," "aquatic therapeutic exercise," "hydrotherapy," "aquatic exercise," "aquatic fitness training," and after that, data retrieval is completed. Finally, Citespace 5.5R5 programme screens 2133 useful research data for visual examination. The findings indicate that the primary fields of study for international aquatic training research “over the past 40 years have been in the fields of sports science”, rehabilitation, internal medicine, rheumatology, physiology, bone science, gerontology and gerontology, neuroscience and neurology, public, environmental, and occupational health, and nursing science. There are many notable multidisciplinary studies in this topic, which has a rich research content. “The depth and breadth of study in this area have grown, and interdisciplinary, regional, and interinstitutional collaboration in scientific research has increased”. The development history of water motion research over the last 40 years can be divided into three categories: basic development stage, rapid development stage, and high-speed development stage. These categories are based on the characteristics of the heat evolution of international water motion research. From a macro perspective, the development of micro hot spots at various stages corresponds to the primary line of sports research hot spot in water, and it consistently emphasizes aquatic training to support health management, lessen the impact of disease, enhance functional quality, enhance personal quality of life, and boost athletic performance. “International aquatic training research has gained a lot of attention in the last five years, with a particular focus on five fields: sports science, rehabilitation, gerontology and gerontology, bone science, public, environmental, and occupational health”.

Warren et al.,(2022)

“Integrative oncology (IO) therapies have been shown to be beneficial for patients with breast cancer in small studies, but referral patterns and treatment timing are uncertain”. This study analyzes how young “women with breast cancer use IO services” and their referral patterns. “A retrospective assessment identified female patients, 40 years of age or younger, who received a documented IO consultation between 2014 and 2019 and were diagnosed with breast cancer”. Analyses were conducted on the patient's demographics, cancer features, treatments, causes and “timing of the IO consultation, and IO therapy modalities. 64 young ladies with a median age of 38.6 years” were treated by the IO programme. Small trials have indicated that IO treatments are helpful for “patients with breast cancer, but referral patterns and timing of treatment are unclear”. “This study examines the referral patterns and IO service usage of young women with breast cancer”. Female patients who obtained a documented IO consultation between 2014 and 2019 and were later diagnosed with breast cancer were found using a retrospective analysis. Patients had to be 40 years of age or younger. “The patient's demographics, cancer characteristics, treatments, reasons for and timing of the IO consultation, and IO therapy modalities were all subjected to analysis. The IO programme treated 64 young girls, with a median age of 38.6 years”.

Pardeshi et al., (2022)

“Due to their hectic schedules, individuals no longer have time to visit the gym, and even if they do locate one nearby, finding a gym trainer with enough free time to correct postures while exercising is impossible without hiring a personal trainer”. “Not everyone can afford either of these techniques, and even if they did, they would need to alter their schedules accordingly”.

“Additionally, because of the global epidemic, many individuals are confined to their homes and unable to visit the gym or even take the chance of speaking with a personal trainer”. We developed a system called Fitness Freaks to track gym exercises repetitions and “to prevent such injuries and pains”. When exercising, whether “it be exercise or yoga, it is important to maintain proper body posture; if not, it can result in serious issues like poor joint alignment, increased shear forces on the spine, compression of discs and joints, less space for nerves to course through the body due to compression, and reduced blood flow”. An AI fitness tracker is Fitness Freaks. With the aid of human pose estimation, it monitors user movement. “This in turn keeps track of exercise repetitions in the gym and helps spot improper body posture while practicing yoga”.

Sharma , Agarwal & Rajpoot (2022)

The age of the digital world is now. For a straightforward task, it becomes increasingly rare to require the assistance of another person. The cornerstones of this modern era are computer vision and machine learning. Modern computer vision techniques allow us to detect, keep an eye on, and even manage the outcomes. Why not in the yoga industry when they are dictating in every other industry? Yoga is an ancient discipline. It has existed from the dawn of time. Yoga is a practice that lengthens your years and your life by years. The estimate of human body position is one of the most important aspects of computer vision. “It is possible to score or compare human poses using pose estimation algorithms as part of yoga practice sessions”. “Different pose grading models exist. This study examines the current pose grading model and suggests a novel transformation model for human position grading based on computer vision”. This research also suggests a method for putting the proposed model into practice, one that takes the shape of a web-based yoga game that teaches and entertains participants.

Vishnu et al., (2022)

A deep learning analysis of various word embeddings; a comparison of statistics and "deep neural network models for stock price prediction; using NLP for relevance feature discovery in text mining"; alumina substrates from within the country that are specifically characterized for thick and thin film hybrid microcircuits; an unbroken "DC-AC power supply with many outputs and independent output voltage management"; combining Mediapipe and video streaming, an "AI-based yoga teacher is simplifying at-home yoga; large-scale 3D virtual environment navigation; Review on difference expansion based reversible watermarking"; "structural design and analysis of mems comb drive capacitive accelerometer for seismic earthquake early warning"; utilizing the Aho-Corasick pattern matching technique for SQL injection detection and prevention; Applications based on XMPP that use multiple multicast architecture and a "pseudo-system protocol for information transfer".

Agarwal, Sharma & Rajpoot (2022)

People now need to do yoga and exercise as a result of COVID-19. Everyone today does yoga to keep their bodies and minds in shape and healthy. People started favoring online modes for the same because it was a whole period of lockdown. The Google Play Store has a wide variety of apps made exclusively for practicing yoga. Artificial intelligence is becoming more and more popular across a wide range of industries, and yoga devotees are no exception. "The adoption of AI in the fitness sector (AI-enabled fitness coaches, intelligent wearables, and AI-based gym equipment, to mention a few) is rapidly gaining popularity among those who are concerned about their health". This paper introduces a "novel idea of AI based Yoga Trainer who reminds,

instructs, guides, and motivates a user to do yoga or while doing yoga and explores various yoga mobile applications" that use "artificial intelligence techniques to motivate their customers with personalized experience and positive feedback".

Dittakavi et al., (2022)

The desire for fitness from home is increasing as working from home becomes more commonplace. For different people, various forms of exercise meet various fitness needs. Both flexibility and stress are reduced by yoga. The muscles get stronger with pilates. Kung Fu promotes harmony. Not everyone can afford to "hire a personal trainer". In this study, "we create Pose Tutor", an "AI-based method for correcting and identifying explainable poses".
To determine posture class predictions, "Pose Tutor integrates vision and pose skeleton models in a cutting-edge coarse-to-fine architecture". The pose class predictions are explained using an angle-likelihood process, which is also utilized to rectify any incorrectly created joints. Pose Tutor displays encouraging "results on the Yoga-82, Pilates-32, and Kungfu-7 datasets even without keypoint level instruction". Additionally, user evaluations carried out with numerous subject-matter specialists support the justifications offered by our architecture.

Shetty et al., (2022)

"Emerging Research in Computing, Information, Communication, and Applications" is the conference's primary area of focus. Introduction; "Gesture Detection Using Accelerometer and Gyroscope"; "Optimal Control of PV Inverters in Utility Grids for Techno-Economic Goals"; to "Monitor Yoga Posture Without Intervention of Human Expert Using 3D Kinematic Pose Estimation Model—A Bottom-Up Approach"; to "Teach Learning-Based Optimization with

Learning Enthusiasm Mechanism"; "An observation regarding the outcome and disparity between AI allied approaches and conventional techniques of chess evaluation"; "cryptanalysis on the secure method of communication using purple cypher machine; network intrusion detection using neural network techniques"; "An analysis of the Belagavi Foundry Industry using artificial intelligence and machine learning"; "a Hexagonal Sierpinski Fractal Antenna for Multiband Wireless Applications"; the Multi-level Hierarchical Information-Driven Risk-Sensitive Routing Protocol for Mobile-WSN: MHIR-SRmW"; and the "translation of Sign Language to Text Using Machine Learning"; "Target Classification Using CNN-LSTM Network with Reduced Sample Size in Surveillance Radar", "machine learning framework for Parkinson's disease prediction in cloud environment", etc. using machine learning algorithms to analyse images of iron oxide nanoparticles; Using Bi-Level Classification Technique, predict bankruptcy; Deep Volumetric U-Net with Gamma Transformation for Infant Brain MRI Segmentation; "Deep Learning Architecture-Based Classifier for Cervical Cancer Classification Analysis"; Covid Sequence-to-Sequence Model for Predicting Adverse Side Effects from Vaccines; Comparison of the Inception V4 Network and ResNet 16 for COVID-19 Prediction; Computational "Deep Learning Models for COVID-19 Detection Using Chest X-Ray Images"; An Ensemble Method for Malaria Detection Using Classification Algorithms; and Google Assistant-Enabled IoT-Enabled Intelligent Home.

2.4 Summary of Review

Visual Summary

Here is a table summarizing the sub-sections and their corresponding topics:

Table 2.4.1t

A table consisting of the areas of literature review, intent and their references

Area	Intent	References
The Rise of Hyper-Personalized Healthcare and Wellness Technologies	- The shift from disease treatment to proactive wellness management. - The role of data, self-tracking, and sensors in personalized health. - The development of mHealth technologies and applications for wellness. - Challenges in data security and privacy related to mHealth. - Cloud-enabled platforms and frameworks for personalized wellness management. - The use of wearable technologies for health monitoring and behavior analysis. - The growing acceptance of AI-enabled fitness coaches and wearable devices.	Swan (2011), Behara et al. (2014), Akbari et al. (2016), Farseev & Chua (2017), Yumak & Pu (2013), Losardo et al. (2015), Doyle & Walsh (2015), Kotz et al. (2016), Platt et al. (2016), Teyhen et al. (2018), Mishra (2020), Hardin & Kotz (2021), Chronaki & Chiarugi (2005), Mattila et al. (2008), Na, Choi & Park (2009), Pheng & Husain (2010), Seppala & Nykanen (2011), Vuong et al. (2011), Sorber et al. (2011), Chan, Zhao & Tsui (2017), Kang et al. (2017), Bhavana & Kumar (2017), Bray et al. (2018), Orlov et al. (2021), Huh et al. (2013), Bi et al. (2017), Agarwal, Sharma & Rajpoot (2022), Dittakavi et al. (2022), Shetty et al. (2022)

Personalized Yoga Instruction as Complementary and Alternative Medicine	- The effectiveness of yoga and meditation for managing chronic conditions, including pain, stress, and sleep disorders. - The potential benefits of yoga for improving flexibility, balance, and functional capacity. - The use of yoga as a complementary therapy for cancer patients, particularly those experiencing side effects from aromatase inhibitors. - The integration of yoga and meditation into healthcare systems and pain management strategies. - The growing interest in mind-body medicine and its applications in healthcare.	Jamatia (2022), April et al. (2020), Grober & Thethi (2003), Wu et al. (2015), Birdee et al. (2009), Mak & Faux (2010), Gonçalves et al. (2011), Macfarlane et al. (2012), Galantino et al. (2012, both papers), Menas et al. (2012), Bryce et al. (2012), Jones et al. (2012), Longacre et al. (2012), Young & Kemper (2013), Klatt et al. (2013), Brown (2015), Jang et al. (2015), Peppone et al. (2015), Benning (2016), Niravath (2016), Mehl-Madrona et al. (2016), Satija & Bhatnagar (2017), Richer (2017), Vergeer et al. (2017, both papers), Dowling et al. (2017), Sawni & Breuner (2017), Roberts et al. (2017, both papers), Voigt et al. (2018), Macinko & Upchurch (2019), Singla et al. (2019), Bravo et al. (2019), Taylor et al. (2019), Goldsmith et al. (2020), Tsai et al. (2021), Chen et al. (2021), Manjula & Ananda (2021), Luo et al. (2021), Warren et al. (2022), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Selvamurthy et al. (1998), Brosseau et al. (2004), Meehan et al. (2004), Li et al. (2005), Mouridsen (2006), Ospina et al. (2008), Luskin et al. (1998)

The Potential of AI in Transforming Yoga Instruction and Personal Training	- AI-driven pose recognition and feedback for personalized yoga practice. - The development of AI-powered yoga trainers for at-home practice. - The potential for AI to enhance the efficiency and scalability of yoga instruction. - The role of AI in creating more accessible and engaging yoga experiences. - The impact of AI on the role of human yoga instructors and the future of yoga training.	Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), Bhavana & Kumar (2017), Mishra (2020), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Jang et al. (2015), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022)
Addressing Ethical and Social Implications of AI in Yoga	- The potential for bias in AI-powered yoga tools and the need for equitable access. - The impact of AI on the role of human instructors and the potential for job displacement. - The importance of considering the psychological and social implications of AI in yoga. - The need for user-centered research to understand the acceptance and usability of AI-enabled yoga tools.	Brown (2015), Horn Jr. (2005), Ahtinen et al. (2008), Moniz & Slutzky (2016)

Analyzing the Landscape of Research in Yoga, Meditation, and AI	- The breadth and depth of research on yoga, meditation, and their health benefits. - The evolution of research on AI in yoga and its applications. - The need for further research on the impact of AI on freelance yoga instructors.	Most references, particularly those focusing on the integration of AI in yoga, contribute to this section.

Note: This table presents a more visually accessible summary for the entire literature review section.

The following section talks about the conclusive understanding from the references, gap and the essential research inquiries.

Conclusive Summary

Research in the field of AI and Yoga has focused on several areas, including pose recognition, personalized instruction, and automatic evaluation of yoga performance. Pose recognition involves using computer vision techniques to analyze images or videos of a person performing yoga poses and providing feedback on the correctness of the pose. Personalized instruction involves using AI algorithms to adapt the yoga practice to an individual's abilities and goals. Automatic evaluation of yoga performance involves using AI to assess the quality of yoga practice based on various metrics such as balance, alignment, and breathing.

Studies have shown that the use of AI in yoga can improve the accuracy of pose recognition and personalized instruction, and provide objective feedback on yoga performance. However, there are several research gaps that need to be addressed in this field. For instance, the majority of

research has focused on the technical aspects of AI in yoga, with little attention given to the business, psychological and social implications of this technology caused by the business impact on freelance Yoga instructors. Additionally, there is a need for further investigation into the ethical considerations of using AI in yoga, such as the potential for bias and the impact on the role of human instructors. Finally, there is a need for more user-centered (business impact on freelance Yoga instructors) research to understand the acceptance and usability of AI-enabled yoga tools among practitioners.

Existing research (parts of which we have seen in references and citations so far) has concentrated on two distinct domains: first, substantiating the significance of practices like Yoga, mindfulness, and meditation for holistic well-being, and second, the integration of Artificial Intelligence (AI) technologies to enhance scalability, automation, user experiences and its business implications. However, a crucial gap remains regarding the potential adverse effects of AI-driven Yoga instruction on the business opportunities for human freelance Yoga instructors. While the goal is not to hinder the use of AI in Yoga, it's imperative to investigate the challenges faced by freelance Yoga instructors and explore a human-centric AI approach. This approach could both mitigate negative impacts and amplify opportunities for instructors to expand their presence and reach within the personal Yoga training landscape. This research aims to address this gap from two angles:

RESEARCH QUESTION 1 (RQ1):

A. Do freelance Yoga instructors experience a decrease in business opportunities due to their inherent physiological limitations (e.g., time and energy constraints) in providing individualized personal training at a huge scale?

B. Does AI impact (reduce) traditional freelance Yoga instructors' market potential and

opportunities with automated self-paced practice instead of augmenting the presence of these Yoga instructors?

RESEARCH QUESTION 2 (RQ2):

Can AI advancements focus on augmenting instructors' capabilities rather than purely replacing them, subsequently enhancing business and physiological well-being for freelance Yoga instructors?

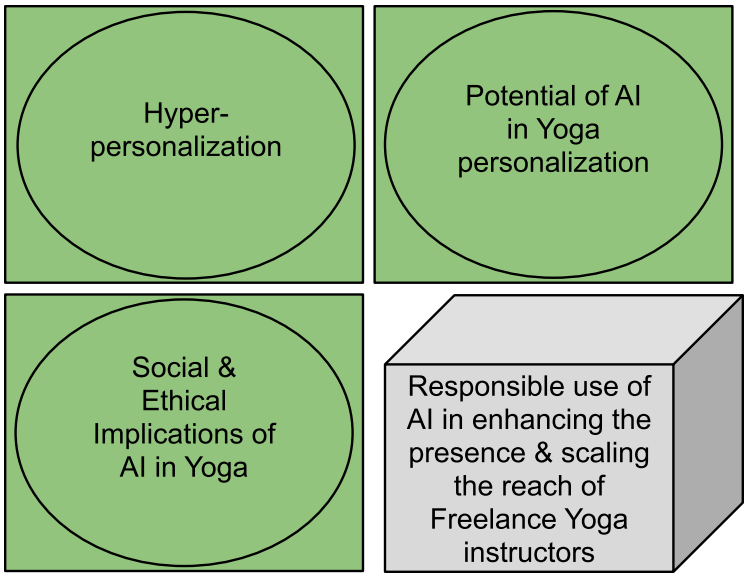
The details of these research questions are covered in the upcoming chapters of this research.

3. Research Methodology

3.1 Introduction of the Problem

The integration of artificial intelligence (AI) into diverse domains has revolutionized human interactions and capabilities, and has penetrated into the area of personal fitness and well-being for some time now. In the last chapter, literature review, we explored in detail the exponentially growing field of AI-powered yoga personal training, examining its potential to enhance market expansion and professional reach for independent instructors. While recent research highlights the potential of AI to automate pose recognition, personalize instruction, and objectively evaluate performance, this review specifically addresses a crucial gap within this field. We funneled the findings and reviews down to 2 research questions that stood out as critical gaps in the literature.

If I want to represent this in a visual format, this is how I would go about it:



As you can see in this diagram, the green boxes encircling the core elements of the existing literature (To cite a few: **Hyper-personalization:** Swan (2011), Behara et al. (2014), Akbari et al. (2016), Jamatia (2022), April et al. (2020), Grober & Thethi (2003). **Potential of AI in Yoga personalization:** Zhang (2010), Lu et al. (2011), Seo et al. (2014). **Social and ethical implications of AI in Yoga:** Brown (2015), Horn Jr. (2005), Ahtinen et al. (2008)) in recent years have all covered the growing need for hyper-personalization in Yoga personal training, how AI can help in personalizing Yoga for practitioners and the need to incorporate ethical and social considerations in the process. But there is a visible missing piece of the puzzle that is represented in the gray box.

The gray box represents the topic that has been missing in the conventional ways of hyper-personalization and in incorporating AI in Yoga Personal Training. The need for understanding the responsible use of Artificial Intelligence has also been limited to the social and ethical implications of what it means to the consumers and not necessarily addressing the plight of personal trainers in Yoga who are freelancing. There are physiological and AI-tools imposed limitations that impede the business opportunities and well-being of Yoga instructors. That is the clear missing piece of the puzzle.

RESEARCH QUESTION 1 (RQ1): We will verify if the problem statements hypothesized are applicable:

Part A) Impact of physiological factors on freelance personal Yoga instructors

- Do physiological factors affect business for freelance Yoga instructors?

Part B) Impact of AI on Yoga personal instruction:

- 1. Does AI impact (reduce) traditional freelance Yoga instructors' opportunities with automated self-paced practice instead of augmenting the presence of these Yoga instructors?
- 2. Can AI advancements augment presence of freelance Yoga instructors for Yoga personal training and scale their market potential?

RESEARCH QUESTION 2 (RQ2): We will propose a new approach for this if the above hypotheses hold true:

> Responsibly leverage AI advancements in augmenting instructors' capabilities rather than replacing them, subsequently enhancing business and physiological well-being for freelance Yoga instructors.

This research is intended to cover only RQ 1 (including parts A and B). RQ 2 is up for research, analysis and discussion for a later investigation.

Now that we have established a high level scope and the research questions in consideration for the research, we can discuss the criteria governing the research methodology.

3.2 Criteria governing the choice of Research Methodology

Based on the literature review and initial problem statements framed above, the following are the criteria for which we want to evaluate the hypothesis under research question 1 (RQ 1):

1. The physiological factors that influence the Freelance Yoga instructors and trainers availability and capability'
    a. Define the different ways freelance Yoga instructors are impacted physiologically

   b. Define the different ways these physiological factors are impacting the business potential of freelance Yoga instructors
2. The advancements in AI that tend to automate hyper-personalized Yoga training and impact the opportunities available for human instructors
   a. Define the different ways AI advancements and tools are personalizing Yoga training
   b. Define the different ways these automations are diminishing the opportunities and market potential of freelance Yoga instructors
   c. Distinguish between the existing ways AI advancements are impacting personalized Yoga training vs. potential use of AI in enhancing presence, visibility and scale of reach of freelance Yoga instructors

Based on these criteria, we can design the list of elements for the research that lead the way into defining the pre-research variables, their relationship (expected correlation) and the level of dependency can be derived between these variables. The upcoming topic covers this in detail and with a visual overview.

3.3 Key Elements of the Research

This research embarks on an exploration of the intricate relationship between artificial intelligence (AI), physiological factors, and the business landscape of freelance yoga instructors. While burgeoning interest surrounds the potential of AI to revolutionize personalized instruction, its implications for independent practitioners remain largely uncharted.

Theoretical Underpinnings:

The investigation is grounded in **post-positivist** principles (Eagleton, 2003: 135, Rigano, 2001: 752), seeking to discern causal relationships and patterns within this complex phenomenon. Drawing upon theories of technology adoption, human-computer interaction, and the gig economy, the research aims to illuminate the factors influencing AI adoption among freelance instructors and its subsequent impact on their business success.

Empirical Exploration:

To gather the lived experiences and perspectives of freelance yoga instructors, a **mixed-methods approach** will be employed. Quantitative data, gleaned through surveys, will shed light on the correlation between physiological factors, AI utilization, and business outcomes.

Simultaneously, qualitative insights, derived from in-depth interviews and content analysis, will provide a richer understanding of the instructors' perceptions, challenges, and opportunities in navigating the evolving landscape of AI-augmented yoga instruction.

Theory-Informed Interpretation of Empirical Findings:

Theoretical frameworks can guide the interpretation of the empirical results. For instance, if the findings show a correlation between physiological factors impacting instructors and AI adoption for preferences towards increased client base, we can draw upon business model theories to explain the underlying mechanisms. Some of the theories that evoked this thought process are: Small_Fitness_Businesses_in_Response_to_Business_Disruptions by Budler, Marko & Božič, Katerina. (2024), Why Fitness Businesses Stop Growing Revenue by Sean Greeley (2023), Future of the 1.5 Trillion Wellness Market by McKinsey & Company, 2021, 2022, Business

Research in 2024 conducted by Global Wellness Institute on Wellness Market Growth from 2019 to 2023.

This demonstrates how theory and data can work together to generate meaningful insights.

How we derived the Key Elements of this Research!

The most powerful research often emerges at the intersection of theory and empirical investigation. Here's how this interplay can shape this "Key Elements of the Research" section.

Investigating the Impact of Physiological Factors (as described in the previous section, summary of research questions): The research will examine whether physiological factors, such as stress levels, sleep quality, and overall fitness, influence the business performance of freelance yoga instructors. (Melinda B. Abbott, 2018. Characteristics of successful personal trainers, Melton, D. I., Dail, T. K., Katula, J. A., & Mustian, K. M. (2010), Maguire, J. S. (2001). Fit and flexible: The fitness industry, personal trainers and emotional service labor).

Assessing AI's Role: Augmentation or Replacement?: A central focus lies in determining whether AI serves to augment the capabilities of freelance instructors or potentially displaces them through automated, self-paced practices. (Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), Bhavana & Kumar (2017), Mishra (2020), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Jang et al. (2015), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022)).

Bridging Theory and Practice: Through a synergistic blend of theoretical frameworks and empirical data, this research aspires to offer nuanced insights into the dynamic interplay between AI, human physiology, and the entrepreneurial endeavors of freelance yoga instructors.

Expected Outcomes

The findings of this study are poised to contribute to a deeper understanding of the multifaceted relationship between AI and the yoga profession. By elucidating the influence of physiological factors and AI on business outcomes, the research aims to inform evidence-based strategies for freelance instructors to thrive in an increasingly technology-driven landscape. Furthermore, the study has the potential to refine existing theoretical models and spark further inquiry into the ethical and social implications of AI in the realm of personal instruction.

The 9-Element Ecosystem of the research

Based on the above criteria and understanding, we can arrive at a 9-element ecosystem to foster our research questions and analytics. Representation in a tabular format:

Table 3.3.1t

A table representing the elements of research addressing Yoga instruction and AI advancement

Yoga Instruction **:** AI Advancement	**Challenges & Opportunities for Freelance Yoga Instructors:**	**Transformative Potential of AI:**	**Extended Tools & Considerations:**
Potential AI Advancements in Yoga Personal Training:	Hyper Personalization, AI-powered plan, feedback	AI-powered marketing, client management, fatigue management & continuous learning tools for Yoga Instructors	Wearables and computer vision for AI-automated posture correction
Impact of AI in Yoga personal training: Augmentation or Replacement?	Job displacement due to AI automation	Augment personalized virtual presence opportunities for freelance Yoga instructors	AI assisted clientele relevance and expansion of market boundaries

Physiological factors limiting the business potential of freelance Yoga instructors:	Self: Fatigue, injuries, burnout, stress, time management, fitness & spiritual growth, continuous learning	External: Relevance and understanding of the clientele, setting & atmosphere, style & culture relevance	Access & cost involved in AI-assistance that help overcome physiological factors

Note: The table above represents the elements of the research. We will base the research questions and interviews based on these 9 key elements governed by the intersection of topics mentioned. Here is the detailed understanding of these elements.

Horizontal Categories

A row-wise analysis covering the (KAR) Key Areas of Research. The result from this will signal in the direction of **drawing conclusions** of whether or not the limiting factors apply and if our suggested framework that AI can help augment instead of replace personalized Yoga instruction is really applicable. This perspective aligns towards favoring the human instructors and towards a quantitative study of the elements through surveys and statistical analyses.

1. **Physiological factors limiting freelance Yoga instructors from maximizing their business potential:**

   This row underscores the internal challenges instructors face: Fatigue, injuries, burnout, stress, time management, and the ongoing pursuit of fitness and spiritual growth can all hinder business growth. The need for continuous learning to stay updated and competitive further adds to these demands. The study about increasing need to be relevant to the clients and understand the cultural and physical comfort of the clientele, other external factors like training setting & atmosphere etc. need to be covered as part of

the research. Is access to the tools and techniques that help overcome these physiological factors also part of the overwhelming list of physiological and environment factors that deter the business potential for freelance Yoga instructors? Access covers both reach, availability & resource cost involved in tools like AI-assistance that help overcome physiological factors.

2. **Potential AI Advancements in Yoga Personal Training:**

   This row explores the exciting possibilities that AI offers. From hyper-personalized instruction and feedback to AI-powered tools for posture correction and client management, this category captures the transformative potential of AI in the yoga domain. It also addresses the potential of AI in drawing correlations between practitioners (the clients) and the instructors based on the hyper-personalization criteria and the instructors' style of teaching and landing the right plan for the practitioners. Computer vision, generative AI and other AI areas including physical devices and wearable technology that aid in automated pose correction calibration are other possible AI advancements and considerations in the area of personal training by freelance Yoga instructors.the hyper-personalization factor brings with it the potential of expanding clientele into new regions and scale it to uncharted territories because of its ability to correlate supply with demand, supply being the strength and style of the instructors and demand being the personalization needs of the clients.

3. **Impact of AI in Yoga personal training: Augmentation or Replacement?:**

This row directly addresses the core question of this research. It highlights the tension between AI potentially augmenting instructors' capabilities versus the fear of job displacement due to automation. Also the part about whether AI advancements can add value to personal training Yoga instructors by helping them in their virtual presence,

Vertical Categories

A column-wise analysis covering the factors like challenges, opportunities for freelance Yoga personal instructors and the AI potential and tools from a neutral stand. The result from this will signal in the direction of **understanding** the challenges, opportunities, potential and other factors governing the research area. This perspective aligns towards a neutral study and a qualitative approach to studying the key elements of research and a thematic analysis of the responses.

1. **Challenges & Opportunities for Freelance Yoga Instructors:**

   This column encapsulates the dual nature of AI's impact on instructors. It acknowledges the challenges they face while highlighting the opportunities AI presents for business growth and expansion.

2. **AI's Transformative Potential:**

   This column delves into the ways AI can fundamentally reshape the yoga instruction landscape. It explores the potential for personalized virtual experiences, expanded market reach, and data-driven insights to enhance client relevance.

3. **Extended Tools & Considerations:**

This column focuses on the concrete technological advancements that can empower both instructors and practitioners. From wearables and computer vision for posture correction to AI-powered marketing and fatigue management tools, this category showcases the practical applications of AI in yoga.

Left to Right Diagonal Category

A diagonal line of analysis covering the intersection of quantitative and qualitative study of elements in the Key Areas of Research we just detailed. This is a derivative of the data accounting for the Key Areas of Research study. The objective is to **help derive** the understanding, correlation and signals required to draw conclusions from the key areas of research catering the hypothesis and proposed solution. This perspective aligns as an intersection of our quantitative and qualitative studies and aims at finding the correlation between the various factors and criteria of the research and concluding whether or not the problems exist and the potential of AI advancements to possibly address the problems.

