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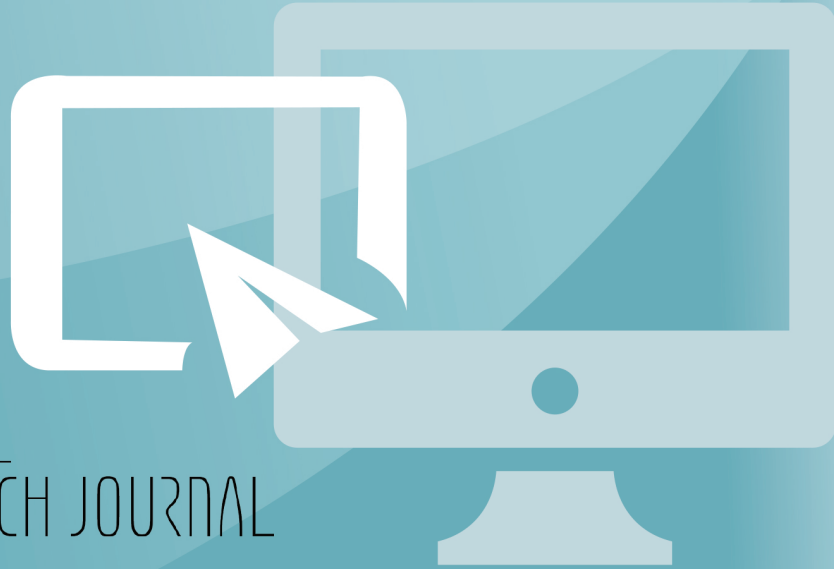Project Management
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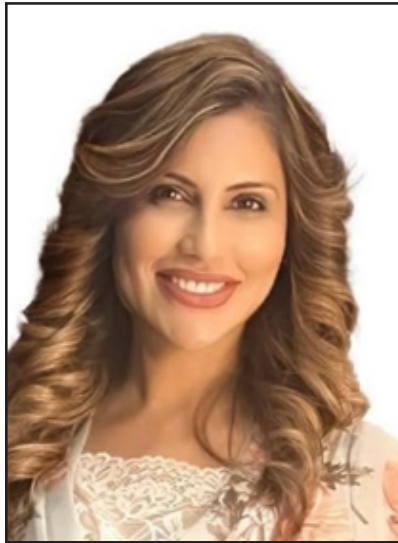
Message from Chief Editor

Global Research Journal (GRJ)~ Sharing Knowledge Through Research

Dear Esteemed Readers,

On behalf of the Global Research Journal (GRJ) team, I am delighted to present to you Issue 7, themed "DIGITAL FUTURES: **ADAPTING TO THE EVOLVING LEARNING LANDSCAPE."** This issue continues our exploration of the profound ways in which digital transformation is reshaping various fields and enhancing our adaptability to new learning paradigms.

The Global Research Conferences 2024, held at New College, Oxford University from 23rd to 26th March, was a landmark event that brought together esteemed researchers and practitioners from around the globe. Their invaluable contributions and insights are now encapsulated in this edition, offering a rich tapestry of knowledge and innovation. In this issue, we delve into several critical areas including: Medicine, Mental health, Leadership, Project Management, Health, Science.

I extend my deepest gratitude to our contributors for their exceptional research and to our dedicated readers for their unwavering support. Together, let us embrace the insights and opportunities presented in this issue, as we continue to adapt and excel in our digital futures.

Warm regards,

Prof. Dr. Parin Somani

Chief Editor, Global Research Journal

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A MESSAGE FROM THE SENIOR EDITOR OF GLOBAL RESEARCH JOURNAL (GRJ)

Dear Esteemed Readers,

On It is with great pleasure that I welcome you to Issue 7 of the Global Research Journal, themed **"DIGITAL FUTURES: ADAPTING TO THE EVOLVING LEARNING LANDSCAPE."** This issue reflects the dynamic changes brought by digital transformation and its impact on diverse fields, enhancing our adaptability and learning experiences.

The Global Research Conferences 2024, held at New College, Oxford University from 23rd to 26th March, was a resounding success. We are thrilled to present the pioneering research and insights shared during this event within the pages of this edition. The Global Research Conferences and Global Research Journal are proud to be one of the seven key initiatives of the London Organisation of Skills Development (LOSD), aimed at fostering knowledge and skill development.
We would like to share the seven LOSD initiatives

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In this issue, we explore several critical areas impacted by digitalisation. We are committed to advancing skills development and lifelong learning through our initiatives. On behalf of LOSD I extend my heartfelt gratitude to our contributors and readers for their continued support.

Sincerely,

Senior Editor
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CONTENTS

EMPOWERING HIGH SCHOOL GIRLS IN STEM: A HOLISTIC APPROACH WITH FEMALE RESEARCH ASSISTANTS AND COLLEGE STUDENT MENTORS

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BIO

Prof. Hui Fang Huang (Angie) Su, Ed.D., is a distinguished professor in the Department of Education at the Abraham S. Fischler College of Education and School of Criminal Justice. She received the President's Distinguished Professor of the Year Award 2017-2018. Dr. Su is renowned for creating Project MIND ® – Math is Not Difficult, implemented nationwide. She has held leadership roles in educational associations and contributed to mathematics standards development. Dr. Su's accolades include the Presidential Award for Excellence in Mathematics and Science Teaching and the William T. Dwyer Award for Excellence in Teaching, among others.

Abstract

This paper explores an initiative aimed at empowering high school female students in STEM through the integration of female research assistants and student mentorship. The research focuses on the effects of female research assistants in STEM projects on minority female students, aiming to close the achievement gap and improve representation in STEM fields (Estrada et al., 2018). By leveraging the skills and insights of female research assistants, this initiative seeks to create a collaborative and inclusive environment that inspires confidence and fosters interest in STEM among high school girls.

1.0 Introduction

The underrepresentation of women in STEM fields has been a persistent concern, prompting the need for innovative strategies to address gender and minority disparities in these critical domains (Van Sickle et al., 2020). To tackle this challenge, this paper introduces an initiative that utilizes female research assistants and incorporates female college students as mentors. This multifaceted project aims to bridge the gap between academia and high school students, mainly focusing on high school girls from minority backgrounds, with the overarching goal of clos-

The underrepresentation of women in STEM fields has been a persistent concern, prompting the need for innovative strategies to address gender and minority disparities in these critical domains (Van Sickle et al., 2020). To tackle this challenge, this paper introduces an initiative that utilizes female research assistants and incorporates female college students as mentors. This multifaceted project aims to bridge the gap between academia and high school students, mainly focusing on high school girls from minority backgrounds, with the overarching goal of closing the achievement gap and fostering increased representation in STEM.

Research consistently underscores the pivotal role of early exposure to STEM topics in cultivating interest and confidence among students pursuing STEM careers (Allen-Ramdial et al., 2017). Building upon this foundation, the initiative seeks to expand successful STEM-awareness workshops, previously led solely by female research assistants, to include female college students as mentors. This strategic addition aims to enrich the mentoring aspect by introducing mentors who are closer in age and educational status to high school students.

Including female college students as mentors brings several advantages to the initiative.

First and foremost, college mentors can serve as relatable role models, offering tangible proof that a successful journey through STEM education is attainable and rewarding. Their proximity in age allows for more seamless communication, making it easier for high school students to envision themselves pursuing STEM paths. Additionally, college mentors can share personal experiences, challenges, and triumphs, creating a more intimate and empathetic mentorship dynamic.

Expanding the initiative to incorporate female college mentors is particularly significant in targeting a Title One minority school like North Lauderdale High School. The project aims to address systemic challenges and contribute to a more inclusive and equitable educational landscape by intentionally choosing schools facing higher educational disparities. The engagement of college mentors ensures a diversified support system that understands the unique obstacles minority students face, thereby fostering an environment conducive to academic success and future STEM pursuits.

This paper introduces an innovative initiative leveraging the collective impact of female research assistants and female college student mentors. By doing so, it aims to close the achievement gap, enhance

representation in STEM, and create a comprehensive mentorship model that resonates with high school girls, especially those from minority backgrounds. This strategic combination holds the potential to inspire, empower, and guide the next generation of diverse STEM leaders.

2. Background and Significance

Community engagement is a cornerstone of this initiative, involving STEM experts from the community, such as infectious (Van Sickle et al., 2019). The significance of female student research assistants lies in their ability to provide diverse perspectives, serve as role models, encourage confidence, and enhance the impact of STEM projects on high school students (Estrada et al., 2018).

The underrepresentation of women in STEM, particularly among minority populations, has been a persistent challenge. A 2019 report from the National Science Board highlighted this issue, emphasizing the need for targeted interventions to address the disparities and create a more inclusive STEM landscape (NSB, 2019). This initiative aligns with and contributes to the broader national goal of increasing diversity in STEM fields.

2.1   Importance of Female

Student Research Assistants

2.1.1 Diverse Perspectives

Female student research assistants bring diverse perspectives to the research process, contributing unique insights and experiences that enrich STEM projects (Lisberg & Woods, 2018). This diversity is crucial for fostering creativity and innovation within the STEM domain.

2.1.2 Role Modeling

The significance of female research assistants goes beyond their technical contributions. By serving as role models, these assistants inspire younger students and demonstrate that women can excel in STEM research, thereby challenging stereotypes and breaking down gender barriers (Lisberg & Woods, 2018).

2.1.3 Encouraging Confidence

Creating a supportive and inclusive environment for female researchers fosters confidence, empowering them to pursue STEM careers and contribute to the broader scientific community (Riegle-Crumb & Morton, 2017). Confidence-building is particularly crucial during the formative years of high school when career aspirations take shape.

2.1.4. Enhancing Project Impact

Female research assistants strengthen the connection between researchers and participants, making STEM projects more relatable to high school students and increasing the project's overall impact (Robnett & Leaper, 2013). This connection is vital for sustaining interest and engagement throughout the mentorship program.

Objectives

The primary objectives of this initiative include broadening participation in STEM workshops, measuring the effect on STEM awareness and interest, and increasing the overall interest and involvement of high school female students in STEM fields.

To achieve these objectives, the initiative adopts a multi-faceted approach that combines educational workshops, mentorship programs, and community engagement activities. These activities enhance technical skills and instill a sense of belonging and confidence among the participants.

2.3 Expected Outcomes

Anticipated outcomes include an improved understanding of STEM fields and careers, enhanced critical thinking and problem-solving skills, increased confidence and motivation among high school female students, and improved achievement in school-based STEM curriculum (Bottia et al., 2015). These outcomes align with broader educational goals and contribute to developing a more diverse and skilled future STEM workforce.

2.4 Project Description

The project creates a collaborative and inclusive environment by integrating arts into STEM education based on mathematics and physics principles (Brown et al., 2018). Female high school students from diverse backgrounds actively participate, with the contributions of female student research assistants playing a pivotal role and integrating arts into STEM aims to make the learning experience more engaging and accessible, breaking down barriers that may hinder some students' initial interest in these fields.

The initiative is evaluated using a comprehensive framework that includes pre-and post-assessments, participant surveys, focus groups, and the S-STEM survey (Faber et al., 2013).

2.5 Implementation

2.5.1: Recruitment of Community Experts and STEM Ambassadors

Recruiting community experts and STEM ambassa-

dors ensures the initiative's success.These individuals bring real-world experiences and diverse perspectives to the program, serving as mentors and role models for the high school participants (Kassaee et al., 2016). The recruitment process involves contacting local businesses, research institutions, and community organizations to identify professionals willing to contribute their time and expertise.

Establishing partnerships with these entities enhances the pool of available mentors and strengthens the connection between the initiative and the broader community. Engaging with professionals from various STEM fields, including infectious disease specialists, engineers, marine biologists, chemists, and environmental scientists, ensures that the mentorship provided aligns with the diverse interests and aspirations of the participating students.

The involvement of STEM ambassadors is crucial for creating a network of support and inspiration. These ambassadors may include successful women in STEM careers, visit schools, participate in workshops, and share their journeys to demonstrate the varied pathways within STEM (Godwin & Potvin, 2017). This multifaceted approach to recruitment contributes to a dynamic and engaging mentorship experience.

2.5.2   Development of an

Arts-Integrated Curriculum Based on Mathematics and Physics

The curriculum is at the heart of the initiative, shaping the learning experiences of high school female students. To make STEM more accessible and engaging, the curriculum integrates arts through mathematics and physics principles (Lisberg & Woods, 2018). This interdisciplinary approach not only enhances the creativity and enjoyment of learning but also highlights the interconnected nature of these disciplines.

The curriculum development process involves collaboration between educators, STEM professionals, and arts specialists. Lessons are designed to incorporate artistic elements, such as visualizations, performances, and hands-on projects, that complement mathematical and physical concepts (Brown et al., 2018). For example, geometry principles may be explored through the creation of geometric art, and physics concepts may be illustrated through interactive experiments with artistic components.

The initiative aims to break down traditional barriers between STEM and the arts through this integration, fostering a more holistic understanding of these fields. The curriculum emphasizes the practical applications of math-ematical and physical principles, demonstrating their relevance to real-world challenges and encouraging creative problem-solving.

2.5.3   Real-World, Hands-On Experiences:

Incorporating real-world, hands-on experiences is a cornerstone of the initiative, providing high school students with tangible applications of STEM concepts (National Center for Science and Engineering Statistics (NCSES), 2021). These experiences go beyond theoretical learning, allowing participants to witness the practical impact of STEM in various industries and research settings.

The initiative includes on-site, hands-on activities and experiments. These activities, designed in collaboration with STEM university faculty members and experts, enable students to apply theoretical knowledge in a controlled and supportive environment (Tai et al., 2006). For example, a chemistry experiment may involve synthesizing a compound with artistic applications, combining scientific principles with creative expression. In addition to off-site experiences, field trips to local laboratories, research institutions, and industry facilities expose students to the day-to-day operations of STEM professionals. These visits provide valuable insights into the

diverse career paths within STEM and showcase the exciting possibilities that await those pursuing these fields.

The emphasis on hands-on experiences is rooted in the belief that actively engaging with STEM concepts fosters a deeper understanding and appreciation for these fields. The initiative aims to ignite curiosity and passion among high school female students by providing opportunities for experimentation and exploration.

The Chemistry, Physics, and Engineering modules were hands-on experiments where students were engaged in performing different experiments:

As part of the Chemistry experiments, an acid-base titration was performed by student groups where a small amount of vinegar (acid) solution was analyzed by neutralizing it with a solution of baking soda (base) (see Figure 1), a vivid change in color when there is a chemical equivalence led to discussion at the fundamental basis of molecular interaction,

Figure 1: Vinegar (acid) solution being neutralized with baking soda

When submerged in water, the observation of very tiny polymeric molecular beads of PMMA (polymethylmethacrylate) swelling to over 50 times their original size (see Figure 2) sparked a conversation about applications. The discussion ranged from water purification not only in space stations but also in places of water scarcity. Students also found that the material inspired the development of sodium acrylate, typically used in diapers because of its super-absorbing polymeric properties.

Figure 2: Swelling very tiny polymeric molecular beads of PMMA.

In the physics module, students created a standing wave using a giant spring. They produced current by moving a magnet in a coil of wire enough to light

In the electronics and engineering module, students could participate in group activities that produced the automated plant watering system that involved sensing the moisture in the soil. In addition, each student was handed a kit that contained electronic components to take home

and build an Arduino-based electronic nose (E-Nose) (see Figure 3). These projects were individually tested at a later session
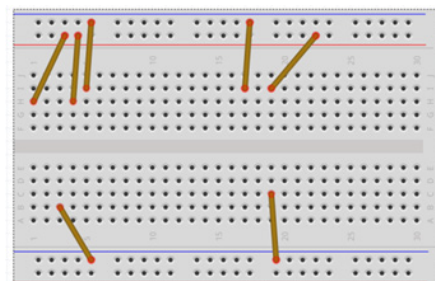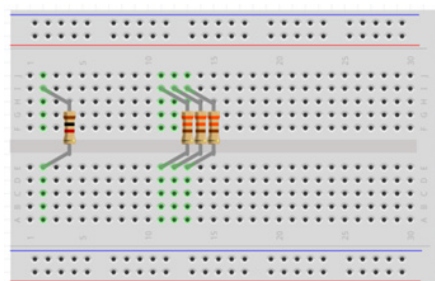

Figure 3: (a) Set of staples used as wires.

Figure 3: (b) Set of four resistors used.
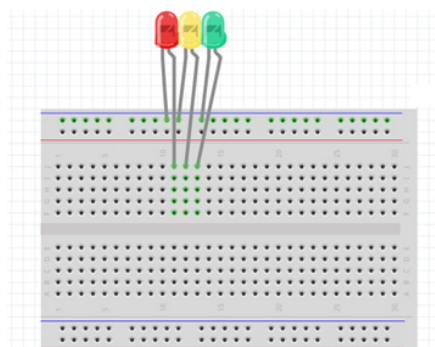
Figure 3: (c) Set of three LEDs used.
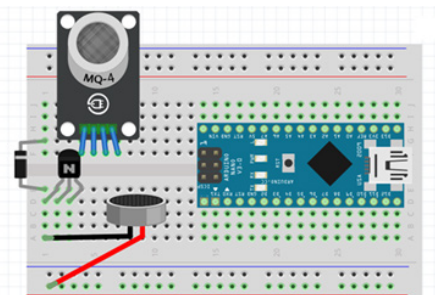
Figure 3: (d) Major components, including Arduino microcontroller.
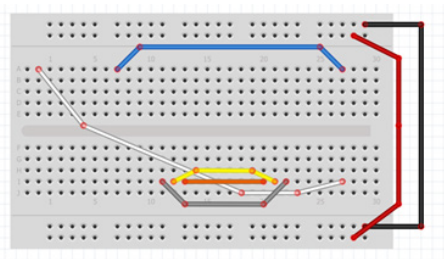
Figure 3: (d) Set of wires used.