1. **Hyper-Personalization, AI-powered plans, & feedback:**

   This element represents the core of AI's potential in yoga personal instruction. It signifies the ability to create highly customized yoga plans and provide real-time feedback based on individual needs, capabilities, and progress. The important point to keep in mind is that this customization depends also on the relevance created by the style, skillset and inclination of the personal Yoga instructor.

2. **Overlap of AI in Yoga and their positive impact potential for instructors**:

This central element encapsulates the crux of this research. It focuses on identifying and analyzing the specific areas where AI can positively impact freelance yoga instructors, enabling them to thrive in an evolving landscape.

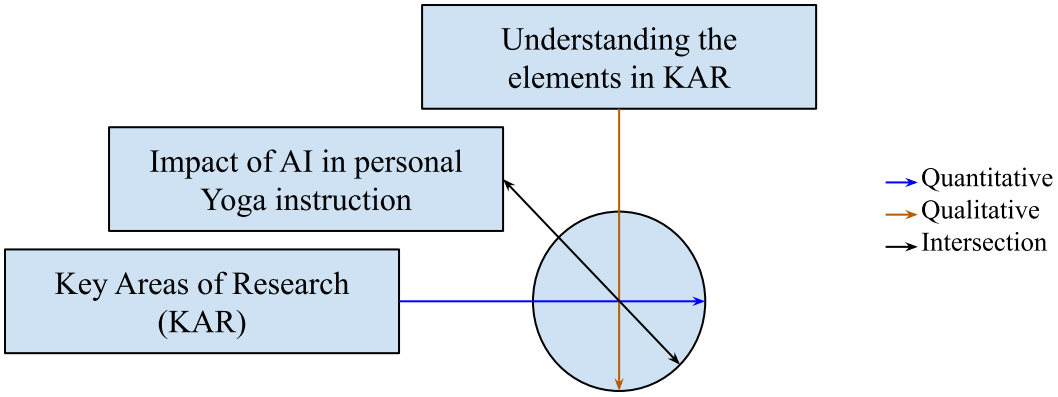
3. **Access & cost involved in AI-assistance that help overcome physiological factors:** This final element highlights the importance of considering accessibility and affordability when evaluating AI solutions for instructors. It emphasizes the need for AI tools that address the physiological challenges faced by instructors and support their overall well-being.

Visual Representation

The horizontal, vertical, and diagonal analyses provide distinct perspectives, enabling us to explore the multifaceted relationship between AI advancement and potential to augment the business opportunities for freelance Yoga instructors comprehensively.

Image 3.3.1i

Image representing this ecosystem as an intersection of the elements, key areas of research and impact of AI in personal Yoga instruction.



Note: By categorizing the key elements of our research matrix in this manner, we have a clear framework for the investigation.

3.4 Research Methodology Overview and Background

1. Research Paradigm

Some background into how we arrived at Post-Positivism as opposed to its former alternatives like positivism:

A lot of discussion, oppositions and criticism to positivist epistemologies and similar methods that only rely on scientific, structured and mathematical validation of knowledge has come over time because of the famous beliefs by scholars (Henriques, Hollway, Urwin, Venn and Walkerdine, 1998: xviii), where they talk about **conventional positivist approaches being objective and not interpretive**, in the sense that person, knowledge and experiences were not seen as "multiple, relational and not bounded by reason". Similarly, as another consideration, scholars (Schratz and Walker, 1995: 125) have also highlighted the **importance of ethical practice** in research in that the "uses and purposes of research, research practice and research

knowledge, should be at least as ethical as they are technical". The importance of research, per these scholars, lies in the principles that are necessary while working with human participants, taking into account all their complexities and non-linear situations. Also, according to Capra, 1996, cited in Spretnak, 1999: 23, "various properties that emerge through the dynamic behavior and interactions cannot be predicted mechanistically at just the outset from the knowledge of various components and parts." and then goes on to imply that "the **research questions** cannot be formulated just by logico-deductive scientific methods, rather reached by a process that is similar to **artistic imagination**".

Post-Positivism:

The answer to these callouts is "**Post-Positivism**": **an approach that asserts the value of passion**, politics and values in research, an approach that supports taking a distanced view that is objective but not just grounded in facts without any other additional context. (Per Eagleton, 2003: 135) "It **does not mean judging from nowhere, but with a good amount of passion, patience, imagination**, sympathy and self-discipline". Finally, from the perspective of Richie and Rigano, 2001: 752, "truth is constructed through a dialogue, and in this context, [**in addition to structured analysis**], it seems right to open up **interpretive discussions**, not for them to confirm or disconfirm them, but to share our thinking and how the ideas might be used.

This research best fits under **epistemology** which refers to the valid information that is required for the research and how one attains it. This ensures that a **deductive approach** (while ensuring the open ended understanding of the complex nature of the area being studied), is taken for the research starting with a specific hypothesis development based on the literature review, and testing of the hypothesis to check if it holds in particular contexts. To summarize, this research

comes under:

- **Post-Positivism:** This paradigm is well-suited for this research, as it aims to identify and test causal relationships (do physiological factors affect freelance Yoga instructors' business? Does AI replace instructors in the process of automating personalization instead of augmenting opportunities?) while acknowledging that complete objectivity is not always attainable. Detailed explanation in next section.

2. Research Design

- **Mixed Methods:** A combination of qualitative and quantitative methods will provide a comprehensive understanding of the complex relationships between AI, physiological factors, and the business of freelance yoga instructors.
    - **Quantitative:**
        - Surveys to gather data on physiological factors (e.g., stress, sleep, fitness levels) and business metrics (e.g., client acquisition, retention, income) among freelance yoga instructors.
        - Statistical analysis to identify correlations and potential causal relationships.
    - **Qualitative:**
        - Interviews with freelance yoga instructors to understand their experiences with AI, perceived impact on their business, and views on the role of physiological factors.
        - Content analysis of online platforms and marketing materials used by AI-powered yoga services to identify messaging and features.

3. Data Collection Methods

- **Surveys:** Design and administer surveys to a representative sample of freelance yoga instructors.
- **Interviews:** Conduct in-depth interviews with a select group of instructors to gain richer insights into their experiences and perspectives.
- **Content Analysis:** Analyze the content of AI-powered yoga platforms, apps, and marketing materials to identify patterns and trends.

4. Data Analysis

- **Statistical Analysis:** Use appropriate statistical tests (e.g., correlation, regression) to analyze quantitative data and test hypotheses related to the impact of physiological factors and AI on instructors' business.
- **Thematic Analysis:** Identify and analyze recurring themes and patterns within the qualitative data (interview transcripts, content analysis) to gain deeper understanding of instructors' perspectives and experiences.

5. Ethical Considerations

The following considerations are taken into account while conducting research for this research question:

- **Informed Consent:** Ensure all participants (survey respondents and interviewees) provide informed consent before participating in the research.
- **Confidentiality and Anonymity:** Protect the privacy of participants by ensuring their data is kept confidential and their identities remain anonymous.

- **Data Security:** Implement appropriate measures to safeguard the collected data. Encrypt and protect identifiers and collect least required information.
- **Researcher Bias:** Acknowledge and address any potential biases that may influence the research process or interpretation of findings.

6. Limitations

- **Sample Size:** The generalizability of the findings may be limited by the sample size and representativeness of the participants.
- **Self-Reported Data:** Survey data may be subject to self-reporting bias.

3.5 Detailed Explanation of the Methodology

Post-Positivism

Post-positivism is a research paradigm that acknowledges the limitations of objectivity and focuses on identifying causal relationships through a rigorous, data-driven approach. This study leverages a deductive mixed-method approach within a post-positivist framework to investigate the complex interplay between AI, physiological factors, and the business landscape of freelance yoga instructors.

This research adopts a post-positivist approach, guided by the belief that objective truth is elusive but can be approximated through systematic observation and analysis. This perspective is particularly relevant for understanding the multifaceted relationship between AI, physiological factors, and the business realities of freelance yoga instructors.

Epistemological Considerations

The post-positivist epistemology acknowledges that knowledge is constructed through interactions with the world, rather than simply being discovered (Hammersley, 2000: 456, (Richie and Rigano, 2001: 744). It recognizes that researchers are inherently influenced by their own biases and perspectives. While striving for objectivity, the research acknowledges that absolute neutrality is unattainable (relatable to the suggestion by Richie and Rigano, 2001: 744), which leads to a more nuanced approach to data interpretation, recognizing the potential for multiple interpretations and the need for critical reflection.

Deductive Mixed-Method Approach

The research utilizes a deductive mixed-method approach, starting with a specific hypothesis formulated based on the existing literature. This hypothesis, focusing on the impact of physiological factors and AI on the business performance of freelance yoga instructors, guides the research design and data collection.

The deductive approach allows for a structured and systematic investigation of the chosen hypotheses. The mixed-method approach combines quantitative and qualitative methods to provide a more comprehensive understanding of the complex phenomena under investigation:

Quantitative data:

Surveys will collect data on physiological factors (stress, sleep, fitness), business metrics (client acquisition, customized plan counts etc.), and AI usage patterns. Statistical analysis will reveal correlations and potential causal relationships between these factors.

Qualitative data:

In-depth interviews with freelance yoga instructors will provide rich insights into their experiences with AI, its impact on their businesses, and their perceptions of physiological challenges. Content analysis of online platforms and marketing materials for AI-powered yoga services will further illuminate the landscape of AI in yoga.

By integrating both quantitative and qualitative approaches, this research aims to provide a comprehensive and multi-faceted understanding of the complex interplay between AI, physiological factors, and the business landscape of freelance yoga instructors. This understanding is essential for informing strategies and solutions that empower freelance instructors to thrive in this evolving professional environment.

3.6 Reasoning behind the choice of methodology

This research methodology leverages a post-positivist paradigm with a deductive mixed-method approach to provide a comprehensive understanding of the complex interplay between AI, physiological factors, and the business landscape of freelance yoga instructors by testing the causal relationships between these factors and their impact on instructor success.

The choice of a post-positivist paradigm, coupled with a deductive mixed-method approach, is strategically aligned with the research objectives and the complex nature of the investigated phenomenon.

The main reason for this paradigm is that (Post-positivism is a research paradigm that acknowledges the inherent limitations of objectivity in research. It seeks to understand and

explain causal relationships within a system, recognizing that our knowledge is always evolving and may be influenced by our own biases and perspectives), this aligns with the goal of this research which is to explore the complex interplay of AI, physiological factors, and the business landscape of freelance yoga instructors. The research aims to identify potential causal relationships between these elements without claiming absolute objectivity or complete certainty.

Deductive reasoning starts with a hypothesis derived from existing theoretical frameworks and literature. The research then gathers data to test and confirm or refute the initial hypothesis. This approach is appropriate for this research as it focuses on testing two key hypotheses:

Hypothesis 1: Physiological factors affect the business performance of freelance yoga instructors.

Hypothesis 2: AI adoption in yoga personalization replaces traditional instructors' opportunities rather than augmenting their presence.

The deductive approach allows for a structured and systematic investigation of these hypotheses, leading to either their confirmation or rejection based on empirical evidence.

The mixed-method approach combines both quantitative and qualitative data collection and analysis methods. This approach offers a multifaceted understanding of the research problem by complementing the quantitative data's broad insights with qualitative data's richness in understanding context, perceptions, and experiences. The combined approach ensures that the research captures a comprehensive picture, addressing both the objective, measurable aspects of AI adoption and the subjective experiences and perspectives of the instructors. This holistic perspective allows for a more nuanced understanding of the complexities of AI's impact on the

freelance yoga landscape, enabling the development of informed recommendations and solutions that cater to both the practical and human aspects of this emerging field.

Quantitative methods, such as surveys, provide valuable insights into the correlation between physiological factors, AI utilization, and business outcomes. The statistical analysis of this data helps identify potential causal relationships and patterns.

Qualitative methods, such as in-depth interviews and content analysis, delve deeper into the instructors' perspectives and experiences with AI, providing valuable context to the quantitative findings. This approach allows for a nuanced understanding of how AI impacts instructors' well-being, business strategies, and perceptions of the evolving yoga landscape.

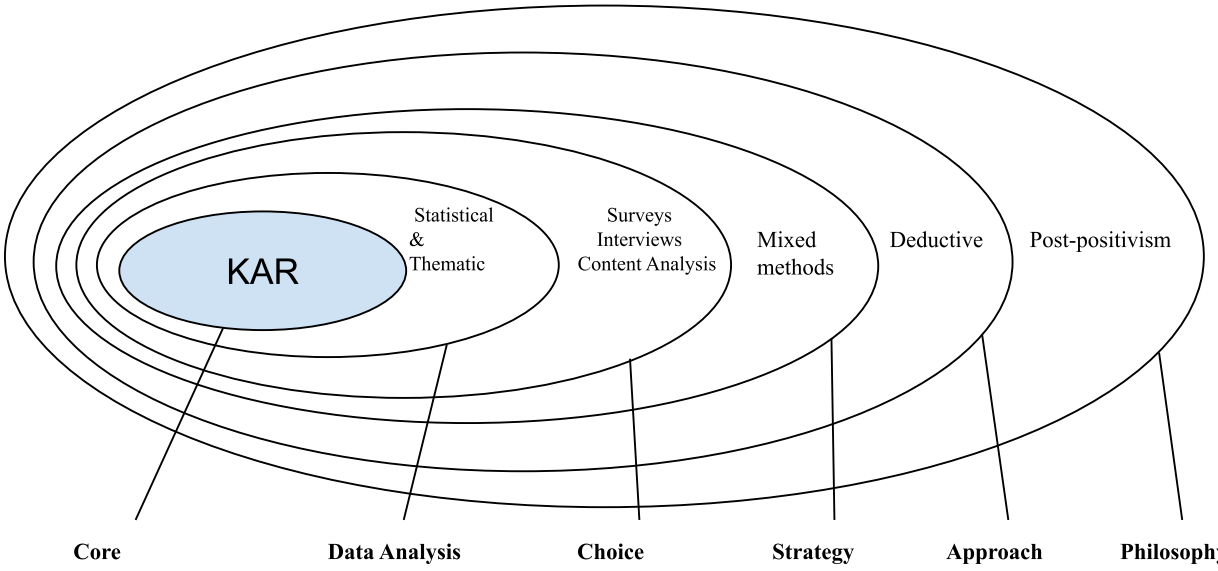
By integrating these elements – post-positivism, deductive reasoning, and a mixed-method approach – the research methodology effectively addresses the complexity of the research problem and aims to provide a comprehensive understanding of the relationship between AI, physiological factors, and the business landscape of freelance yoga instructors.

3.7 Visual Representation of the Research Methodology

A visual representation of the key components and stages of this research is as follows. The Research Onion inspired model symbolically illustrates the ways in which different elements involved in the research could be examined to develop the final research design.

Image 3.7.1i

Image representing the research methodology and the key components and stages of the research



Note: The image represents research methodology and the research components we will discuss in the rest of this section.

1. Outermost Layer: Philosophy

Post-positivism: This is my chosen philosophical stance, which emphasizes objectivity, empirical evidence, and testing hypotheses and in the context of this research, this implies that while I aim to uncover relationships between AI, physiology, and freelance yoga instructors' success, we can recognize the potential influence of subjective interpretations and context.

2. Second Layer: Research Approach

Deductive: This approach involves starting with a theory or hypothesis and then collecting data to test its validity. In this research, I have formulated hypotheses based on the literature review done (e.g., "Do physiological factors affect business for freelance yoga instructors?"). The

mixed-methods design will allow me to gather evidence to support or refute these hypotheses.

3. Third Layer: Research Strategy

Mixed Methods: This strategy combines both quantitative and qualitative data collection and analysis techniques. In this study, I utilize surveys for quantitative data on physiological factors and business metrics and interviews for qualitative insights into instructors' experiences and perceptions. This approach allows for a richer and more nuanced understanding of the complex phenomenon under investigation.

4. Fourth Layer: Research Choices

I choose to engage the Data Collection Methods like surveys to cover the design and administration of surveys to a representative sample of freelance yoga instructors, collecting quantitative data on relevant variables, interviews to cover the in-depth discussions conducted with selected instructors to gain deeper qualitative insights into their experiences and perspectives and content analysis to cover the analysis of aforementioned interview segments, other platforms and available literature related to yoga for content plan and AI to identify trends and patterns in how AI is being presented and utilized.

5. Data Analysis Methods:

Statistical Analysis: The method employed in the form of statistical tests (correlation mostly and regression as a peep into the post-doctoral scope) to analyze quantitative survey data and test the hypotheses about relationships between variables.

Thematic Analysis: Systematic analysis of interview transcripts and content analysis data to

identify recurring themes and patterns, offering a deeper understanding of the qualitative aspects of the research.

6. Core: Key Areas of Research (KAR)

The 3x3 Matrix: This matrix represents the heart of the research, outlining the key areas of inquiry and their interrelationships. It visually demonstrates the three dimensions you are exploring:

Horizontal Categories: The challenges and opportunities faced by freelance yoga instructors, the impact of AI on the yoga instruction landscape, and the potential of AI advancements in yoga and personal training

Vertical Categories: Challenges & Opportunities for Freelance Yoga Instructors, the transformative potential of AI in yoga instruction, extended tools and considerations in this area.

Diagonal Elements: The central research focus, encompassing hyper-personalization, the interplay of AI and its positive impact on instructors, and the accessibility and cost of AI solutions for addressing physiological challenges. KAR represents the core of the research which is the table illustrated in Table 3.3.1t.

Summary

1. The layers of the Research Onion are interconnected and influence each other.
2. The research philosophy (post-positivism) guides the approach (deductive) and strategy (mixed methods), which in turn inform the specific choices regarding data collection and analysis.

3. The core of the onion (KAR) represents the central focus of this research, shaping the entire methodological design.

3.8 Research Design for Part A of Research Question 1

Hypothesis

Physiological factors affect business for freelance Yoga instructors.

For this hypothesis in our area of research, we will need to design the parameters that attribute to our key elements. Parameters comprise of the variables to track as part of the research, key metrics to measure, and the questions that need to be addressed to test the hypothesis.
The rest of this section will cover the research design and process for testing this hypothesis.

Variables

Independent Variables:

- Physiological & other Factors:
    - Fatigue
    - Mental & physical exhaustion
    - Fitness level
    - Importance of fitness
    - Injuries
    - Time allocation

    - Stress
    - Administrative burden
    - Time constraints
    - Importance of physical presence
    - Burnout
    - Continuous learning
    - Personalization
    - Client understanding
    - Adaptability
    - Work-life balance

Dependent Variables:

- Perceived impact of physiological conditions on business
- Business metrics:
    - Client base size
    - Pricing
    - Marketing effort
    - Overall satisfaction
    - Overall business growth (Number of in-person sessions)

Extraneous Variables:

- Market demand: Popularity and demand for yoga instruction in the instructor's area.
- Economic factors: Economic conditions affecting the overall fitness industry.

- Instructor demographics: Age, gender, experience level, physical fitness.

Key Metrics that are needed for the research

Metric	Dependent Variable	Rationale
Physiological Strain Score	Perceived impact of physiological conditions on business	This metric directly reflects the instructor's physiological conditions when pursuing Yoga teaching as a freelance personal instructor.
Correlation between Physiological Strain Score and Business Performance Index	Perceived impact of physiological conditions on business	This metric directly reflects the instructor's physiological conditions when pursuing Yoga teaching as a freelance personal instructor and their impact on the instructor’s business performance.
Average Weekly Client Sessions	Client Base Size	This metric directly reflects the instructor's ability to attract and retain clients, which is a core element of their business potential.
Average Hourly Rate	Client Base Size	This metric directly reflects the instructor's ability to attract and retain clients, which is a core element of their business potential.
Weekly Marketing Time	Marketing Effort	This metric reflects the instructor's efforts to reach potential clients and grow their business.
Business Satisfaction Score	Overall Satisfaction	This subjective metric provides valuable insights into the instructor's overall perception of their business performance.

Research Questionnaire Approach

The approach and reasons that are considered for creating the research questionnaire is as follows:

1. Based on the research concept, literature review, the choice of methodology, research criteria and the key elements of research were derived.
2. From this the independent variables, dependent (target variables) and the metrics that contribute to the target variables were identified.
3. The research is designed to cover these variables as part of the questionnaire so that we can analyze the response for the signals (metrics) that contribute to the result of the hypothesis test.

Based on this approach for the current hypothesis, the focus is on physiological factors and the impact on business performance for freelance Yoga instructors doing Yoga personal training.

Considerations:

1. Ensured survey questions are clear, concise, and easy to understand.
2. Considered using a combination of open-ended and closed-ended questions to gather both quantitative and qualitative insights.
3. Ensured that the research adheres to all ethical guidelines.
4. Obtain informed consent from participants, ensure confidentiality, and minimize any potential harm to participants.
5. Since we have a few external factors grouped under extraneous variables that could influence the study even though they are not directly a part of it, the research procedure will include an approach to control these factors. This is covered in the research process section.

The Questionnaire

Research Questions for Freelance Yoga Trainers to address the first hypothesis,

Part A: Physiological Factors and Business

The origin and background for these questions

Based on these considerations, the recommendations and practices by renowned scholars in the forms supporting discourse theory and frameworks (such as, Davies and Harré, 1990: 45, Mama, 1995: 98. Weedon, 1987: 11, Davies (1999: 64)), the importance of social significance [can be interpreted to questions] (Stephenson, Kippax and Crawford, 1996), and the areas of topics covered in the literature reviewed (Melinda B. Abbott, 2018. Characteristics of successful personal trainers, Melton, D. I., Dail, T. K., Katula, J. A., & Mustian, K. M. (2010), Maguire, J. S. (2001). Fit and flexible: The fitness industry, personal trainers and emotional service labor etc.), we can arrive at the following questions.

Questions, KAR and Metrics Association

Now that the questions to cover the variables and derived metrics are identified, it is easy to map the questions to their corresponding research metrics.

Table 3.8.1t

A table representing questions for Part A of the research, key elements, and their metrics

Question	Key Element	Key Area of Research	Research Metric

1. How often do you experience fatigue due to teaching multiple yoga classes or sessions in a day?	Physiological Factors: Fatigue	Impact of Physiological Factors on Business Potential	Physiological Strain Score
2. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Often," how often do you feel physically or mentally drained after a yoga session?	Physiological Factors: Mental & Physical Exhaustion	Impact of Physiological Factors on Business Potential	Physiological Strain Score
3. Do you feel that your physical fitness level directly impacts your ability to teach yoga effectively?	Physiological Factors: Fitness Level	Impact of Physiological Factors on Business Potential	Physiological Strain Score
4. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Important," how important is it for you to maintain a high level of personal fitness to be a successful yoga instructor?	Physiological Factors: Importance of Fitness	Impact of Physiological Factors on Business Potential	Physiological Strain Score
5. How often do you experience injuries due to practicing or teaching yoga?	Physiological Factors: Injuries	Impact of Physiological Factors on Business Potential	Physiological Strain Score
6. How many hours per week do you dedicate to practicing yoga for personal development and fitness?	Physiological Factors: Time Allocation	Impact of Physiological Factors on Business Potential	Physiological Strain Score
7. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Stressed," how stressed do you feel due to the demands of being a freelance yoga instructor?	Physiological Factors: Stress	Impact of Physiological Factors on Business Potential	Physiological Strain Score
8. How often do you feel overwhelmed by the administrative tasks associated with your business, such as scheduling, marketing, and client communication?	Physiological Factors: Administrative Burden	Impact of Physiological Factors on Business Potential	Physiological Strain Score

9. Do you feel that your personal time constraints limit your ability to grow your business and reach more clients?	Physiological Factors: Time Constraints	Impact of Physiological Factors on Business Potential	Physiological Strain Score
10. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Important," how important is it for you to be physically present at a specific location to effectively teach yoga?	Physiological Factors: Importance of Physical Presence	Impact of Physiological Factors on Business Potential	Physiological Strain Score
11. How often do you feel a lack of motivation or inspiration to continue as a freelance yoga instructor?	Physiological Factors: Burnout	Impact of Physiological Factors on Business Potential	Physiological Strain Score
12. Do you find it challenging to stay up-to-date with the latest trends and advancements in yoga instruction?	Physiological Factors: Continuous Learning	Impact of Physiological Factors on Business Potential	Physiological Strain Score
13. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Difficult," how difficult is it for you to create a personalized yoga plan for each client based on their unique needs and goals?	Physiological Factors: Personalization	Impact of Physiological Factors on Business Potential	Physiological Strain Score
14. How often do you feel a disconnect or lack of understanding between yourself and your clients in terms of their expectations, goals, and preferences?	Physiological Factors: Client Understanding	Impact of Physiological Factors on Business Potential	Physiological Strain Score
15. Do you find it difficult to adapt your teaching style to cater to different client demographics, including age, fitness level, and cultural backgrounds?	Physiological Factors: Adaptability	Impact of Physiological Factors on Business Potential	Physiological Strain Score

16. How often do you feel limited in your ability to connect with and grow your client base due to geographical constraints?	Physiological Factors: Geographical Limitations	Impact of Physiological Factors on Business Potential	Physiological Strain Score
17. How many clients do you currently have on average?	Business Metrics: Client Base Size	Impact of Physiological Factors on Business Potential	Average Weekly Client Sessions
18. What is your average charge per session per client as a personal yoga instructor?	Business Metrics: Pricing	Impact of Physiological Factors on Business Potential	Average Hourly Rate
19. How much time do you spend on average in a week on marketing your services?	Business Metrics: Marketing Effort	Impact of Physiological Factors on Business Potential	Weekly Marketing Time
20. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Satisfied," how satisfied are you with the current state of your business?	Business Metrics: Overall Satisfaction	Impact of Physiological Factors on Business Potential	Business Satisfaction Score
21. Do you feel that your business growth has been hindered due to your physiological limitations?	Impact of Physiological Factors on Business Potential: Overall Impact	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index
22. How often do you feel the need for additional training, education, or resources to enhance your teaching skills and knowledge?	Physiological Factors: Continuous Learning	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index

23. Do you feel that your business potential is limited by the lack of a robust network of fellow instructors or mentors?	Physiological Factors: Community Support	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index
24. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Important," how important is it for you to have access to a community of yoga instructors for support, inspiration, and professional development?	Physiological Factors: Importance of Community	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index
25. How often do you find it difficult to balance your personal life with the demands of running your freelance yoga business?	Physiological Factors: Work-Life Balance	Impact of Physiological Factors on Business Pote	Correlation between Physiological Strain Score and Business Performance Index
26. Do you believe being physically present for each personal training client is indispensable?	Impact of AI on Business Potential: Virtual vs. In-Person	Impact of Physiological Factors on Business Potential	Physiological Strain Score
27. How many physically-present (in-person) Yoga personal training 1 on 1 (or a group less than 5) sessions do you manage to cover in a day on average?	Business Metrics: Number of In-Person Sessions	Impact of Physiological Factors on Business Potential	Physiological Strain Score
28. What style of Yoga practice do you teach?	Impact of AI on Business Potential: Yoga Style	Impact of Physiological Factors on Business Potential	Perception of Replacement Potential

Note: The table has the research questions and related attributes for part A of the research. Based on these questions and the key metric against each, we would be able to arrive at the target dependent variables: physiological strain, business metrics and perceived impact of physiological conditions on business.

3.9 Research Design for Part B of Research Question 1

Hypothesis

B1) AI adoption in Yoga personalization limits traditional instructors' opportunities and market potential rather than augmenting their presence.

B2) AI potential in Yoga personal training can augment the presence of freelance Yoga instructors and increase market potential

For this hypothesis in our area of research, we will need to design the parameters that attribute to our key elements. Parameters comprise of the variables to track as part of the research, key metrics to measure, and the questions that need to be addressed to test the hypothesis.

The rest of this section will cover the research design and process for testing this hypothesis.

Variables

Independent Variables

- Familiarity with AI-powered yoga platforms
- Use or consideration of AI-powered tools
- Specific AI-powered tool selection (pose correction apps, virtual yoga instructors, personalized plan generators, client management app, continuous learning tools)
- Concerns about AI replacement
- Perceived benefits for instructors and practitioners

- Market expansion Potential with AI-powered tools
- Concerns about AI use in yoga instruction
- Data & insights provided by AI-powered platforms
- Efficiency & workload reduction with AI
- Overcoming physiological limitations with AI
- Virtual Yoga enhancement with AI
- Accessibility & affordability of AI-powered Yoga instruction
- Ethical concerns about AI in Yoga
- AI as supplement vs. replacement

Dependent Variables

- Impact of AI on Business Potential:
    - Perceived impact of AI replacement potential
    - Perceived impact of AI on increasing virtual presence
    - Perceived impact of AI on expanding market reach
    - Overall impact of AI on business potential

Extraneous Variables

- Market demand: Popularity and demand for Yoga instruction in the instructor's area.
- Economic factors: Economic conditions affecting the overall fitness industry.
- Instructor demographics: Age, gender, experience level, physical fitness.