Figure 4: Alcohol signal detected with E-nose.

Students were able to test the E-noses, and Figure 4 shows an example of a sample signal from alcohol.

The chemistry of perfumes was discussed, and students could experience samples of various essential oil blends. For the chemistry of colors, both natural and synthetic colors were broadly incorporated into the painting display.

The teaching assistants who are also majoring in art shared their work. One of the co-authors, an amateur artist, displayed some of his pen and ink and colored pencil drawings (see Figure 5). The author discussed the techniques used to create the drawings in this session. One of the drawings from Figure 5, which happens to be a famous National Geographic photograph, was used to illustrate a mathematical modeling technique developed by one of the co-authors to model images.

In this technique, the author uses linear and multilinear algebra to model an image as a 2-D dynamic model, known as a 2-D Kalman Filter mod-

Figure 5: Artwork discussed during the workshop.
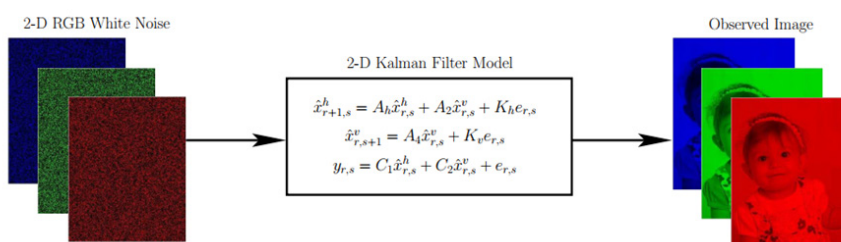
Figure 6: The process of converting 2-D white noise into an image.

el (Ramos and Mercère, 2016). It takes a 2-D white Gaussian noise image in red, green, and blue (RGB) colors and converts it into an image using a 2-D stochastic realization algorithm (see Figure 6). This discussion led the author to motivate the use of animation in STEAM.

Finally, the discussion was illustrated with practical, real-world examples, such as the case of modeling a baby image shown in Figure 7, where (a) is the original image, (b) is the modeled image, and (c) is the residual image.

(a)   (b)   (c)

Figure 7: Modeling an image of a baby: (a) original image, (b) image modeled with a 2-D dynamic model, and (c) residual image.

2.5.4: University Visit and Student Ambassador Roundtables

University visits are a pivotal component of the initiative, offering high school students a glimpse into higher education opportunities in STEM (Bystydzienski et al., 2015). These visits are strategically planned to expose participants to campus life, academic resources, and STEM programs offered by universities. The goal is to demystify the university experience and encourage students to consider pursuing higher education in STEM fields.

During these visits, students interact with faculty members, engage in hands-on activities in university labs, and attend informational sessions about STEM degree programs and career paths (Rice et al., 2013). The exposure to university environments helps bridge the transition from high school to higher education, instilling a sense of familiarity and confidence in navigating academic settings.

Student ambassador roundtables complement university visits by providing peer-to-peer mentorship. Female students pursuing STEM degrees are ambassadors, sharing their experiences, challenges, and successes with high school participants. These roundtable discussions create a supportive space for open dialogue, allowing high school students to ask questions, seek advice, and envision themselves pursuing STEM studies at the university level (Robnett & Leaper, 2013).The combination of university visits and student ambassador roundtables aims to foster a sense of community and connection among aspiring STEM professionals. By facilitating interactions between high school and university-level students, the initiative encourages the formation of mentorship relationships that extend beyond the duration of the program.

2.5.5: Extended Evaluation Framework:

The evaluation framework en-sures a thorough understanding of the program's impact on participants' knowledge, skills, and attitudes toward STEM fields. The extended evaluation approach includes pre-and post-assessments, participant surveys, focus group discussions, and the S-STEM survey (NSF MISO 2012).

2.5.6 Pre-and post-assessments

Participants undergo assessments before and after the program to to measure changes in their understanding of STEM concepts. These assessments are designed with educators and STEM experts, aligning with the curriculum's learning objectives. Pre-assessments establish a baseline, while post-assessments gauge the knowledge gained and skills developed throughout the initiative.

2.5.7: Participant Surveys

Participants are surveyed to gather feedback on their experiences, perceptions, and overall satisfaction with the program (NSF (MISO) 2012). These surveys include questions related to workshop effectiveness, mentorship impact, and the integration of arts into STEM education. Analyzing survey responses provides valuable insights into the program's strengths and areas for improvement.

2.5.8: Focus Group Discussions

Focus group discussions offer a qualitative dimension to the evaluation process, al-

lowing participants to share their thoughts, experiences, and suggestions (Faber et al., 2013). Facilitated by trained moderators, these discussions delve into the participants' perspectives on mentorship, hands-on experiences, and the initiative's overall impact. Qualitative data from focus groups provide a nuanced understanding of the program's influence on participants' attitudes and aspirations.

2.5.9: S-STEM Survey

The S-STEM survey, developed by the National Science Foundation, assesses the program's alignment with the goals of the Scholarships in STEM (S-STEM) program (NSF MISO, 2012). This survey captures data related to participants' academic and career trajectories, retention in STEM fields, and the influence of mentorship on their educational journey. The S-STEM survey offers a longitudinal perspective on the program's lasting impact.

This extended evaluation framework ensures a comprehensive assessment of the initiative's effectiveness, allowing for data-driven adjustments and refinements. The combination of quantitative and qualitative data provides a holistic understanding of the program's outcomes and contributes to the ongoing improvement of similar initiatives.

The provided data represent the responses of 10th—and 11th-grade female students to three questions about their attitudes toward math, science, and engineering/technology. I will give a statistical analysis and interpretation for each set.

Let us focus on each section individually, math, science, and engineering/technology, to perform a statistical analysis and interpret the pre- and post-STEM survey results for 10th- and 11th-grade female students who participated in a STEM awareness workshop.
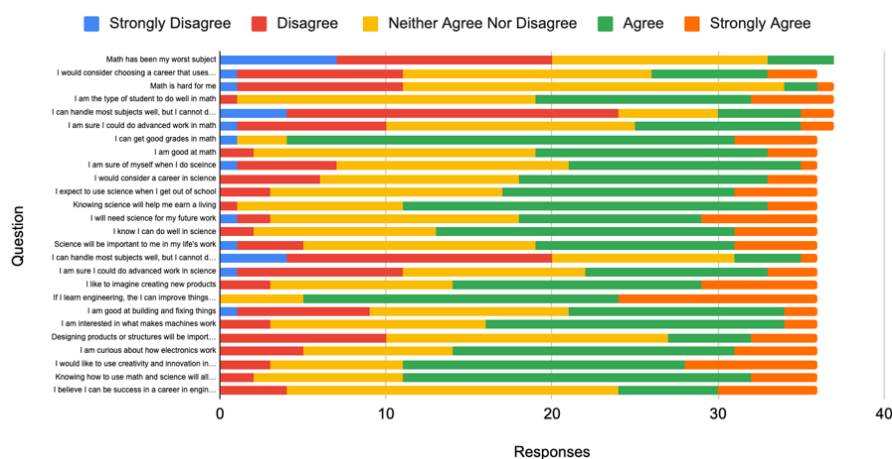
Figure 1: Preliminary Survey Data of 10th and 11th-Grade Female Students STEM (Science, Technology, Engineering, &Math)
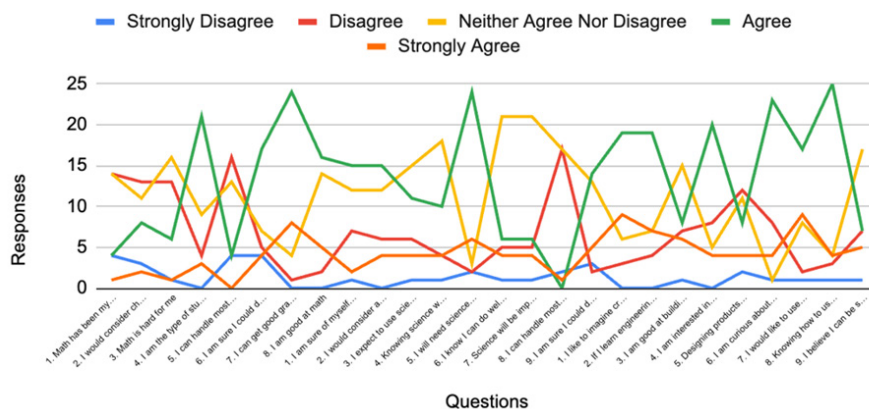
Figure 2: Post-Intervention Survey Data of 10th and 11th-Grade Female Students STEM (Science et al., & Math)

2.6: Summary

The STEM awareness workshop appears to positively impact students' attitudes towards science, with an increase in the "Agree" category. There is some variation in the impact on attitudes towards math and engineering/technology, with a shift towards more uncertainty or negativity in specific categories.

It is important to note that the interpretation is based on

the changes in distribution between the pre and post-tests. Further qualitative data or participant feedback could provide additional insights into the reasons behind these changes and help refine future STEM programs.

et al., 2020). From recruiting community experts and STEM ambassadors to developing an arts-integrated curriculum and hands-on experiences, each component is carefully crafted to contribute to the overarching goal of closing

environment (Robnett et al., 2013). These elements provide valuable exposure to STEM careers and foster community and mentorship among participants.

	Math		Science		Engineering & Technology	
	Pre	Post	Pre	Post	Pre	Post
Total Respondents	37	37	37	37	37	37
Strongly Disagree	8.11%	10.81%	8.11%	8.11%	10.81%	10.81%
Disagree	35.14%	43.24%	29.73%	27.03%	29.73%	32.43%
Neither Agree nor Disagree	35.14%	37.84%	37.84%	37.84%	21.62%	29.73%
Agree	10.81%	8.11%	18.92%	24.32%	27.03%	21.62%
Strongly Agree	0%	2.7%	5.41%	2.70%	10.81%	5.41%
Interpretation: There is a shift towards more uncertainty or negativity in the post-test responses, particularl in the "Disagree" and "Agree" categories. This suggests that the STEM awareness workshop influenced some students to reevaluate their perceptions of math.		Interpretation:There is a slight shift towards more positivity in the post-test responses, especially in the "Agree" category. This suggests that the STEM awareness workshop positively impacted students' attitudes towards science.		Interpretation:The post-test re-ds engineering and technology is less pronounced than in other areas.		

3.0 Conclusion

In conclusion, implementing this initiative is a multifaceted and strategic process designed to empower female STEM students (Van Sickle

the gender gap in STEM.

The emphasis on real-world applications, university visits, and student ambassador roundtables creates a dynamic and immersive learning

The extended evaluation framework ensures that the initiative's impact is rigorously assessed, allowing continuous improvement and refinement (Brown et al., 2018).

The initiative aims to capture a nuanced understanding of its influence on participants' knowledge, skills, and attitudes toward STEM fields by incorporating pre- and post-assessments, participant surveys, focus group discussions, and the S-STEM survey.

As the program progresses, ongoing collaboration with educators, community partners, and STEM professionals will be crucial for adapting to the evolving needs of high school female students (Watt et al., 2012). The initiative aspires to serve as a model for future endeavors to foster diversity and inclusivity in STEM education and careers by continually refining the implementation based on feedback and data-driven insights. Thrive in the exciting and dynamic world of STEM.

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FROM TRADITIONAL TREATMENTS TO TAILORED THERAPY: WHY INDIA IS EMERGING AS A LEADER IN CANDROL IMMUNOTHERAPY FOR MEDICAL TOURISM

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Theme of the Article: Medicine

Research Objectives: Evaluate the effectiveness of Candrol immunotherapy in treating various cancers. Analyse India's strengths in medical research, affordability, and infrastructure for cancer treatment. Investigate the potential of India as a medical tourism destination for patients seeking Candrol therapy.

BIO

Dr. Rishi Sharma, M.D., is a graduate of S.K.H Medical College, Jaipur, is a pioneering figure in cancer immunotherapy. His groundbreaking research on Non pDL1 criteria led to the development of the Candrol line of treatments, without cytotoxic effects in the body. Honoured with numerous national and international accolades, including recognition from Forbes and Houses of Parliament, London. He serves patients from across the world and is a well reputed centre for medical tourism in India IN for cancer patients. With his constant efforts to chase immunology in cancer patients he is able to bring 65% positive response in stage 4 patients which is highly appreciated globally. His expertise have contributed to revolutionary change in cancer medicine through his understanding of genes and cancer behaviour in all chemotherapy resistant subjects.

From Traditional Treatments to Tailored Therapy: Why India is Emerging as a Leader in Candrol Immunotherapy for Medical Tourism

Abstract

Cancer remains a leading cause of death worldwide. Immunotherapy has revolutionised cancer treatment, offering new hope for patients. Candrol, a groundbreaking non-PD-L1 based immunotherapy protocol, tailors treatment to individual patient characteristics and cancer type. This study explores India's potential as a burgeoning medical tourism destination for Candrol therapy, focusing on its well-researched technology, highly qualified medical professionals, affordability, and advanced medical infrastructure. The study explores how India's strengths position it as a compelling destination for medical tourists seeking Candrol immunotherapy. This study is carried out through a thorough review of existing literature and professional experience. Central findings highlight Candrol's effectiveness in reducing cancer recurrence, offering a potential lifeline for patients who may not respond well to traditional therapies. Clinical trials indicate a promising reduction in recur-

rence rates, even in advanced and aggressive cancers. Furthermore, Candrol exhibits a low side effect profile, primarily limited to mild blood sugar fluctuations and sleepiness, making it a more tolerable option for many patients.

India actively invests in medical research, contributing to advancements in immunotherapy and potentially offering access to the latest treatments. The country boasts a large pool of highly skilled and experienced oncologists who can provide expert care. Additionally, India offers significantly lower treatment costs compared to developed nations, making Candrol therapy more accessible to a wider range of patients. Finally, major Indian hospitals possess cutting-edge medical facilities to support advanced treatments, ensuring patients receive high-quality care.

Keywords:

Cancer, Immunotherapy, Candrol, India

1.0 Introduction

Cancer remains a significant global health burden, claiming millions of lives annually (WHO, 2024). Traditional treatment modalities like surgery, chemotherapy, and radiotherapy have played a vital role in managing cancer, but they often come with debilitating side effects and limited efficacy depending on the stage and type of cancer (Anand, et al., 2022). The emergence of immunotherapy has revolutionised the treatment landscape, offering a more targeted and potentially less toxic approach (Zhang & Zhang, 2020).

One such innovative immunotherapy protocol is Candrol. Unlike the prevailing PD-L1 checkpoint inhibitors, Candrol utilises a non-PD-L1 based approach, tailoring treatment to the specific characteristics of each patient and their unique cancer type. This personalised approach holds immense promise for improved treatment outcomes and a reduction in side effects (Sharma, 2019).

Types of cancer immunotherapy encompass immune checkpoint inhibitors, cancer vaccines, cytokines, viral therapies, and adoptive cell transfer as illustrated in figure 1.

India presents a compelling option as a burgeoning medical tourism destination for Candrol immunotherapy for several reasons. Firstly, the country boasts a well-established medical 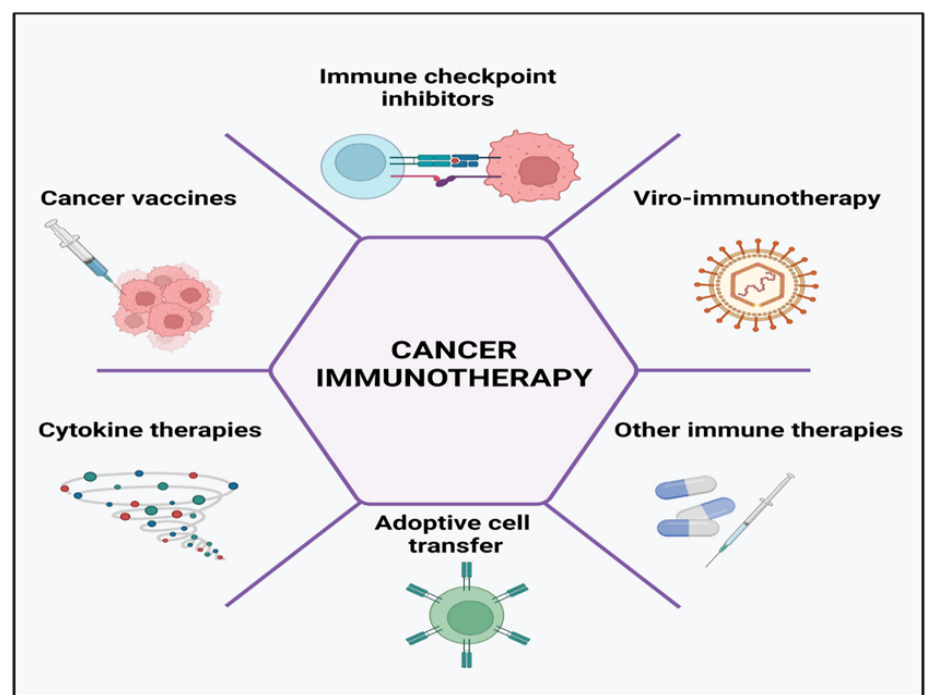research infrastructure (Kshirsagar, Pahuja, Chatterjee, & Kamboj, 2023), actively contributing to advancements in immunotherapy and potentially offering access to cutting-edge treatments like Candrol. Secondly,

Figure 1. (Kciuk, et al., 2023)

according to the National Medical Council (NMC), there are 594 postgraduate seats for MD in Radiation Oncology available across various states in India (Munshi, Rastogi, Durga, & Beriwal, 2023). India offers a significant advantage in terms of affordability compared to developed nations (Kumar, 2023), making Candrol therapy potentially accessible to a wider range of patients seeking this novel treatment option. This unique combination of well-researched technology, highly qualified medical professionals, and affordability positions India as a potential leader in Candrol immunotherapy for medical tourism.