Key Metrics that are needed for the research

Metric	Dependent Variable	Rationale
AI Tool Usage (can cater to both sub parts of the hypothesis: B1 and B2)	Overall Impact of AI on business potential	These questions gather information about instructors' familiarity with, experience using, and perceptions of AI-powered yoga tools, providing insights into the potential for AI to augment or replace their roles.
Perception of AI Replacement Potential (to test hypothesis B1)	Impact of AI on Business Potential	These questions directly address the instructors' concerns about AI potentially replacing their roles as personalized yoga instructors.
AI-Assisted Virtual Training Potential (to test hypothesis B2)	Perceived Impact of AI on increasing virtual presence	These questions assess the instructors' perceptions about a hypothetical AI-assisted virtual training system, gauging the potential for AI to enhance their reach and client base.
AI-Assisted Relevance and Scaling Potential (to test hypothesis B2)	Perceived Impact of AI on expanding market reach	These questions assess the instructors' perceptions about a hypothetical AI-assisted virtual training system, gauging the potential for AI to scale their client base and increase relevance.

Research Questionnaire Approach

The approach and reasons that are considered for creating the research questionnaire is as follows:

1. Based on the research concept, literature review, the choice of methodology, research criteria and the key elements of research were derived.
2. From this the independent variables, dependent (target variables) and the metrics that contribute to the target variables were identified.
3. The research is designed to cover these variables as part of the questionnaire so that we can analyze the response for the signals (metrics) that contribute to the result of the hypothesis test.

Based on this approach for the current hypothesis, the focus is on the potential of AI in augmenting the presence of freelance Yoga instructors in personal training and its impact on business performance for freelance Yoga instructors doing Yoga personal training.

Considerations:

1. Ensured survey questions are clear, concise, and easy to understand.
2. Considered using a combination of open-ended and closed-ended questions to gather both quantitative and qualitative insights.
3. Ensure that your research adheres to all ethical guidelines.
4. Obtain informed consent from participants, ensure confidentiality, and minimize any potential harm to participants.
5. Since we have a few external factors grouped under extraneous variables that could influence the study even though they are not directly a part of it, the research procedure

will include an approach to control these factors. This is covered in the research process section.

The Questionnaire

Research Questions for Freelance Yoga Trainers to address the second hypothesis, Part B: AI for Instructor Opportunities

The origin and background of these questions

Based on these considerations, the recommendations and practices by renowned scholars in the forms supporting discourse theory and frameworks (such as, Davies and Harré, 1990: 45, Mama, 1995: 98. Weedon, 1987: 11, Davies (1999: 64)), the importance of social significance [can be interpreted to questions] (Stephenson, Kippax and Crawford, 1996), and the areas of topics covered in the literature reviewed (Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), Bhavana & Kumar (2017), Mishra (2020), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Jang et al. (2015), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022)), we can arrive at the following questions.

Questions, KAR and Metrics Association

Now that the questions to cover the variables and derived metrics are identified, it is easy to map the questions to their corresponding research metrics.

Table 3.9.1t

A table representing questions for Part B of the research, key elements, and their metrics

Question	Key Element	Key Area of Research	Research Metric
1. Are you familiar with AI-powered yoga instruction apps or platforms?	AI Adoption: Familiarity	Potential AI Advancements in Yoga Personal Training	AI Tool Usage
2. If yes, have you ever used or considered using such AI-powered tools for your yoga instruction?	AI Adoption: Use/Consideration	Potential AI Advancements in Yoga Personal Training	AI Tool Usage
3. If yes, what specific AI-powered tools have you used or are considering using? (choose one of the 5: pose correction apps, virtual yoga instructors, personalized plan generators, client management app, continuous learning tools)	AI Adoption: Specific Tool Selection	Potential AI Advancements in Yoga Personal Training	AI Tool Usage
4. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Concerned," how concerned are you about the potential for AI to replace traditional yoga instructors instead of helping augment their business?	AI Adoption: Concerns about Replacement	Impact of AI on Business Potential	Perception of AI Replacement Potential
5. Do you believe that AI-powered yoga platforms offer benefits for both instructors and practitioners?	AI Adoption: Perceived Benefits	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
6. If yes, what specific benefits do you see for instructors?	AI Adoption: Instructor Benefits	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
7. If yes, what specific benefits do you see for practitioners?	AI Adoption: Practitioner Benefits	Potential AI Advancements in Yoga Personal Training	AI Tool Usage

8. Do you think that AI-powered yoga platforms could help you reach a wider audience and expand your business?	AI Adoption: Market Expansion Potential	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
9. If yes, how do you think AI-powered tools could help you achieve this?	AI Adoption: Market Expansion Methods	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
10. What are your concerns about the use of AI in yoga instruction?	AI Adoption: Concerns about AI Use	Impact of AI on Business Potential	Perception of AI Replacement Potential
11. Do you think that AI-powered yoga platforms could provide valuable data and insights into client behavior and preferences?	AI Adoption: Data & Insights	Impact of AI on Business Potential	Perceived Value of AI-Generated Data
12. If yes, how could you utilize such data to enhance your teaching and business strategies?	AI Adoption: Data Application	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
13. Do you believe that AI could help you improve your teaching efficiency and reduce the workload associated with administrative tasks?	AI Adoption: Efficiency & Workload Reduction	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
14. If yes, how do you think AI could assist you in these areas?	AI Adoption: Specific AI Assistance	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
15. Do you see a potential for AI to help you overcome the physiological limitations you face as a freelance instructor?	Impact of AI on Business Potential: Overcoming Physiological Limitations	Impact of AI on Business Potential	AI-Assisted Virtual Training Potential
16. If yes, how could AI be used to address these limitations?	Impact of AI on Business Potential: Overcoming Physiological Limitations	Impact of AI on Business Potential	AI-Assisted Virtual Training Potential

17. Do you think AI could help you create more engaging and personalized virtual yoga sessions for your clients?	Impact of AI on Business Potential: Virtual Yoga Enhancement	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
18. If yes, how could AI enhance the virtual yoga experience for both instructors and clients?	Impact of AI on Business Potential: Virtual Yoga Enhancement	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
19. Imagine a system where you are able to configure your inputs to simulate your personal Yoga training essence, skill level, focus, instruction style and cultural inclination into an AI-assisted virtual trainer assistant that imparts this custom personal trainer in your clients' training sessions, even without you having to be virtually present (optionally) in real time during practice. Will this be able to improve and scale your training presence and enable you to be personal-training more clients at the same time, thereby increasing your simultaneous training reach and market potential?	Impact of AI on Business Potential: AI-Assisted Virtual Trainer	Impact of AI on Business Potential	AI-Assisted Virtual Training Potential
20. Do you think such a system would be able to customize and personalize Yoga personal training plan for each client based on their personalization needs and your style/skill and teaching orientation, thereby creating more alignment in terms of "right supply" of clients for your demands as an instructor?	Impact of AI on Business Potential: AI-Assisted Personalization	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
21. Do you think such a system capable of creating the right alignment (matching client base) would maximize your business potential as an instructor by expanding your training region and territory of reach?	Impact of AI on Business Potential: AI-Assisted Market Expansion	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential

22. Do you think that AI could be used to create more accessible and affordable yoga instruction for a wider range of individuals?	AI Adoption: Accessibility & Affordability	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
23. Do you have any concerns about the potential for bias or inequality in AI-powered yoga platforms?	AI Adoption: Ethical Concerns	Impact of AI on Business Potential	Perception of AI Replacement Potential
24. Do you think that AI should be used to supplement traditional yoga instruction, rather than replacing it entirely?	AI Adoption: AI as Supplement vs. Replacement	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
25. If you conduct virtual personal training for Yoga for your clients, do you feel they get the same personalized experience that they get in-person?	Impact of AI on Business Potential: Virtual vs. In-Person	Impact of Physiological Factors on Business Potential	AI-Assisted Virtual Training Potential
26. Do you think your clients are with you because of your unique style, focus, skill level, culture inclination and instruction style in Yoga? Yes or No.	Impact of AI on Business Potential: Instructor Uniqueness	Impact of Physiological Factors on Business Potential	AI-Assisted Virtual Training Potential
27. If yes, what is your unique style of instruction, skill level of teaching and culture inclination (if applicable)?	Impact of AI on Business Potential: Instructor Uniqueness	Impact of Physiological Factors on Business Potential	AI-Assisted Virtual Training Potential
28. If not, do you think they can just as well be trained by anyone else or by recorded videos or apps as an alternative?	Impact of AI on Business Potential: Instructor Replaceability	Impact of Physiological Factors on Business Potential	Perception of Replacement Potential
29. What are your overall thoughts on the potential impact of AI on the future of personal freelance yoga instruction?	Impact of AI on Business Potential: Overall Impact	Potential AI Advancements in Yoga Personal Training	AI Tool Usage

Note: The table has the research questions and related attributes for part B of the research. Based on these questions and the key metric against each, we would be able to narrow down the results for the tests: 1) If AI impacts (reduces) freelance Yoga instructors' opportunities with

automated self-paced practice instead of augmenting the presence of these Yoga instructors and 2) If AI advancements can augment presence of freelance Yoga instructors for Yoga personal training and scale their market potential. The results are represented by the dependent variables perceived impact of AI replacement potential, perceived impact of AI on increasing virtual presence, perceived impact of AI on expanding market reach and overall impact of AI on business potential.

3.10 Research Procedure Overview

This section outlines the research procedures for collecting and analyzing data to investigate the hypothesis related to the impact of physiological factors and AI on freelance yoga instructors' business potential:

Data Collection Method

This research will employ a mixed-methods approach, combining quantitative and qualitative data collection techniques: Previously I have mentioned the different methods of data collection I would employ in this research. In this section, I cover how and what aspects are addressed with those chosen methods.

Quantitative Data Collection

Surveys

The primary method for collecting quantitative data will be online surveys administered to a **sample of freelance yoga instructors**. The surveys will contain **structured questions** we covered in the above section designed to gather information on:

Physiological Factors: Fatigue, stress, injuries, fitness levels, time allocation, burnout, continuous learning, personalization, client understanding, adaptability, other limitations, and work-life balance.

Business Metrics: Client base size, pricing, marketing effort, overall satisfaction, and business growth (number of in-person sessions) etc.

AI Adoption: Familiarity with AI-powered platforms, use or consideration of AI tools, specific AI tool selection, concerns about AI replacement, perceived benefits for instructors and practitioners, market expansion potential with AI tools, concerns about AI use in yoga instruction, data and insights provided by AI platforms, efficiency and workload reduction with AI, overcoming physiological limitations with AI, virtual yoga enhancement with AI, accessibility and affordability of AI, ethical concerns about AI, and AI as a supplement versus a replacement.

Data will be collected in a secure online platform ensuring confidentiality and data security.

Qualitative Data Collection

Semi-structured Interviews

In-depth interviews will be conducted with a **smaller, purposefully selected** sample of freelance yoga instructors. These interviews will allow for a deeper exploration of the open questions covered in the questionnaire section:

Experiences with AI: Instructors' perceptions of AI-powered yoga tools, their impact on business, and their concerns regarding AI replacing human instructors.

Physiological Challenges: Insights into the specific physiological limitations instructors face, their impact on business, and their strategies for managing these challenges.

AI's Potential: Exploring instructors' perceptions of AI's potential to augment their capabilities, expand their reach, and enhance their overall business.

Content Analysis: Yoga instructors style of teaching and how session plans for clients are constructed. Additionally, considering online platforms, and materials related to Yoga and AI-powered yoga services will be analyzed to identify themes, trends, and messaging regarding AI's role in yoga instruction.

Population

For the purpose of practicality and scope, the research area for this study is limited to the city of Bangalore. This is the region that we consider the research population from. The population is made of Yoga instructors who consider personalized freelance Yoga instruction for their profession in the city of Bangalore. The population can also include general practitioners and enthusiasts to record their view of the problem statement and how they view this as a business.

Data Sampling Approach

To ensure a representative sample and robust data analysis, the following sampling approach will be used:

Quantitative Data (Surveys)

Probability Sampling:

A random sampling technique will be used to ensure that each freelance yoga instructor within the population has an equal chance of being selected for participation in the survey. This method helps minimize bias and improve the generalizability of findings.

Stratified Random Sampling:

The population of freelance yoga instructors will be stratified based on key characteristics, such as age group, gender, years of experience, geographic location within Bangalore (North, South, East and West), and teaching style. Stratification ensures that each group is proportionally represented in the sample, enhancing the representativeness of the data.

Qualitative Data (Interviews)

Purposive Sampling:

The selection of interview participants will be based on their specific experiences with AI, physiological challenges, and perspectives on the potential of AI in yoga instruction. This approach aims to gather rich insights from individuals with diverse backgrounds and experiences related to the research questions and consists even of enthusiasts in this research area.

Sample Size

Quantitative Data (Surveys)

Sample Size Calculation:

The sample size for the surveys will be determined using a power analysis based on the desired statistical power, effect size, and significance level. This method helps ensure that the sample size is sufficiently large to detect statistically significant differences or correlations between the variables.

Minimum Sample Size:

A minimum sample size of 100 participants is adhered, as recommended for surveys to ensure sufficient data for robust statistical analysis and to generalize findings to a larger population.

Qualitative Data (Interviews)

Saturation Point:

The number of interviews will be determined by the point of saturation, where no new themes or insights emerge from additional participants.

Minimum Interview Number:

A minimum of 10-15 interviews is adhered, as recommended to achieve saturation and provide sufficient depth to the qualitative data analysis.

3.11 Research Procedure Steps

The following steps will be followed to conduct the research:

Step 1: Recruitment

Freelance yoga instructors will be recruited for questionnaires and interviews through online platforms, professional networks, and targeted outreach efforts. Yoga entrepreneurship related meetup group events and sessions also allow for semi-structured interviews. This is another way I intend to meet and interact with Yoga instructors and practitioners who are part of these instructors' sessions.

Step 2: Data Collection

Participants will be invited to complete the online survey, and a select group will be chosen for semi-structured interviews. Content analysis of relevant AI-powered yoga platforms and marketing materials will be conducted concurrently.

Step 3: Data Cleaning and Coding

Survey responses will be cleaned for errors and inconsistencies, while interview transcripts will be coded for key themes and patterns.

Step 4: Data Analysis

Quantitative data will be analyzed using statistical tests, while qualitative data will be analyzed through thematic analysis.

Step 5: Report Writing

The research findings will be presented in a detailed report, including a summary of the data, analysis, and interpretation of the findings.

3.12 Handling extraneous variables

Handling the extraneous variables means that the study is more likely to investigate how the independent variable and not other variables affect the dependent variable by controlling the effect of these extraneous variables on the test. Since we have a few external factors grouped under extraneous variables that could influence the study even though they are not directly a part of it, the approach would be to include the following consideration in the interview and interpretation of the research procedure. The questions are standardized and test conditions are well informed in detail to the participants.

Standardizing experiments

All participants are interviewed in the same conditions and parameters where applicable and the scope of study is limited to one region as well. To minimize the impact of extraneous variables on the research findings, the following strategies will be employed in this research:

- **Controlled Demographic Choice:** The research questionnaire will collect demographic information about participants, such as age, gender, years of experience, and geographic location. This information will be used to control for these factors during data analysis. The region is limited to Bangalore to limit and standardize the scope for research.
- **Controlled Market Choice:** Data collection will be done in the areas of prevalence of yoga instruction, and this information will be used to control for variations in market demand.
- **Controlled Time & Condition:** Data will be collected on the overall state of the fitness industry in the instructors' regions to control for economic influences on business performance at a time when there is no specific impact or influence in the economy of the Yoga personal training industry.

Randomization

In scenarios where standardization is not possible, we ensure the extraneous variables are considered in the allocation of participants and are assigned randomly in the questionnaire process.

Counterbalancing

To reduce the effect of order in the process, it is ensured that the questions are mixed up and not in the same order for each participant or group.

Matching

If randomization is not possible, matching techniques can be used to ensure that the groups are comparable on important extraneous variables (e.g., age, experience level).

Statistical Control

Statistical techniques (regression analysis) can be used to control the effects of extraneous variables during the data analysis stage.

- Example Scenario:

  Let's say we find that freelance yoga instructors who experience high levels of stress also report lower client retention rates. We might try to conclude that stress directly causes lower retention. However, if we discover through extraneous variable questions that the stressed instructors also work in areas with less demand for yoga, then we can more

accurately conclude that market demand is likely a confounding factor, not just the stress itself.

Questions to handle Extraneous Variables

Based on this, here are the questions that will be used to help control the impact of extraneous variables on this research.

For Research Question 1, Part A (Physiological Factors)

1. How would you rate the overall demand for yoga instruction in the areas / region you teach? (e.g., High, Medium, Low)

   This helps account for variations in market saturation and overall interest in yoga in different regions.
2. Has the current economic climate affected your business (e.g., client spending, class attendance)?
3. If so, how?

   Economic downturns can impact the fitness industry, so this helps control for that variable.
4. What is your age range?
5. What is your gender?
6. How many years of experience do you have as a yoga instructor?
7. How would you rate your overall fitness level? (e.g., Excellent, Good, Fair)

   These questions allow you to control for potential demographic differences that might influence physiological factors or business performance.

For Research Question 1, Part B (AI Impact)

1. Are you aware of any significant changes in the demand for yoga instruction due to the emergence of AI-powered platforms?
2. If so, how have these changes impacted your business?

   This helps assess if AI platforms have influenced consumer preferences or the overall yoga market.
3. Do you believe that AI-powered tools would be more appealing to younger or older yoga instructors?
4. Why?

   This helps control for potential demographic biases in AI adoption among instructors.

By carefully addressing these potential extraneous variables, we can increase the internal validity of this research, making findings more reliable and convincing.

3.13 Ethical Considerations

The following ethical considerations will guide this research:

Informed Consent

All participants will be fully informed about the research objectives, procedures, and potential risks before providing informed consent to participate.

Confidentiality and Anonymity

Participants' identities will be kept confidential, and their data will be anonymized before analysis to protect their privacy.

Data Security

All data will be stored securely, and access will be restricted to authorized researchers.

Researcher Bias

As a researcher I am mindful of self biases and strive for objectivity in the research process.

3.14 Population, Sampling and Research Procedure Summary

Based on the research procedure, process steps and considerations above, the research procedure for the 2 enquiries in this thesis can be summarized as follows:

This research investigates the impact of physiological factors and AI on the reach and business potential of freelance yoga instructors in Bangalore. The study employs a mixed-methods approach, combining quantitative data from surveys and qualitative data from semi-structured interviews and content analysis. This section summarizes the population, sampling strategy, and research procedures employed to ensure robust and reliable findings.

Table 3.14.1t

A table representing the research steps and other details

Research Data Details	Step Taken	Number (where applicable)	Source
Population	The study focuses on the population of freelance yoga instructors in Bangalore,	3200 to 5500 freelance personal Yoga Instructors ROUGHLY	The estimate for the total number of yoga instructors in Bangalore is primarily derived from a combination of online sources and general

	including those offering personalized instruction, practitioners, and enthusiasts. This specific geographic location allows for a controlled study environment and ensures a consistent understanding of the local yoga market.		knowledge about the yoga industry in Bangalore. While there's no single definitive source providing an exact count, here's a breakdown of where the information likely originates: Web searches: Searching for "yoga instructors in Bangalore" or similar queries can lead to websites, articles, or directories listing yoga studios and instructors in the city. These listings often mention the number of instructors associated with them or provide broader estimates for the city. For example, a search result might state something like "There are over 4,200 yoga instructors in Bangalore" or "Bangalore has a thriving yoga community with thousands of instructors." Industry reports and surveys: Yoga teacher training schools, yoga associations, or fitness industry research organizations might publish reports or conduct surveys about the yoga industry in India, including estimates of the number of yoga instructors in different cities. Local yoga communities and forums: Online platforms and social media groups for yoga practitioners in Bangalore could have discussions or posts that mention the number of instructors in the city, providing anecdotal evidence or insights based on their experiences. https://www.urbanpro.com/bangalore/yoga-classes
Sample	A multi-pronged approach was used to recruit a representative sample:	Quantitative Spot Quiz: 200 Quantitative Detailed: 100	I conducted the data collection process based on the procedure and questions on the inquiries mentioned in the previous sections of this

	Quantitative Data (Surveys): A probability sampling method, specifically stratified random sampling, was employed to ensure a balanced representation of instructors based on age, gender, experience, geographic location within Bangalore, and teaching style. This approach minimizes bias and enhances the generalizability of findings to the wider population of freelance yoga instructors in Bangalore. Qualitative Data (Interviews): A purposive sampling strategy was utilized to select interview participants with diverse experiences with AI, physiological challenges, and perspectives on AI's potential in yoga instruction. This approach allows for in-depth exploration of specific themes and insights related to the research questions.	Qualitative Detailed: 25	research.
Research Procedure	The data collection process adhered to a structured protocol, ensuring consistency and minimizing potential for bias: Data Collection: Online surveys were administered to a minimum of 100 participants, while semi-structured interviews were conducted with a minimum of 25 participants. Additionally, content analysis of relevant AI-powered yoga platforms and marketing	Almost all of the samples collected were complete. Cleaning was done to spot quizzes.	

	materials was conducted. Spot quizzes were also conducted for 200 audiences for focused responses on the research inquiries 1 and 2 (part A and B). Data Cleaning and Coding: Collected data underwent thorough cleaning to ensure accuracy and consistency. Interview transcripts were coded for thematic analysis, revealing key patterns and insights.		
Mode	• Questionnaire form sent over email and internet • Instagram, Facebook & LinkedIn • In-person discussions, conference calls and meetup group attendance		
Considerations	Handling Extraneous Variables: To ensure the study's internal validity, several strategies were employed to control for potential extraneous variables: Standardization: Data collection procedures were standardized, ensuring consistent interview conditions and limiting the research scope to Bangalore. Controlled Demographic and Market Choice: Demographic information and market data were		

	collected and analyzed to account for potential influences on findings. Controlled Time & Condition: The study considered the broader economic context of the fitness industry to control for external influences on business performance. Randomization: Randomization was used in instances where standardization was not feasible, ensuring even distribution of extraneous variables. Counterbalancing: The order of questions was randomized to minimize potential order effects. Statistical Control: Statistical techniques like regression analysis were used to control for extraneous variables during data analysis. Ethical Considerations: The research was conducted with a strong focus on ethical considerations, ensuring: Informed Consent: Participants were informed about the research objectives, procedures, and potential risks before providing informed consent. Confidentiality and Anonymity: Participant identities were kept confidential, and data was		

	anonymized to protect privacy. Data Security: Data was stored securely, with access restricted to authorized researchers. Researcher Bias: I was mindful of personal biases and strived for objectivity throughout the research process.		

Note: The above table represents the research steps and their attributes.

In conclusion, the chosen population, sampling methods, and rigorous research procedures ensure the collection of robust and reliable data for this doctoral thesis. The comprehensive analysis of both quantitative and qualitative data, combined with strategies for handling extraneous variables and addressing ethical concerns, contribute to the internal and external validity of the study. This methodological approach provides a solid foundation for drawing meaningful and impactful conclusions regarding the impact of physiological factors and AI on the business potential of freelance yoga instructors in Bangalore.

3.15 A checkpoint of the structure of the research and analysis

Here's a breakdown of the steps I took to write the research report, considering the methodology chosen:

Abstract: A concise summary of the research, including the research question, methodology, key findings, and implications.

Introduction: Brief introduction of the problem, its significance, and how your research addresses the gap in existing literature.

Literature Review: Summary of the most relevant studies and theories that underpin the research, highlighting the key gaps you're addressing.

Methodology:

Research Paradigm: Explanation of the choice of post-positivism, including its strengths and limitations in relation to the research question.

Research Design: Explanation of the mixed-methods approach, including the rationale for choosing both quantitative and qualitative methods.

Data Collection: Description of the specific data collection methods (surveys, interviews, content analysis) and the steps taken to recruit participants.

Data Analysis: Detailed statistical and thematic analysis methods used and explanation of how they were appropriate for the research question.

Ethical Considerations: Explanation of how informed consent, anonymity, data security, and minimized researcher bias are ensured.

Limitations: Acknowledgement of the limitations of the study, such as sample size, potential biases, and the inability to establish definitive causal relationships.

Results:

Quantitative Results: Presentation of the quantitative findings clearly and concisely, using tables, figures, and statistical significance testing.

Qualitative Results: Presentation of the thematic analysis findings, providing illustrative quotes and examples from interviews or content analysis.

Discussion:

Interpretation: Explanation of the findings and how they relate to the research question.

Contributions: Discussion of how the findings contribute to the existing body of knowledge and what implications they have for the field of yoga instruction.

Future Research: Suggest potential directions for future research based on the gaps or inconsistencies uncovered.

Conclusion: Summarization of the key findings, restating the significance of the research, and reiteration of its implications for practice.

References & Appendices: Inclusion of any references and supplemental information, such as surveys, interview questions, or detailed tables of data.

In this structure, we have already completed the abstract, concept introduction, literature review, methodology and procedure. The rest of this research process covers the analysis and processing of the data collected and conclusive summary of the report.

Organizing the findings

Quantitative Data: Analyze the survey data using the statistical tests outlined (correlation, regression). Create tables, charts, and figures to visually represent the findings and highlight significant correlations.

Qualitative Data: Conduct thematic analysis on the interview transcripts and content analysis. Identify key themes, patterns, and recurring ideas that emerge from the data.

Interrelation of Data: Identify connections between quantitative and qualitative results. Where do they confirm or challenge each other?

3.16 Quantitative Analysis

This section presents a quantitative analysis of the data collected for the research focusing on the impact of physiological factors and AI on freelance yoga instructors' business potential in Bangalore. The analysis utilizes **exploratory analysis, regression and correlation** techniques to investigate the hypotheses formulated in the research methodology.

Research Question 1 Part A: Physiological Factors Impacting Freelance Yoga Business Potential

Hypothesis: Physiological factors affect the business performance of freelance yoga instructors.

Variables:

Independent Variables: Fatigue, Mental & Physical Exhaustion, Fitness Level, Importance of Fitness, Injuries, Time Allocation, Stress, Administrative Burden, Time Constraints, Importance of Physical Presence, Burnout, Continuous Learning, Personalization, Client Understanding, Adaptability, Work-Life Balance.

Dependent Variables (Target):

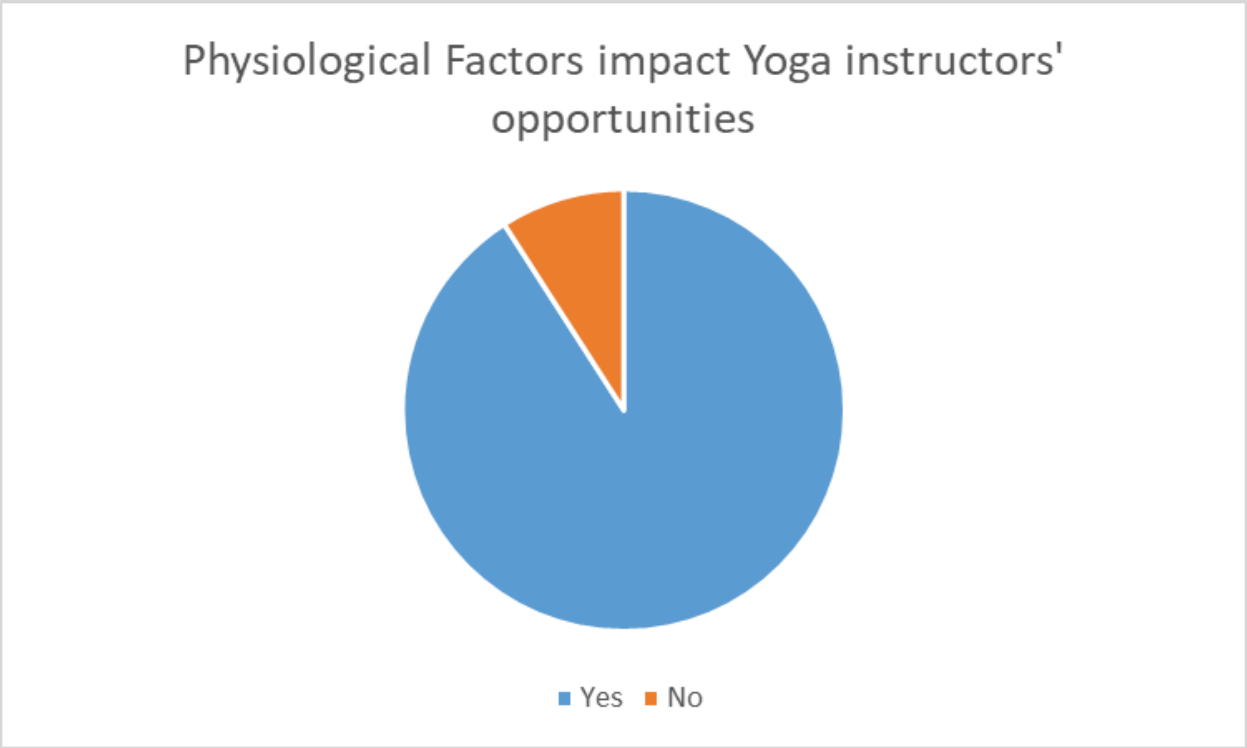
- **Perceived Impact of Physiological Conditions on Business:** This is a subjective measure of how instructors perceive physiological factors impacting their business. However in this section, we are calculating this objectively with 1s and 0s to represent negative impact and no impact characteristics respectively.

    - Physiological Strain Score
- **Business Performance Index:** This composite index is constructed from the following business metrics:
    - Average Weekly Client Sessions
    - Average Hourly Rate
    - Weekly Marketing Time
    - Business Satisfaction Score
- **Average Number of In-Person Sessions:** This metric reflects the instructor's ability to conduct physically present sessions.

Statistical Analysis

Chart 3.16.1:

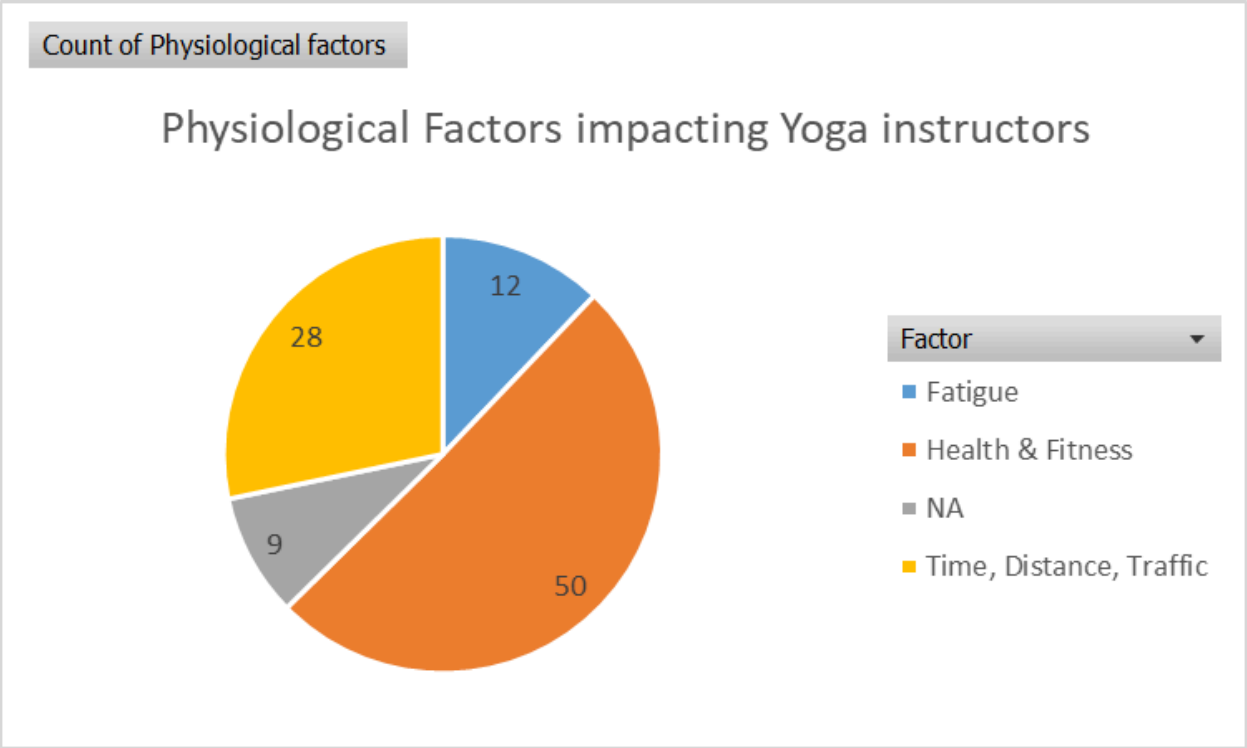
Perceived Impact of Physiological Conditions on Personal Yoga Instructors' Business:



Note: From the responses submitted by the freelance Yoga instructors, we can see that the data points that 91% of the participants face negative impact on business opportunities in freelance Yoga personal instruction because of physiological factors.

Chart 3.16.2:

The factors influencing the business opportunities negatively from the data:



The pie charts above represent the following:

Metric: Percentage of instructors experiencing impact from physiological factors (Health & Fitness, Time, Distance, Traffic, Fatigue)

Chart: Pie chart showing the proportion of instructors experiencing each factor.

Considerations addressing Extraneous Variables:

These considerations are applicable for **all** the inquiries of the current research:

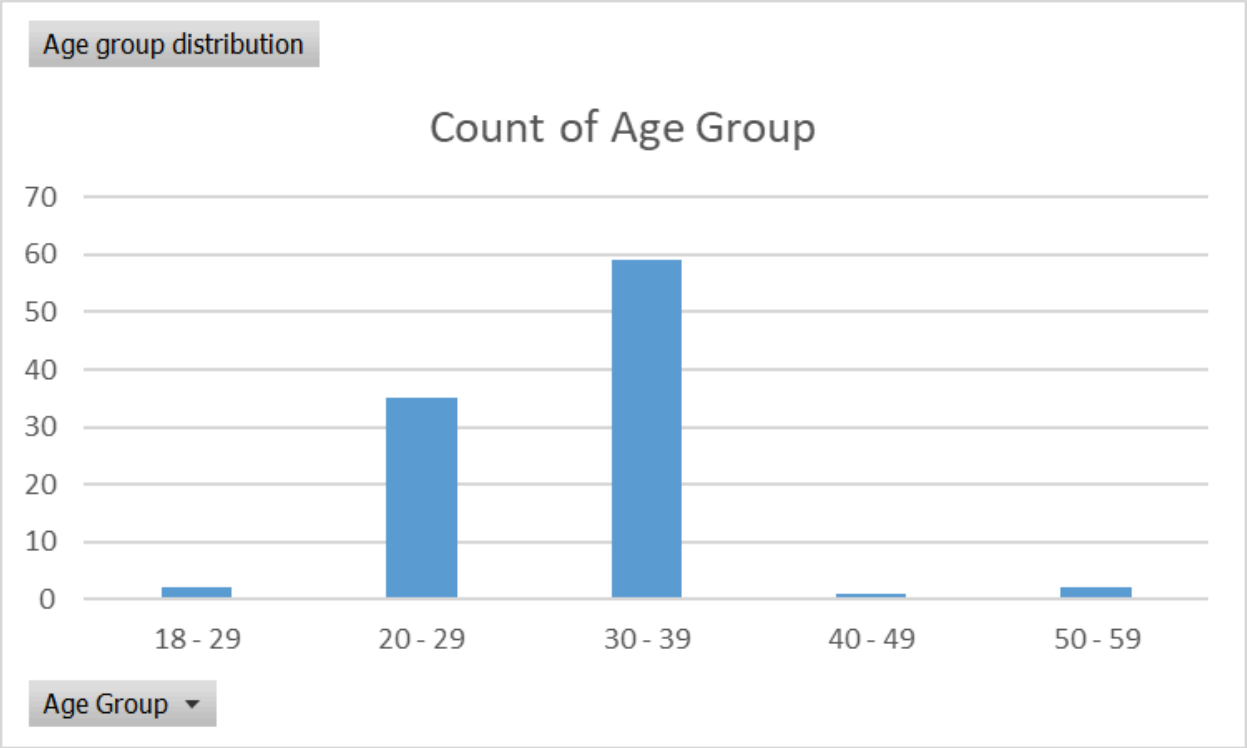
1. **Age group distribution:**

   Metric: Number of instructors in each age group (20-29, 30-39, 40-49, 50-59, 18-29).

   Chart: Bar chart showing the number of instructors in each age group.

Chart 3.16.3:

Age distribution of the instructors participating in the research



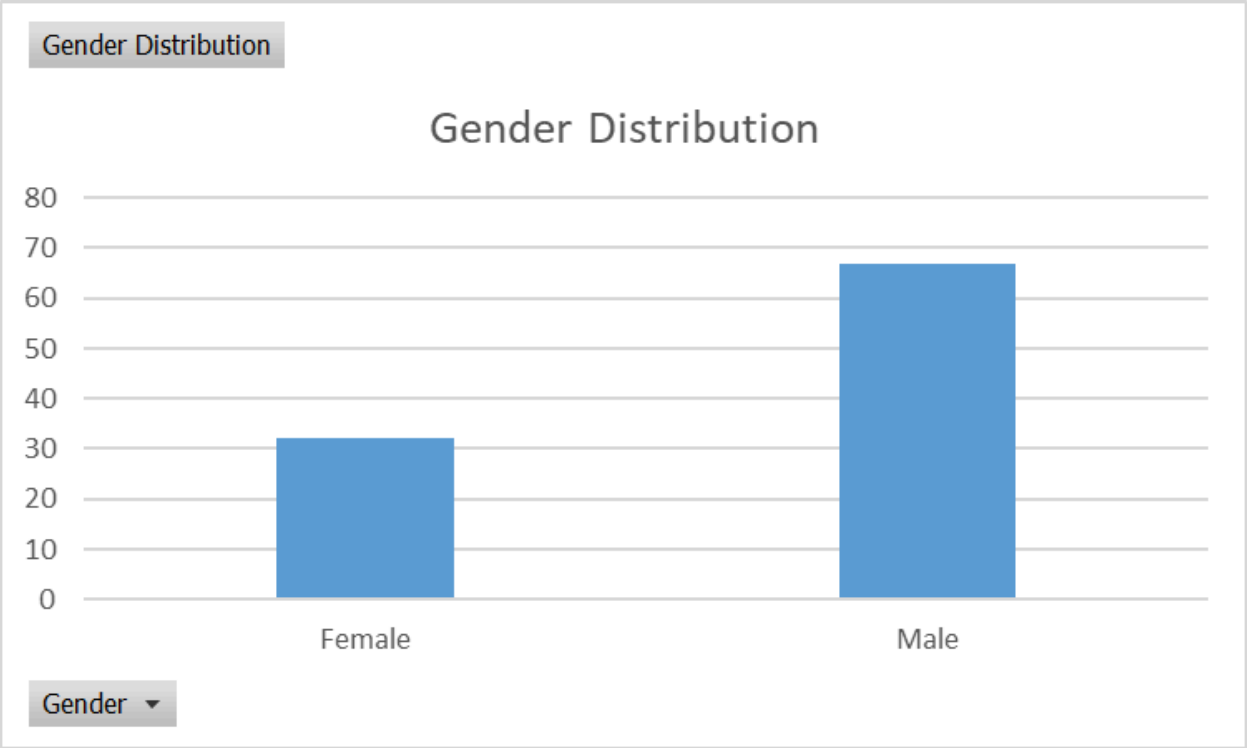
2. **Gender distribution:**

   Metric: Number of instructors by gender.

   Chart: Bar chart showing the number of instructors for each gender.

Chart 3.16.4:

Gender distribution of the instructors participating in the research:

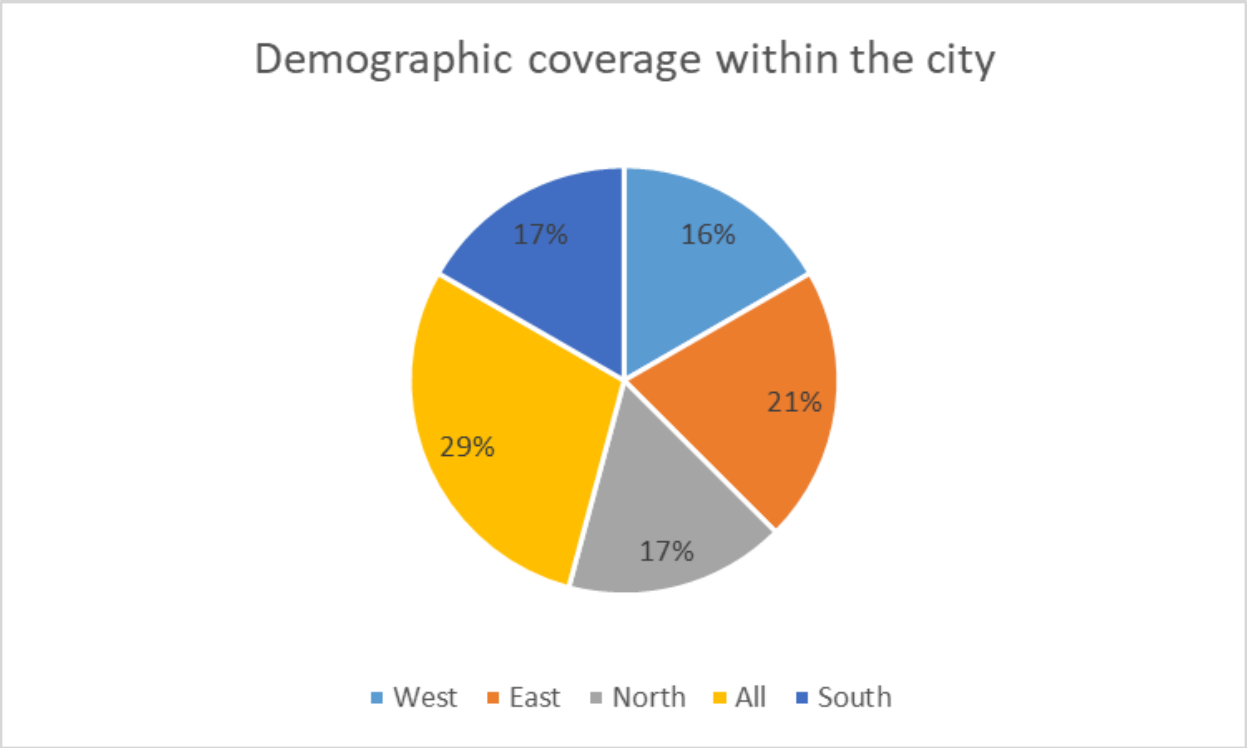


3. **Demographic coverage within the city:**

   A pie chart showing the demographic regions within the city that the freelance Yoga instructors cover as part of their personal training.

Chart 3.16.5:

Region (within the city) distribution of the instructors participating in the research



4. **Experience of the freelance Yoga instructors who participated in the research:**
    - Average: 6
    - Min: 3
    - Max: 10
    - Outliers: few months, 20

5. **Demand for private Yoga instructors during the time of the research:**
    - Moderate to High (Usual demand)

6. **Economic Climate impacting Yoga instructors business:**
    - No specific impact due to any environmental or economic factors (60% instructors)

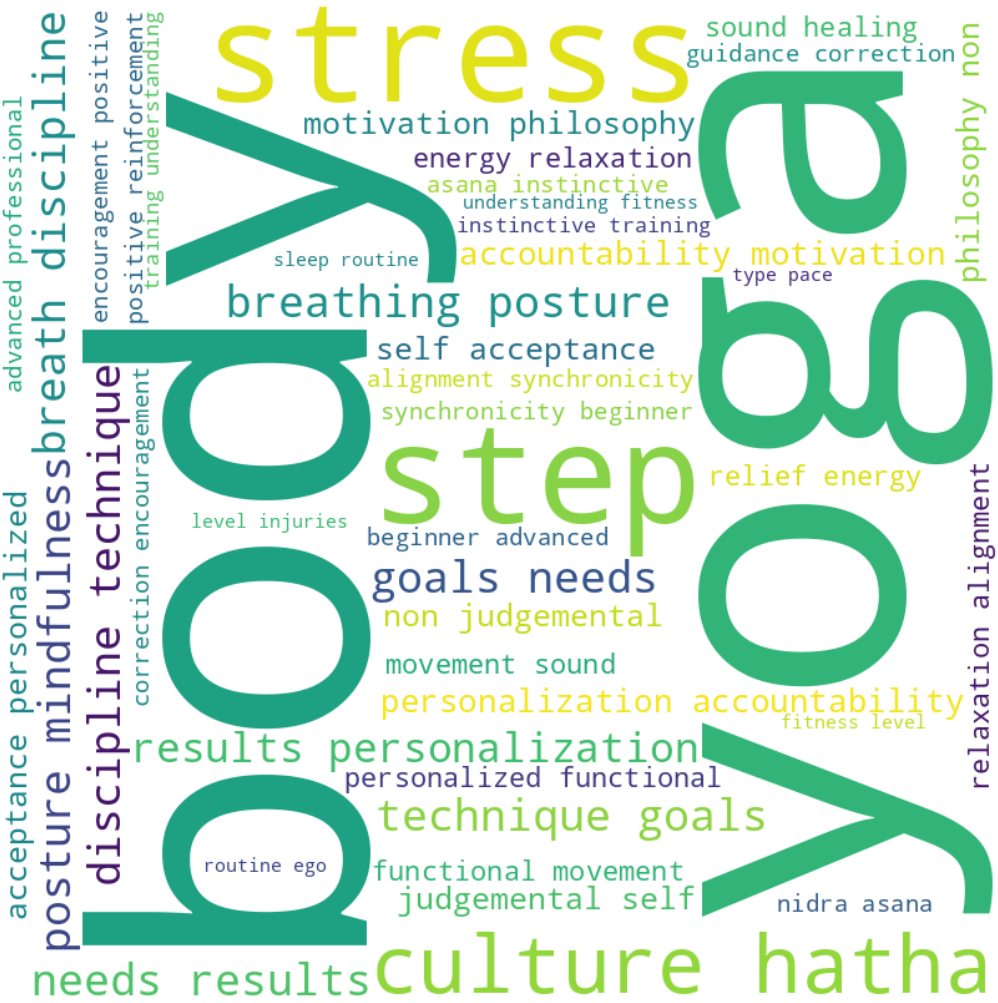
- But in general, client-spend on personal Yoga training is less (40% instructors)

7. **Instructors' Unique Styles of Teaching**

   A word-cloud of the details provided by Yoga instructors about their unique teaching styles and practices:

Chart 3.16.6:

Word cloud distribution of the instructors' style of teaching



Let's move onto the results of this inquiry.

Results

1. **Physiological Strain Score:**

   Metric: We have calculated the Physiological Strain Score by assigning a value (1 or 0) to each physiological factor based on its impact on the instructor's business:

   - 1 = Negative impact (e.g., fatigue, injuries, burnout, etc.)
   - 0 = No impact or a neutral impact.

   Calculation: Sum the scores for all physiological factors for each instructor.

   The higher the score, the greater the perceived physiological strain.

   Physiological Strain Score = Score of Instructor A + B + … + N

   Example:

   Instructor A: Fatigue (1), Injuries (0), Stress (1), Time Constraints (1), Burnout (1) = 4

   Instructor B: Fatigue (0), Injuries (0), Stress (0), Time Constraints (0), Burnout (0) = 0

   Total Physiological Strain Score = 127

   Instructors who showed no impact due to physiological factors = 15

2. **Business Performance Index:**

   Metric: There are few business metrics we collected, but we need to combine them into a single Business Performance Index to better understand the overall impact of physiological factors.

Calculation: I have used a weighted average to combine these metrics, giving more weight to metrics I consider more important (e.g., business satisfaction score).

Formula:

Business Performance Index =

(Average Weekly Client Sessions x 0.2) + (Average Hourly Rate x 0.3) + (Weekly Marketing Time x 0.1) + (Business Satisfaction Score x 0.4)

The Average Business Performance Index based on the above formula for the collected data = 190

Maximum Business Performance Index = 600

Minimum Business Performance Index = 22

3. **Correlation between Physiological Score and Business Performance Index**

Metric: Using a statistical correlation coefficient (Pearson's correlation coefficient) to determine the relationship between the Physiological Strain Score and the Business Performance Index. A negative correlation indicates that as physiological strain increases, business performance tends to decrease.

Correlation Calculation: I used this piece of code in Python to calculate the Pearson's Correlation Coefficient:

Image 3.16ii

Image of the program snippet showing the correlation between physiological strain and business performance:

```
# Importing necessary libraries
import pandas as pd
from scipy.stats import pearsonr

# Ingesting data: Physiological Strain Score
# and Business Performance Index
df = pd.read_csv("YogaInstructors1.csv")

# Converting dataframe to lists
list1 = df['Physiological Strain Score']
list2 = df['Business Performance Index']

# Applying the pearsonr() method to calculate
# correlation coefficient
corr, _ = pearsonr(list1, list2)
print('Pearsons correlation: %.3f' % corr)
```

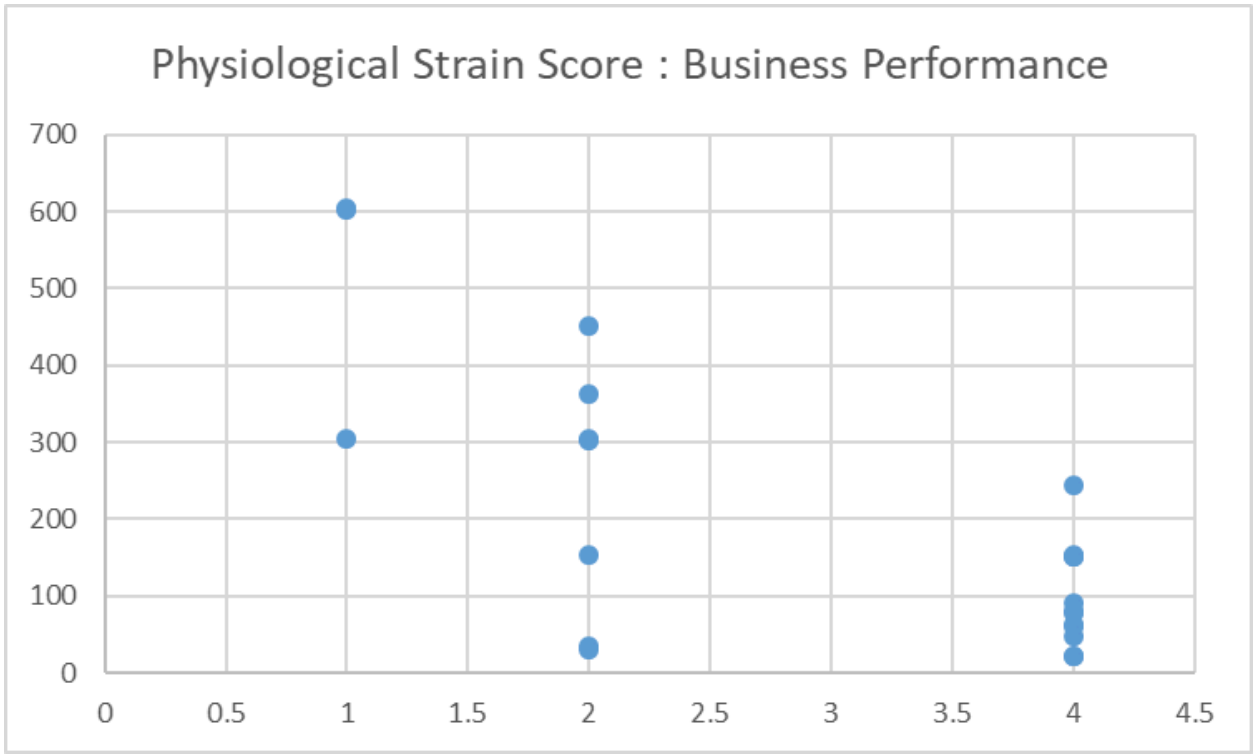
```
Pearsons correlation: -0.721
```

As we can observe from the result, the correlation is **STRONG** and it is **NEGATIVE**. It means that there is **strong correlation between the physiological strain and business performance for freelance Yoga instructors and they move in opposite directions** (meaning when strain increases, performance decreases).

Chart 3.16.7:

Physiological strain score Vs Business Performance Index

Scatter Plotting a subset of the data with Physiological strain score on the X and Business Performance Index on the Y axes respectively, it is evident that lower the physiological strain, better the business performance index. But more often than not, all instructors go through physiological impact in one form or the other.



90% of the instructors who took the survey responded YES to at least one of the physiological factors impacting their business performance.

This collective result is steering the research in the direction of determining that a significant correlation exists between physiological strain and business performance, supporting the Hypothesis of Research Question 1 Part A.

Research Question 1 Part B: AI Advancement Impacting Freelance Yoga Business Potential

Hypothesis

B1) AI adoption in Yoga personalization limits traditional instructors' opportunities and market potential rather than augmenting their presence.

B2) AI potential in Yoga personal training can augment the presence of freelance Yoga instructors and increase market potential

Variables:

Independent Variables:

Familiarity with AI-powered yoga platforms, Use or consideration of AI-powered tools, Specific AI-powered tool selection (pose correction apps, virtual yoga instructors, personalized, plan generators, client management app, continuous learning tools), Concerns about AI replacement, Perceived benefits for instructors and practitioners, Market expansion Potential with AI-powered tools, Concerns about AI use in yoga instruction, Data & insights provided by AI-powered platforms, Efficiency & workload reduction with AI, Overcoming physiological limitations with AI, Virtual Yoga enhancement with AI, Accessibility & affordability of AI-powered Yoga instruction, Ethical concerns about AI in Yoga, AI as supplement vs. replacement.

Dependent Variables (Target):

- Impact of AI on Business Potential:
    - Perceived impact of AI replacement potential
    - Perceived impact of AI on increasing virtual presence & wider relevant market reach

Key Quantitative Metrics that are needed for the research

- **Perception of AI Replacement Potential** (to test hypothesis B1)
    - Dependent Variable: Impact of AI on Business Potential

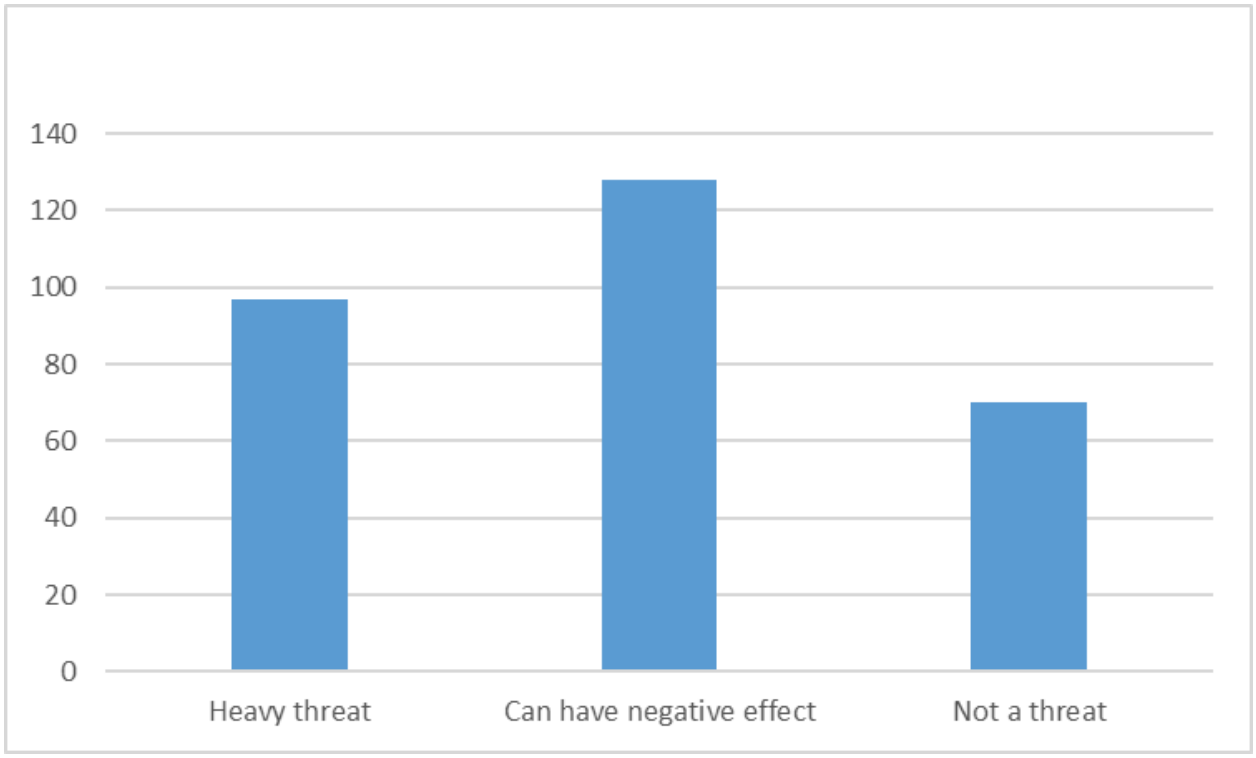
    - Rationale: These questions directly address the instructors' concerns about AI potentially replacing their roles as personalized yoga instructors.

- **AI-Assisted Virtual Training Potential** (to test hypothesis B2)
    - Dependent Variable: Perceived Impact of AI on increasing virtual presence
    - Rationale: These questions assess the instructors' perceptions about a hypothetical AI-assisted virtual training system, gauging the potential for AI to enhance their reach and client base.
- **AI-Assisted Relevance and Scaling Potential** (to test hypothesis B2)
    - Dependent Variable: Perceived Impact of AI on expanding market reach
    - Rationale: These questions assess the instructors' perceptions about a hypothetical AI-assisted virtual training system, gauging the potential for AI to scale their client base and increase relevance.