Objectives

This research aims to:
1. Evaluate the effectiveness of Candrol immunotherapy in treating various cancers.
2. Analyse India's strengths in medical research, affordability, and infrastructure for cancer treatment.
3. Investigate the potential of India as a medical tourism destination for patients seeking Candrol therapy.

2.0 Method

This research employed a comprehensive review methodology to investigate India's potential as a medical tourism destination for Candrol immunotherapy. The review focused on three key areas:
1. Candrol Immunotherapy: This involved a review of existing literature on Candrol, including its mechanism of action, clinical trials, effectiveness data, and side effect profile. Relevant sources included scientific journals, research reports, and conference proceedings.
2. India's Medical Tourism Industry: This analysed the current state of India's medical tourism industry. Research focused on factors such as infrastructure, affordability, government initiatives, and the availability of skilled medical professionals. Relevant sources included industry reports, government publications, and academic journals.
3. India's Medical Research and Infrastructure: This reviewed India's research capabilities in the field of immunotherapy and its overall medical infrastructure. Sources included reports from government agencies, medical research institutions, and healthcare industry associations.

Inclusion and Exclusion Criteria:
Inclusion Criteria:
o   Studies published in the last 10 years (2014-2024) on immunotherapy and Candrol immunotherapy.

o   Studies focusing on India's medical tourism industry and its strengths.

o   Studies analysing India's medical research infrastructure and its capacity for advanced treatments.
Exclusion Criteria:

o   Studies solely focused on marketing or promotional content for Candrol or Indian medical tourism.

o   Studies published in non-peer-reviewed sources or with limited methodological rigor.

Data Analysis: Extracted data from the reviewed literature was critically analysed to identify key themes and patterns. These themes were used to assess the strengths and weaknesses of India's suitability for medical tourism with Candrol immunotherapy.

3.Results and Discussion

Candrol Immunotherapy:

Reviewing existing literature on Candrol revealed its potential as a promising treatment for various cancers. The key findings are as follows:

Tailored Therapy: A Personalised Approach to Cancer Treatment Candrol immunotherapy stands out in the

field by offering a non-PD-L1 based approach to cancer treatment (Sharma, 2019). This translates to a more personalised treatment plan for each patient, potentially leading to improved efficacy compared to "one-size-fits-all" approaches.

Non-PD-L1 Based Approach: Traditional immunotherapy often relies on PD-L1 checkpoint inhibitors (Boldt, 2024). These drugs work by targeting a specific protein (PD-L1) found on cancer cells, allowing the immune system to recognise and attack them. However, not all cancers express high levels of PD-L1, and some patients may not respond well to these therapies. Candrol takes a different route, focusing on other mechanisms within the immune system that can be activated to fight cancer, regardless of PD-L1 expression.

Candrol immunotherapy goes beyond a one-size-fits-all approach. To optimise treatment for each patient, several factors are considered: genetic mutations driving the cancer, allowing for targeted therapy; immune system function, which influences whether Candrol should stimulate or regulate the immune response; and overall health, ensuring a safe and effective treatment plan (Sharma, 2019). By analysing these factors, a personalised Candrol protocol is developed, potentially including a unique combination of ingredients tailored to the patient's specif-

ic cancer for maximised effectiveness and minimised side effects.

Potential Benefits of Tailored Therapy with Candrol

According to case studies carried out on patients at the Canderol centre of oncology the following provides potential benefits of Candrol for cancer patients:

Improved Efficacy: By focusing on the individual's cancer and immune system, Candrol may offer a more effective attack on the tumour compared to generic therapies. This could lead to better tumour shrinkage, improved response rates, and potentially longer progression-free survival.

Reduced Side Effects:

 Since Candrol targets the specific cancer and avoids relying solely on PD-L1, it may have fewer off-target effects. This could translate to a less disruptive treatment experience for patients with a lower risk of severe side effects.

Hope for Previously Untreatable Patients: Patients who haven't responded well to traditional treatments due to low PD-L1 expression or other factors might find new hope with Candrol's personalised approach.

3.1   Reduced   Recurrence:

Hope for High-Risk Cancer Patients

The reappearance of cancer after initial treatment, remains a significant challenge (Riggio, Varley, & Welm, 2021). It can be emotionally devastating for patients and their families, and depending on the type and stage of cancer, recurrence can significantly impact survival rates. Clinical trials carried out by Candrol Cancer Treatment and Research Center suggest that Candrol immunotherapy might offer a glimmer of hope by potentially reducing cancer recurrence rates, particularly for patients with a high risk of relapse after traditional treatments (Sharma, 2019).

Cancer recurrence remains a significant hurdle after initial treatment. Dormant cancer cells, those that lie hidden after therapy, can reawaken and cause relapse. Additionally, traditional treatments like chemo and radiation may not eliminate all cancer cells, leaving behind a population that can regrow. Furthermore, cancer cells themselves can mutate, developing resistance to the initial treatment and increasing the chance of recurrence (Waldman, Fritz, & Lenardo, 2020).

Candrol's Potential Impact on Recurrence: According to Candrol Centre of Oncology, Candrol might play a role in reducing recurrence by po-

tentially influencing various mechanisms:

·Enhanced Immune Memory: Candrol therapy could potentially stimulate the immune system to develop a stronger "memory" of the cancer cells. This enhanced memory allows the immune system to more effectively recognise and attack any residual cancer cells or those that might try to re-emerge after initial treatment.

·Targeting Dormant Cells: Certain components of Candrol might target dormant cancer cells, preventing them from awakening and initiating relapse.

·Immunomodulation: Candrol may help regulate the immune system, creating a more balanced environment that hinders cancer cell growth and promotes a robust anti-tumour response.

Hope for High-Risk Patients: Patients with a high risk of recurrence including those with aggressive cancer types, advanced stages, or incomplete initial treatment response, often face a heightened anxiety about relapse. The potential of Candrol to reduce recurrence rates offers significant hope for this group. It could potentially extend their disease-free intervals, improve overall survival rates, and offer a longer period of quality life.

Important Considerations: While the findings are encouraging, it's crucial to remember that the data on Candrol is still preliminary. Further research with larger patient cohorts and longer follow-up is necessary to definitively establish its effectiveness in reducing recurrence rates across various cancer types. Additionally, Candrol might be most effective when used in conjunction with other conventional treatment modalities as part of a comprehensive treatment plan. The potential of Candrol to reduce cancer recurrence offers a promising avenue for high-risk patients. Continued research and clinical trials are crucial to confirm its efficacy and solidify its role in the fight against cancer recurrence.

3.2 Manageable Side Effects

Traditional cancer treatments, while life-saving, often come with a significant burden of side effects. These side effects can range from nausea and fatigue to hair loss and nerve damage, severely impacting a patient's quality of life during treatment.

Candrol immunotherapy offers a potential advantage in this regard, exhibiting a low side effect profile, making the treatment experience potentially more manageable.

The Burden of Traditional Treatment Side Effects:

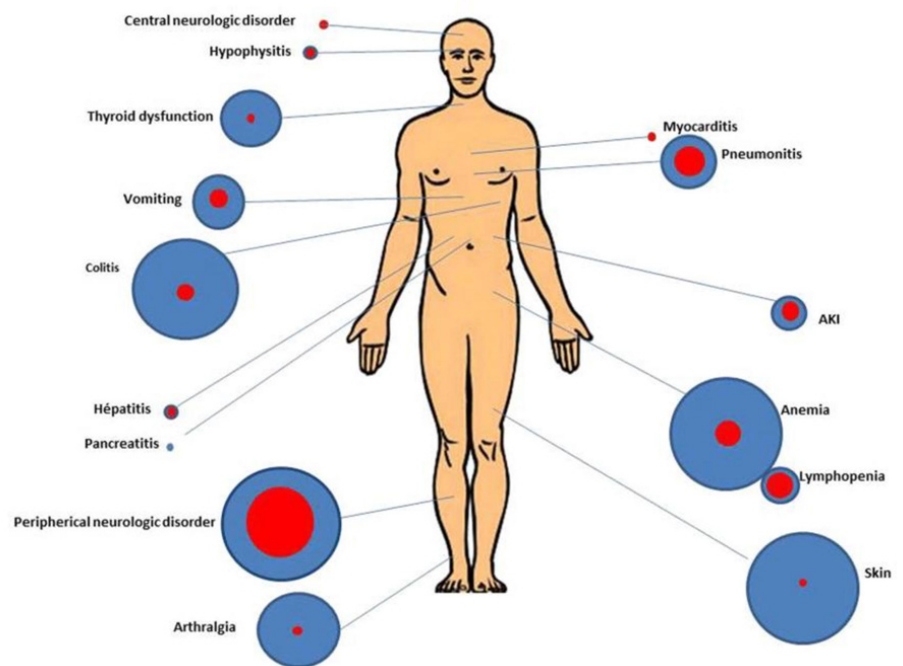· Debilitating Effects: Chemotherapy and radiother-

Figure 2. (Winstead, 2019)

apy are effective in killing cancer cells, but they also damage healthy tissues in the process (Zawrzykraj, Deptuła, Kondej, Tymińska, & Pikuła, 2023). This can lead to a range of debili-

tating side effects, such as nausea, vomiting, fatigue, hair loss, and mouth sores. These side effects can significantly interfere with daily activities, work, and overall well-being.

- Long-Term Complications: Some side effects of traditional therapies can have long-term consequences. For example, chemotherapy can damage the heart, lungs, and kidneys, while radiotherapy can increase the risk of secondary cancers (Majeed & Gupta, 2024).

- Reduced Treatment Adherence: The severity of side effects can sometimes lead to treatment non-adherence. Patients may choose to skip or stop treatment altogether due to the debilitating effects, potentially compromising the treatment's success.

It has been suggested by Candrol Centre of Oncology that Candrol exhibits a low side effect profile. The primary concerns seem to be limited to: Mild Blood Sugar Fluctuations: Candrol might influence blood sugar levels in some patients. This can be easily managed through dietary modifications or medication adjustments. Sleepiness: Some patients may experience mild sleepiness or fatigue while undergoing Candrol therapy. This could potentially be addressed through adjustments in sleep hygiene or medication timing.

Significance of Manageable Side Effects:

- Improved Quality of Life: By minimising debilitating side effects, Candrol potentially allows patients to maintain a better quality of life during treatment. They can continue with daily activities, work, and social interactions with fewer disruptions.
- Enhanced Treatment Adherence: A more tolerable treatment regimen with fewer severe side effects can lead to improved treatment adherence. Patients are more likely to complete the entire course of Candrol therapy, maximising its potential benefits.
- Greater Patient Experience: Overall, a treatment with a low side effect profile can significantly improve the patient experience. It allows them to focus on fighting the disease while maintaining a sense of normalcy in their lives.

Candrol's potentially low side effect profile presents a significant advantage over traditional cancer treatments. This could lead to a more tolerable treatment experience, improved quality of life, and potentially better treatment outcomes for patients.

Complementary Treatment:

Combining Candrol with Existing Therapies for Enhanced Outcomes Candrol potential is further amplified by its ability to be used in conjunction with existing treatment modalities like radiotherapy and chemotherapy. This complementary approach could offer additive or even synergistic effects, potentially leading to improved patient outcomes (Sharma, 2019).

Limitations of Traditional Therapies:

While established therapies like radiotherapy and chemotherapy play a vital role in cancer treatment, they have limitations (Fernández, 2024).

Non-Specificity: These treatments often target both cancerous and healthy cells, leading to side effects.
Development of Resistance: Cancer cells can develop resistance to traditional therapies over time, rendering them ineffective.
Limited Efficacy: Depending on the cancer type and stage, these therapies may not always achieve complete tumour eradication.

Potential Benefits of Combining Candrol:

Candrol's ability to be used alongside traditional therapies offers several potential advantages according to Candrol Cancer Treatment and Research Center:

Additive Effects: Combining Candrol with radiotherapy or chemotherapy might create an additive effect, enhancing the overall tumour-killing power of the treatment regimen. This could potentially lead to better tumour shrinkage and improved response rates.

Synergistic Effects: In some cases, the combination of Candrol with traditional therapies might create a synergistic effect. This means that the combined impact is greater than the sum of the individual treatments. Candrol could potentially enhance the immune system's ability to recognise and attack cancer cells targeted by radiotherapy or chemotherapy.

Overcoming Resistance: Candrol's mechanism of action, independent of PD-L1 expression, might help overcome resistance developed against traditional therapies, offering a new line of attack for previously unresponsive cancers.

3.3 India's Medical Tourism Industry

India's medical tourism industry has emerged as a strong contender in recent years, attracting patients worldwide seeking high-quality and cost-effective healthcare (Malhotra & Dave, 2022).

Affordability: Compared to developed nations, India offers significantly lower treatment costs for advanced medical procedures, including cancer treatments (Mehrotra & Yadav, 2022). This affordability factor is particularly relevant for Candrol immunotherapy, which might not yet be covered by all insurance plans internationally. Medical tourists in India pay only a fraction of the cost compared to similar treatments in developed countries. This affordability makes Candrol therapy potentially accessible to a wider range of patients seeking this novel treatment option.

Skilled Medical Professionals: Medical professionals often receive training at prestigious institutions in India and abroad (Kansal, et al., 2023), ensuring they possess the necessary knowledge and skills to handle complex treatment protocols like Candrol. Additionally, the Medical Council of India (MCI) regulates the medical education system, and Central Council Of Homoeopathy (CCH) ensuring a standardised level of training and competency among medical professionals. This abundance of skilled oncologists allows patients seeking Candrol therapy to access high-quality care from qualified healthcare providers.

Advanced Medical Infrastructure:

Major Indian hospitals, particularly those catering to medical tourists, possess cutting-edge medical facilities equipped with advanced technologies to support complex treatment protocols. These facilities often house sophisticated diagnostic equipment, specialised treatment units, and modern laboratories. This advanced infrastructure ensures access to the necessary resources for successful treatment delivery. For instance, many hospitals boast advanced imaging technologies like PET scans and MRIs crucial for accurate cancer diagnosis and treatment planning, potentially impacting the effectiveness of Candrol therapy.

4.0 Conclusion

The findings from this study suggest a compelling synergy between Candrol immunotherapy and India's medical tourism industry. Patients seeking access to this novel treatment can potentially benefit from India's affordability, skilled medical professionals, and advanced medical infrastructure. However, some limitations require consideration. Firstly, the availability of data on Candrol is limited due to its relatively new status. Further research with larger patient cohorts and long-term follow-up is necessary to definitively establish its effectiveness. Secondly, while India's medical tourism industry offers advantages, concerns regarding quality control and potential medical errors in

some facilities exist.

Patients considering Candrol therapy in India should thoroughly research to choose reputable hospitals with proven patient safety records and successful outcomes. This could involve checking for accreditation by international organisations and reviewing patient testimonials. India's medical tourism industry positions itself as a game-changer for Candrol immunotherapy, a promising new cancer treatment. This powerful synergy stems from India's strengths: affordability, making Candrol accessible to a broader patient base compared to developed nations.

By focusing on these areas, India can optimise the synergy with Candrol immunotherapy:

- **Continued Research:** Investing in clinical trials and research on Candrol's effectiveness will strengthen its reputation as a viable treatment option.

- **Quality Focus:** The medical tourism industry can solidify its position by prioritising robust accreditation processes and transparent reporting of patient outcomes.

- **Patient Education:** Raising awareness about Candrol and the importance of choosing reputable healthcare providers within India

is crucial for informed decision-making by patients.

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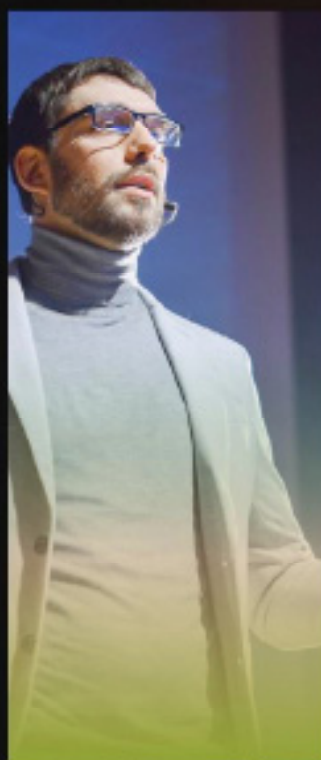
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DIGITAL INTERVENTIONS FOR MENTAL HEALTH: HARNESSING TECHNOLOGY TO PROMOTE WELL-BEING

BIO

Prof. Dr. Parin Somani
Director: London Organisation of Skills Development

Prof. Dr. Parin Somani, Director of LOSD, is a distinguished Academic Scholar, TEDx Speaker, and Author, honoured the title of Mrs Universe 2022 and crowned by Bollywood Actress Mahek Chahal. With 2 Academic and 6 Honorary Doctorates, she's a multi-award-winner and humanitarian. She is a prolific author of 19 books, and a record-breaker recognised in Guinness World Records and multiple prestigious record books. She was invited to deliver a Keynote Speech at Harvard University, Cambridge University and many more. In her global travels to 127 countries, Prof. Dr. Parin Somani tirelessly contributes to education, women empowerment, and youth development.

BIO

Roxanne Boodhoo
Research student

Roxanne Boodhoo is an accomplished professional with a diverse and versatile background. Her extensive academic training has equipped her with a wide range of skills and knowledge, enabling her to excel in various roles. Roxanne is known for her strong work ethic, diligence, and commitment to undertaking any responsibilities assigned to her. She is deeply passionate about helping and supporting others, making her a compassionate and empathetic individual. Throughout her career, Roxanne has consistently demonstrated a dedication to making a positive impact, whether through her professional work or community involvement, striving to uplift those around her.

Theme of the Article: Mental Health

Research Objectives: To provide an insight into conditions for implementing synchronous digital mental health interventions) in 'real-world' settings, thus contributing to the field of implementation science.

Abstract

Effective mental health promotion and prevention of mental disorders is an important social and economic goal. Anxiety disorders, depression, bipolar affective disorder, and schizophrenia are among the most common and burdensome mental disorders globally. One in four adults and one in ten young people suffer from one or more mental health disorders in Europe in any given year, and at least one in two will develop psychological distress during their lifetime. Even if mental health care capacities were to be dramatically increased, it would still be a challenge to reduce these figures. Given this context, efforts to promote good mental health and self-relaxation are gaining increasing importance. Policy-makers and health care provider alike see the potential of digital interventions to address these increasing needs and demands for mental well-being. Social isolation in the wake of COVID-19 has had adverse effects on mental health. Many people have turned to digital interventions to help them cope, often without much evidence on how effective these interventions are among different user groups and under different conditions.

Social isolation due to the COVID-19 pandemic has had adverse effects on mental health. In response, many have turned to digital interventions with enthusiasm. Yet, enthusiasm alone is not enough: the individual and contextual factors that influence the effectiveness of digital mental health interventions need to be better understood.

Keywords:

Mental Health, Anxiety, Technology, Wellbeing

1.0 Introduction

Mental illnesses, including depression, anxiety, and post-traumatic stress disorder (PTSD), are a leading cause of global burden of diseases and economic loss, overshadowing other chronic medical illnesses (Saad et al., 2021). Within any given year, an estimated 26% of US adults, or about 1 in 4 individuals, are suffering from a mental illness.

Only half of the people with a mental illness will seek help, and even if they are able to access care for behavioral health conditions, their treatment may not be evidence-based or guideline-concordant.

Therefore, there is growing pressure to find and implement evidence-based ways to combat the mental health crisis. One possible path to such evidence-based and scalable solutions might be through digital interventions, the use of technology to provide therapeutic support for mental illnesses. To provide affordable and accessible mental health interventions, there are several critical steps that stakeholders need to develop (Liu & Zhang, 2024). These solutions should be easy to use, scalable, and built using a bottom-up approach, with insights from the target users. Investigators working in collaboration with young mental health care users to develop user-centered digital tools allows for the expedited development of scalable options.

However, digital systems require incentive-based engagement and often function within complex systems characterised by public and digital architectures with competing goals. Whereas passive interventions, like educational websites, are appealing and non-invasive, but ignorable, while active, non-invasive dig-

ital interventions, like a mobile app installed on a user's personal device, are disruptive and require high user participation. However, this also results in a demand on the user, a barrier to help-seeking, as users often need time to trust the system and assess the potential benefits.

According to the National Health Service almost 1 in 6 people in the last week encounter a common mental health issue like stress, decay, anxiety, or mental ill-health at the workplace. A daily stressor is the major symptom of difficulty in focusing and improving the patient's well-being. If issues of well-being are not properly dealt early, they could lead to more serious mental health issues. If significant well-being treatment is offered, individuals with common mental health disorders gain from enhanced productivity and improved working and caring performance. Depression, anxiety, and insomnia are essential components of a major depressive disorder (Woodward et al., 2019). Therefore, well-being is not only an optimistic way to measure our life quality but deficiencies in well-being and illness may be a significant problem that creates factors that contribute to significant depressive and anxious problems and is also associated with numerous physical diseases. Nonetheless, it was revealed that train-

ing in mindfulness targeting anxiety showed significant changes of satisfaction with life.

The unprecedented challenges of a growing mental health crisis, exemplified by the COVID-19 pandemic and its association with increases in mental health disorders, propelled the expansion of electronic interventions. These electronic interventions range from web-based and smartphone-based schedules to fully automated digital characters (avatars). Although there are proven efficient interventions and useful therapy delivery modes, these technological interventions have not been broadly implemented due to the demanding technological infrastructure and regular post-development research to guarantee effectiveness, as well as adherence to local mental health care regulations (Mohammed, 2023).

E-mental health interventions may implement methodologies dependent on digital components to identify and monitor mental illness tendencies, to avoid and detoxify emotional distress, to care of present mild psychiatric conditions, to support mental health disorders as a complementary approach to a weaker central therapy, or to avoid decompensating the chronic and acute psychiatric disorders with routine main-

tenance treatment by the acceptable mix of both digital and face-to-face therapy techniques.

Therefore, it is important in this modern era to advance communications with mental health care centers to make modifications in the present psychotherapeutic interventions to develop additional ethnic treatment packages, and also to develop innovative e-therapy systems, with particular emphasis on how to envelop and monitor them in regular health practices and all that efficiently, appropriately, and ethically through the integration of tested, proof-based treatment methodologies, in addition to the flexible contribution of new clinical knowledge from every current delivery form, thereby increasing the overall impact (Robinson et al., 2023).

Increasingly, agencies are looking beyond face-to-face singular treatments towards digital solutions. National Health Service (NHS) England have established the 'Digital First' initiative, aiming to expand digital services as a cost-effective and inherently patient-centred option for service users to access support (Easton et al., 2021). Since 2016, NHS England has aimed to increase digital services to England, with over 58 services now available. If digital solutions to reduce the demand

for face-to-face services are provided centrally, the service may see need fewer appointments. Such interventions may also improve patient-clinician communication, with attractive proposals of eHealth records (EHRs).

Writing Health applications are helping to reshape the way we think about mental health treatment (Woodward et al., 2019). A change in patient expectation and the promotion of self-management in health services is tangible evidence of the effect of not only interventions in mental healthcare, but also digital and mobile technologies that have a major part to play in promoting mental well-being and accessing interventions (A. J. De Witte et al., 2021). Mobile technologies have been identified as superior for delivering such treatment or interventions for many reasons. The The results from this review will be able to help users choose an effective smartphone application to improve their psychological health according to the systematic evaluation of free and fee-based smartphone applications (Santhanam et al., 2023). The issues of needing external development funding and content updating were evaluated as suboptimal. Even multiform interventions to create less professional dependence on one of the counterparticipants in the user-interview process were

indicated. For an advanced updating of counteractive smartphone applications in an ethical and moral manner, researchers should collaborate closely with development and production units.

Mobile mental health apps have seen rapid and robust development, shaping the epidemiology of mental health services (Koh et al., 2022). The increasing prevalence of mental health produces a challenging and diversified usage of such mobile applications, which need to be continuously reviewed. This study aimed to systematically review and rate smartphone applications to reduce alcohol consumption and depressive symptoms among youth (Magwood et al., 2022). The umbrella review was conducted using several databases, such as PubMed, ScienceDirect, Cumulative Index to Nursing and Allied Health Literature, and Google Scholar. Keywords in the umbrella review were: (1) mobile apps, (2) youth, (3) depression, (4) alcohol addiction, (5) randomized controlled trials or quasi-experimental trials, and (6) pre-post comparison studies.

The quality of the included studies in the umbrella review was assessed using relevant tools for systematic reviews and meta-analyses of randomized controlled studies, and the results were presented

using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

2. Literature Review

Third Generation Cognitive Behavioural Therapy (CBT) has garnered empirical support in treating various mental health concerns with good effect sizes. Thus, third generation CBT is regarded as the state-of-the-art psychological therapy. When applying third wave CBT models, very few researchers or therapists use manualized third wave CBT treatments, in contrast to manualized CBT.

This suggests that a more adaptive, flexible, and holistic approach to understanding what specific persons want a change in is needed.Third wave CBT focuses on understanding mental challenges with a more functional perspective, emphasising factors such as personal values, and targets experiential avoidance and psychological inflexibility in addition to matching selected strategies to actual functions of the specific mental challenge. Hence, the future of personalized third wave CBT can potentially be digital and machine learning can be used to achieve psychological personalized treatments, according to the user's profile (Zhao et al., 2024).

Most people experience mental health challenges at some point in their lives. Modern challenges, including COVID-19, have made the demand for effective and scalable digital mental health interventions ever more salient (Somani, P., 2020). The shift to remote mental health care has accelerated the development of innovative digital mental health interventions, including those that harness machine learning techniques.

However, for these interventions to be effective, they must be grounded in a deep understanding of psychological processes and evidence-based therapies. The tension between the potential flexibility of digital interventions and the need for clear and standardized interventions from a clinical perspective will be discussed (Sage Chen et al., 2022).

Digital mental health interventions have the potential to transformatively improve mental health care in ways that are likely to be unprecedented. This new and emerging field of mental health interventions primarily involves providing mental health services or self-help services via web portals, online counselling, secure e-mailing, video calls, chat rooms, health-related apps, or automated text messages. Sometimes, monitoring or interventions can be integrated in mobile interventions. Other intervention forms can contain augmented or virtual reality. Advanced interventions include decision and prediction functionalities. Digital mental health interventions can be preventive or therapeutic. They can range from education and promotion to destinations such as crisis intervention and assessment and therapy services. These therapies can represent different schools of psychotherapy, including cognitive-behavioral therapy, dialectic behavior therapy and mindfulness-based interventions. Moreover, therapies can be provided by different stakeholders such as health care professionals and clinicians to digital agents based on different machine-learning approaches. Virtually any mental disorder or symptom can be the target and any form of digitally mediated interaction between people or digital artifacts related to mental health are eligible. Topos of digital mental health interventions can span mental health literacy, wellbeing and self-help, psychoeducation, preventing, diagnosis, therapy and monitoring or assessment (Jadhakhan et al., 2022).

Mental health conditions are among the most common and widespread morbidities worldwide (Mohammed, 2023). Digital mental health services, provided through the use of mobile technologies or media, have gained increased attention and momentum in mental health care contexts, leading to significant changes in the therapeutic landscape. Mental health conditions have been long associated with social and economic costs. Further, these morbidities are associated with a higher risk of comorbidities or chronic health conditions. Moreover, with the COVID-19 pandemic, rates of mental health illness and psychological distress might have increased exponentially. It is therefore critical for societies to invest in strategies that prevent mental health conditions or reduce their effects. Researchers studying the mental health of people with chronic diseases have reported that people with a chronic disease have twice the risk of depression compared with the general population. Given that mental conditions might have a bidirectional association with physical conditions, preventing or managing mental health conditions early-on could support the prevention, amelioration or management of chronic health conditions as well. This prevention and early intervention might help in reducing wider societal implications throughout the lifespan of individuals.

3. Results and Discussion

Digital health care interventions such as smart phone -based apps aimed at mental health promotion are widely used, few systematic reviews have been published providing an overview of what is available. However, recently published work, primarily focused on low-cost mobile apps and web-based platforms, has nonetheless identified advancements in this area. Smartphone applications (apps) have been developed, for example, to monitor and treat mood disorders such as depression. These apps have been shown to significantly reduce self-reported depression symptoms. Limitations include the relatively small number of mental health disorders targeted by available apps and approaches mainly anchored in the principles of cognitive-behavioral therapy.

In another systematic review, Firth et al (2017) identified a substantial gap in apps tailored to address mental well-being proactively as opposed to providing treatment for existing symptoms. Notwithstanding these limitations, digital self-help interventions are recognized as having great potential for scalability and cost-effectiveness for population-level public mental health. Such adaptive digital health inter-

ventions suitable for broad mental well-being promotion are essential in the current scenario. Rooted in optimal human-computer interaction, they can provide real-time objective measures and timely, personalised support to the user for different contexts. There is ongoing scaling-up of the development of digital apps from a passive monitoring role primarily in the mental health/illness places to also include those that aim at addressing mental well-being and relaxation through reminders and live sessions in nonclinical and nonstandard settings (Saleem et al., 2021).

ital interventions to provide real-time support, monitor symptoms, promote relaxation and enhance mindfulness (Woodward et al., 2019). The use of digital technologies for psychological interventions has been discussed extensively. In a systematic review by Firth et al (2017), apps targeting depression and/or anxiety showed greater effect sizes at postintervention than those targeting mental well-being. In a 2017 meta-analysis of 18 studies involving university students, Carey et al found a significant effect size (g=.25) for psychological intervention with mobile apps relative to

Wellmind - NHS	3.4***	Calm - Calm.com	4.6*****
Record Feelings, Advice and Relaxing audio. Developed by reputable organisation but offers little functionality other than the ability to read general information and record limited moods.		Range of activities to help comfort, distract, release, breathe and more. The app provides a variety of tasks to complete all within different categories but these tasks have not been tested to ensure effectiveness.	
Dayio - Relaxios.r.o	4.8*****	MoodPath - MoodPath UG	4.6*****
Simple app that provides an effective way to monitor moods and what might impact mood over time, much like traditional self-reporting but easier to access. The ability to customise the moods is useful and a feature many other apps do not offer.		Tracks mood, offers mental health assessment and information on detection and treatment. Has very limited functionality. It is intuitive through the use of large simple icons and provides a mental health assessment after 14 days. The app also provides potentially useful statistics about mood over time.	
Whats Up? – Jackson Tempra	4.4****	Headspace - Headspace	4.6 *****
The app has a large number of features but is very unintuitive with a complex user interface relying on custom icons. There is little research about how well the included help such as breathing control, grounding and uplifting quotes work.		Provides guided meditation to help reduce stress and anxiety and improve focus and sleep. The app has a wide range of guided mediation available with useful goals and statistics to make monitoring progress easy. However there is little evaluation to prove its effectiveness.	

Fig 1. (Woodward et al., 2019)

A number of digital interventions including smartphone applications (apps), wearable devices, and web-based platforms have been developed to address mental health challenges. Substantial progress has been made in the development and evaluation of dig-

waiting list control. Digital interventions for mental health include a wide range of technologies—mobile devices and wearable devices—and methods for monitoring and enhancing mental well-being such as gaming and 3D visualisation. Technologies are avail-

able for real-time monitoring of well-being with multiple indices (eg, psychophysiological, movement, and movement patterns), positive feedback, and automated ('smart') guidance. Smartphone and wearable devices make the collection of physiological data cost-effective and convenient. Figure 1 highlights a summary of the most popular mental health apps on the Google Play Store compared to Wellmind, an app developed by the NHS.

A growing area of research called "digital health" is aimed at understanding how technology and digital tools can be used to improve health outcomes in patients with a variety of diseases. For example, a recent review identified a reliance on stand-alone products rather than ecosystem integration (i.e., how an app contributes to the broader collection of mental health tools), proprietary systems (i.e., apps and digital health products created by one company rather than supporting interoperability with other tools), and an underrepresentation of apps focused on anxiety (Romael Haque & Rubya, 2022). If users do not continue to engage with interventions (i.e., repeated use or longer usage periods), it is unlikely that outcomes will be achieved. Several psychological theories have been developed to explain the process of why individuals continue to engage with

systems and how to influence them.

Digital interventions for mental health promotion continue to increase in prevalence as a way to overcome several of the barriers to mental health care (e.g., lack of resources, physical and social accessibility; (Fonseca Zuccolo et al., 2021)). Moreover, digital interventions offer completions in an innovative way that can include more tailored and real-time support. However, user engagement with digital interventions for mental health continues to be a challenge. Engaging and retaining users alternate digital interventions can promote the utilization of services, and potentially improve health outcomes and well-being ((Saleem et al., 2021)).

Supportive strategies like reminders, gamification, and push notifications have been successful in increasing engagement with digital interventions. A digital mental health intervention that enhanced their implementation of key engagement components was able to increase the number of completed activities by over 20% compared to their standard implementation.

Proposed strategies will need to be assessed further in empirical studies in order to evaluate the benefits and risks associated with different engagement strategies.

4. Conclusion

Capturing the voices of service beneficiaries is crucial to developing and improving mental health services. Many service users have now experienced the recent digital turn in mental health; less is known about their experiences and needs. This study aimed to understand service users' attitudes and experiences of accessing and engaging with digital mental health interventions, comparing these with their experiences of traditional face-to-face services. A meta-ethnographic synthesis was conducted of qualitative research comparing service users' experiences of accessing digital interventions and traditional face-to-face mental healthcare. Included studies were those published in English about digital mental health interventions and their effectiveness on common mental disorders (CMD) in primary care. Outcomes were changes in mental health symptom severity and experts' perspectives on implementation of digital mental health interventions. Metadata and a quality assessment of the quantitative studies were conducted. 14 quantitative studies were included with data (n > 1000). Interventions were seen as acceptable. Effects were suggested to be dependent on course and symptom

severity. Digital mental health interventions require tailored, ethical and evidence-based implementation. Utilization of digital health should be naïve and encouraged to benefit people.

The COVID-19 pandemic has been particularly threatening for the mental health of many people, with increased levels of mental distress and spiking mental health problems in certain populations (Mohammed, 2023) (Hanf et al., 2021). This situation has given a push for the development and implementation of (digital) (preventive) mental health care. Although digital interventions can bring many benefits in facilitating timely, personalised and remote support, we must be aware of potential negative side effects of digital mental health solutions.

This editorial reflects on the experiences of digital mental health interventions in the first year of the COVID-19 pandemic, mainly from ongoing research programs in Specialised Mental Health Care in Dutch treatment programs. In these digital interventions we address both people with and without current mental health problems. Furthermore, digital mental health interventions are integrated in routine mental health care programs. From these experiences, we have learned a few lessons, and make recommendations to guide future implementation

and development of digital mental health interventions beyond this COVID-19 period. With these recommendations we aim at avoiding stigmatisation and dismantling barriers to equitable and ethical digital mental interventions. And in this way maximizing the effectiveness and applicability of digital mental health interventions for everybody.