Statistical Analysis

Chart 3.16.8:

Perceived Impact of AI Advancements on Personal Yoga Instructors' Business:

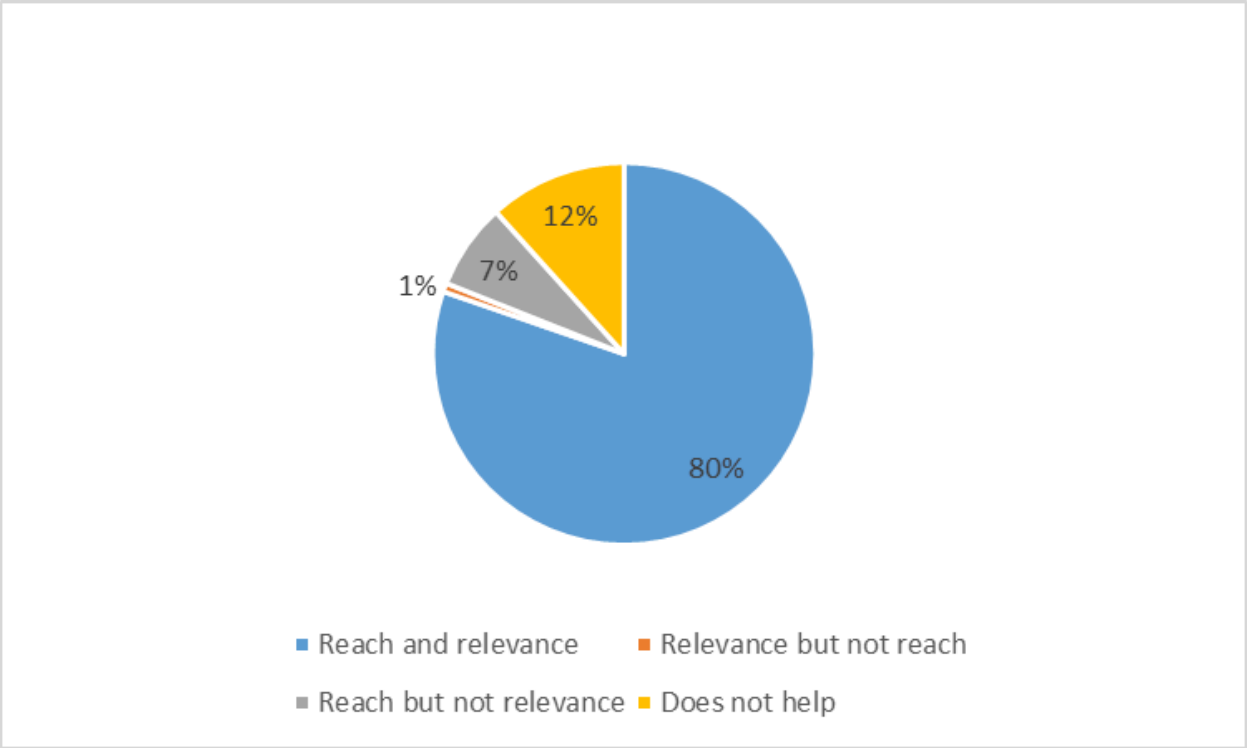


Based on the collected data plotted as a bar chart as shown above, it is seen that the perceived notion of AI advancements inclines heavily towards it being a threat to the opportunities of freelance Yoga instructors (77% of the instructors perceive it this way).

Chart 3.16.9:

Areas where AI advancements can help Personal Yoga Instructors' Business:

There are some questions in our questionnaire that are related to how AI advancements can actually help augment the reach (virtual presence and instruction) and the relevance of clientbase for freelance Yoga instructors and below is the response summary:



As seen here, 80% of instructors surveyed see that the advancements can actually help with virtually reaching customers and gaining relevant customers for their style of Yoga instruction. 19% believe that AI advancement can help in one of reach or relevance but not both.

But this does not mean that AI advancement is not seen as a threat to freelance Yoga instructors' business. We will address the correlation between these two variables in the results section.

Results

1. **Perception of AI Replacement Potential (AI replacing freelance Yoga instructors):**

   Calculation: From Chart 3.16.8, **77%** of instructors perceive AI advancements as a heavy threat or a negative effect to their opportunities.

Interpretation: The data strongly supports Hypothesis B1. The majority of instructors perceive AI as a threat to their business, indicating a significant concern about AI replacing their roles in personalized yoga instruction.

2. **AI-Assisted Virtual Training Potential (Perceived Impact of AI on increasing virtual presence):**

   Calculation: From Chart 3.16.9, **80%** of instructors believe AI can help with virtually reaching customers.

   Interpretation: The data partially supports Hypothesis B2. A significant majority of instructors acknowledge AI's potential to enhance virtual presence, suggesting AI could help expand their reach.

3. **AI-Assisted Relevance and Scaling Potential (Perceived Impact of AI on expanding market reach):**

   Calculation: From Chart 3.16.9, **80%** of instructors believe AI can help with both reaching and gaining relevant customers for their style of yoga instruction.

   Interpretation: The data strongly supports Hypothesis B2. The majority of instructors recognize AI's ability to help them find relevant clients, indicating potential for increased market reach and scalability.

Correlation Calculation:

While the data provides a strong indication of both perceived threat and potential benefits of AI, it's crucial to explore their correlation aspect further.

Metric: Using a statistical correlation coefficient (Pearson's correlation coefficient) to determine the relationship between AI being perceived as a THREAT and the AI being perceived to enhance customer reach and relevance for freelance Yoga instructors.

A strong positive correlation would indicate that as if AI is seen as a threat, then AI will also be perceived to enhance reach and relevance (business potential) for freelance Yoga instructors. A strong negative correlation would indicate that as if AI is seen as a threat, then AI will not be perceived to enhance reach and relevance (business potential) for freelance Yoga instructors.

Let’s see the correlation between these 2 factors in our analysis:

Image 3.16i

Image of the program snippet showing the correlation between AI being seen as a threat to business potential and AI being perceived as the factor that could enhance reach and relevance:

```
# Importing necessary libraries
import pandas as pd
from scipy.stats import pearsonr

# Ingesting data: Physiological Strain Score
# and Business Performance Index
df = pd.read_csv("YogaInstructors4.csv")

# Converting dataframe to lists
list1 = df['AI advancement is a threat']
list2 = df['AI advancement helps reach and relevance']

# Applying the pearsonr() method to calculate
# correlation coefficient
corr, _ = pearsonr(list1, list2)
print('Pearsons correlation: %.3f' % corr)
```

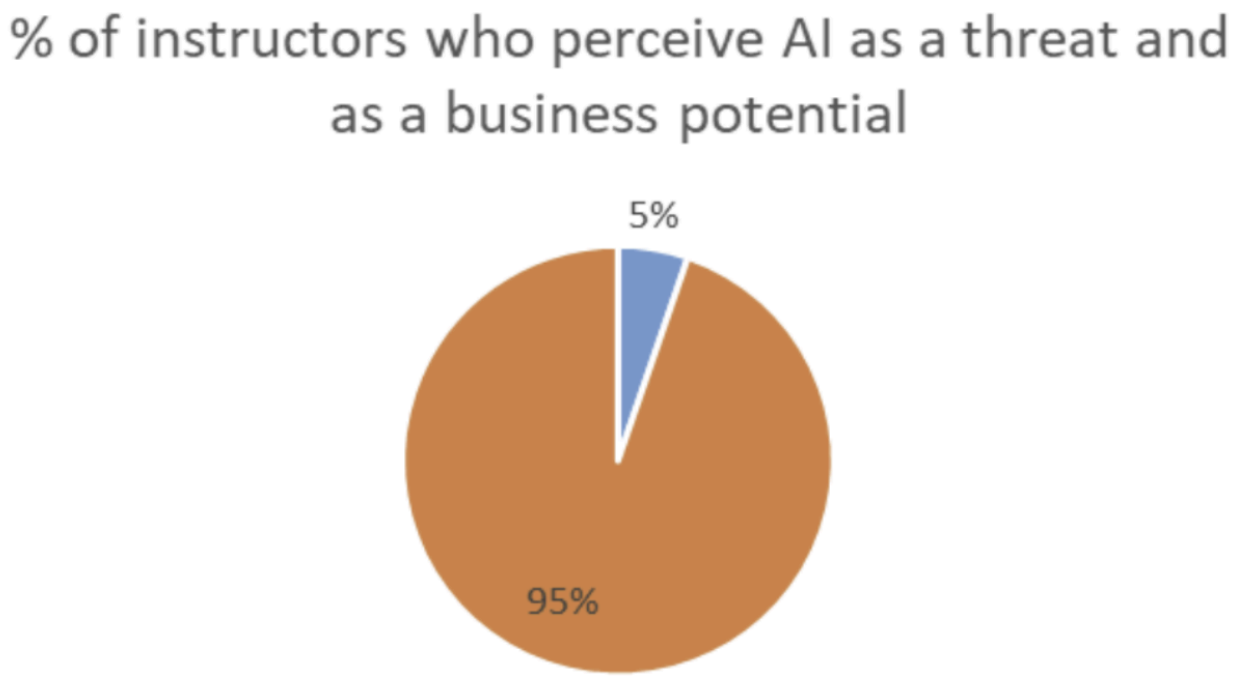
```
Pearsons correlation: -0.175
```

As we can observe from the result, the correlation is **WEAK** and it is **NEGATIVE**. It means that there is **NO correlation between the instructors perceiving AI as a threat and believing that AI will enhance reach and relevance (business opportunities)** for freelance Yoga instructors.

Chart 3.16.10:

Instructors perceiving AI as both threat and as having business potential

Plotting in a Pie Chart, the data of the instructors who think AI as both a threat and as a potential enhancer of business opportunities:

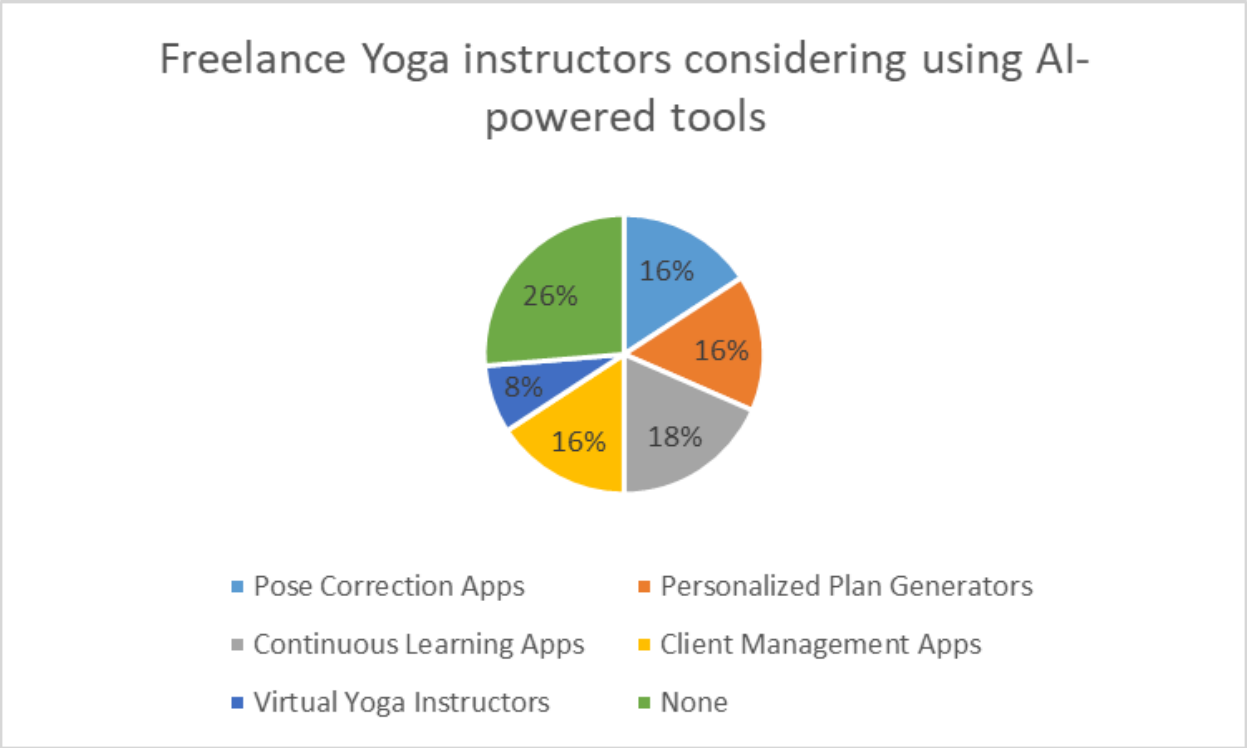


It is evident that **95%** of the personal Yoga instructors who believe that AI is a threat, also believe that AI can enhance their business potential in terms of virtual presence (reach) and customer relevance.

Chart 3.16.11:

Freelance Yoga Instructors considering AI tools

Another interesting observation from the data is that **73%** of the same set of Yoga instructors also opted to consider using AI powered tools for freelance private Yoga instruction.



While the data suggests that AI may pose a threat to freelance personal yoga instructors, it also highlights its potential for expanding reach and market relevance. Further investigation into the specific applications, the role of human interaction, and the potential evolution of business models will be critical in understanding the true impact of AI on freelance yoga instructors' future. This validates Hypothesis of Research Question 1 Part B 1 and B2.

3.17 Qualitative Analysis

This section presents a qualitative analysis of the data collected for the research focusing on the impact of physiological factors and AI on freelance yoga instructors' business potential in Bangalore. The analysis utilizes **thematic analysis, natural language extraction and**

summarization techniques to investigate the hypotheses formulated in the research methodology.

Research Question 1 Part A: Physiological Factors Impacting Freelance Yoga Business Potential

Hypothesis: Physiological factors affect the business performance of freelance yoga instructors.

Thematic Analysis

This qualitative analysis details the impact of physiological factors on the business opportunities of freelance yoga instructors in Bangalore, India. The analysis is based on data collected from a questionnaire administered to 28 participants. The analysis examines themes and patterns emerging from the qualitative responses to gain insights into how physiological factors affect freelance yoga instructors' businesses.

1. **Fatigue and Burnout:**

   Several participants reported experiencing fatigue due to teaching multiple yoga classes or sessions within a day. This fatigue was attributed to both physical exertion and mental strain, leading to a feeling of being drained and impacting their ability to perform at their best.

   A sense of burnout was also a recurring theme. In particular, instructors felt overwhelmed by the administrative burden of managing their business and the need to continuously learn and stay updated with new yoga trends.

2. **Stress**

   The demanding nature of being a freelance yoga instructor, especially in a competitive market, was reported as a significant source of stress. Participants cited factors such as juggling teaching, marketing, client management, and personal development as contributing to their stress levels.

3. **Time Constraints:**

   Limited time, often coupled with geographical constraints, was a major obstacle for many instructors in growing their businesses. Balancing personal life, personal practice, and the demands of running a freelance business proved challenging, leading to feelings of being overwhelmed and hindering business growth.

4. **Importance of Physical Presence:**

   While some instructors acknowledged the growing popularity of online yoga, most still believed that being physically present for each client was indispensable. This sentiment highlighted the importance of establishing trust, building relationships, and providing personalized attention, elements that are often difficult to replicate through virtual platforms.

5. **Impact on Business Performance:**

Client Base Size: Participants who reported feeling significantly impacted by physiological factors (fatigue, stress, etc.) often had smaller client bases. This observation suggests that these factors can limit an instructor's ability to take on more clients and grow their business.

Pricing: The average charge per session was not consistently correlated with physiological strain, indicating that pricing strategies were not directly affected by physiological factors. However, some instructors did mention adjusting their prices based on the number of sessions they could realistically offer due to fatigue or time constraints.

Marketing Efforts: Some participants expressed difficulty in dedicating sufficient time to marketing due to their workload and personal commitments. This suggests that physiological factors can hinder an instructor's ability to effectively promote their services and expand their reach.

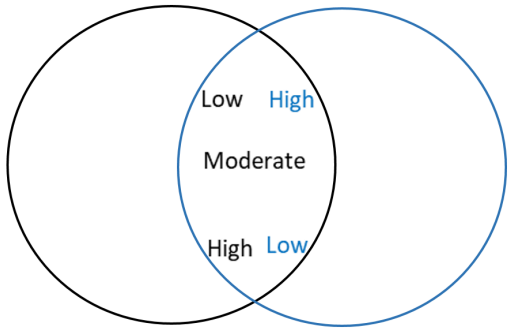
Result

Physiological Strain and Business Success:

The study suggests a strong link between physiological factors, like fatigue, stress, and time constraints, and the ability of freelance yoga instructors to build and sustain successful businesses.

Image 3.17i

Venn Diagram depicting the overlap between Physiological Strain and Business Performance:



The black bordered circle represents physiological strain factors and the blue bordered circle represents business performance. The overlap represents the correlation between the two.

Low Strain, High Performance: This area represents instructors with low physiological strain and high business performance.

High Strain, Low Performance: This area represents instructors experiencing high levels of physiological strain and having low business performance.

Moderate Strain, Moderate Performance: This area represents instructors with moderate physiological strain and moderate business performance.

Areas Outside the Overlap:

High Strain, High Performance: This area could represent instructors who manage to achieve high business performance despite facing high physiological strain.

Low Strain, Low Performance: This area could represent instructors with low physiological strain who are struggling with business performance for other reasons.

The diagram reveals that high physiological strain is often associated with low business performance, while low physiological strain is associated with higher business performance. However, it also highlights that a moderate level of strain doesn't necessarily hinder success, suggesting that factors like resilience and coping mechanisms play a role.

The Human Element: The human element of yoga, including the ability to build relationships, provide personalized guidance, and create a welcoming atmosphere, remains crucial. So being personally connected with their customers seems important whilst having the opportunity to reach more people and more often.

Community and Support: Freelance yoga instructors recognized the importance of a supportive network of fellow instructors, mentors, and resources to navigate challenges and overcome physiological limitations.

This qualitative analysis provides valuable insights into the physiological challenges and opportunities faced by freelance private yoga instructors in a rapidly changing world. The data clearly demonstrates that physiological factors play a significant role in their ability to establish and maintain sustainable businesses. The human element of yoga, including personal connection, empathy, and a deep understanding of individual needs, will likely continue to be paramount in ensuring the long-term success of freelance yoga instructors.

Research Question 1 Part B: AI Advancement Impacting Freelance Yoga Business Potential

Hypothesis

B1) AI adoption in Yoga personalization limits traditional instructors' opportunities and market potential rather than augmenting their presence.

B2) AI potential in Yoga personal training can augment the presence of freelance Yoga instructors and increase market potential

Thematic Analysis

This analysis details the qualitative data collected from freelance yoga instructors in Bangalore to understand the potential impact of AI advancement on their business opportunities in personal yoga training. The focus is on understanding the instructors' perceptions about AI-powered yoga platforms and AI's potential to augment or replace their roles.

The qualitative data reveals several key themes that provide valuable insights into the landscape of freelance personal Yoga instruction in the era of AI. These themes include:

1. **AI perceived as a threat**

   The majority of respondents are aware of AI's growing influence on the fitness industry, particularly in the areas of virtual yoga classes, personalized plan generation, and posture correction. While some see it as a positive force, enhancing accessibility and efficiency,

others express concern about the potential loss of human connection and the risk of over-reliance on AI.

2. **Concerns about AI's Potential:**

   While recognizing the potential benefits of AI, many instructors expressed concerns about its potential to:

   a. Devalue personal connection and human interaction.
   b. Increase reliance on technology, reducing the importance of the instructor's expertise.
   c. Create a more impersonal experience for clients.
   d. Raise privacy concerns about data collection and usage.
   e. Contribute to a wider skill gap between instructors who adopt AI and those who don't.
   f. While recognizing the potential benefits of AI, instructors also express concerns about data privacy and the potential for bias in AI algorithms. They want assurance data will be handled ethically and that AI-powered platforms will not perpetuate existing inequalities in the yoga community.

3. **Value of Personalized Instruction:**

   Freelance yoga instructors highlight the unique value they bring to their clients, emphasizing their personalized approach, individual style, and cultural sensitivity. This suggests that clients seek out personalized training and would likely not be satisfied with solely AI-driven yoga sessions.

4. **Importance of Human Connection:**

   The majority of instructors highlight the importance of human connection and personalized interaction in yoga training. They believe that AI can assist in tasks but cannot fully replace the emotional and motivational support that instructors provide.

5. **Focus on AI-Assisted Virtual Training:**

   The data reveals a strong interest in AI-powered platforms that can support virtual yoga instruction. Instructors perceive the potential for AI to create more engaging and accessible virtual training sessions, thereby expanding their reach and market potential.

6. **AI's Role in Business Management:**

   Many instructors believe AI could significantly streamline their administrative tasks, such as managing bookings, creating personalized plans, and generating content. This, in turn, could free up more time for teaching and client interaction. However, there are concerns about potential privacy issues and the need for AI to be user-friendly and adapted to the specific requirements of yoga instruction.

7. **Instructor Demographics and Views:**

   There is no apparent significant difference in the way instructors of different ages, genders, and experience levels perceive the impact of AI. However, younger instructors tend to be more open to the adoption of AI tools and technology, while older instructors may feel more comfortable with traditional methods of yoga instruction.

8. **AI as a Tool, Not a Replacement:**

   While some instructors express concerns about AI replacing their roles, the majority view AI as a tool that can augment their presence and enhance their services. They believe AI can help automate tasks, personalize training plans, and expand their reach to a wider audience.

9. **Future of Freelance Yoga Instruction:**

   While the future of freelance yoga instruction in the age of AI remains uncertain, many instructors believe that those who embrace technology and incorporate AI effectively will have a competitive advantage. This could involve using AI to enhance their services, streamline their business operations, and reach a wider audience.

Result

Here is a look at the insights gathered under each key theme:

1. **AI can be perceived as a threat:**

   Competition & Job Security: Some instructors worry about AI-powered platforms potentially replacing their services. They fear that AI-powered virtual classes or personalized yoga plans could disrupt the traditional instructor-client relationship, impacting their business viability and creating a competitive environment.

   Depersonalization & Lack of Human Connection: Some instructors express concerns that AI might lead to a depersonalized experience, potentially diminishing the crucial

human connection between instructor and client. They fear that relying heavily on AI could weaken the emotional and motivational aspect of yoga practice, which is vital for many clients.

Ethical Concerns: A few instructors express ethical concerns regarding AI's potential misuse. They worry about the potential for AI algorithms to be biased, leading to unfair or discriminatory outcomes in yoga recommendations.

2. **Instructor Attitudes Towards AI**

   Openness to Experimentation: Many instructors express a willingness to explore AI tools and technology, particularly in areas like planning, scheduling, and marketing. They see the potential for AI to augment their existing skills and improve their business operations.

   Cautious Optimism: Some instructors express cautious optimism about AI's impact, recognizing its potential benefits while acknowledging the risks and challenges. They remain open to incorporating AI tools strategically, ensuring that human interaction and personalized guidance remain central to their practice.

3. **Skepticism and Resistance:** A few instructors express skepticism or even outright resistance towards AI. They worry about the ethical implications, potential for job displacement, and the risk of losing the personal touch that defines their practice. They are hesitant to embrace AI wholeheartedly, preferring to focus on their existing skills and traditional teaching methods.**AI as a Tool, Not a Replacement:**

Reducing workload: Instructors are enthusiastic about AI-powered tools that can automate administrative tasks, create personalized training plans, and track client progress, thus freeing up time to focus on teaching and other aspects of their business.

Expanding market reach: Many believe AI-powered platforms can help them reach a wider audience, especially those who prefer virtual training sessions, making their services more accessible and affordable.

Enhancing virtual training: The data shows a strong interest in AI-assisted virtual training systems that can personalize the experience for each client based on their needs and preferences.

4. **Value of Personalized Instruction:**

   Unique skill and style: Instructors are confident that their unique teaching styles, skill level, and cultural sensitivity are crucial for providing personalized training. They believe that clients seek out their expertise, and AI alone, cannot replicate this unique value.

   Human connection: Instructors emphasize the importance of human connection and individual attention in yoga practice. They believe that AI cannot replace the emotional support, motivation, and guidance that they provide to their clients.

5. **Focus on AI-Assisted Virtual Training:**

   Increased accessibility: Many instructors believe that AI can make yoga training more accessible for a wider range of individuals, particularly those with physical limitations or who prefer virtual sessions.

Engaging virtual sessions: Instructors express optimism that AI can create more engaging virtual sessions by providing personalized instruction, tracking progress, and offering real-time feedback.

Scaling business: AI-powered platforms can help instructors reach a wider audience, potentially leading to a larger client base and increased revenue.

6. **Perceived Overall Benefits of AI:**

Enhanced Personalization: Several instructors believe that AI could significantly enhance client personalization, allowing them to cater to individual needs more effectively. They envision AI-powered tools assisting in creating personalized yoga plans, recommending exercises, and providing tailored guidance based on client goals and preferences.

Increased Efficiency: Some instructors see AI as a tool to streamline administrative tasks, freeing up more time for teaching and client interaction. They perceive AI's potential in automating scheduling, appointment reminders, and marketing efforts, which could lead to more efficient business operations.

Accessibility & Reach: Some instructors believe that AI could broaden their reach by making yoga more accessible to a wider audience. AI-powered platforms could allow them to offer virtual classes, providing remote access to yoga instruction and potentially expanding their client base.

Improved Knowledge & Learning: Instructors acknowledge the vast resources available through AI-powered platforms, which could assist them in enhancing their knowledge and staying updated on the latest yoga trends and techniques.

7. **Importance of Human Connection:**

   Emotional and motivational support: Instructors strongly believe in the importance of human connection and emotional support in yoga practice. They understand that AI can provide information and feedback, but it cannot replace the personalized care, guidance, and motivation that they offer.

   Building trust and rapport: A crucial aspect of yoga training is building trust and rapport with clients. Instructors believe that AI cannot fully replicate this aspect of the instructor-client relationship.

To quantify the qualitative data, the following scores were calculated using natural language processing of the responses to questions in the attached data:

Formula for these scores:

A score of 1 is assigned if there seems to be AI interest / adoption / perceived benefit / threat (as applicable) for each of these questions. The average of all the responses for each group of questions is taken as the final score.

1. **AI Adoption Score:**

   This score is calculated from responses to questions 1, 2, and 8. It aims to measure how much AI is already integrated into their practice. The score is calculated based on the frequency of AI usage and the level of comfort with AI tools. The average AI Adoption Score for the sample group is **1.7 (out of 3)**, suggesting a decent adoption.

2. **Perceived AI Benefits Score:**

   This score is calculated from responses to questions 11, 13, 15. It aims to capture instructors' perception of AI's positive impact on their practice. A higher score indicates more perceived benefits of AI. The average Perceived AI Benefits Score is **2.5 (out of 3)** suggesting excellent perception of AI's benefits.

3. **Perceived AI Threats Score:**

   This score is calculated from responses to questions 4, 10, 23. It assesses instructors' perception of potential negative impacts of AI. A higher score indicates more perceived threats from AI. The average Perceived AI Threats Score is **2.2 (out of 3)**, suggesting reasonably high concerns about AI's potential negative impacts.

4. **Expectation for AI to enhance Yoga instruction opportunities instead of replacing:**

   This score is calculated from responses to question 24. It assesses instructors' perception of expectations from AI. The average expectation to augment score is **0.8 (out of 1)**, which is very high showcasing the anticipation of freelance private Yoga instructors from AI to enhance business opportunities instead of fully replacing them.

The qualitative data reveals that freelance yoga instructors in Bangalore view AI as a powerful tool with the potential to augment their presence and business opportunities, particularly in virtual training. However, they also highlight the critical importance of human connection and personalized instruction, suggesting that AI should not replace the role of the instructor. As we already summarized in the quantitative section:

1. 95% of the personal Yoga instructors who believe that AI is a threat, also believe that AI can enhance their business potential in terms of virtual presence (reach) and customer relevance.
2. 73% of the same set of Yoga instructors also opted to consider using AI powered tools for freelance private Yoga instruction.

While instructors recognize AI's potential to enhance their virtual presence and business opportunities, they also express concern about AI replacing their opportunities and replacing the human element of their profession. The data suggests that the instructors value the personal connection and personalized instruction they provide. They believe AI should complement, not replace, their role.

This analysis points to a key issue in the adoption of AI. While AI can offer efficiency and reach, it must be carefully integrated to avoid replacing the human touch that is often essential for freelance private Yoga instructors' opportunities and also customer satisfaction. The following Problem Statement Analysis study will likely address how instructors perceive the balance between AI and human interaction, providing insights for the future of this industry.

3.18 Hypothetical Problem Statement Analysis

Narrowing down on the results from the above quantitative and qualitative analysis results, we naturally land on this bigger picture question:

> **How is it that 95% of instructors who see it as a threat also perceive it to enhance business opportunities?**

The answer to this lies in a hypothetical problem statement analysis conducted with freelance private Yoga instructors given a hypothetical situation.

Hypothetical Problem Statement

Imagine a system where you are able to configure your inputs and simulate your personal Yoga training preferences, individuality, essence, skill level, focus, instruction style, cultural inclination and even voice into an AI-assisted virtual trainer assistant that imparts this custom personal trainer in your clients' training sessions, even without you having to be virtually present (optionally) in real time during practice. The system will take care of correcting the practitioner's postures while giving you the option of interfering (virtually) if required.

Considering the above hypothetical scenario, answer the following questions:

1. Do you think this will be able to improve and scale your training presence and enable you to be personal-training more clients at the same time, thereby increasing your simultaneous training reach and market potential?
2. Do you think such a system would be able - customize and personalize Yoga personal training plan for each client based on their personalization needs and your style/skill and teaching orientation, thereby creating more alignment in terms of "right supply" of clients for your demands as an instructor?
3. Do you think such a system capable of creating the right alignment (matching client base) would maximize your business potential as an instructor by expanding your training region and territory of reach?