Artificial Intelligence therapies have been shown to have a positive impact on depression and anxiety. Wearable devices have the potential to collect continuous cardio data in the real world, which can be integrated with momentary self-report data and ecological momentary assessments for more fine-grained tailoring of (intervention) components. Most literature addressing mental health and technology is very clinical: we question whether technological solutions have to be large-scale and institutionalized, or can there be sand-boxed (prototype) or community-based solutions next to larger platforms. We would advocate that in technological design, for every problem, about as many types of solutions can also exist. The importance of having a variety of technological solutions could be to accommodate (in)formality, but also a one-size-fits-all approach may not work for all users different populations, age groups.

Technological challenges in creating digital interventions for mental well-being (Gu et al., 2019). Digital and mobile interventions have demonstrated success with respect to a range of app-based and web-based interventions, others have looked at text message interventions or other types of digital interventions like sensors and smart devices. The efficacy of such interventions is also shown to depend on different factors, and understanding which digital interventions or settings are most successful is important to disseminate successful interventions.

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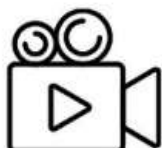
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WOMEN LEADERS AND NEUROSCIENCE LEADERSHIP MASTERY POST PANDEMIC

Martha Davidson

Founder: Mpowering
Minds Now

Theme of the Article: Leadership

Research Objectives: Highlight the essential role of empathy and compassion as core leadership competencies for women. Explore the profound impact of emotional and social intelligence in fostering inclusive and supportive work cultures.

BIO

Martha Davidson is the founder of Mpowering Minds Now where her mission is to empower corporate leaders use Neuroscience leadership practices and inspire midlevel managers specifically in the STEM profession to accelerate their desire to own a seat in the executive suite utilising neuroscientific leadership strategies. Currently less 5 % of African American Women in STEM rise to senior leadership and less than 25% of women in technology over-all are in leadership positions. She is Certified in Neuroscience Coaching and Leadership specialising in Unconscious Bias, Corporate Leadership Consultancy. She is an International Speaker and Author that is passionate in empowering others to amplify their purpose and superpowers with the brain in mind. She has over twenty-five years in Cybersecurity as a global leader and influencer for Fortune 100 companies in United States, the Royal Bank of Scotland and BCD Travel. Her mission is to empower 100,000 women to Empower Women in technology professions to thrive by 2024. She is a Google Women Techmaker Global Ambassador and DEI advocate Truist Women In Tech.

Abstract

This research aims to delve into the significant role that neuroscience plays in amplifying women's leadership abilities. Particularly in overcoming the 'broken rung' challenge - a metaphor for the obstacles that impede women's rise to leadership positions. There is an integration of neuroscientific principles with practical leadership strategies, focusing on the vital roles of empathy, social, and emotional intelligence in the intricate landscape of our post-pandemic work environment. Through foundational works "Women and Leadership: A Neuro-Social Point of View" by Hiebert, B. (2015), "The Neuroscience of Female Leadership" by Mary Ovenstone, and Dr. Daniel Amen's, insights into the natural leadership talents of women are investigated.

The primary aim of this research is to highlight the essential role of empathy and compassion as key leadership competencies. Exploring the profound impact of emotional and social intelligence in creating inclusive and supportive

workplace cultures. Additionally, examining the necessity for adaptable leadership styles in response to the dynamic shifts in workplace interactions post-pandemic. Through this research, a holistic, brain-based approach to leadership is highlighted, an approach crucial for the advancement of women in leadership roles. A comprehensive framework for organisations looking to develop empathetic, emotionally intelligent leadership styles, capable of navigating the complexities of the modern workplace will be provided. This strategy is pivotal in dismantling the 'broken rung', ensuring women leaders are not only prepared to excel but also to succeed at every stage of their career. By merging neuroscience with leadership strategies, there is an endeavour to mark a significant paradigm shift.

Keywords: Women Leaders, Neuroscience, Broken Rung, Leadership Strategies, Empathy in Leadership

Figure 1 (Thakur, 2023)

1.0 Introduction

Leadership within the world is undergoing a seismic shift (Whyte, et al., 2022). The post-pandemic world demands a new breed of leaders, those who are adept at directing remote teams, fostering resilience, and prioritising employee well-being (Somani, 2021). The leadership landscape pre-pandemic often resembled a command centre. Leaders were heralded for their decisiveness, strategic thinking, and ability to steer the ship with a firm hand. They were expected to make clear pronouncements, delegate tasks efficiently, and prioritise individual achievement (Webb, 2024). Charismatic leaders who could inspire and motivate with unwavering confidence were particularly admired. However, the global pandemic turned this model on its head. Remote workforces, team restructuring, and heightened employee well-being concerns demanded a different kind of leader. Empathy, adaptability, and emotional intelligence became the new hallmarks of effective leadership (Wells, 2024). The ability to foster collaboration, navigate complex team dynamics, and prioritise the psychological well-being of employees became mission critical. This shift in leadership demands opened the door for a re-evaluation of women's strengths and their natural aptitude for the very skills the new era requires. While Leadership Quality comprises numerous components, figure 1 illustrates nine crucial elements emerge as indispensable for its development.

Figure 1 (Thakur, 2023).This research explores a groundbreaking idea: that the leadership qualities most needed today may have a biological basis, particularly for women. Imagine a leader with a heightened capacity for understanding others' emotions, a key feature of the brain regions associated with empathy in women. Such a leader can foster trust, build strong relationships, and navigate complex team dynamics. Social intelligence, another strength often linked to women's neurological makeup, allows for effective collaboration and communication, crucial for harnessing the collective wisdom of a diverse workforce. Finally, emotional intelligence equips leaders to manage not only their own emotions but also those of their teams, fostering a positive and supportive work environment, a cornerstone of employee well-being and productivity.

A vast body of research underscores the unique leadership strengths women possess. Existing literature suggests women tend to exhibit high-

er levels of empathy, collaboration, and emotional intelligence compared to their male counterparts (Kitsios, Papageorgiou, Kamariotou, Perifanis, & Talias, 2022). Hiebert (2015), in her work "Women and Leadership: A Neuro-Social Point of View," emphasises the neurobiological basis for these strengths (Hiebert, 2015). She highlights the heightened activity in brain regions associated with empathy and emotional processing observed in women. Similarly, Ovenstone (2018) explores the biological underpinnings of women's leadership styles in "The Neuroscience of Female Leadership," emphasising their natural capacity for collaboration and relationship-building (Ovenstone, 2015). Dr. Daniel Amen's insights further contribute to this understanding, illuminating the neurological foundations of these leadership qualities (Amen, 2023).

However, despite these strengths, women remain underrepresented in leadership roles.

Aim

This research has several key objectives. Firstly, it aims to highlight the essential role of empathy and compassion as core leadership competencies for women. Secondly, it seeks to explore the profound impact of emotional and social intelligence in fostering inclusive and supportive work

cultures.

Furthermore, the research examines the necessity for adaptable leadership styles in response to the dynamic shifts in workplace interactions post-pandemic. Ultimately, this research strives to develop a holistic, brain-based framework for organisations to cultivate empathetic and emotionally intelligent leadership styles. This framework is intended to be a pivotal tool in dismantling the "broken rung" by ensuring women leaders are not only prepared to excel but also thrive at every stage of their careers.

2.0 Method

This research employed a multifaceted methodological approach. First, a comprehensive literature review was conducted, analysing foundational works on the neurobiology of leadership, particularly those focusing on empathy, social intelligence, and emotional intelligence. Works by Hiebert (2015), Ovenstone (2015), and Dr. Amen (2023) were central to this review, alongside other relevant academic sources. Secondly, the research integrated these neuroscientific principles with established leadership development concepts. This involved analysing how these principles could be

applied to understand and enhance the leadership potential of women. Finally, based on these findings, a practical framework for organisations was developed. This framework outlined strategies and tools that organisations could utilise to cultivate empathetic and emotionally intelligent leadership styles within their workforce, fostering a more inclusive and supportive work environment.

3. Results and Discussion

3.1 Unveiling the Neurobiological Connection: Women and Leadership Strengths

The comprehensive literature review yielded a wealth of information, unveiling a fascinating link between neuroscience and women's leadership potential. Works by Hiebert (2015), Ovenstone (2015), and Dr. Amen (2023) provided compelling evidence for the biological underpinnings of leadership behaviours. They focused on empathy, social intelligence, and emotional intelligence – strengths frequently attributed to women leaders. This research delves deeper, exploring the exciting possibility that these leadership qualities may have a foundation in the very structure and function of the fe-

male brain.

Neuroscience of Empathy and Emotional Intelligence:

Hiebert's (2015) work stands out in this regard. Her research highlights how brain regions associated with empathy and emotional processing, such as the anterior cingulate cortex and the insula, show heightened activity in women. These areas play a crucial role in understanding and responding to the emotions of others, a vital skill for fostering strong relationships and building trust within teams – qualities essential for effective leadership.

Figure 2 (Chauvigné & Brown, 2018)

The Neural Basis of Collaboration:

Ovenstone (2015) sheds light on the biological underpinnings of women's leadership styles, emphasising their natural capacity for collaboration and relationship-building. This strength may be linked to the stronger connectivity observed in women between the prefrontal cortex and the

limbic system (Foo & Freedle, 2024). These brain regions are involved in planning, decision-making, and emotional regulation, suggesting a neurological basis for women's ability to integrate diverse perspectives and foster a collaborative work environment.

Dr. Amen's Contribution:

Dr. Amen's work (2015) on brain imaging (Amen Clinics, 2024) further contributes to this understanding by illuminating the neurological foundations of leadership qualities. He identifies specific brain regions associated with traits like decisiveness, risk-taking, and social adeptness, all crucial for effective leadership. While his research does not differentiate between genders, it provides valuable insights into the biological underpinnings of leadership behaviours in general.
Figure 2 depicts a Shared network for leading and following.

In a study involving a group of participants, the brain regions associated with leadership in the entire cohort tended to correlate with proficiency in leading, while regions related to following tended to correlate with proficiency in following. Another interpretation of these findings is that adept leaders scarcely utilized additional brain areas during following that were not already activated during leading; similarly, adept followers hardly activated any areas during leading that were not already engaged during following.

Aligning with Post-Pandemic Needs:

The alignment between these neuroscientific findings and the increasingly sought-after leadership skills in the post-pandemic world (Eichenauer, Ryan, & Alanis, 2022) is particularly striking. Adaptability, empathy, and emotional intelligence are crucial for navigating the complexities of a rapidly changing work environment. Remote workforces, team restructuring, and heightened employee well-being concerns necessitate leaders who can foster trust, build strong relationships, and make sound decisions with a human touch. Women, with their natural neurological predispositions towards these very skills, are well-positioned to excel in leadership roles and contribute significantly to the suc-
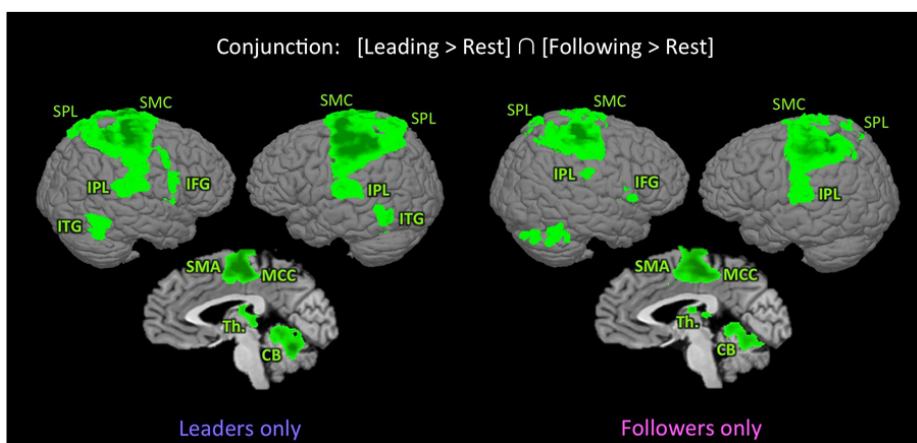
cess of organisations in the post-pandemic era.

3.2 Empowering Women Leaders:

By understanding the biological basis of behaviours like empathy, social intelligence, and emotional intelligence, women can leverage these inherent strengths in a targeted manner. This self-awareness becomes a powerful tool for professional development (Yadav, 2022). Research has found that women leaders can translate this knowledge into action through the following:

Building Confidence:

Understanding the neurological basis of their strengths can bolster confidence in women leaders. The knowledge that their natural tendencies align with sought-after leadership skills can be a powerful motivator. This newfound confidence can empower them to take on new challenges and assert their leadership vision.

Targeted Development:

By pinpointing specific strengths, women can develop targeted strategies for honing their leadership skills. For instance, a leader with a strong neurological foundation for empathy might focus on developing active listening skills or conflict resolution strategies that leverage their natural ability to understand others' perspectives.

Communication Strategies:

Understanding the neural basis of communication can help women leaders develop communication styles that resonate with their teams. Focusing on clear, empathetic communication that fosters trust and collaboration can be particularly effective.

Fostering Collaboration:

Women's natural capacity for relationship-building, supported by their neurological predisposition for social intelligence, can be leveraged to cultivate a collaborative work environment.
By fostering open communication and encouraging team participation, women leaders can create a space where diverse perspectives are valued and collective problem-solving thrives.

Navigating the "Broken Rung":

Understanding the biological underpinnings of leadership strengths can equip women leaders to navigate the "broken rung" challenge. They can leverage their strengths in networking and building supportive relationships to overcome systemic barriers and secure opportunities for advancement.

By actively utilising this newfound self-awareness, women leaders can not only excel in their roles but also pave the way for future generations by dismantling the "broken rung" and creating a more equitable leadership landscape.

3.3 Fostering Inclusion

For organisations, fostering a culture that empowers women leaders necessitates a two-pronged approach: dismantling systemic barriers and creating opportunities for them to thrive (Smith & Sinkford, 2022). The framework developed through this research offers practical tools to achieve this. By integrating these strategies into leadership development programs and organisational practices, companies can cultivate empathetic and emotionally intelligent leadership styles across the workforce, fostering a more inclusive and productive work environment.

The Framework in Action:

The framework outlines several key strategies that organisations can implement:

Leadership Development Programs:

Revamp leadership development programs to emphasise the value of empathy, social intelligence, and emotional intelligence. This could involve workshops on active listening,

communication styles that build trust, and emotional regulation techniques.

Mentorship Opportunities:

Foster mentorship opportunities specifically for women leaders. Pairing them with experienced mentors, regardless of gender, can provide guidance, support, and access to valuable networks.

Work-Life Balance Initiatives:

Implement work-life balance initiatives that recognise the unique challenges often faced by working women. This might include flexible work arrangements, childcare support resources, and parental leave policies that are equitable for all genders.

Unconscious Bias Training:

Educate all employees on unconscious bias and its impact on promotion practices. Creating a culture of awareness allows for fairer evaluation processes and removes invisible barriers hindering women's advancement.

Sponsorship Programs:

Develop sponsorship programs that connect high-potential women leaders with senior executives who can champion their careers and advocate for their advancement.

Performance Reviews:

Revise performance review processes to incorporate metrics that capture the value of strengths associated with women's leadership styles, such as collaboration, team building, and emotional intelligence.

Benefits of an Inclusive Environment:

By implementing these strategies, organisations can cultivate a more inclusive work environment. This benefits not only women leaders but also the entire workforce. It can foster Enhanced Employee Engagement; when employees feel valued, respected, and heard, their engagement and morale improve, leading to increased productivity and innovation (Mazzetti & Schaufeli, 2022). Talent Acquisition and Retention; a diverse and inclusive workplace attracts and retains top talent, regardless of gender.

There is improved Decision-Making:

Leadership teams with diverse perspectives and strengths are better equipped to make well-rounded decisions. Positive Brand Image; companies that champion gender equality create a positive brand image and attract a wider pool of talent and customers.The framework presented here is a starting point. Organisations can adapt and expand upon these strategies to create a customised approach that fosters a culture where women leaders can thrive. By dismantling the "broken rung" and creating a truly inclusive environment, organisations unlock the full potential of their diverse workforce, leading to a more successful and sustainable future.

4.0 Conclusion

This research has shed light on the transformative potential of neuroscience in amplifying women's leadership potential. By unveiling the neuro-biological underpinnings of leadership behaviours associated with empathy, social intelligence, and emotional intelligence, strengths that are often attributed to women. This research has made a compelling case for their natural aptitude for leadership roles.This understanding is particularly relevant in the ever-evolving post-pandemic landscape, where these very skills are increasingly sought after for navigating complex challenges and fostering team resilience. The discussion around these findings has centred on two crucial aspects: empowering women leaders and fostering a more inclusive work environment. By understanding the biological basis of their strengths, women can leverage them to navigate the complexities of leadership and dismantle

the persistent "broken rung" challenge that hinders their advancement (Mountroui-dou, et al., 2019). The framework developed within this research offers practical tools for organisations to cultivate empathetic and emotionally intelligent leadership across the workforce. Implementing these strategies can create a truly inclusive environment where all employees, regardless of gender, feel valued, respected, and empowered to reach their full potential.

However, this research is not merely an exploration; it is a springboard for a more equitable future. By promoting a deeper understanding of women's leadership strengths informed by neuroscience, we can dismantle the unconscious biases that have long impeded their progress. This future envisions women not only excelling in leadership roles but also inspiring and paving the way for the next generation of female leaders. The time has come to move beyond rhetoric and harness the full potential of a diverse workforce.