Analysis

The responses to the three questions reveal a complex interplay of perceived opportunities:

Responses to question 1: Improved Reach and Scalability

- Majority (90%) believe the AI system could improve reach and scalability. This suggests that instructors see the potential for increased client volume through simultaneous training.
- 9% of respondents expressed uncertainty (Maybe). This points to concerns regarding the system's effectiveness and the potential impact on the instructor's role.
- 1% answered "No," highlighting the potential perception of the AI as a direct threat to their livelihood.

Responses to question 2: Personalization and Alignment

The responses here are more balanced:

- **50%** of the respondents believe the **AI could facilitate better personalization and client alignment**. This suggests that the AI's ability to tailor training plans to individual needs is appealing.
- **49%** of the respondents expressed uncertainty (Maybe) but not totally negative. This reflects a **move with caution** about the AI's ability to truly replicate the instructor's personalized touch.
- **1%** of the respondents answered "No," indicating a **lack of faith in the AI's ability** to understand the intricacies of hyper personalization in personal yoga practice.

Responses to question 3: Business Potential and Reach

While 50% respondents see AI as potentially expanding their reach and business potential, this is the question that generates the most uncertainty. 50% respondents answered "Maybe," reflecting a complex perception of the AI as both a potential asset and a possible risk to their business.

Common considerations that the instructors brought up during the discussion:

During the discussion, the instructors put forth really valuable considerations for when such a system is developed. This hypothetical situation if put into practice should incorporate further investigation and considerations for the below:

Pricing and accessibility:

- How will the system be priced?
- Will it be accessible to all instructors, or will it only benefit those with financial resources?

Quality control:

- How will the system ensure accuracy and safety in its training recommendations?

Instructor training:

- How will instructors be trained to effectively utilize the AI system?

Ethical considerations:

- Will the system respect the privacy of client data and ensure transparency in its operation?

The data reveals a nuanced view of the AI-assisted virtual yoga instructor. While many instructors see its potential to enhance their business opportunities through scalability,

personalization, and expanded reach, concerns about its impact on the instructor's role and the authenticity of the experience remain significant.

Key Takeaways

1. **The AI system offers a promising solution for expanding reach and providing personalized training plans, but it must be developed with the instructor's expertise and individuality in mind.**

2. Addressing instructor concerns about their role and the potential for job displacement will be crucial for the successful implementation of such a system.

3. The success of the AI system depends on its ability to strike a balance between technological capabilities and the human touch that instructors provide.

By carefully addressing these considerations, the potential of AI-assisted virtual yoga instructors to transform the industry while respecting the vital role of human instructors can be realized.

3.19 Limitations & Objective Focus Opportunities for Future Research

1. Sample and Generalizability:
    - The research focuses on freelance yoga instructors in Bangalore, limiting generalizability to other regions or demographics.

- The guideline sample size of 100 - 300 for the survey and 25 for interviews, though gives a comprehensive picture for the scope of the city of Bangalore, it may not be large enough to capture the full range of experiences and perspectives within the diverse population of yoga instructors in a larger scope, if its scope needs to be extended.

2. Physiological factors and knowledge:

   Survey data may possibly introduce some bias in responses related to physiological factors, AI usage, and business performance. Participants may overestimate or underestimate their experiences.

3. Correlation vs. Causation:

   While the research aims to identify correlations, and prove causality between physiological factors, AI adoption, and business outcomes, there could still be other confounding factors that may influence the observed relationships.

4. Hypothetical Scenario and Potential Bias:

   The problem statement analysis study uses a hypothetical scenario, introducing a potential for responses based on participants' understanding of as-is scenario rather than a futuristic real-world experience using such AI-assisted virtual instructors.

5. Technological Advancements:

   The study focuses on AI technologies available at the time of research. Rapid advancements in AI could potentially render some findings outdated, requiring ongoing updates and research.

6. Limited Exploration of Business Models:

   The research primarily focuses on the impact of AI on instructors' physical presence and scaling market opportunities. But the potential evolution of business models in the yoga industry in the long term is not considered.

7. Economic feasibility:

   The research does not incorporate detailed economic data on the costs and benefits of AI adoption, limiting the study's conclusions regarding the economic feasibility of AI-powered tools for yoga instructors.

Such limitations can only be addressed in a potential future investigation when the solution and scope for such an AI assisted Yoga platform is discussed with realtime examples and experiences of experimenting the solution.

3.20 Future Research Opportunity

Exploring the feasibility and impact of developing an instructor-augmented, hyper-personalized AI-assisted yoga personal training platform requires effort to address the limitations of the current research by:

Addressing Instructor Concerns:

Future research should delve deeper into instructor concerns about AI replacing their roles and develop strategies to mitigate these fears. This could involve exploring the potential for AI to enhance instructor skills and augment their expertise, rather than replacing them.

Focusing on Platform Development:

Building on the hypothetical scenario explored in the study, future research should focus on the technical aspects of developing a robust AI-assisted platform. This would involve addressing key areas such as:

- Data Collection and Security:

  Investigate the ethical implications of data collection and usage in the context of yoga instruction. Explore strategies for anonymizing and securing client data to address privacy concerns.

- Algorithm Development:

  Develop algorithms that can accurately analyze individual needs, goals, and preferences, and generate personalized training plans that align with instructor expertise.

- User Interface Design:

  Develop a user-friendly interface that is intuitive for both instructors and clients, ensuring seamless integration into existing workflows.

- Testing and Evaluation:

  Conduct a comprehensive evaluation of the developed platform, involving a larger sample of instructors and clients across diverse demographics and geographical locations.

Evaluating Platform Effectiveness:

Assess the effectiveness of the AI-assisted platform in terms of:

- Improving Client Outcomes:

  Monitor client progress, satisfaction, and adherence to their training plans.

- Increasing Instructor Efficiency:

  Measure the platform's impact on instructor workload, time management, and ability to scale their practice.

- Expanding Market Reach:

  Analyze the platform's ability to reach new clients and expand the instructor's geographical reach.

- Gathering Feedback:

  Collect feedback from both instructors and clients to understand their experience and identify areas for improvement.

- Exploring Business Models:

  Future research should investigate various business models for the AI-assisted platform, considering different pricing strategies and revenue streams. The research should assess the financial feasibility of the platform for both instructors and platform developers.

Investigating the Role of Human Interaction:

While the AI-assisted platform aims to enhance personalization and efficiency, it's crucial to recognize the importance of human interaction in yoga instruction. Future research should explore how to smoothly integrate human interaction within the AI-powered platform, allowing instructors to provide ongoing support, motivation, and guidance.

By addressing these research opportunities, future studies can contribute to a deeper understanding of the potential for AI-assisted virtual yoga instructors to transform the industry while respecting the vital role of human instructors. This will be crucial for ensuring the long-term success of both instructors and clients.

One-Page Report of the Research

This report summarizes the findings of the thesis. The research focuses on two main inquiries:

Research Question 1: Impact of Physiological Factors and AI on Freelance Yoga Instructors

A. Physiological Factors Impacting Freelance Yoga Business:

Findings

The study reveals that 91% of freelance yoga instructors experience negative impacts on their business due to physiological factors such as fatigue, stress, injuries, time constraints, and a perceived need for physical presence.

Key Details

- Fatigue and burnout are significant challenges, stemming from multiple sessions, administrative burdens, and continuous learning needs.

- Stress is prevalent, driven by workload management, client expectations, and market competition.
- Time constraints often limit business growth due to personal commitments and geographical constraints.
- The importance of physical presence in building trust and providing personalized attention is highlighted.

Correlation

A strong correlation is found between physiological strain and business performance, indicating that as physiological strain increases, business performance tends to decrease.

B. AI Impacting Freelance Yoga Instructors:

Findings

The study indicates a complex perception of AI among freelance yoga instructors. While a significant majority (77%) perceive AI as a potential threat to their opportunities, 80% also acknowledge its potential to enhance their virtual presence and client relevance.

Key Details

- Instructors perceive AI as both a threat (potentially replacing their role) and a potential enabler of business growth (enhancing virtual presence and client relevance).
- A strong majority (73%) are willing to consider using AI-powered tools for yoga instruction.

Correlation

A weak negative correlation is found between instructors perceiving AI as a threat and believing that AI will enhance their business opportunities. This suggests that instructors are not necessarily convinced that AI will enhance their business even if they see it as a threat.

Open Discussion (Interview) Analysis

A hypothetical scenario involving an AI-assisted virtual trainer revealed mixed perceptions. While many instructors see the potential for increased reach and personalized training, concerns remain about the impact on their role and the authenticity of the client experience.

Research Question 2: Exploring a Human-Centric AI Approach to Augment Instructor Capabilities

The study highlights the need for a human-centric approach to AI in yoga instruction. While AI tools can be beneficial, they should be designed to enhance instructor capabilities rather than replace them.

Future Research Opportunity

Future research should focus on developing an instructor-augmented, hyper-personalized AI-assisted yoga platform, addressing concerns about AI replacing instructors and exploring strategies for seamless integration of human interaction within the AI-powered platform.

Overall Implications

The thesis provides a comprehensive understanding of the complex relationship between AI, physiological factors, and the market for freelance yoga instruction. The findings suggest that AI has the potential to both transform and disrupt the industry. While AI tools can enhance efficiency, virtual presence, and client relevance, they must be carefully integrated to avoid replacing the valuable human connection and personalized instruction that clients seek. Further research and development efforts should focus on a human-centric approach that leverages AI to empower instructors and enrich the yoga experience for clients.

Bibliography

Deana I. Melton, Jeffrey A. Katula and Karen M. Mustian, 2008. The Current State of Personal Training: an Industry Perspective of Personal Trainers in a Small Southeast Community https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4021014/ (Section “Results”, page 3)

Moh H. Malek, David P. Nalbone, Dale E. Berger and Jared W. Coburn, 2002. Importance of Health Science Education for Personal Fitness Trainers (pages 22 - 24) https://www.researchgate.net/profile/Dale-Berger/publication/11526901_Importance_of_Health_Science_Education_for_Personal_Fitness_Trainers/links/59e51bbba6fdcc1b1d8d28ae/Importance-of-Health-Science-Education-forPersonal-Fitness-Trainers.pdf

Melinda B. Abbott, 2018. Characteristics of successful personal trainers (pages 14-23) https://www.proquest.com/openview/cf4fc1b4c2c77a6c950bcda999f477e8/1?pqorigsite=gscholar&cbl=18750

Melton, D. I., Dail, T. K., Katula, J. A., & Mustian, K. M. (2010). The current state of personal training: Managers' perspectives. Journal of Strength & Conditioning Research,24, 3173–3179. https://doi.org/10.1519/JSC.0b013e3181e381f5

Melton, D. I., Katula, J. A., & Mustian, K. M. (2008). The current state of personal training: An industry perspective of personal trainers in a small Southeast community. Journal of Strength and Conditioning Research,22, 883–889. https://doi.org/10.1519/JSC.0b013e3181660dab

Heyward, V. Advanced Fitness Assessment and Exercise Prescription (3rd ed.). Champaign, IL: Human Kinetics, 1997.

Hilgenkamp, K. Ethical behavior and professionalism in the business of health and fitness. ACSM Health Fit. J. 2(6). 1998.

Howley, E.T., and B.D. Franks. Health Fitness Instructor's Handbook. Champaign, IL: Human Kinetics, 1997.

Idea. IDEA/ASD Personal Fitness Training Survey: The Consumer Perspective. http://www.ideafit.com/prasdsurvey.cfm (17 Feb. 2000)

Maguire, J. S. (2001). Fit and flexible: The fitness industry, personal trainers and emotional service labor. Sociology of Sport Journal, 18, 379-402

Walter R. Thompson, Ph.D., FACSM, 2021. Worldwide Survey of Fitness Trends for 2021 https://ig-fitness-schweiz.ch/wp-content/uploads/2021/05/Worldwide_Survey_of_Fitness_Trends_for_2021.6-1.pdf

The 2024 Wellness Market Research conducted by Global Wellness Institute on Wellness Market Growth from 2019 to 2023 https://globalwellnessinstitute.org/industry-research/wellness-real-estate-market-growth-2019-2023-and-future-developments/

Health Happiness and the Wellness Economy, An Empirical Analysis by Shun Wang) https://www.researchgate.net/publication/369974813_Health_Happiness_and_the_Wellness_Economy_An_Empirical_Analysis

Future of the 1.5 Trillion Wellness Market by McKinsey & Company, 2021, 2022 https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/feeling-good-the-future-of-the-1-5-trillion-wellness-market https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/still-feeling-good-the-us-wellness-market-continues-to-boom

Budler, Marko & Božič, Katerina. (2024)

https://www.researchgate.net/publication/380595401_Adopting_Transitional_Business_Models_in_Small_Fitness_Businesses_in_Response_to_Business_Disruptions

Sean Greeley (2023). 10 Reasons Why Fitness Businesses Stop Growing Revenue.

https://www.npefitness.com/why-gyms-fail/

Alexandra Rada, Ágnes Szabó (2022)

https://www.researchgate.net/publication/364022386_The_impact_of_the_pandemic_on_the_fitness_sector_-_The_general_international_situation_and_a_Hungarian_example

Puccinelli et al., 2021

https://www.researchgate.net/publication/348387191_Physical_Activity_Levels_and_Mental_Health_during_the_COVID-19_Pandemic_Preliminary_Results_of_a_Comparative_Study_between_Convenience_Samples_from_Brazil_and_Switzerland

Swan, M., 2012, March. DIYgenomics crowdsourced health research studies: personal wellness and preventive medicine through collective intelligence. In 2012 AAAI Spring Symposium Series.

Behara, R.S., Agarwal, A., Pulumati, P., Jain, R. and Rao, V., 2014, November. Predictive modeling for wellness and chronic conditions. In 2014 IEEE International Conference on Bioinformatics and Bioengineering (pp. 394-398). IEEE.

Akbari, M., Hu, X., Liqiang, N. and Chua, T.S., 2016, February. From tweets to wellness: Wellness event detection from twitter streams. In Proceedings of the AAAI Conference on Artificial Intelligence (Vol. 30, No. 1).

Farseev, A. and Chua, T.S., 2017, February. Tweetfit: Fusing multiple social media and sensor data for wellness profile learning. In Thirty-First AAAI Conference on Artificial Intelligence.

Jamatia, B., 2022. Effects of Online Yoga Training on Self-Perceived Stress of the Students of Certificate Programme in Yoga (CPY) of IGNOU. Journal of Learning for Development, 9(3), pp.563-575.

April, K.T., Stinson, J., Cavallo, S., Proulx, L., Wells, G.A., Duffy, C.M., ElHindi, T., Longmuir, P.E. and Brosseau, L., 2020. Yoga and Aerobic Dance for Pain Management in Juvenile Idiopathic Arthritis: Protocol for a Pilot Randomized Controlled Trial. JMIR Research Protocols, 9(7), p.e12823.

Chronaki, C.E. and Chiarugi, F., 2005. Interoperability as a quality label for portable & wearable health monitoring systems. Studies in health technology and informatics, 117, pp.108-116.

Mattila, E., Korhonen, I., Merilahti, J., Nummela, A., Myllymaki, M. and Rusko, H., 2008, January. A concept for personal wellness management based on activity monitoring. In 2008 Second International Conference on Pervasive Computing Technologies for Healthcare (pp. 32-36). IEEE.

Mattila, E., Korhonen, I., Lappalainen, R., Ahtinen, A., Hopsu, L. and Leino, T., 2008, August. Nuadu concept for personal management of lifestyle related health risks. In 2008 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (pp. 5846-5850). IEEE.

Na, H.S., Choi, Y.S. and Park, T.S., 2009, November. Mobile robot for personal exercise training in ubiquitous healthcare environments. In Proceedings of the 2nd International Conference on Interaction Sciences: Information Technology, Culture and Human (pp. 742-744).

Pheng, L.T. and Husain, W., 2010, June. I-Wellness: a hybrid case-based framework for personalized wellness therapy. In 2010 International Symposium on Information Technology (Vol. 3, pp. 1193-1198). IEEE.

Seppälä, A. and Nykänen, P., 2011, October. Contextual Analysis and Modeling of Personal Wellness. In KEOD (pp. 202-207).

Vuong, N.K., Chan, S., Lau, C.T. and Lau, K.M., 2011, June. A predictive location-aware algorithm for dementia care. In 2011 IEEE 15th International Symposium on Consumer Electronics (ISCE) (pp. 339-342). IEEE.

Sorber, J., Shin, M., Peterson, R., Cornelius, C., Mare, S., Prasad, A., Marois, Z., Smithayer, E. and Kotz, D., 2012, February. An amulet for trustworthy wearable mHealth. In Proceedings of the Twelfth Workshop on Mobile Computing Systems & Applications (pp. 1-6).

Yumak, Z. and Pu, P., 2013. Survey of sensor-based personal wellness management systems. BioNanoScience, 3, pp.254-269.

Losardo, A., Grossi, F., Matrella, G., De Munari, I. and Ciampolini, P., 2015. Tools for Behavior Monitoring: An Ambient Assisted Living Real Experience. In Ambient Assisted Living: Italian Forum 2014 (pp. 93-100). Springer International Publishing.

Doyle, J. and Walsh, L., 2015. Independent living applications. Introduction to Nursing Informatics, pp.177-211.

Kotz, D., Gunter, C.A., Kumar, S. and Weiner, J.P., 2016. Privacy and security in mobile health: a research agenda. Computer, 49(6), pp.22-30.

Platt, A., Outlay, C., Sarkar, P. and Karnes, S., 2016. Evaluating user needs in wellness apps. International Journal of Human-Computer Interaction, 32(2), pp.119-131.

Teyhen, D.S., Robbins, D. and Ryan, B.A., 2018. Promoting and sustaining positive personal health behaviors–putting the person first. Military medicine, 183(suppl_3), pp.213-219.

McCall, I.C., Lau, C., Minielly, N. and Illes, J., 2019. Owning ethical innovation: claims about commercial wearable brain technologies. Neuron, 102(4), pp.728-731.

Kettunen, E., Kari, T. and Critchley, W., 2019. Critical Experiences with Sport and Wellness Technology Digital Coach: A Study among University Students with Low Levels of Physical Activity. In Pacific Asia Conference on Information Systems. Association for Information Systems.

Mishra, K.N., 2020. An Efficient Approach towards Enhancing the Performance of m-Health Using Sensor Networks and Cloud Technologies. Internet of Things (IoT) Concepts and Applications, pp.491-513.

Hardin, T. and Kotz, D., 2021. Amanuensis: Information provenance for health-data systems. Information Processing & Management, 58(2), p.102460.

Grober, J.S. and Thethi, A.K., 2003. Osteoarthritis: when are alternative therapies a good alternative?. Consultant, 43(2), pp.197-203.

Horn Jr, R.A., 2005. Post-formal conversation. In Dialogue as a Means of Collective Communication (pp. 291-321). Boston, MA: Springer US.

Ahtinen, A., Mantyjarvi, J. and Hakkila, J., 2008, August. Using heart rate monitors for personal wellness-The user experience perspective. In 2008 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (pp. 1591-1597). IEEE.

Zhang, B., 2010, June. Health care applications based on ZigBee standard. In 2010 International Conference On Computer Design and Applications (Vol. 1, pp. V1-605). IEEE.

Lu, C.H., Chiao, Y.L., Deng, Y.S. and Liu, P.L., 2011, May. A sense of connection: Towards a personal wellness management ready society. In 2011 International Joint Conference on Service Sciences (pp. 1-5). IEEE.

Seo, C., Kang, W., Zeigler, B.P. and Kim, D., 2014, April. Expanding DEVS and SES applicability: using M&S kernels within IT systems. In SpringSim (TMS-DEVS) (p. 7).

Farseev, A. and Chua, T.S., 2017. Tweet can be fit: Integrating data from wearable sensors and multiple social networks for wellness profile learning. ACM Transactions on Information Systems (TOIS), 35(4), pp.1-34.

Chan, W.M., Zhao, Y. and Tsui, K.L., 2017. Implementation of electronic health monitoring systems at the community level in Hong Kong. In Smart Health: International Conference, ICSH 2017, Hong Kong, China, June 26-27, 2017, Proceedings (pp. 94-103). Springer International Publishing.

Kang, W.S., Son, C.S., Lee, S., Choi, R.H. and Ha, Y.M., 2017, July. A wellness software platform with smart wearable devices and the demonstration report for personal wellness management. In International Conference on Nano-Bio Sensing, Imaging, and Spectroscopy 2017 (Vol. 10324, pp. 72-74). SPIE.

Bhavana, G. and Kumar, K.M., 2017, August. Cardiac disease monitoring based on ZigBee technology. In 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS) (pp. 392-395). IEEE.

Bray, J.W., Hinde, J.M., Kaiser, D.J., Mills, M.J., Karuntzos, G.T., Genadek, K.R., Kelly, E.L., Kossek, E.E. and Hurtado, D.A., 2018. Effects of a flexibility/support intervention on work performance: Evidence from the work, family, and health network. American Journal of Health Promotion, 32(4), pp.963-970.

Orlov, O.I., Orlov, V.A., Strizhakova, O.V. and Fetisov, O.B., 2021. Remote monitoring of population health and performance reserves. Voprosy Kurortologii, Fizioterapii, i Lechebnoi Fizicheskoi Kultury, 98(6), pp.33-38.

Duffy, J.T., Perez, J., Green, S. and ODell, C., 2021. An Ironic Pairing: Enlisting Technology to Bring the Benefits of Nature to Counseling Students. Journal of Creativity in Mental Health, pp.1-14.

Roy, T. and Nahid, M.M., 2022, March. The IoMT and Cloud in Healthcare: Use, Impact and Efficiency of Contemporary Sensor Devices Used by Patients and Clinicians. In Proceedings of the 2nd International Conference on Computing Advancements (pp. 426-434).

Baig, M.M., Afifi, S., GholamHosseini, H. and Mirza, F., 2019. A systematic review of wearable sensors and IoT-based monitoring applications for older adults–a focus on ageing population and independent living. Journal of medical systems, 43, pp.1-11.

Luskin, F.M., Newell, K.A., Griffith, M., Holmes, M., Telles, S., Marvasti, F.F., Pelletier, K.R. and Haskell, W.L., 1998. A review of mind-body therapies in the treatment of cardiovascular

disease. Part 1: Implications for the elderly. Alternative therapies in health and medicine, 4(3), pp.46-61.

Selvamurthy, W., Sridharan, K., Ray, U.S., Tiwary, R.S., Hegde, K.S., Radhakrishnan, U. and Sinha, K.C., 1998. A new physiological approach to control essential hypertension. Indian journal of physiology and pharmacology, 42, pp.205-213.

Brosseau, L., Pelland, L., Wells, G., Macleay, L., Lamothe, C., Michaud, G., Lambert, J., Robinson, V. and Tugwell, P., 2004. Efficacy of aerobic exercises for osteoarthritis (part II): a meta-analysis. Physical Therapy Reviews, 9(3), pp.125-145.

Meehan, T., Eisenhut, M. and Stephens, D., 2004. A review of alternative treatments for tinnitus. Audiological Medicine, 2(1), pp.74-82.

Li, Q.Z., Li, P., Garcia, G.E., Johnson, R.J. and Feng, L., 2005. Genomic profiling of neutrophil transcripts in Asian Qigong practitioners: A pilot study in gene regulation by mind–body interaction. Journal of Alternative & Complementary Medicine, 11(1), pp.29-39.

Mouridsen, H.T., 2006. Incidence and management of side effects associated with aromatase inhibitors in the adjuvant treatment of breast cancer in postmenopausal women. Current medical research and opinion, 22(8), pp.1609-1621.

Ma, M., McNeill, M., Charles, D. and McDonough, S., 2006. Virtual Reality Games for Motor Rehabilitation. University of Wolverhampton.

Ospina, M.B., Bond, K., Karkhaneh, M., Buscemi, N., Dryden, D.M., Barnes, V., Carlson, L.E., Dusek, J.A. and Shannahoff-Khalsa, D., 2008. Clinical trials of meditation practices in health

care: characteristics and quality. The Journal of Alternative and Complementary Medicine, 14(10), pp.1199-1213.

Birdee, G.S., Wayne, P.M., Davis, R.B., Phillips, R.S. and Yeh, G.Y., 2009. T'ai chi and qigong for health: patterns of use in the United States. The Journal of Alternative and Complementary Medicine, 15(9), pp.969-973.

Mak, J.C. and Faux, S., 2010. Complementary and alternative medicine use by osteoporotic patients in Australia (CAMEO-A): a prospective study. The Journal Of Alternative and Complementary Medicine, 16(5), pp.579-584.

Gonçalves, L.C., de Souza Vale, R.G., Barata, N.J.F., Varejao, R.V. and Dantas, E.H.M., 2011. Flexibility, functional autonomy and quality of life (QoL) in elderly yoga practitioners. Archives of gerontology and geriatrics, 53(2), pp.158-162.

Macfarlane, G.J., Paudyal, P., Doherty, M., Ernst, E., Lewith, G., MacPherson, H., Sim, J. and Jones, G.T., 2012. A systematic review of evidence for the effectiveness of practitioner-based complementary and alternative therapies in the management of rheumatic diseases: osteoarthritis. Rheumatology, 51(12), pp.2224-2233.

Galantino, M.L., Desai, K., Greene, L., DeMichele, A., Stricker, C.T. and Mao, J.J., 2012. Impact of yoga on functional outcomes in breast cancer survivors with aromatase inhibitor–associated arthralgias. Integrative Cancer Therapies, 11(4), pp.313-320.

Menas, P., Merkel, D., Hui, W., Lawton, J., Harper, A. and Carro, G., 2012. Incidence and management of arthralgias in breast cancer patients treated with aromatase inhibitors in an outpatient oncology clinic. Journal of Oncology Pharmacy Practice, 18(4), pp.387-393.

Bryce, J., Bauer, M. and Hadji, P., 2012. Managing arthralgia in a postmenopausal woman taking an aromatase inhibitor for hormone sensitive early breast cancer: a case study. Cancer Management and Research, pp.105-111.

Jones, C., Gilmore, J., Saleh, M., Feinberg, B., Kissner, M. and Simmons, S.J., 2012. Therapeutic optimization of aromatase inhibitor–associated arthralgia: etiology, onset, resolution, and symptom management in early breast cancer. Community Oncology, 3(9), pp.94-101.

Mckenna Longacre, M.M., Silver-Highfield, E., Lama, P. and Grodin, M.A., 2012. Complementary and alternative medicine in the treatment of refugees and survivors of torture: a review and proposal for action. Torture, 22(1), pp.38-57.

Galantino, M.L., Greene, L., Archetto, B., Baumgartner, M., Hassall, P., Murphy, J.K., Umstetter, J. and Desai, K., 2012. A qualitative exploration of the impact of yoga on breast cancer survivors with aromatase inhibitor-associated arthralgias. Explore, 8(1), pp.40-47.

Young, L. and Kemper, K.J., 2013. Integrative care for pediatric patients with pain. The Journal of Alternative and Complementary Medicine, 19(7), pp.627-632.

Klatt, M., Harpster, K., Browne, E., White, S. and Case-Smith, J., 2013. Feasibility and preliminary outcomes for Move-Into-Learning: An arts-based mindfulness classroom intervention. The Journal of Positive Psychology, 8(3), pp.233-241.

Brown, C.G., 2015. Integrative Medicine in the Hospital: Secular or Religious?. Society, 52, pp.462-468.

Wu, W.W., Kwong, E., Lan, X.Y. and Jiang, X.Y., 2015. The effect of a meditative movement intervention on quality of sleep in the elderly: a systematic review and meta-analysis. The Journal of Alternative and Complementary Medicine, 21(9), pp.509-519.

Jang, K.J., Ryoo, J., Telhan, O. and Mangharam, R., 2015, June. Cloud Mat: Context-aware personalization of fitness content. In 2015 IEEE International Conference on Services Computing (pp. 301-308). IEEE.

Peppone, L.J., Janelsins, M.C., Kamen, C., Mohile, S.G., Sprod, L.K., Gewandter, J.S., Kirshner, J.J., Gaur, R., Ruzich, J., Esparaz, B.T. and Mustian, K.M., 2015. The effect of YOCAS©® yoga for musculoskeletal symptoms among breast cancer survivors on hormonal therapy. Breast cancer research and treatment, 150, pp.597-604.

Benning, T.B., 2016. Should Psychiatrists Resurrect the Body?. Advances in Mind-body Medicine, 30(1), pp.32-38.

Niravath, P., 2016. Aromatase Inhibitor-Associated Arthralgia: How Big Is the Problem and What Can Be Done?. Current Breast Cancer Reports, 8, pp.135-138.

Mehl-Madrona, L., Mainguy, B. and Plummer, J., 2016. Integration of complementary and alternative medicine therapies into primary-care pain management for opiate reduction in a rural setting. The Journal of Alternative and Complementary Medicine, 22(8), pp.621-626.

Geisz, S., 2016. Body Practice and Meditation as Philosophy: Teaching Qigong, Taijiquan, and Yoga in College Courses. Teaching Philosophy, 39(2), pp.115-135.

Moniz, R. and Slutzky, H., 2015. A brief introduction to mindfulness: origins, science, the brain, and practice. The Mindful Librarian: Connecting The Practice of Mindfulness to Librarianship (Eds R Moniz, JE Eshleman, J Henry, H Slutzky, L Moniz), pp.1-24.