By empowering women leaders, organisations can unlock a new era of success and innovation. This research provides a roadmap for achieving this transformation. It is a call to action for both women and organisations. Women leaders can leverage the knowledge of their inherent strengths to advocate for themselves, build

supportive networks, and inspire others. Organisations must commit to dismantling systemic barriers, fostering a culture of inclusion, and implementing the framework outlined here.

The benefits extend far beyond individual successes, a diverse leadership landscape fosters a culture of collaboration, innovation, and better decision-making. It unlocks the talents of the entire workforce, leading to increased productivity and a more positive work environment for all. Ultimately, by embracing the transformative potential of women's leadership, organisations and societies alike can pave the way for a more successful and sustainable future.

Recommendations

Building upon the insights gleaned from this research, the following recommendations are offered to further empower women leaders and foster a more inclusive work environment:

For Women Leaders:

Self-Awareness & Continuous Learning:
Women leaders are encouraged to actively engage in self-awareness exercises to further understand their natural leadership strengths, particularly those rooted in empathy, social intelligence, and emotional intelligence. This knowledge can be leveraged

to develop targeted leadership development plans, honing existing skills and acquiring new ones through ongoing professional development opportunities.

Building Networks & Mentorship: Intentionally fostering strong professional networks and pursuing mentorship opportunities with experienced leaders, regardless of gender, can provide invaluable support, guidance, and access to valuable resources.

Advocacy & Visibility: Women leaders should leverage their voices to advocate for themselves and other women within the organisation. This can involve promoting initiatives that champion gender equality and acting as role models for aspiring women leaders.

For Organisations:

Leadership Development Revision: Review and revise leadership development programs to emphasise and cultivate the value of empathy, social intelligence, and emotional intelligence. This can be achieved through workshops focusing on active listening, communication styles that build trust, and emotional regulation techniques.

Data-Driven Initiatives: Gather and analyse data related to employee advancement and leadership positions to identi-

fy potential biases and areas where women may be underrepresented. Utilise this data to inform the development of targeted initiatives that promote gender equality.

Accountability & Transparency: Develop clear metrics that assess leadership effectiveness, taking into account the full range of leadership strengths, including those associated with women's leadership styles. This promotes transparency and ensures fairness in promotion and advancement opportunities.

Diversity & Inclusion Champions: Identify and empower diversity and inclusion champions within the organisation who can advocate for change and ensure the successful implementation of initiatives aimed at fostering a more inclusive work environment.

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EMPOWERING RESEARCH: PROJECT MANAGEMENT STRATEGIES FOR THE DIGITAL AGE

Dr. Osagie Benson

Executive Mini MBA

Theme of the Article: Project Management

Research Objectives: Explore the critical role of project management in empowering researchers to understand the intricacies of academic research in the digital age.

BIO

Dr. Osagie Benson, driven by a lifelong commitment to education and a natural talent for management, holds a Bachelor's degree in Health and Social Care. Motivated by a passion for learning, Osagie is pursuing a Master's degree in Human Resource Management to advance professionally. With qualifications in Executive Mini MBA and a clear vision for career progression, Osagie aspires to become a Human Resources Director. Recognizing the transformative potential of education, Osagie is determined to obtain an MBA in Human Resource Management for further growth. Eager to join a renowned institution, Osagie looks forward to contributing to its academic excellence and success.

Abstract

The digital revolution has transformed academic research, necessitating innovative project management approaches. This paper explores how effective project management strategies can empower researchers to navigate the complexities of digital research within evolving learning environments. Examining the challenges and opportunities presented by digitalisation, this paper provides insights into effective project management strategies. Drawing on existing literature, it identifies key considerations and best practices for successfully managing academic research projects in the digital era. These considerations emphasise fostering adaptability, strengthening collaboration through online platforms, and implementing strategic planning to optimise resource allocation in the face of data overload.

The paper highlights the critical role of project management in enabling researchers to leverage the potential of digital technologies, such as fostering international collaboration, streamlining data analysis, and facilitating knowledge dissemination. However, navigating the complexities of the digital age also presents challenges, including data security concerns and information overload.

Through its exploration of agile methodologies and the integration of cloud-based tools, this paper equips researchers with a practical toolkit for maximising the efficiency and impact of their research endeav-

ours. This, in turn, empowers them to contribute meaningfully to the ever-evolving world of learning and shape the future of academic research within a digitalised world.

Keywords:

Project management, academic research, digital futures, learning landscape, collaboration, adaptability

1. Introduction

The rapid advancement of digital technologies has revolutionised various aspects of society, including the world of academic research (Van Veldhoven & Vanthienen, 2022). The emergence of "digital futures," characterised by ubiquitous connectivity, enhanced accessibility of information, and data-driven methodologies, is fundamentally reshaping traditional research paradigms (Myrick, et al., 2022). This evolution necessitates a critical re-evaluation of project management practices within the academic context. Effective project management strategies are crucial to harness the immense opportunities presented by digitalisation, such as fostering international collaboration, streamlining data analysis, and facilitating knowledge dissemination.

Traditionally, researchers operate within a defined paradigm,

a foundational framework that shapes their approach coln, 1994). As depicted in Figure 1.

This paradigm encompasses four key components: Ontology (the nature of reality), Epistemology (how we acquire knowledge), Methodology
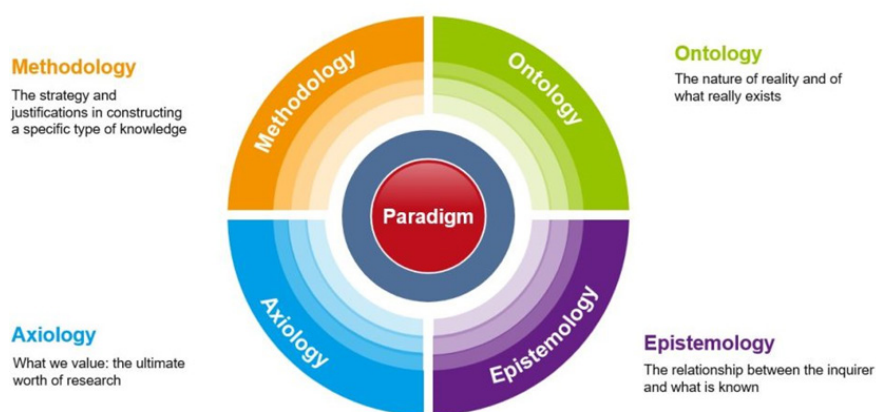
Figure 1. (Alele & Malau-Aduli, 2023)

(research methods used), and Axiology (the role of values). The vast amount of data, the ever-evolving nature of online platforms, and the ethical considerations surrounding digital research methods all challenge researchers to adapt their paradigms and embrace new approaches to project management in this dynamic environment. Facilitating the complexities of the digital age also presents significant challenges, including data overload, information security concerns, and the ever-increasing need for efficient resource allocation (Arnold, Goldschmitt, & Rigotti, 2023).

This paper explores the critical role of project management in empowering researchers to understand the intricacies of academic research in the digital age. By examining the

challenges and opportunities presented by digitalisation, there is an objective to provide insights into effective project management strategies for researchers. There is an aim to equip researchers with a practical toolkit for maximising the efficiency, impact of their research endeavours and help shape the future of academic research within a digitalised world.

2. Method

This research employed a multi-pronged approach to explore effective project man-

agement strategies for academic research in the digital age. Firstly, a comprehensive review of existing literature was conducted. This involved analysing scholarly articles, books, and reports which addressed project management frameworks and their application within the academic research context. Secondly, the study incorporated case studies of successful research projects that had demonstrably benefited from effective project management practices in the digital era. By examining this research, key considerations and best practices were identified. These focused on fostering adaptability, strengthening collaboration through online platforms, and implementing strategic planning to optimise resource allocation in the face of data overload. Through this analysis of literature, the paper aimed to provide a practical and actionable framework for researchers navigating the complexities of project management in the digital age.

3. Results and Discussion

3.1 Digital Transformation in Academic Research:

The digital revolution has significantly impacted academic research, permeating every stage of the research process (Bryda & Costa, 2023). From data collection and analysis to dissemination and collaboration, digital technologies have fundamentally reshaped research practices. The vast availability of data, facilitated by online databases and digital research tools, has empowered researchers to explore new frontiers and address complex research questions with unparalleled scope and depth (Aldoseri, Al-Khalifa, & Hamouda, 2024). Sophisticated analytical tools, such as machine learning and artificial intelligence, have further enhanced researchers' and student's ability to extract meaningful insights from this data (Somani, 2021).

However, this digital transformation is not without its challenges. Information overload, resulting from the sheer volume of data available, can hinder researchers' ability to identify and access relevant information. Figure 2 suggests that as the allocation of mental resources toward information management increases, there is a corresponding decrease in the mental capacity available for comprehension. Studies indicate that decision-making effectiveness declines by 50% once saturation point is reached.

Additionally, data security concerns necessitate robust measures to protect sensitive research data from cyberattacks and breaches (Cremer, et al., 2022). Ethical considerations surrounding data privacy and ownership also require careful attention as researchers progress through understanding and succeeding in digital research.

Moreover, the shift towards digital scholarship necessitates a transformation in research practices. Researchers need to adapt their methodologies to leverage the full potential of digital tools and data resources. This may involve developing new skills in data analysis, embracing open science principles for data sharing and collaboration, and critically evaluating the quality and provenance of digital information (Nieminen, Bearman, & Ajjawi, 2023).

By effectively navigating these challenges and adapting their skillsets, researchers can harness the immense potential of digital technologies to advance knowledge creation
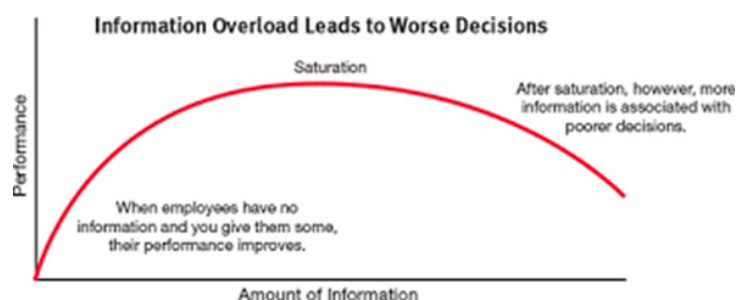

Information Overload Leads to Worse Decisions

Figure 2 (Larkin, 2019)

and scholarly communication in the digital age.

3.2 Project Management in Academic Research:

Project management has emerged as a foundation of successful academic research. It organises the intricate components of research projects, ensuring their completion within defined timeframes and resource constraints. By employing structured methodologies and frameworks, project managers can streamline workflows, optimise resource allocation, and proactively mitigate potential risks (Simonaitis, Daukšys, & Mockienė, 2023). This structured approach fosters efficiency and maximises the return on investment for research endeavours.

Furthermore, project management facilitates collaboration among multidisciplinary research teams, a hallmark of contemporary academic research (Mazzetto, 2020). Project managers establish clear communication channels and maintain project visibility for all team members, fostering a collaborative environment that leverages diverse expertise. This is particularly crucial in the digital age, where research often involves geographically dispersed teams working with complex data sets and tools.

The digital landscape pres-ents unique challenges for project managers in academic research.Beyond technical expertise in project management frameworks, effective project managers in the digital age require adaptability and innovation (Amoah & Marimon, 2021). The ability to embrace emerging technologies and adapt project plans to accommodate unforeseen challenges is critical for overcoming the complexities of digital research environments. By fostering a culture of continuous improvement and leveraging the power of digital tools, project managers can empower researchers to achieve optimal research outcomes.

3.3. Adapting to the Evolving Learning Landscape:

The rapidly evolving world of learning necessitates a paradigm shift in both educational and research practices. This shift prioritises adaptability and innovation to cater to the changing needs of learners and researchers. Digital pedagogy, with its emphasis on interactive and participatory learning approaches, goes beyond the traditional classroom boundaries (Somani, E-learning in Tomorrow's Age, 2021). By leveraging online platforms and collaborative tools, digital pedagogy fosters a culture of lifelong learning and knowledge dissemination beyond the confines of physical classrooms. This democratises access to education and empowers learners to actively engage with knowledge creation.

Similarly, within research, as learning continually changes, it compels us to embrace interdisciplinary collaborations and digital tools. Complex research questions often necessitate diverse expertise and transcend traditional disciplinary boundaries. Collaborative research platforms and online communication tools facilitate seamless collaboration between researchers across geographical and disciplinary divides. Moreover, the availability of vast digital datasets necessitates the adoption of sophisticated analytical tools to extract meaningful insights. This confluence of interdisciplinary collaboration and digital methodologies empowers researchers to tackle multifaceted challenges and generate novel discoveries.

To help progress this evolving learning landscape effectively, a holistic approach that integrates pedagogical innovation with cutting-edge research methodologies is crucial (Sharma, 2024). By bridging the gap between education and research, we can foster a continuous cycle of knowledge creation and dissemination. This requires not only a shift in teaching and research practices but also a commitment to continuous learning for both educators and researchers. By embracing life-

long learning and fostering a culture of collaboration and innovation, we can leverage the evolving learning landscape to advance knowledge creation and equip learners for success in a rapidly changing world.

3.4 Strategies for Effective Project Management:

Effective project management in the digital age necessitates a shift towards flexible and agile methodologies for academic research projects (Daraojimba, Nwasike, Adegbite, Ezeigweneme, & Gidiagba, 2024). Traditional, linear project management approaches may struggle to accommodate the dynamic and often unpredictable nature of digital scholarship.

Agile methodologies, characterised by iterative development cycles, continuous feedback loops, and a focus on adaptation, offer a more suitable framework for research projects. This iterative approach allows researchers to adjust their methods and research questions as new information emerges, fostering a more responsive and efficient research process (Morgan & Nica, 2020).

Furthermore, the integration of digital tools and platforms plays a crucial role in enhancing collaboration, data management, and project tracking. Cloud-based platforms facilitate real-time collabora-tion among geographically dispersed research teams, enabling seamless communication zthan, Varghese, & Devkar, 2020). Additionally, digital tools empower researchers to effectively manage and analyse vast datasets, improving data accuracy and accessibility.

Project management software further enhances project visibility by providing real-time progress updates and facilitating communication between team members and project managers.By embracing agile methodologies and leveraging the power of digital tools, researchers and project managers can navigate the complexities of digital research environments (Balaban & Đurašković, 2021).

This combined approach fosters adaptability, streamlines workflows, and optimises resource allocation, ultimately leading to a significant improvement in the efficiency and effectiveness of academic research projects in the digital age.

3.5 Best Practices:

Examining successful research projects offers a wealth of practical knowledge for researchers facilitating them towards overcoming the complexities of project management in the digital age (Kraus, et al., 2022). By dissecting these successful cases and identifying the best practices employed, researchers can attain valuable lessons and adapt them to enhance their own research endeavours.These best practices may encompass a range of strategies, including:

Fostering Collaboration: Successful research projects often highlight the importance of effective communication and collaboration, particularly in thecontext of geographically dispersed teams (Vuchkovski, Zalaznik, Mitręga, & Pfajfar, 2023). Case studies may showcase the use of online platforms and collaborative tools that facilitate seamless information sharing and joint problem-solving, fostering a unified research environment.

Embracing Agile Methodologies: Examining case studies that explore the adoption of agile project management methodologies can provide valuable insights for managing dynamic research projects (Biely, 2024). These methodologies often prioritise iterative development cycles and constant feedback loops, allowing researchers to adapt their approach as new information emerges.

Leveraging Digital Tools: Case studies showcasing the innovative use of digital project management tools can demonstrate their effectiveness in streamlining research workflows(Ogunbukola, 2024). These tools can encompass platforms for communication, data management, and proj-

ect tracking, ultimately contributing to efficient and successful research outcomes.

By critically analysing these best practices from successful projects, researchers can curate a practical toolkit of strategies for managing their own research endeavours in a digital environment. This fosters a culture of knowledge transfer and continuous improvement within the research community, leading to a higher calibre of research projects with enhanced efficiency and impact.

3.0 Conclusion

In conclusion, project management has emerged as a pivotal cornerstone of successful academic research in the digital age (Danijela, Bojan, Milan, Danijela, & Darko, 2022). By embracing the opportunities presented by "digital futures" and adapting to the evolving learning landscape, researchers can leverage the power of digital technologies to drive knowledge creation and innovation.

Effective project management strategies, informed by agile methodologies, interdisciplinary collaboration, and the integration of digital tools, are essential for ensuring the successful execution and long-term sustainability of research projects within the digital era.

As the world of academic research continues its dynamic evolution, ongoing exploration and refinement of project management practices will be crucial. This necessitates a commitment to continuous learning and innovation within the research community, fostering adaptability in the face of emerging challenges and opportunities presented by digital scholarship. By actively engaging with these advancements, researchers can harness the full potential of project management to optimise research outcomes and contribute meaningfully to the advancement of knowledge in a digitalised world.

3.1 Recommendations

The digital revolution has fundamentally reshaped academic research, presenting both opportunities and challenges. To continue evolving effectively, researchers and research institutions can benefit from a multi-pronged approach:

Promote Continuous Learning and Upskilling: Equipping researchers with the necessary skills within the digital environment is crucial. Institutions can offer training programs on project management methodologies, data analysis tools, and digital collaboration platforms. Additionally, fostering a culture of lifelong learning within the research community will enable researchers

to adapt to the ever-evolving digital landscape.

Embrace Open Science Practices: Open science principles, emphasising data sharing and transparency, can accelerate research progress and foster collaboration in the digital age. Educational institutions should incentivise open science practices by providing researchers with resources and infrastructure to facilitate data sharing and collaboration with colleagues across geographical and disciplinary boundaries.Invest in Digital Infrastructure: Robust digital infrastructure is essential for managing complex research projects and efficiently processing vast datasets. Universities should invest in cloud-based storage solutions, high-performance computing capabilities, and user-friendly data management systems to support researchers in the digital age.

Develop Research-Industry Partnerships:

Collaboration with industry partners can provide researchers with access to cutting-edge technologies and real-world research applications. Academic institutions can facilitate such partnerships by establishing dedicated research clusters and fostering communication channels between researchers and industry stakeholders. By implementing these rec-

ommendations, researchers and research institutions can harness the full potential of digital technologies to advance knowledge creation and innovation in a digitalised world. This will contribute to a more collaborative, efficient, and impactful research ecosystem within the continually evolving world.

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Dr BK Geeta Didi
Senior Raja Yoga Teacher

Theme of the Article: Health

Research Objectives: Understand the transformative potential of Raja Yoga in promoting stress reduction, focus improvement, and a greater sense of purpose.

BIO

Dr BK Geeta Didi, Guiness world record holder for bringing positive change is a true embodiment of spiritual wisdom, has devoted over 35 years of her life to the Brahma Kumaris organization, tirelessly working towards personal and global transformation. With fervour and passion, she imparts knowledge and nurtures the growth of individuals through spiritual, moral, and value education. Her teachings and guidance have left a profound impact on countless lives, helping individuals find inner peace, clarity, and purpose. Dr BK Geeta Didi's deep understanding of spirituality and her ability to communicate complex concepts in a relatable manner make her a revered mentor.Through her unwavering dedication, she continues to inspire and uplift others on their spiritual journeys.

Abstract

In a world increasingly dominated by digital technology, Raja Yoga meditation emerges as a powerful tool for fostering global well-being. This paper delves into the empowering influence and self-transformative power of this ancient practice. Raja Yoga, with its emphasis on self-awareness and inner peace, equips individuals with the mental and emotional resilience necessary to navigate the myriad challenges of the digital age. The paper highlights the transformative potential of Raja Yoga in several key areas: stress reduction, focus improvement, and fostering a greater sense of purpose. These benefits are particularly pertinent in today's fast-paced, digitally-driven society, where the constant bombardment of information can lead to heightened stress and a sense of disconnection. Furthermore, the paper discusses the innovative ways in which Raja Yoga is embracing technology to enhance its accessibility and personalise the meditation experience. Through apps, online classes, and virtual communities, practitioners can now engage with Raja Yoga in ways that fit seamlessly into their daily lives. This integration of traditional meditation techniques with modern technology not only

makes Raja Yoga more accessible to a global audience but also ensures that the practice evolves to meet the needs of contemporary society. By merging the timeless wisdom of Raja Yoga with the advancements of the digital era, this practice is uniquely positioned to promote holistic well-being in the digitized world, offering a pathway to inner peace and resilience amidst the chaos of modern life.

Key words:

Raja Yoga, Meditation, Self-transformation, Mindfulness, Soulfulness, Digital Technology

1.0 Introduction

The ever-expanding digital landscape, while offering countless benefits, can also be a source of stress, anxiety, and a sense of disconnection (Teepe, Glase, & Reips, 2023). In this hyper-connected world, the ancient practice of Raja Yoga meditation offers a powerful counterpoint (Nagesh, Revitalizing Modern Minds: Embracing Brahma Kamari's Raja Yoga Meditation for Modern Challenges, 2023). More than just a relaxation technique, Raja Yoga is a transformative journey that fosters inner peace, self-awareness, and a deeper connection to

oneself. There is an empowering influence and self-transformative power of Raja Yoga meditation, with the potential to cultivate global well-being in the digital age (Nagesh, Brahma kumaris raja yoga meditation in modern times: Addressing the current issues and applications, 2023). Figure 1 illustrates the Yoga philosophy, which outlines four paths leading to enlightenment.

Figure 1: (Jain, 2022)

Aim:

This study aims to examine how Raja Yoga equips individuals with the tools to navigate the complexities of the digital world, fostering stress reduction, improved focus, and a renewed sense of purpose. Furthermore, we will explore the innovative ways in which Raja Yoga is embracing technology

to enhance accessibility and personalise the meditation experience.

2.0 Method

Via an extensive review of literature and personal experiences, this study explores Raja Yoga's role in promoting holistic well-being in a digitised world.

The research methodology involves a comprehensive analysis of existing scholarly articles, books, and credible online resources to understand the theoretical foundations and documented benefits of Raja Yoga. Additionally, personal anecdotes and qualitative data from practitioners were gathered to provide a practical perspective on the practice's

impact. This dual approach ensures a robust examination of both the empirical and experiential dimensions of Raja Yoga, highlighting its potential to enhance mental and emotional resilience, reduce stress, and improve focus. By integrating these diverse sources of information, the study aims to present a well-rounded view of how Raja Yoga can be effectively utilised to foster well-being in an increasingly digital society.

3.0 Results and Discussion

3.1 The Digital Age and its Impact on Well-being:

The digital age has undeniably revolutionised our lives. From instant communication across continents to information at our fingertips, technology offers unparalleled convenience and connectivity (Somani, 2021). However, this constant barrage of stimuli and the ever-present digital world come with a hidden cost – a potential detriment to our well-being.

While social media platforms connect us with loved ones and provide a platform for self-expression, they can also fuel feelings of inadequacy and social comparison (Qiu, 2024). The curated online personas we see can distort reality, leading to anxiety and low self-esteem. Additionally, the pressure to stay constantly connected can disrupt sleep patterns and contribute to a sense of information overload.

Despite these challenges, technology also offers potential solutions. Mindfulness apps and online meditation resources are becoming increasingly popular tools for managing stress and improving focus. Ultimately, the impact of the digital age on well-being depends on how we choose to interact with it (Büchi, 2024). By setting boundaries, fostering digital literacy, and embracing practices that promote mental well-being, we can harness the power of technology while safeguarding our emotional and mental health.

Digital age can affect well-being in the following ways:

Information Overload: The constant influx of information, news updates, and social media notifications can be overwhelming. This can lead to feelings of anxiety, difficulty concentrating, and decision fatigue.

Social Media Pressures: The curated perfection often portrayed on social media platforms can breed feelings of inadequacy, envy, and loneliness. The pressure to maintain an online presence can also contribute to stress and anxiety.

Attention Fragmentation: The constant availability of digital distractions disrupts our ability to focus for extended periods.This can negatively impact productivity, creativity, and the ability to engage deeply in tasks or relationships.

Sleep Disruption: The blue light emitted by electronic devices suppresses the production of melatonin, a hormone crucial for sleep regulation. This can lead to sleep disturbances, further impacting our overall well-being.

Social media, while fostering connection, can also be a breeding ground for negativity (Osborne, Costello, & Duckitt, 2023). The curated portrayal of others' lives can lead to social comparison and feelings of inadequacy. Additionally, the pressure to maintain an online presence and the fear of missing out (FOMO) can further exacerbate anxiety and loneliness.

Furthermore, the digital world can be addictive. The constant notifications and dopamine hits we receive from social media and online games can disrupt sleep patterns and decrease attention spans. This can lead to a vicious cycle,

where a lack of sleep further diminishes our ability to focus, making us crave the stimulation of digital devices even more.

3.2 Raja Yoga: A Pathway to Inner Peace:

In today's fast-paced, technology-driven world, it's easy to feel overwhelmed and disconnected from ourselves. The constant barrage of information and social media pressure can leave us feeling stressed, anxious, and yearning for a sense of inner peace. It's in these moments that ancient practices like Raja Yoga meditation, offered by the Brahma Kumaris, emerge as a powerful tool for self-discovery and well-being.

The Brahma Kumaris, a global socio-spiritual organisation, promotes Raja Yoga as a path to self-realisation and spiritual connection (BK, Meditation, 2023). Unlike some meditation practices, Raja Yoga doesn't require specific mantras or rituals. Instead, it focuses on cultivating self-awareness and inner peace through simple techniques. Here's how Raja Yoga, as taught by the Brahma Kumaris, can be your gateway to inner tranquility:

Inner Reflection: Raja Yoga meditation encourages us to turn our attention inwards. By focusing on the breath and observing our thoughts and emotions without judgment, we gain a deeper understanding of ourselves. This self-awareness is the first step towards managing stress and fostering emotional resilience.

Taming the Mind: Our minds are often bombarded with a constant stream of thoughts. Raja Yoga techniques, like focusing on a point of light or a spiritual image, help us train our attention and reduce mental chatter. This newfound mental discipline allows us to approach challenges with a calmer and more focused perspective.

Connecting with the Divine: The Brahma Kumaris emphasise the importance of connecting with our inner spiritual essence. Through Raja Yoga meditation, we cultivate a sense of peace and connection with a higher power, a source of strength and comfort in difficult times.

The beauty of Raja Yoga with the Brahma Kumaris is its accessibility. Their meditation sessions are open to all, regardless of age, background, or religious beliefs. They offer guided meditations, educational workshops, and online resources to make learning Raja Yoga convenient and easy to integrate into your daily life (Kumaris, 2024).

Raja Yoga, meaning "the royal path," is an ancient practice that emphasises self-awareness and inner peace. The Brahma Kumaris teach a simple and accessible form of Raja Yoga meditation, focusing on withdrawing the attention from external stimuli and directing it inwards. Through meditation, we can cultivate a space of inner silence, a sanctuary from the digital chaos.

Reduced Stress and Anxiety: By focusing on the breath and cultivating inner stillness, meditation helps calm the mind and reduce stress hormones. This can lead to a sense of relaxation and emotional balance.

Enhanced Focus and Concentration: Meditation trains the mind to become more focused and less prone to distractions. This can improve our ability to concentrate on tasks in the digital world and beyond.

Increased Self-Awareness: Through meditation, we gain a deeper understanding of our thoughts, emotions, and reactions. This self-awareness empowers us to make conscious choices and respond to situations rather than simply react.

A Meditation for Everyone: Raja Yoga meditation with the Brahma Kumaris is open to people of all ages, backgrounds, and faiths. It requires no special equipment or rit-

uals, making it easily accessible in the comfort of your own home. The Brahma Kumaris offer free meditation classes and resources online and in person, making it easier than ever to embark on your journey to inner peace.

In conclusion, Raja Yoga meditation with the Brahma Kumaris offers a powerful antidote to the challenges of the digital world. By cultivating inner peace, focus, and self-awareness, we can navigate the digital landscape with greater resilience and well-being. So, take a moment, close your eyes, and embark on your own journey to inner peace with Raja Yoga meditation.

3.3 Stress Reduction through Raja Yoga

Chronic stress has become a defining characteristic of the modern world. Our fast-paced lives, bombarded by information and constant connectivity, leave us feeling perpetually on edge. Fortunately, ancient practices like Raja Yoga meditation offer a powerful tool for stress reduction, providing a much-needed oasis of calm in the digital storm.

Raja Yoga, meaning "royal union," emphasises self-awareness and inner peace. One of its key benefits is its ability to combat stress. Here's how:

Physiological Relaxation:

Raja Yoga incorporates breathwork techniques like Pranayama. Focusing on the breath regulates the nervous system, lowering cortisol (the stress hormone) levels. This physiological shift promotes a sense of calm and reduces physical tension associated with stress.

Quieting the Mind: Stress often manifests as a constant mental chatter. Raja Yoga teaches us to observe our thoughts without judgment, creating a space between ourselves and our thoughts. This allows us to detach from negative thought patterns and anxieties, fostering mental tranquility.

Focus and Mindfulness: Raja Yoga meditation strengthens our ability to focus on the present moment. This reduces rumination on past worries and anxieties about the future, two major contributors to stress. By anchoring ourselves in the present, we learn to respond to situations calmly and thoughtfully, rather than reacting impulsively under stress.

Inner Peace and Resilience: Through regular practice, Raja Yoga cultivates a sense of inner peace and emotional resilience. This newfound mental strength allows us to better manage stressful situations and bounce back from challenges with greater ease.

The beauty of Raja Yoga for stress reduction lies in its cumulative effect. Regular practice cultivates a sense of inner calm that spills over into our daily lives. We become less reactive to external stressors and more equipped to navigate the complexities of the digital age with greater balance and composure.

Raja Yoga, meaning "royal union," focuses on harnessing the mind's power to achieve inner harmony. This practice equips us with techniques that directly target the physiological and psychological effects of stress. Here's how Raja Yoga meditation helps to unwind the digital knot:

Physiological Relaxation: Stress triggers the release of cortisol, a hormone that puts our bodies into "fight-or-flight" mode. Raja Yoga incorporates deep breathing exercises that activate the parasympathetic nervous system, promoting relaxation and lowering cortisol levels. This physiological shift reduces muscle tension, slows heart rate, and eases anxiety.

Taming the Thought Storm: The constant mental chatter characteristic of a stressed mind can be overwhelming. Raja Yoga meditation teaches us to observe our thoughts without judgment. By becoming aware of our thought patterns, we can break free

from their negative influence and cultivate a sense of calm amidst the mental storm.

Detachment from External Stimuli: Our digital world bombards us with information and notifications, keeping our minds constantly engaged. Raja Yoga meditation teaches us to withdraw our attention from external stimuli and focus inwards. This allows us to disconnect from the constant mental chatter and reconnect with our inner peace.

Building Resilience: Chronic stress can leave us feeling overwhelmed and vulnerable. Raja Yoga meditation strengthens our mental and emotional resilience. By regularly practicing mindfulness and self-awareness, we develop the capacity to respond to stressful situations with calmness and composure rather than reacting impulsively.

3.4 Cultivating Emotional Resilience

The digital age throws a lot at us. From the constant barrage of news to the curated perfection of social media, it's easy to feel overwhelmed and emotionally drained. This is where emotional resilience comes in – the ability to bounce back from setbacks, navigate challenging emotions, and maintain a sense of well-being even in the face of adversity. Fortu-

nately, ancient practices like Raja Yoga meditation offer powerful tools to cultivate this vital skill.

Raja Yoga, meaning "royal union," emphasises self-awareness and inner peace. By focusing inward, we gain a deeper understanding of our emotions and how they influence our thoughts and actions. Here's how Raja Yoga helps build a stronger emotional core:

Understanding Your Triggers: Through meditation, we learn to observe our reactions to situations and identify the emotions that Unise our triggers – the events or circumstances that typically throw us off balance. By knowing our triggers, we can anticipate them and develop healthier coping mechanisms.

Acceptance, Not Judgment: Often, our emotional reactions are fueled by resistance to what is happening. Raja Yoga teaches acceptance, not judgment, of our emotions. By acknowledging our feelings without negativity, we detach from them and regain control. This allows us to respond calmly rather than react impulsively.

Developing Detachment: The digital world can fuel a constant need for external validation. Raja Yoga promotes

inner strength and a sense of self-worth independent of external circumstances. This detachment allows us to be less affected by negativity online or setbacks in life.

Building a Positive Mindset: Raja Yoga meditation cultivates a sense of optimism and hope. By focusing on the present moment and appreciating the good things in life, we train our minds to see the positive even in challenging situations. This positive outlook fosters resilience and helps us navigate difficulties with a sense of perspective.

Emotional resilience is not about becoming emotionless. It's about acknowledging, accepting, and managing our emotions effectively. Raja Yoga meditation equips us with the tools to do just that. By strengthening our emotional core, we become better equipped to handle the inevitable ups and downs of life, navigate the digital world with greater ease, and ultimately, thrive in the face of adversity.

Raja Yoga equips us with several tools to build inner strength:

Emotional Regulation: Through meditation techniques like breathwork and visualisation, we learn to regulate our emotional responses. Instead of being swept away

by negative emotions, we can observe them objectively and choose a more positive and constructive response.

Acceptance and Non-judgment: Life throws curveballs, and negative emotions are a natural part of the human experience. Raja Yoga teaches us to accept these emotions without judgment. By not resisting them, we allow them to flow through us and eventually dissipate.

Inner Peace as a Foundation: Regular meditation practice cultivates a sense of inner peace that serves as a foundation for emotional resilience. When we feel grounded and centered, we are better equipped to handle the inevitable ups and downs of life.

Developing Detachment: The digital world often fuels feelings of attachment – to possessions, social validation, and certain outcomes. Raja Yoga encourages us to cultivate a sense of detachment. This doesn't mean indifference, but rather a healthy distance from external circumstances, allowing us to maintain emotional stability.

Building Self-Compassion: Raja Yoga fosters self-compassion, the ability to treat ourselves with kindness and understanding. This is crucial for emotional resilience. When we

are compassionate towards ourselves, we are less likely to be consumed by self-criticism and negativity, which can exacerbate emotional distress.

Cultivating emotional resilience through Raja Yoga is an ongoing process. However, with consistent practice, we can develop the inner strength and emotional intelligence to navigate the challenges of the modern world with greater ease. Raja Yoga empowers us to not just survive in the digital age, but to thrive, fostering a sense of well-being that allows us to fully embrace life's experiences, both positive and negative.

Here's how Raja Yoga meditation fosters emotional resilience:

Understanding Your Emotions: Raja Yoga teaches us to observe our emotions without judgment. This allows us to understand their root causes and identify healthy ways to express or manage them. By acknowledging our emotions instead of suppressing them, we gain greater control over our reactions.

Acceptance and Detachment: Life throws curveballs. Raja Yoga meditation helps us cultivate acceptance of what we cannot control.
By letting go of negativity and focusing on the present mo-

ment, we lessen the emotional impact of challenges.
Building Inner Strength: Through regular meditation practice, we develop mental discipline. This allows us to manage difficult emotions and resist negative impulses. We become less reactive and more proactive in handling stressful situations.