Satija, A. and Bhatnagar, S., 2017. Complementary therapies for symptom management in cancer patients. Indian journal of palliative care, 23(4), p.468.

Richer, A.C., 2017. Functional medicine approach to traumatic brain injury. Medical acupuncture, 29(4), pp.206-214.

Vergeer, I., Bennie, J.A., Charity, M.J., Harvey, J.T., van Uffelen, J.G., Biddle, S.J. and Eime, R.M., 2017. Participation trends in holistic movement practices: a 10-year comparison of yoga/Pilates and t'ai chi/qigong use among a national sample of 195,926 Australians. BMC Complementary and Alternative Medicine, 17(1), pp.1-13.

Dowling, M., 2017. Arthralgia in breast cancer survivors: an integrative review of endocrine therapy. Number 3/May 2017, 44(3).

Sawni, A. and Breuner, C.C., 2017. Clinical hypnosis, an effective mind–body modality for adolescents with behavioral and physical complaints. Children, 4(4), p.19.

Roberts, K., Rickett, K., Greer, R. and Woodward, N., 2017. Management of aromatase inhibitor induced musculoskeletal symptoms in postmenopausal early Breast cancer: a systematic review and meta-analysis. Critical Reviews in Oncology/Hematology, 111, pp.66-80.

Voigt, N., Cho, H. and Schnall, R., 2018. Supervised physical activity and improved functional capacity among adults living with HIV: A systematic review. Journal of the Association of Nurses in AIDS Care, 29(5), pp.667-680.

Vergeer, I., Bennie, J.A., Charity, M.J., van Uffelen, J.G., Harvey, J.T., Biddle, S.J. and Eime, R.M., 2018. Participant characteristics of users of holistic movement practices in Australia. Complementary Therapies in Clinical Practice, 31, pp.181-187.

Macinko, J. and Upchurch, D.M., 2019. Factors associated with the use of meditation, US adults 2017. The Journal of Alternative and Complementary Medicine, 25(9), pp.920-927.

Singla, S., Aswath, S., Kumar, D., Thatavarti, S. and Veeramalai, G., Role of Yoga for People Suffering from Schizophrenia in India.

Bravo, C., Skjaerven, L.H. and Catalan-Matamoros, D., 2019. Effectiveness of movement and body awareness therapies in patients with fibromyalgia: a systematic review and meta-analysis. European Journal of Physical and Rehabilitation Medicine, 55(5), pp.646-657.

Taylor, S.L., Herman, P.M., Marshall, N.J., Zeng, Q., Yuan, A., Chu, K., Shao, Y., Morioka, C. and Lorenz, K.A., 2019. Use of complementary and integrated health: a retrospective analysis of US veterans with chronic musculoskeletal pain nationally. The Journal of Alternative and Complementary Medicine, 25(1), pp.32-39.

Goldsmith, E.S., MacLehose, R.F., Jensen, A.C., Clothier, B., Noorbaloochi, S., Martinson, B.C., Donaldson, M.T. and Krebs, E.E., 2020. Complementary, integrative, and non-drug therapy use for pain among US military veterans on long-term opioids. Medical care, 58(Suppl 2 9 Suppl), p.S116.

Roberts, K.E., Rickett, K., Feng, S., Vagenas, D. and Woodward, N.E., 2020. Exercise therapies for preventing or treating aromatase inhibitor-induced musculoskeletal symptoms in early breast cancer. Cochrane Database of Systematic Reviews, (1).

Tsai, C.L., Liu, L.C., Liao, C.Y., Liao, W.L., Liu, Y.H. and Hsieh, C.L., 2021. Yoga versus massage in the treatment of aromatase inhibitor-associated knee joint pain in breast cancer survivors: a randomized controlled trial. Scientific reports, 11(1), pp.1-10.

Manjula, H.M. and AnandaRaj, S.P., 2021, December. Ayurvedic Diagnosis using Machine Learning Techniques to examine the diseases by extracting the data stored in AyurDataMart. In 2021 3rd International Conference on Advances in Computing, Communication Control and Networking (ICAC3N) (pp. 239-244). IEEE.

Chen, X.P., Wang, L.J., Chang, X.Q., Wang, K., Wang, H.F., Ni, M., Niu, W.X. and Zhang, M., 2021. Tai Chi and Yoga for Improving Balance on One Leg: A Neuroimaging and Biomechanics Study. Frontiers in Neurology, p.1796.

Manjula, H.M. and AnandaRaj, S.P., 2021, December. Ayurvedic Diagnosis using Machine Learning Techniques to examine the diseases by extracting the data stored in AyurDataMart. In 2021 3rd International Conference on Advances in Computing, Communication Control and Networking (ICAC3N) (pp. 239-244). IEEE.

Luo, L., Wang, X. and Song, N., 2021, January. Review and Prospect of International Aquatic Training Research--Based on Visualization Analysis of Big Data literature. In 2021 International Conference on Information Technology and Contemporary Sports (TCS) (pp. 241-248). IEEE.

Warren, Y., Hecksher, A., Schepel, C., Trufan, S., Greiner, R., Yaguda, S., Bailey-Dorton, C., Fisher, J., White, R. and Hadzikadic-Gusic, L., 2022. Integrative Oncology in Young Women With Breast Cancer. Oncology (Williston Park, NY), 36(11), pp.658-663.

Pardeshi, H., Ghaiwat, A., Thongire, A., Gawande, K. and Naik, M., 2022, November. Fitness Freaks: A System for Detecting Definite Body Posture Using OpenPose Estimation. In Futuristic

Trends in Networks and Computing Technologies: Select Proceedings of Fourth International Conference on FTNCT 2021 (pp. 1061-1072). Singapore: Springer Nature Singapore.

Sharma, K., Agarwal, V. and Rajpoot, A.K., 2022, September. Digital Yoga Game with Enhanced Pose Grading Model. In 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA) (pp. 1-6). IEEE.

Vishnu, S.N.S., Gandluru, A. and Ramesh, S.R., 2022, May. 32-Bit RISC Processor Using VedicMultiplier. In 2022 3rd International Conference for Emerging Technology (INCET) (pp. 1-5). IEEE.

Agarwal, V., Sharma, K. and Rajpoot, A.K., 2022, May. AI based Yoga Trainer-Simplifying home yoga using mediapipe and video streaming. In 2022 3rd International Conference for Emerging Technology (INCET) (pp. 1-5). IEEE.

Dittakavi, B., Bavikadi, D., Desai, S.V., Chakraborty, S., Reddy, N., Balasubramanian, V.N., Callepalli, B. and Sharma, A., 2022. Pose tutor: An explainable system for pose correction in the wild. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 3540-3549).

Shetty, N.R., Prasad, N.H. and Nalini, N., 2022. Emerging research in computing, information, communication and applications. Springer Singapore.

Annex to the Thesis

Table 2.3.2t

Table listing the literature and the keywords referenced in each of the references:

Literature	Keywords
Swan (2011)	Artificial Intelligence, Machine Learning, AI for health
Behara et al., (2014)	Artificial Intelligence, Machine Learning, AI for health
Akbari, Liqiang & Chua (2016)	Artificial Intelligence, Machine Learning, AI for fitness
Farseev & Chua (2017)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Jamatia (2022)	Yoga, Yoga instructor, Personalized instruction, AI for Yoga, AI for fitness

April et al., (2020)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Chronaki & Chiarugi (2005)	Artificial Intelligence, Machine Learning, AI for health
Mattila et al., (2008)	Personal trainer, AI for fitness, AI for Yoga instructors
Mattila et al., (2008)	Personal trainer, AI for fitness, AI for Yoga instructors
Na, Choi & Park (2009)	Personal trainer, AI for fitness, AI for Yoga instructors
Pheng & Husain (2010)	Personal trainer, AI for fitness, AI for Yoga instructors
Seppala & Nykanen (2011)	Personal trainer, AI for fitness, AI for Yoga instructors
Vuong, Chan, & Lau (2011)	Artificial Intelligence, Machine Learning, AI for health
Sorber et al., (2011)	Artificial Intelligence, Machine Learning, AI for health
Yumak & Pu (2013)	Personal trainer, AI for fitness, AI for Yoga instructors
Losardo et al., (2015)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors

Doyle & Walsh (2015)	Personal trainer, AI for fitness, AI for Yoga instructors
Kotz et al., (2016)	Artificial Intelligence, Machine Learning, AI for health
Platt et al., (2016)	Personal trainer, AI for fitness, AI for Yoga instructors
Teyhen, Robbins & Ryan (2018)	Personal trainer, AI for fitness, AI for Yoga instructors
Coates et al., (2019)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Kettunen, Kari & Critchley (2019)	Personal trainer, AI for fitness, AI for Yoga instructors
Lau & Soh (2020)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Mishra (2020)	Artificial Intelligence, Machine Learning, AI for health, AI for fitness, AI for Yoga instructors
Hardin & Kotz (2021)	Artificial Intelligence, Machine Learning, AI for health
Grober & Thethi (2003)	Yoga, Personal instructor in Yoga, Health science, Fitness industry

Horn (2005)	Yoga, Personal instructor in Yoga, Health science
Ahtinen, Mantyjarvi & Hakkila .(2008)	Personal trainer, AI for fitness, AI for Yoga instructors
Zhang (2010)	Artificial Intelligence, Machine Learning, AI for health
Lu et al., (2011)	Artificial Intelligence, Machine Learning, AI for health, AI for fitness, AI for Yoga instructors
Huh et al., (2013)	Personal trainer, AI for fitness, AI for Yoga instructors
Farseev & Chua (2017)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Bi et al., (2017)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Chan, Zhao & Tsui (2017)	Personal trainer, AI for fitness, AI for Yoga instructors
Kang et al., (2017)	Personal trainer, AI for fitness, AI for Yoga instructors
Bhavana & Kumar (2018)	Artificial Intelligence, Machine Learning, AI for health
Bray et al., (2018)	Personal trainer, AI for fitness, AI for Yoga instructors

Orlov, Strizhakova & Fetisov (2021)	Personal trainer, AI for fitness, AI for Yoga instructors, Responsible AI
Duffy et al., (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Roy & Nahid (2022)	Artificial Intelligence, Machine Learning, AI for health, AI for fitness, AI for Yoga instructors
Seo et al., (2014)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Luskin et al., (1998)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Selvamurthy et al., (1998)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Brosseau et al., (2004)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Meehan, Eisenhut & Stephens (2004)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Li et al., (2005)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Mouridsen (2006)	Yoga, Personal instructor in Yoga, Health science

Kruger and Malaka (2006)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Ospina et al., (2008)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Birdee et al., (2009)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Mak & Faux (2010)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Gonçalves et al., (2011)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Macfarlane et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Galantino et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Menas et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Bryce, Bauer & Hadji (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry

Jones et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Longacre et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Galantino et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Young & Kemper (2013)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Klatt et al., (2013)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Brown (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Wu et al., (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Jang et al ., (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga, AI for fitness
Peppone et al., (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga

Benning (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Niravath (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Mehl-Madrona, Mainguy & Plummer (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Moniz & Slutzky (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Satija & Bhatnagar (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Richer (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Vergeer et al (2017)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, Health science, Fitness industry, Fitness market growth, Yoga professionals growth and scale
Dowling, McDonagh & Meade (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry

Sawni & Breuner (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Roberts et al (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Voigt, Cho & Schnall (2018)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Vergeer et al., (2018)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, Health science, Fitness industry, Fitness market growth, Yoga professionals growth and scale
Macinko & Upchurch (2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Singla et al., (2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Bravo et al.,(2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Taylor et al., (2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Goldsmith et al.,(2020)	Yoga, Personal instructor in Yoga, Health science, Fitness industry

Roberts et al (2020)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Tsai et al., (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Chen et al., (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Manjula & Ananda (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga, AI for fitness
Luo,Wang & Song (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Warren et al.,(2022)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Pardeshi et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Sharma , Agarwal & Rajpoot (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking

Vishnu et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Agarwal, Sharma & Rajpoot (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Dittakavi et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Shetty et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking

Index of Tables

Index of Charts

Index of Images

Annex to the Executive Summary

Annex 1

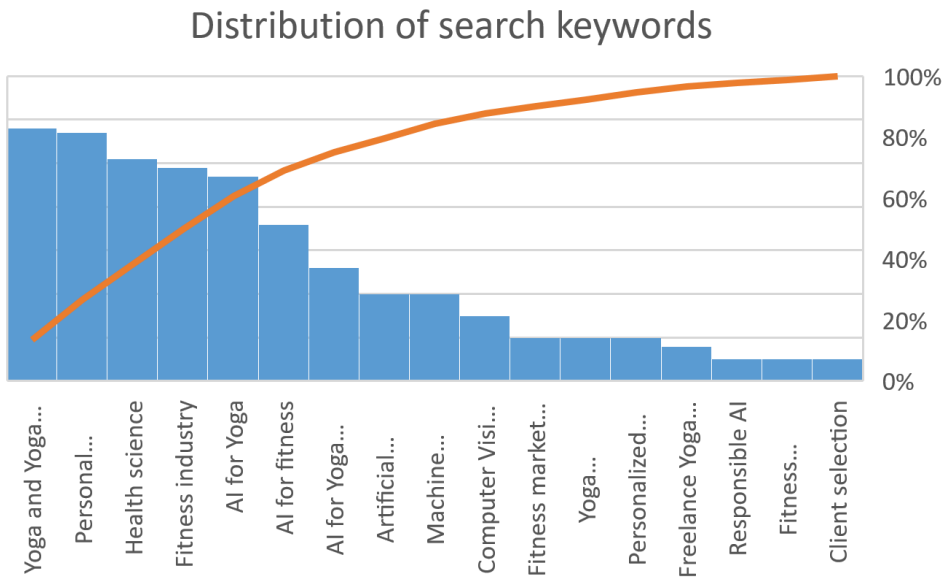
Metadata that governs the Literature Review:

S.No.	Metadata	Value
1	Keywords used for the research	Yoga, Yoga instruction as a profession, Personal instructor in Yoga, Freelance Yoga instructor, Personal trainer, Personalized instruction, Yoga instructor, Health science, health education, Fitness industry, Fitness market, Fitness market growth, Yoga professionals growth and scale, Artificial Intelligence, Machine Learning, AI for Yoga, AI for fitness, AI for Yoga instructors, Responsible AI, Personalized Yoga instruction, Social pressure for Yoga instructors, Fitness assessments, Client selection, Computer Vision for movement tracking
2	Distribution %	There is a detailed visual (Graph 2.2.1g) below this table that represents the distribution of keywords based on their impact on the topic of research. The chart shows the distribution of search keywords used in research. The X axis lists the keywords, and the Y axis the percentage of importance of each keyword. The orange line shows the cumulative percentage of importance. This means that the first few keywords account for the majority of the research. For example, the first 10 keywords account for about 90% of the research.
3	Importance criteria	Yoga and Yoga instruction as a profession are the most crucial keywords, reflecting the central focus of the research. The keywords Personal instructor in Yoga and freelance Yoga instructor are closely tied to Yoga and the focus of this research, indicating the specific target audience. AI for Yoga and AI for fitness demonstrate the core research interest in application of AI within the yoga and fitness sector. Health science and Fitness industry are also important keywords

		next in line because they highlight the broader context of the research and how health science status plays an important role in impacting freelance professional Yoga instructors. Keywords related to AI technology (Artificial Intelligence, Machine Learning, Computer Vision) are all very critical to the focus on applying AI for impact in market growth and presence of Yoga instructors rather than their technical details.
4	Search databases	Scopus, Google Scholar, Web of science, Ebaco
5	Systematic approach	1. Define the research topic and open question that is specific, measurable, achievable, relevant, and time-bound (SMART) 2. Develop search strategy: identified search databases, framed the keywords based on the SMART research question definition, refined inclusion and exclusion words, filtered based on timeline, language and area covered, screen based on titles and abstracts first 3. Extract data: get full-text articles of relevant resources, record the reasons and importance criteria for including and excluding results 4. Analyze the literature: identify patterns and themes in literature identified, assess the strength and inclination to the research topic, categorize the findings and the understanding, orchestrate summaries and recommendations 5. Report the study: document the analysis results in structured, categorized and organized / modular text, visual representations and groups. Identify any bias or gaps and reiterate the above steps to reduce bias and improve relevance

Annex 2

Distribution of Search Keywords:



Full keywords in this chart above in the order they appear:

Yoga and Yoga instruction, Personal instructors, Health science, Fitness industry, AI for Yoga AI for fitness, AI for Yoga instructors, Artificial Intelligence, Machine Learning, Computer Vision for movement tracking, Fitness market, Yoga professionals growth and scale, Personalized Yoga instruction, Freelance Yoga instructor, Responsible AI, Fitness assessments, Client selection.

Annex 3

Keyword - Literature Correlation:

Table listing the literature and the keywords referenced in each of the references:

Literature	Keywords

Swan (2011)	Artificial Intelligence, Machine Learning, AI for health
Behara et al., (2014)	Artificial Intelligence, Machine Learning, AI for health
Akbari, Liqiang & Chua (2016)	Artificial Intelligence, Machine Learning, AI for fitness
Farseev & Chua (2017)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Jamatia (2022)	Yoga, Yoga instructor, Personalized instruction, AI for Yoga, AI for fitness
April et al., (2020)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Chronaki & Chiarugi (2005)	Artificial Intelligence, Machine Learning, AI for health
Mattila et al., (2008)	Personal trainer, AI for fitness, AI for Yoga instructors
Mattila et al., (2008)	Personal trainer, AI for fitness, AI for Yoga instructors
Na, Choi & Park (2009)	Personal trainer, AI for fitness, AI for Yoga instructors
Pheng & Husain (2010)	Personal trainer, AI for fitness, AI for Yoga instructors
Seppala & Nykanen (2011)	Personal trainer, AI for fitness, AI for Yoga instructors
Vuong, Chan, & Lau (2011)	Artificial Intelligence, Machine Learning, AI for health
Sorber et al., (2011)	Artificial Intelligence, Machine Learning, AI for health

Yumak & Pu (2013)	Personal trainer, AI for fitness, AI for Yoga instructors
Losardo et al., (2015)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Doyle & Walsh (2015)	Personal trainer, AI for fitness, AI for Yoga instructors
Kotz et al., (2016)	Artificial Intelligence, Machine Learning, AI for health
Platt et al., (2016)	Personal trainer, AI for fitness, AI for Yoga instructors
Teyhen, Robbins & Ryan (2018)	Personal trainer, AI for fitness, AI for Yoga instructors
Coates et al., (2019)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Kettunen, Kari & Critchley (2019)	Personal trainer, AI for fitness, AI for Yoga instructors
Lau & Soh (2020)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Mishra (2020)	Artificial Intelligence, Machine Learning, AI for health, AI for fitness, AI for Yoga instructors
Hardin & Kotz (2021)	Artificial Intelligence, Machine Learning, AI for health
Grober & Thethi (2003)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Horn (2005)	Yoga, Personal instructor in Yoga, Health science
Ahtinen, Mantyjarvi & Hakkila .(2008)	Personal trainer, AI for fitness, AI for Yoga instructors

Zhang (2010)	Artificial Intelligence, Machine Learning, AI for health
Lu et al., (2011)	Artificial Intelligence, Machine Learning, AI for health, AI for fitness, AI for Yoga instructors
Huh et al., (2013)	Personal trainer, AI for fitness, AI for Yoga instructors
Farseev & Chua (2017)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Bi et al., (2017)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors
Chan, Zhao & Tsui (2017)	Personal trainer, AI for fitness, AI for Yoga instructors
Kang et al., (2017)	Personal trainer, AI for fitness, AI for Yoga instructors
Bhavana & Kumar (2018)	Artificial Intelligence, Machine Learning, AI for health
Bray et al., (2018)	Personal trainer, AI for fitness, AI for Yoga instructors
Orlov, Strizhakova & Fetisov (2021)	Personal trainer, AI for fitness, AI for Yoga instructors, Responsible AI
Duffy et al., (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Roy & Nahid (2022)	Artificial Intelligence, Machine Learning, AI for health, AI for fitness, AI for Yoga instructors
Seo et al., (2014)	Artificial Intelligence, Machine Learning, AI for fitness, AI for Yoga instructors

Luskin et al., (1998)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Selvamurthy et al., (1998)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Brosseau et al., (2004)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Meehan, Eisenhut & Stephens (2004)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Li et al., (2005)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Mouridsen (2006)	Yoga, Personal instructor in Yoga, Health science
Kruger and Malaka (2006)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Ospina et al., (2008)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Birdee et al., (2009)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Mak & Faux (2010)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Gonçalves et al., (2011)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Macfarlane et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Galantino et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Menas et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Bryce, Bauer & Hadji (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry

Jones et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Longacre et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Galantino et al., (2012)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Young & Kemper (2013)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Klatt et al., (2013)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Brown (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Wu et al., (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Jang et al ., (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga, AI for fitness
Peppone et al., (2015)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Benning (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Niravath (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Mehl-Madrona, Mainguy & Plummer (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Moniz & Slutzky (2016)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Satija & Bhatnagar (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Richer (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry

Vergeer et al (2017)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, Health science, Fitness industry, Fitness market growth, Yoga professionals growth and scale
Dowling, McDonagh & Meade (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Sawni & Breuner (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Roberts et al (2017)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Voigt, Cho & Schnall (2018)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Vergeer et al., (2018)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, Health science, Fitness industry, Fitness market growth, Yoga professionals growth and scale
Macinko & Upchurch (2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Singla et al., (2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Bravo et al.,(2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Taylor et al., (2019)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Goldsmith et al.,(2020)	Yoga, Personal instructor in Yoga, Health science, Fitness industry
Roberts et al (2020)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga

Tsai et al., (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Chen et al., (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Manjula & Ananda (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga, AI for fitness
Luo,Wang & Song (2021)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Warren et al.,(2022)	Yoga, Personal instructor in Yoga, Health science, Fitness industry, AI for Yoga
Pardeshi et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Sharma , Agarwal & Rajpoot (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Vishnu et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Agarwal, Sharma & Rajpoot (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Dittakavi et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking
Shetty et al., (2022)	Yoga, Personal instructor in Yoga, Freelance Yoga instructor, AI for Yoga, AI for fitness, Computer Vision for movement tracking.

Annex 4

Visual Summary of the literature review:

Area	Intent	References
The Rise of Hyper-Personalized Healthcare and Wellness Technologies	- The shift from disease treatment to proactive wellness management. - The role of data, self-tracking, and sensors in personalized health. - The development of mHealth technologies and applications for wellness. - Challenges in data security and privacy related to mHealth. - Cloud-enabled platforms and frameworks for personalized wellness management. - The use of wearable technologies for health monitoring and behavior analysis. - The growing acceptance of AI-enabled fitness coaches and wearable devices.	Swan (2011), Behara et al. (2014), Akbari et al. (2016), Farseev & Chua (2017), Yumak & Pu (2013), Losardo et al. (2015), Doyle & Walsh (2015), Kotz et al. (2016), Platt et al. (2016), Teyhen et al. (2018), Mishra (2020), Hardin & Kotz (2021), Chronaki & Chiarugi (2005), Mattila et al. (2008), Na, Choi & Park (2009), Pheng & Husain (2010), Seppala & Nykanen (2011), Vuong et al. (2011), Sorber et al. (2011), Chan, Zhao & Tsui (2017), Kang et al. (2017), Bhavana & Kumar (2017), Bray et al. (2018), Orlov et al. (2021), Huh et al. (2013), Bi et al. (2017), Agarwal, Sharma & Rajpoot (2022), Dittakavi et al. (2022), Shetty et al. (2022)

Personalized Yoga Instruction as Complementary and Alternative Medicine	- The effectiveness of yoga and meditation for managing chronic conditions, including pain, stress, and sleep disorders. - The potential benefits of yoga for improving flexibility, balance, and functional capacity. - The use of yoga as a complementary therapy for cancer patients, particularly those experiencing side effects from aromatase inhibitors. - The integration of yoga and meditation into healthcare systems and pain management strategies. - The growing interest in mind-body medicine and its applications in healthcare.	Jamatia (2022), April et al. (2020), Grober & Thethi (2003), Wu et al. (2015), Birdee et al. (2009), Mak & Faux (2010), Gonçalves et al. (2011), Macfarlane et al. (2012), Galantino et al. (2012, both papers), Menas et al. (2012), Bryce et al. (2012), Jones et al. (2012), Longacre et al. (2012), Young & Kemper (2013), Klatt et al. (2013), Brown (2015), Jang et al. (2015), Peppone et al. (2015), Benning (2016), Niravath (2016), Mehl-Madrona et al. (2016), Satija & Bhatnagar (2017), Richer (2017), Vergeer et al. (2017, both papers), Dowling et al. (2017), Sawni & Breuner (2017), Roberts et al. (2017, both papers), Voigt et al. (2018), Macinko & Upchurch (2019), Singla et al. (2019), Bravo et al. (2019), Taylor et al. (2019), Goldsmith et al. (2020), Tsai et al. (2021), Chen et al. (2021), Manjula & Ananda (2021), Luo et al. (2021), Warren et al. (2022), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Selvamurthy et al. (1998), Brosseau et al. (2004), Meehan et al. (2004), Li et al. (2005), Mouridsen (2006), Ospina et al. (2008), Luskin et al. (1998)

The Potential of AI in Transforming Yoga Instruction and Personal Training	- AI-driven pose recognition and feedback for personalized yoga practice. - The development of AI-powered yoga trainers for at-home practice. - The potential for AI to enhance the efficiency and scalability of yoga instruction. - The role of AI in creating more accessible and engaging yoga experiences. - The impact of AI on the role of human yoga instructors and the future of yoga training.	Zhang (2010), Lu et al. (2011), Seo et al. (2014), Farseev & Chua (2017), Kang et al. (2017), Bhavana & Kumar (2017), Mishra (2020), Agarwal et al. (2022), Dittakavi et al. (2022), Shetty et al. (2022), Jang et al. (2015), Pardeshi et al. (2022), Sharma et al. (2022), Vishnu et al. (2022)
Addressing Ethical and Social Implications of AI in Yoga	- The potential for bias in AI-powered yoga tools and the need for equitable access. - The impact of AI on the role of human instructors and the potential for job displacement. - The importance of considering the psychological and social implications of AI in yoga. - The need for user-centered research to understand the acceptance and usability of AI-enabled yoga tools.	Brown (2015), Horn Jr. (2005), Ahtinen et al. (2008), Moniz & Slutzky (2016)

Analyzing the Landscape of Research in Yoga, Meditation, and AI	- The breadth and depth of research on yoga, meditation, and their health benefits. - The evolution of research on AI in yoga and its applications. - The need for further research on the impact of AI on freelance yoga instructors.	Most references, particularly those focusing on the integration of AI in yoga, contribute to this section.