Finding Inner Peace: At its core, Raja Yoga aims to cultivate inner peace. This sense of calm becomes a foundation for emotional resilience. When faced with challenges, we can draw upon this inner peace to maintain composure and navigate them more effectively.

Raja Yoga meditation isn't a magic bullet, but it's a powerful tool. Consistent practice equips us with the skills to manage our emotions effectively. In a world that often bombards us with negativity, Raja Yoga offers a path to inner strength and emotional well-being, empowering us to thrive in the face of adversity.

3.5 Meditation Meets Modernity

The digital age reigns supreme, offering instant connection and a wealth of information at our fingertips. However, this constant connectivity comes with a hidden cost – a rise in stress, anxiety, and a yearning for inner peace. Here's where

a timeless practice, Raja Yoga meditation, steps in, surprisingly finding fertile ground in the digital sphere.

Traditionally, Raja Yoga focused on self-discovery and inner peace through guided instruction and introspection. Today, however, technology is revolutionising its accessibility and reach. Here's how Raja Yoga is embracing the digital world:

Mobile Meditation Apps: Numerous apps offer guided Raja Yoga meditations tailored for different needs and experience levels. These apps provide a convenient and portable way to integrate meditation into daily life, even amidst busy schedules.

Online Courses and Tutorials: The internet provides a vast library of online courses and tutorials on Raja Yoga meditation. This allows individuals to learn at their own pace and explore different meditation techniques from the comfort of their homes.

Virtual Communities: Online communities dedicated to Raja Yoga meditation offer a space for connection and support. These online groups foster a sense of belonging and allow individuals to share experiences, ask questions, and stay motivated in their practice.

Interactive Meditation Tools: Technology is also paving the way for interactive meditation tools. Biofeedback devices, for instance, can provide real-time feedback on physiological responses during meditation, helping users refine their practice and achieve deeper states of relaxation.This digital embrace of Raja Yoga offers several advantages:

Increased Accessibility: Technology removes geographical barriers, making Raja Yoga meditation accessible to a wider audience than ever before. Anyone with an internet connection can now learn and practice this ancient technique.

Personalised Experience: Digital tools allow for personalised meditation experiences. Apps and online courses can cater to individual preferences and learning styles, making the practice more engaging and effective.

Community Building: Online communities foster a sense of connection and belonging among practitioners, providing valuable support and motivation for continued practice. However, it's important to acknowledge the potential downsides:

Tech Overload: While technology can enhance accessibility, relying solely on digital tools can defeat the purpose.

It's crucial to maintain a balance between digital meditation and traditional practices.

Distraction: The digital world itself can be a source of distraction. Practicing meditation in a quiet, distraction-free environment remains essential to reap its full benefits.

In conclusion, Raja Yoga's embrace of the digital sphere opens doors to a wider audience seeking inner peace in a world brimming with digital stimuli. Technology offers convenient tools and fosters a sense of community, but it's vital to maintain a balance with traditional practices and prioritise a distraction-free environment. By harnessing the power of technology responsibly, Raja Yoga meditation can continue to empower individuals to cultivate inner peace and navigate the complexities of the digital age with greater clarity and well-being.,

By embracing technology, Raja Yoga is no longer confined to meditation centers or yoga studios. It's transforming into a dynamic and accessible practice that can be integrated into our digital lives. This integration empowers individuals to cultivate inner peace, manage stress, and enhance well-being, fostering a sense of calm amidst the constant digital buzz.

4.0 Conclusion

For centuries, Raja Yoga meditation has been touted for its ability to promote inner peace and well-being. However, in recent years, science has begun to catch up with tradition, validating the positive effects of this ancient practice. Let's delve into the scientific evidence supporting Raja Yoga's benefits:

Stress Reduction: Numerous studies have shown that Raja Yoga meditation effectively reduces stress hormones like cortisol. By activating the parasympathetic nervous system, Raja Yoga promotes relaxation and counteracts the body's fight-or-flight response.

Improved Focus and Attention: Brain imaging studies reveal that Raja Yoga meditation enhances activity in areas associated with focus and attention. Regular practice strengthens our ability to filter out distractions and maintain concentration in a world filled with stimuli.

Emotional Regulation: Research suggests that Raja Yoga meditation leads to increased activity in the prefrontal cortex, a region crucial for emotional regulation. This translates to a better ability to manage emotions and respond to challenges with composure.

Enhanced Sleep Quality: Studies have shown that Raja Yoga meditation can improve sleep quality. By reducing stress and promoting relaxation, it allows individuals to fall asleep faster and experience deeper, more restorative sleep.

Cognitive Benefits: Emerging research points towards potential cognitive benefits associated with Raja Yoga meditation. Studies suggest it may improve memory, cognitive flexibility, and overall cognitive function.

It's important to note that research on Raja Yoga is ongoing, and further studies are needed to fully understand the mechanisms behind its benefits. However, the growing body of scientific evidence strengthens the case for Raja Yoga as a valuable tool for promoting mental and emotional well-being.

Beyond the studies mentioned above, Raja Yoga's benefits are often described in terms of:

Increased Self-Awareness: Through meditation, individuals gain a deeper understanding of their thoughts, emotions, and behavioral patterns. This self-awareness empowers them to make conscious choices and cultivate positive change.

Greater Sense of Well-being: Raja Yoga fosters a sense of inner peace and well-being that transcends temporary emotional states. This holistic approach to well-being enhances overall quality of life.Science is backing the benefits of Raja Yoga through the following:

Stress Reduction: Studies have shown that Raja Yoga meditation practices like mindful breathing and focused attention effectively activate the parasympathetic nervous system, promoting relaxation and reducing stress lates to lowered blood pressure, decreased anxiety, and improved sleep quality.

Enhanced Focus and Cognition: Research suggests that Raja Yoga meditation can improve cognitive function. Studies have shown positive effects on working memory, attention span, and executive function – the mental skills that govern decision-making and planning.

Emotional Regulation: Raja Yoga's emphasis on self-awareness equips individuals to identify and manage emotions effectively.Brain imaging studies show that meditation practices can strengthen areas associated with emotional regulation, leading to greater resilience and a decrease in reactivity.

Improved Physical Health: The stress-reduction benefits of Raja Yoga can positively impact physical health. Studies have linked meditation practices to lower blood pressure, improved immune function, and reduced pain perception.

While research is ongoing, the growing body of evidence is promising. Raja Yoga meditation appears to be more than just a feel-good practice; it offers tangible benefits for both mental and physical well-being.

Here are some key considerations when evaluating scientific research on Raja Yoga:

Standardization of Practices: Raja Yoga encompasses various techniques. Studies need to clearly define the specific practices used to ensure generalizability of findings.

Control Groups: Strong research designs involve comparison groups that don't participate in meditation. This helps isolate the effects of Raja Yoga from other factors influencing well-being.

Long-Term Effects: Many studies focus on short-term benefits. Further research is needed to explore the long-term impact of consistent Raja Yoga practice.

The scientific exploration of Raja Yoga is in its early stages, but the initial findings are encouraging. As research continues, we can expect a deeper understanding of the mechanisms by which this ancient practice promotes well-being in the modern world. This growing body of evidence reinforces the value of Raja Yoga as a powerful tool for navigating the complexities of the digital age and fostering holistic well-being.

Integration with Healthcare: The growing scientific evidence supporting the benefits of Raja Yoga might pave the way for its integration with mainstream healthcare. Imagine meditation apps being prescribed by doctors or Raja Yoga becoming a standard practice in stress management programs.

4.1 The Future of Raja Yoga in a Digital World

The digital age presents both challenges and opportunities for ancient practices like Raja Yoga meditation. As technology continues to evolve, so too will Raja Yoga, adapting and integrating with the digital sphere to reach a wider audience and offer even greater benefits. Figure 2 provides a glimpse into the potential future of Raja Yoga:

AI-Powered Personalization: Artificial intelligence (AI) has the potential to personalize the Raja Yoga experience further. Imag ine AI-powered apps that analyse your emotional state and tailor meditation practices to address specific needs in real-time. **Virtual Reality (VR) Immersion:** VR technology can create immersive meditation environments, transporting users to se-

Figure 2 (Didi)

rene landscapes or calming virtual temples. This could enhance focus and mindfulness during meditation practice.

Biofeedback Integration and Gamification: Advanced biofeedback technologies could provide even more detailed feedback on physiological responses during meditation. Gamification techniques could be incorporated to create engaging and motivating meditation experiences.

Global Community Building: Digital platforms can facilitate the creation of even more vibrant online Raja Yoga communities. These communities can foster a sense of global connection and shared purpose, promoting peace and well-being across borders.

Scientific Validation and Integration: The future holds promise for further research into the benefits of Raja Yoga. As scientific evidence grows, it could lead to the integration of Raja Yoga practices into mainstream healthcare and stress management programs.

The future of Raja Yoga in the digital world is not about replacing traditional practices, but rather, about enhancing them. Technology can provide new tools and experiences that make Raja Yoga more accessible, engaging, and effective. This symbiotic relationship between ancient wisdom and modern technology has the potential to empower individuals around the globe to cultivate inner peace, emotional resilience, and a sense of well-being in the ever-evolving digital landscape.

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COMING WINTER 2025

TRAJECTORIES OF MARIJUANA USE, AND CO-OCCURRING DEPRESSION AND ALCOHOL USE DISORDER AMONG ADOLESCENT IN THE UNITED STATES

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Theme of the Article: Mental Health

Research Objectives: Examine the predictive prevalence of major depressive episodes (MDE), MDE with severe impairment, MDE with alcohol use disorder in relation to sociodemographic disparity and frequency of cannabis use.

BIO

Dr. Ismatara Reena, Ed.D, MBBS, CHES, serves as an Assistant Professor in the Health Promotion and Wellness Program at the University of Louisiana at Lafayette, USA. Her diverse research portfolio spans underrepresented groups, mental health literacy, social determinants of health, COVID-19's effects on higher education, and health equity. With a passion for promoting wellness and addressing disparities, she contributes invaluable insights to the field. Dr. Reena's work underscores her commitment to advancing knowledge and fostering positive change in healthcare and education. Her multidisciplinary approach and dedication to improving health outcomes make her a valuable asset to the academic community and beyond.

Abstract

Youth substance use is a major public health concern. Marijuana and alcohol, the two most common illicit drugs among adolescents are increasing being studied for affective risk. Despite the steady fall of teens substance use since pandemic, teens depressive symptoms elevated, and mental health condition worsened. This study investigates the association between adolescent marijuana use, depression, and alcohol use disorder (AUD) using data from the 2021 National Survey of Drug Use and Health (NSDUH). Descriptive statices and binary logistic regression were used analyze the data.

The findings reveal that adolescent marijuana use is significantly associated with higher odds of lifetime MDE, past-year MDE, past-year MDE with severe role impairment, and past-year MDE with AUD. Female gender and White race followed by Hispanic have statistically higher marijuana consumption. Two out of five adolescent lifetime marijuana user had past year MDE, and 9% had MDE with AUD. A significant portion of adolescents, ranging from 63% to 75%, perceive moderate to heavy marijuana use as lacking substantial risks. A consistent and particular escalating odds is identified between

past-year cannabis use frequency and the likelihood of experiencing MDE with co-occurring AUD.

1.0 Introduction

Marijuana and alcohol are among the most common form of psychoactive polysubstance use globally particularly among adolescents (Banks et al., 2017; Jones & McCance-Katz, 2019). In 2020, nearly 900,000 adolescents had alcohol use disorder and 1.3 million people had marijuana use disorder (Substance Abuse and Mental Health Services Administration [SAMHSA], 2022). Cannabis reforms such as decriminalization, medicalization, and legalization have had varied consequences youth in the United States, including some advantages and detrimental consequences on adolescent mental health (Hammond et al., 2020). Marijuana and alcohol alone or when used together has disproportionate population distribution (McHugh, 2019; Gajos et al., 2021; Pedroni et al., 2021; Siddiqui et al., 2022). Both substances are linked to a wide range of acute and long-term

health hazards and repercussions (Aloi et al., 2019; Crocker et al., Marijuana and alcohol are among the most common form of psychoactive polysubstance use globally particularly among adolescents (Banks et al., 2017; Jones & McCance-Katz, 2019). In 2020, nearly 900,000 adolescents had alcohol use disorder and 1.3 million people had marijuana use disorder (Substance Abuse and Mental Health Services Administration [SAMHSA], 2022). Cannabis reforms such as decriminalization, medicalization, and legalization have had varied consequences youth in the United States, including some advantages and detrimental consequences on adolescent mental health (Hammond et al., 2020). Marijuana and alcohol alone or when used together has disproportionate population distribution (McHugh, 2019; Gajos et al., 2021; Pedroni et al., 2021; Siddiqui et al., 2022). Both substances are linked to a wide range of acute and long-term health hazards and repercussions (Aloi et al., 2019; Crocker et al., 2021; Pasman et al., 2018; Reece & Hulse, 2020).

Overall, a steady fall of substance use has been noticed among adolescents since the pandemic culmination, yet the upward trajectory of depression prevalence remains same among all demographics (Patalay & Gage, 2019). Higher marijuana con-

sumption attributed to the discourse on cannabis reform can translate into a greater mental healthcare burden (Bodden et al., 2018; Mojtabai et al., 2016; Ssegonja et al., 2019; Twenge, 2020; Zuckermann et al., 2019). Converging evidence of robust literatures indicate the association of cannabis use to depression in adolescents (Chadi et al., 2019; Langlois et al., 2021; Weinberger et al., 2020), however the directionality is not clear. The relationship between cannabis uses and depression has three hypotheses so far: depression preceding cannabis use, cannabis-induced brain changes increasing MDD risk, and confounding factors (Gukasyan & Strain, 2020). In contrast, ample scholarly works have demonstrated the association of risk of depression with alcohol misuse.

However, the results of extensive population-based surveys show that depression brought on by solely drinking alcohol is not extremely prevalent. Studies have revealed that many cases that were initially diagnosed as alcohol-induced depression were later reclassified as independent depression (i.e., not substance caused), as the condition persisted even after a period of abstinence (McHugh, 2019).
Marijuana use can potentially lead to use of other substances including alcohol (Hines et al., 2020; Nugent et al., 2018;

Ramlagan et al., 2021). A large number of adolescents in the U.S. are engaged in substance use according to recent national surveys (SAMHSA. 2022). In 2021, The percentage for marijuana vaping in the past month among current marijuana users was highest among adolescents. In 2020, Nearly 900,000 adolescents had alcohol use disorder and 1.3 million people had marijuana use disorder. In addition, 20.1 percent (weighted 5.0 million adolescents) had major depressive episode (MDE), and 14.7 percent (weighted 3.7 million adolescents) had MDE with severe impairment in various roles of life. Among adolescents aged 12 to 17, 2.9 percent (weighted 724,000 people) had both an MDE with severe impairment and an substance use disorder (SUD). Additionally, a concerning prevalence of depression effects like suicidal thoughts, plans, and attempts among adolescents was observed. The estimates are derived from surveying in the subsequent year. This high prevalence raises the concern for outlining the predictors of depression related to substance use.

Although co-use of alcohol and marijuana and its associated risk of moderate depression has been studied several times in several demographics (Claus et al., 2017; Lipperman-Kreda et al., 2017; Thompson et al., 2021; White et al., 2019),

the impact of cannabis use on MDE with alcohol use disorder (AUD) has not been studied enough. The relevance to identify the sociodemographic disparity is paramount importance to recognize target strata of population. With shifting cannabis legalization in the US, and alcohol being the second most common used substance, it's crucial to investigate the link between adolescent cannabis use with adolescent with major depressive episodes and with alcohol use disorder and the pattern of population distribution.

The objective of the current study is to examine the predictive prevalence of major depressive episodes (MDE), MDE with severe impairment, MDE with alcohol use disorder in relation to sociodemographic disparity and frequency of cannabis use.

2.0 Method

This research employed a secondary data analysis approach, utilizing data from the 2021 National Survey of Drug Use and Health (NSDUH). The study included a total of 10,743 adolescent participants aged 12-17, drawn from the NSDUH database. The data were nationally representative of the United States population. The NSDUH conducted multimod-

al data collections throughout 2021, compiling information from households, noninstitutionalized group quarters, and civilians on military bases. Data were anonymized and available for public use.

The primary outcome measures were lifetime major depressive episodes (MDE), past year MDE, past year MDE with alcohol use disorder (AUD) and past year MDE with severe role impairment. All outcomes were binary dichotomous variables, with responses categorized as "Yes" or "No." The NSDUH adapted discrete adolescent depression criteria from the Diagnostic and Statistical Manual of Mental Disorders-5 (American Psychiatric Association, 2013) to define lifetime MDE.

Past year depression was determined for those with lifetime MDE reporting a 2-week or longer period of depression in the past 12 months. Adolescents concurrently reporting alcohol abuse underwent assessments for alcohol use disorder. The Sheehan Disability Scale (Leon et al., 1997) measured the impact of a disorder on adolescents' life, assessing role functioning in chores, relationships, and social life.

Adolescents were classified as having an MDE with severe impairment if their depression caused severe problems with their ability to do

chores at home, do well at work or school, get along with their family or have a social life. Scores ≥7 in any domain indicated MDD with severe role impairment. Independent variable, cannabis use frequency was obtained by classifying past year cannabis use into four categories: non-user, mild user (1-11 days a year), moderate user (12-49 days a year), and heavy user (≥50 days a year) (Gukasyan & Strain, 2020).

Descriptive analysis characterized participant demographics and assessed the prevalence of cannabis use. Binary logistic regression analyses were conducted to predict the probabilities of experiencing lifetime major depressive episode, past year major depressive episode, major depressive episode with severe