Annex 5

Criteria governing the choice of Research Methodology:

Based on the literature review and initial problem statements, the following are the criteria for which we want to evaluate the hypothesis under research question 1 (RQ 1):

1. The physiological factors that influence the Freelance Yoga instructors and trainers availability and capability'
    a. Define the different ways freelance Yoga instructors are impacted physiologically
    b. Define the different ways these physiological factors are impacting the business potential of freelance Yoga instructors
2. The advancements in AI that tend to automate hyper-personalized Yoga training and impact the opportunities available for human instructors
    a. Define the different ways AI advancements and tools are personalizing Yoga training
    b. Define the different ways these automations are diminishing the opportunities and market potential of freelance Yoga instructors

c. Distinguish between the existing ways AI advancements are impacting personalized Yoga training vs. potential use of AI in enhancing presence, visibility and scale of reach of freelance Yoga instructors

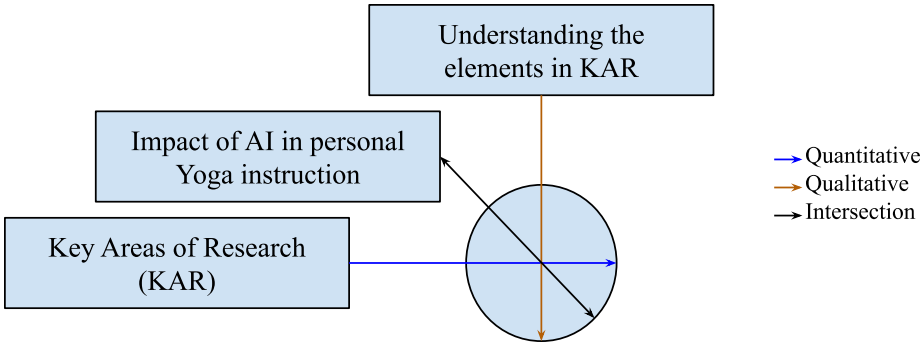
Annex 6

9-element ecosystem of the research:

Yoga Instruction **:** AI Advancement	**Challenges & Opportunities for Freelance Yoga Instructors:**	**Transformative Potential of AI:**	**Extended Tools & Considerations:**
Potential AI Advancements in Yoga Personal Training:	Hyper Personalization, AI-powered plan, feedback	AI-powered marketing, client management, fatigue management & continuous learning tools for Yoga Instructors	Wearables and computer vision for AI-automated posture correction
Impact of AI in Yoga personal training: Augmentation or Replacement?	Job displacement due to AI automation	Augment personalized virtual presence opportunities for freelance Yoga instructors	AI assisted clientele relevance and expansion of market boundaries
Physiological factors limiting the business potential of freelance Yoga instructors:	Self: Fatigue, injuries, burnout, stress, time management, fitness & spiritual growth, continuous learning	External: Relevance and understanding of the clientele, setting & atmosphere, style & culture relevance	Access & cost involved in AI-assistance that help overcome physiological factors

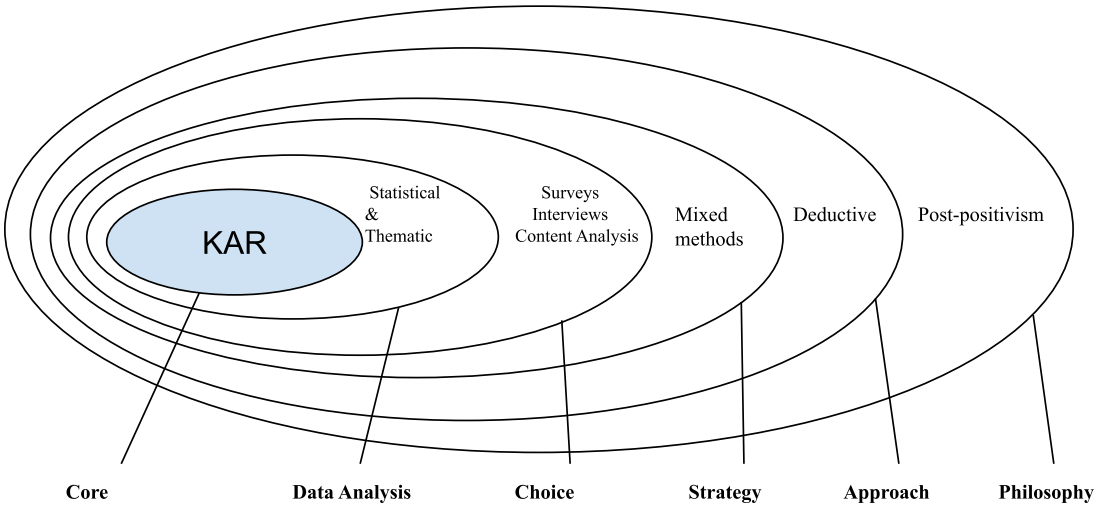
Annex 7

3-dimensional intersection of the 9-element ecosystem:



Annex 8

Visual Representation of the Research Methodology:



Annex 9

A table representing questions & key metrics for Part A of the research:

Question	Key Element	Key Area of Research	Research Metric

1. How often do you experience fatigue due to teaching multiple yoga classes or sessions in a day?	Physiological Factors: Fatigue	Impact of Physiological Factors on Business Potential	Physiological Strain Score
2. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Often," how often do you feel physically or mentally drained after a yoga session?	Physiological Factors: Mental & Physical Exhaustion	Impact of Physiological Factors on Business Potential	Physiological Strain Score
3. Do you feel that your physical fitness level directly impacts your ability to teach yoga effectively?	Physiological Factors: Fitness Level	Impact of Physiological Factors on Business Potential	Physiological Strain Score
4. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Important," how important is it for you to maintain a high level of personal fitness to be a successful yoga instructor?	Physiological Factors: Importance of Fitness	Impact of Physiological Factors on Business Potential	Physiological Strain Score
5. How often do you experience injuries due to practicing or teaching yoga?	Physiological Factors: Injuries	Impact of Physiological Factors on Business Potential	Physiological Strain Score
6. How many hours per week do you dedicate to practicing yoga for personal development and fitness?	Physiological Factors: Time Allocation	Impact of Physiological Factors on Business Potential	Physiological Strain Score
7. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Stressed," how stressed do you feel due to the demands of being a freelance yoga instructor?	Physiological Factors: Stress	Impact of Physiological Factors on Business Potential	Physiological Strain Score
8. How often do you feel overwhelmed by the administrative tasks associated with your business, such as scheduling, marketing, and client communication?	Physiological Factors: Administrative Burden	Impact of Physiological Factors on Business Potential	Physiological Strain Score

9. Do you feel that your personal time constraints limit your ability to grow your business and reach more clients?	Physiological Factors: Time Constraints	Impact of Physiological Factors on Business Potential	Physiological Strain Score
10. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Important," how important is it for you to be physically present at a specific location to effectively teach yoga?	Physiological Factors: Importance of Physical Presence	Impact of Physiological Factors on Business Potential	Physiological Strain Score
11. How often do you feel a lack of motivation or inspiration to continue as a freelance yoga instructor?	Physiological Factors: Burnout	Impact of Physiological Factors on Business Potential	Physiological Strain Score
12. Do you find it challenging to stay up-to-date with the latest trends and advancements in yoga instruction?	Physiological Factors: Continuous Learning	Impact of Physiological Factors on Business Potential	Physiological Strain Score
13. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Difficult," how difficult is it for you to create a personalized yoga plan for each client based on their unique needs and goals?	Physiological Factors: Personalization	Impact of Physiological Factors on Business Potential	Physiological Strain Score
14. How often do you feel a disconnect or lack of understanding between yourself and your clients in terms of their expectations, goals, and preferences?	Physiological Factors: Client Understanding	Impact of Physiological Factors on Business Potential	Physiological Strain Score
15. Do you find it difficult to adapt your teaching style to cater to different client demographics, including age, fitness level, and cultural backgrounds?	Physiological Factors: Adaptability	Impact of Physiological Factors on Business Potential	Physiological Strain Score

16. How often do you feel limited in your ability to connect with and grow your client base due to geographical constraints?	Physiological Factors: Geographical Limitations	Impact of Physiological Factors on Business Potential	Physiological Strain Score
17. How many clients do you currently have on average?	Business Metrics: Client Base Size	Impact of Physiological Factors on Business Potential	Average Weekly Client Sessions
18. What is your average charge per session per client as a personal yoga instructor?	Business Metrics: Pricing	Impact of Physiological Factors on Business Potential	Average Hourly Rate
19. How much time do you spend on average in a week on marketing your services?	Business Metrics: Marketing Effort	Impact of Physiological Factors on Business Potential	Weekly Marketing Time
20. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Satisfied," how satisfied are you with the current state of your business?	Business Metrics: Overall Satisfaction	Impact of Physiological Factors on Business Potential	Business Satisfaction Score
21. Do you feel that your business growth has been hindered due to your physiological limitations?	Impact of Physiological Factors on Business Potential: Overall Impact	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index
22. How often do you feel the need for additional training, education, or resources to enhance your teaching skills and knowledge?	Physiological Factors: Continuous Learning	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index

23. Do you feel that your business potential is limited by the lack of a robust network of fellow instructors or mentors?	Physiological Factors: Community Support	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index
24. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Important," how important is it for you to have access to a community of yoga instructors for support, inspiration, and professional development?	Physiological Factors: Importance of Community	Impact of Physiological Factors on Business Potential	Correlation between Physiological Strain Score and Business Performance Index
25. How often do you find it difficult to balance your personal life with the demands of running your freelance yoga business?	Physiological Factors: Work-Life Balance	Impact of Physiological Factors on Business Pote	Correlation between Physiological Strain Score and Business Performance Index
26. Do you believe being physically present for each personal training client is indispensable?	Impact of AI on Business Potential: Virtual vs. In-Person	Impact of Physiological Factors on Business Potential	Physiological Strain Score
27. How many physically-present (in-person) Yoga personal training 1 on 1 (or a group less than 5) sessions do you manage to cover in a day on average?	Business Metrics: Number of In-Person Sessions	Impact of Physiological Factors on Business Potential	Physiological Strain Score
28. What style of Yoga practice do you teach?	Impact of AI on Business Potential: Yoga Style	Impact of Physiological Factors on Business Potential	Perception of Replacement Potential

Annex 10

A table representing questions & key metrics for Part B of the research:

Question	Key Element	Key Area of Research	Research Metric
1. Are you familiar with AI-powered yoga instruction apps or platforms?	AI Adoption: Familiarity	Potential AI Advancements in Yoga Personal Training	AI Tool Usage
2. If yes, have you ever used or considered using such AI-powered tools for your yoga instruction?	AI Adoption: Use/Consideration	Potential AI Advancements in Yoga Personal Training	AI Tool Usage
3. If yes, what specific AI-powered tools have you used or are considering using? (choose one of the 5: pose correction apps, virtual yoga instructors, personalized plan generators, client management app, continuous learning tools)	AI Adoption: Specific Tool Selection	Potential AI Advancements in Yoga Personal Training	AI Tool Usage
4. On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Extremely Concerned," how concerned are you about the potential for AI to replace traditional yoga instructors instead of helping augment their business?	AI Adoption: Concerns about Replacement	Impact of AI on Business Potential	Perception of AI Replacement Potential
5. Do you believe that AI-powered yoga platforms offer benefits for both instructors and practitioners?	AI Adoption: Perceived Benefits	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
6. If yes, what specific benefits do you see for instructors?	AI Adoption: Instructor Benefits	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
7. If yes, what specific benefits do you see for practitioners?	AI Adoption: Practitioner Benefits	Potential AI Advancements in Yoga Personal Training	AI Tool Usage

8. Do you think that AI-powered yoga platforms could help you reach a wider audience and expand your business?	AI Adoption: Market Expansion Potential	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
9. If yes, how do you think AI-powered tools could help you achieve this?	AI Adoption: Market Expansion Methods	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
10. What are your concerns about the use of AI in yoga instruction?	AI Adoption: Concerns about AI Use	Impact of AI on Business Potential	Perception of AI Replacement Potential
11. Do you think that AI-powered yoga platforms could provide valuable data and insights into client behavior and preferences?	AI Adoption: Data & Insights	Impact of AI on Business Potential	Perceived Value of AI-Generated Data
12. If yes, how could you utilize such data to enhance your teaching and business strategies?	AI Adoption: Data Application	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
13. Do you believe that AI could help you improve your teaching efficiency and reduce the workload associated with administrative tasks?	AI Adoption: Efficiency & Workload Reduction	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
14. If yes, how do you think AI could assist you in these areas?	AI Adoption: Specific AI Assistance	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
15. Do you see a potential for AI to help you overcome the physiological limitations you face as a freelance instructor?	Impact of AI on Business Potential: Overcoming Physiological Limitations	Impact of AI on Business Potential	AI-Assisted Virtual Training Potential
16. If yes, how could AI be used to address these limitations?	Impact of AI on Business Potential: Overcoming Physiological Limitations	Impact of AI on Business Potential	AI-Assisted Virtual Training Potential

17. Do you think AI could help you create more engaging and personalized virtual yoga sessions for your clients?	Impact of AI on Business Potential: Virtual Yoga Enhancement	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
18. If yes, how could AI enhance the virtual yoga experience for both instructors and clients?	Impact of AI on Business Potential: Virtual Yoga Enhancement	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
19. Imagine a system where you are able to configure your inputs to simulate your personal Yoga training essence, skill level, focus, instruction style and cultural inclination into an AI-assisted virtual trainer assistant that imparts this custom personal trainer in your clients' training sessions, even without you having to be virtually present (optionally) in real time during practice. Will this be able to improve and scale your training presence and enable you to be personal-training more clients at the same time, thereby increasing your simultaneous training reach and market potential?	Impact of AI on Business Potential: AI-Assisted Virtual Trainer	Impact of AI on Business Potential	AI-Assisted Virtual Training Potential
20. Do you think such a system would be able to customize and personalize Yoga personal training plan for each client based on their personalization needs and your style/skill and teaching orientation, thereby creating more alignment in terms of "right supply" of clients for your demands as an instructor?	Impact of AI on Business Potential: AI-Assisted Personalization	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
21. Do you think such a system capable of creating the right alignment (matching client base) would maximize your business potential as an instructor by expanding your training region and territory of reach?	Impact of AI on Business Potential: AI-Assisted Market Expansion	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential

22. Do you think that AI could be used to create more accessible and affordable yoga instruction for a wider range of individuals?	AI Adoption: Accessibility & Affordability	Potential AI Advancements in Yoga Personal Training	AI-Assisted Relevance and Scaling Potential
23. Do you have any concerns about the potential for bias or inequality in AI-powered yoga platforms?	AI Adoption: Ethical Concerns	Impact of AI on Business Potential	Perception of AI Replacement Potential
24. Do you think that AI should be used to supplement traditional yoga instruction, rather than replacing it entirely?	AI Adoption: AI as Supplement vs. Replacement	Impact of AI on Business Potential	AI-Assisted Relevance and Scaling Potential
25. If you conduct virtual personal training for Yoga for your clients, do you feel they get the same personalized experience that they get in-person?	Impact of AI on Business Potential: Virtual vs. In-Person	Impact of Physiological Factors on Business Potential	AI-Assisted Virtual Training Potential
26. Do you think your clients are with you because of your unique style, focus, skill level, culture inclination and instruction style in Yoga? Yes or No.	Impact of AI on Business Potential: Instructor Uniqueness	Impact of Physiological Factors on Business Potential	AI-Assisted Virtual Training Potential
27. If yes, what is your unique style of instruction, skill level of teaching and culture inclination (if applicable)?	Impact of AI on Business Potential: Instructor Uniqueness	Impact of Physiological Factors on Business Potential	AI-Assisted Virtual Training Potential
28. If not, do you think they can just as well be trained by anyone else or by recorded videos or apps as an alternative?	Impact of AI on Business Potential: Instructor Replaceability	Impact of Physiological Factors on Business Potential	Perception of Replacement Potential
29. What are your overall thoughts on the potential impact of AI on the future of personal freelance yoga instruction?	Impact of AI on Business Potential: Overall Impact	Potential AI Advancements in Yoga Personal Training	AI Tool Usage

Annex 11

Summary of population, sampling strategy, and research procedures employed to ensure robust and reliable findings:

Research Data Details	Step Taken	Number (where applicable)	Source
Population	The study focuses on the population of freelance yoga instructors in Bangalore, including those offering personalized instruction, practitioners, and enthusiasts. This specific geographic location allows for a controlled study environment and ensures a consistent understanding of the local yoga market.	3200 to 5500 freelance personal Yoga Instructors ROUGHLY	The estimate for the total number of yoga instructors in Bangalore is primarily derived from a combination of online sources and general knowledge about the yoga industry in Bangalore. While there's no single definitive source providing an exact count, here's a breakdown of where the information likely originates: Web searches: Searching for "yoga instructors in Bangalore" or similar queries can lead to websites, articles, or directories listing yoga studios and instructors in the city. These listings often mention the number of instructors associated with them or provide broader estimates for the city. For example, a search result might state something like "There are over 4,200 yoga instructors in Bangalore" or "Bangalore has a thriving yoga community with thousands of instructors." Industry reports and surveys: Yoga teacher training schools, yoga associations, or fitness industry research organizations might publish reports or conduct surveys about the yoga industry in India, including estimates of the number of yoga instructors in different cities. Local yoga communities and forums: Online platforms and social media groups for yoga practitioners in Bangalore could have discussions or

			posts that mention the number of instructors in the city, providing anecdotal evidence or insights based on their experiences. https://www.urbanpro.com/bangalore/yoga-classes
Sample	A multi-pronged approach was used to recruit a representative sample: Quantitative Data (Surveys): A probability sampling method, specifically stratified random sampling, was employed to ensure a balanced representation of instructors based on age, gender, experience, geographic location within Bangalore, and teaching style. This approach minimizes bias and enhances the generalizability of findings to the wider population of freelance yoga instructors in Bangalore. Qualitative Data (Interviews): A purposive sampling strategy was utilized to select interview participants with diverse experiences with AI, physiological challenges, and perspectives on AI's potential in yoga instruction. This approach allows for in-depth exploration of specific themes and insights related to the research questions.	Quantitative Spot Quiz: 200 Quantitative Detailed: 100 Qualitative Detailed: 25	I conducted the data collection process based on the procedure and questions on the inquiries mentioned in the previous sections of this research.
Research Procedure	The data collection process adhered to a structured protocol, ensuring consistency and minimizing potential for bias:	Almost all of the samples collected were complete. Cleaning was done to spot quizzes.	

	Data Collection: Online surveys were administered to a minimum of 100 participants, while semi-structured interviews were conducted with a minimum of 25 participants. Additionally, content analysis of relevant AI-powered yoga platforms and marketing materials was conducted. Spot quizzes were also conducted for 200 audiences for focused responses on the research inquiries 1 and 2 (part A and B). Data Cleaning and Coding: Collected data underwent thorough cleaning to ensure accuracy and consistency. Interview transcripts were coded for thematic analysis, revealing key patterns and insights.		
Mode	● Questionnaire form sent over email and internet ● Instagram, Facebook & LinkedIn ● In-person discussions, conference calls and meetup group attendance		
Considerations	Handling Extraneous Variables: To ensure the study's internal validity, several strategies were employed to control for potential extraneous variables:		

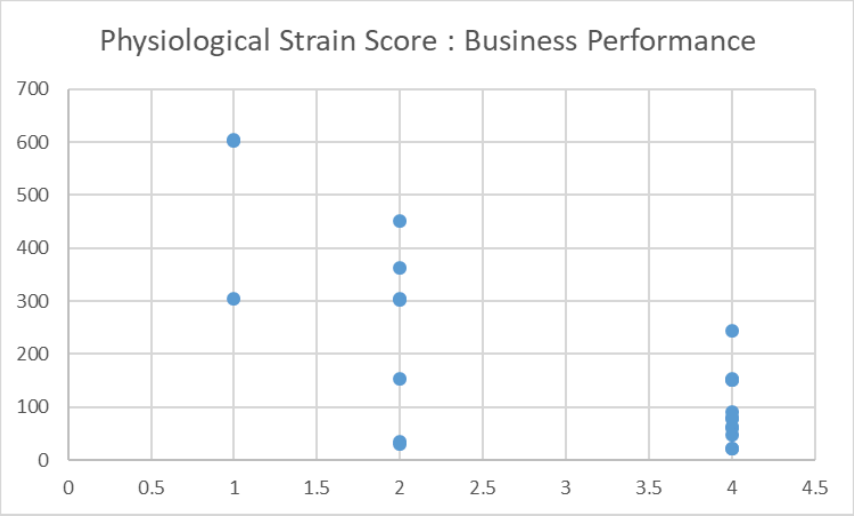
	Standardization: Data collection procedures were standardized, ensuring consistent interview conditions and limiting the research scope to Bangalore. Controlled Demographic and Market Choice: Demographic information and market data were collected and analyzed to account for potential influences on findings. Controlled Time & Condition: The study considered the broader economic context of the fitness industry to control for external influences on business performance. Randomization: Randomization was used in instances where standardization was not feasible, ensuring even distribution of extraneous variables. Counterbalancing: The order of questions was randomized to minimize potential order effects. Statistical Control: Statistical techniques like regression analysis were used to control for extraneous variables during data analysis. Ethical Considerations: The research was conducted with a strong focus on ethical considerations, ensuring:		

	Informed Consent: Participants were informed about the research objectives, procedures, and potential risks before providing informed consent. Confidentiality and Anonymity: Participant identities were kept confidential, and data was anonymized to protect privacy. Data Security: Data was stored securely, with access restricted to authorized researchers. Researcher Bias: I was mindful of personal biases and strived for objectivity throughout the research process.		

Annex 12

Physiological strain score Vs Business Performance Index:

Scatter Plotting a subset of the data with Physiological strain score on the X and Business Performance Index on the Y axes respectively, it is evident that lower the physiological strain, the better the business performance index. But more often than not, all instructors go through physiological impact in one form or the other.



90% of the instructors who took the survey responded YES to at least one of the physiological factors impacting their business performance.

Correlation between physiological strain and business performance:

```
# Importing necessary libraries
import pandas as pd
from scipy.stats import pearsonr

# Ingesting data: Physiological Strain Score
# and Business Performance Index
df = pd.read_csv("YogaInstructors1.csv")

# Converting dataframe to lists
list1 = df['Physiological Strain Score']
list2 = df['Business Performance Index']

# Applying the pearsonr() method to calculate
# correlation coefficient
corr, _ = pearsonr(list1, list2)
print('Pearsons correlation: %.3f' % corr)
```

```
Pearsons correlation: -0.721
```

As we can observe from the result, the correlation is **STRONG** and it is **NEGATIVE**. It means that there is **strong correlation between the physiological strain and business performance**

for freelance Yoga instructors and they move in opposite directions (meaning when strain increases, performance decreases).

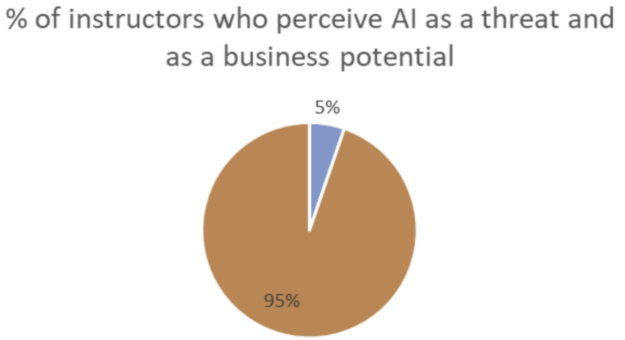
Annex 13

Correlation between the instructors perceiving AI as a threat and believing that AI will enhance reach and relevance (business opportunities):

```
# Importing necessary libraries
import pandas as pd
from scipy.stats import pearsonr

# Ingesting data: Physiological Strain Score
# and Business Performance Index
df = pd.read_csv("YogaInstructors4.csv")

# Converting dataframe to lists
list1 = df['AI advancement is a threat']
list2 = df['AI advancement helps reach and relevance']

# Applying the pearsonr() method to calculate
# correlation coefficient
corr, _ = pearsonr(list1, list2)
print('Pearsons correlation: %.3f' % corr)
```

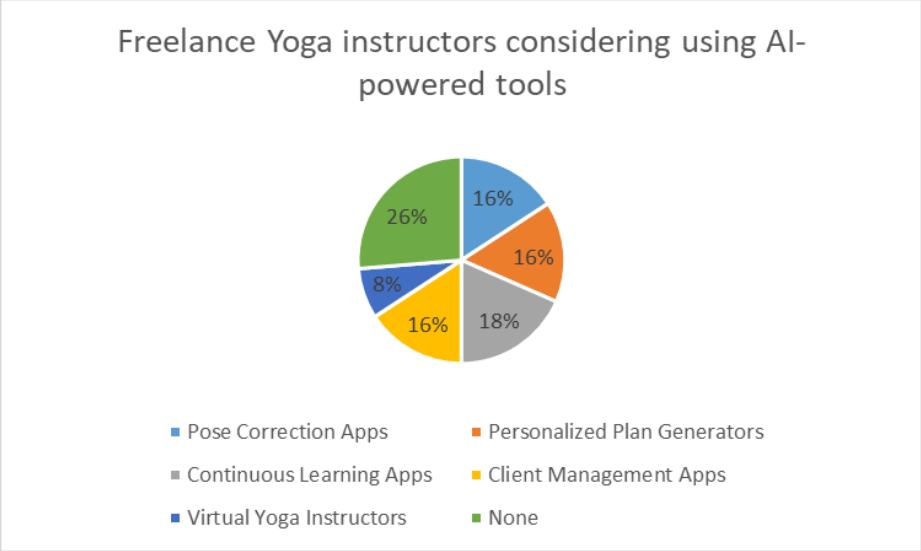
```
Pearsons correlation: -0.175
```

Instructors perceiving AI as both threat and as having business potential:



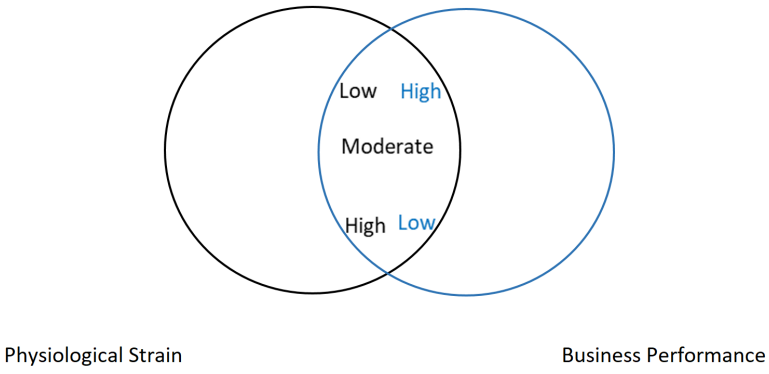
Annex 14

Freelance Yoga Instructors considering AI tools:



Annex 15

Venn Diagram depicting the overlap between Physiological Strain and Business Performance:



The black bordered circle represents physiological strain factors and the blue bordered circle represents business performance. The overlap represents the correlation between the two.

Low Strain, High Performance: This area represents instructors with low physiological strain and high business performance.

High Strain, Low Performance: This area represents instructors experiencing high levels of physiological strain and having low business performance.

Moderate Strain, Moderate Performance: This area represents instructors with moderate physiological strain and moderate business performance.

Areas Outside the Overlap:

High Strain, High Performance: This area could represent instructors who manage to achieve high business performance despite facing high physiological strain.

Low Strain, Low Performance: This area could represent instructors with low physiological strain who are struggling with business performance for other reasons.

The diagram reveals that high physiological strain is often associated with low business performance, while low physiological strain is associated with higher business performance. However, it also highlights that a moderate level of strain doesn't necessarily hinder success, suggesting that factors like resilience and coping mechanisms play a role.

Annex 16

Analysis of the qualitative data for RQ 1 Part B:

The following scores were calculated using natural language processing of the responses to questions in the attached data:

Formula for these scores:

A score of 1 is assigned if there seems to be AI interest / adoption / perceived benefit / threat (as applicable) for each of these questions. The average of all the responses for each group of questions is taken as the final score.

1. **AI Adoption Score:**

   This score is calculated from responses to questions 1, 2, and 8. It aims to measure how much AI is already integrated into their practice. The score is calculated based on the frequency of AI usage and the level of comfort with AI tools. The average AI Adoption Score for the sample group is **1.7 (out of 3)**, suggesting a decent adoption.

2. **Perceived AI Benefits Score:**

   This score is calculated from responses to questions 11, 13, 15. It aims to capture instructors' perception of AI's positive impact on their practice. A higher score indicates more perceived benefits of AI. The average Perceived AI Benefits Score is **2.5 (out of 3)** suggesting excellent perception of AI's benefits.

3. **Perceived AI Threats Score:**

   This score is calculated from responses to questions 4, 10, 23. It assesses instructors' perception of potential negative impacts of AI. A higher score indicates more perceived threats from AI. The average Perceived AI Threats Score is **2.2 (out of 3)**, suggesting reasonably high concerns about AI's potential negative impacts.

4. **Expectation for AI to enhance Yoga instruction opportunities instead of replacing:**

This score is calculated from responses to question 24. It assesses instructors' perception of expectations from AI. The average expectation to augment score is **0.8 (out of 1)**, which is very high showcasing the anticipation of freelance private Yoga instructors from AI to enhance business opportunities instead of fully replacing them.

Annex 17

Hypothetical Problem Statement:

Imagine a system where you are able to configure your inputs and simulate your personal Yoga training preferences, individuality, essence, skill level, focus, instruction style, cultural inclination and even voice into an AI-assisted virtual trainer assistant that imparts this custom personal trainer in your clients' training sessions, even without you having to be virtually present (optionally) in real time during practice. The system will take care of correcting the practitioner's postures while giving you the option of interfering (virtually) if required.

Considering the above hypothetical scenario, answer the following questions:

1. Do you think this will be able to improve and scale your training presence and enable you to be personal-training more clients at the same time, thereby increasing your simultaneous training reach and market potential?
2. Do you think such a system would be able - customize and personalize Yoga personal training plan for each client based on their personalization needs and your style/skill and teaching orientation, thereby creating more alignment in terms of "right supply" of clients for your demands as an instructor?

3. Do you think such a system capable of creating the right alignment (matching client base) would maximize your business potential as an instructor by expanding your training region and territory of reach?

Annex 18

Analysis of the hypothetical problem statement responses:

The responses to the three questions reveal a complex interplay of perceived opportunities:

Responses to question 1: Improved Reach and Scalability

- The majority (90%) believe the AI system could improve reach and scalability. This suggests that instructors see the potential for increased client volume through simultaneous training.
- 9% of respondents expressed uncertainty (Maybe). This points to concerns regarding the system's effectiveness and the potential impact on the instructor's role.
- 1% answered "No," highlighting the potential perception of the AI as a direct threat to their livelihood.

Responses to question 2: Personalization and Alignment

The responses here are more balanced:

- **50%** of the respondents believe the **AI could facilitate better personalization and client alignment**. This suggests that the AI's ability to tailor training plans to individual needs is appealing.

- **49%** of the respondents expressed uncertainty (Maybe) but not totally negative. This reflects a **move with caution** about the AI's ability to truly replicate the instructor's personalized touch.
- **1%** of the respondents answered "No," indicating a **lack of faith in the AI's ability** to understand the intricacies of hyper personalization in personal yoga practice.

Responses to question 3: Business Potential and Reach

While 50% respondents see AI as potentially expanding their reach and business potential, this is the question that generates the most uncertainty. 50% respondents answered "Maybe," reflecting a complex perception of the AI as both a potential asset and a possible risk to their business.

Annex 19

Research Summary Visualization: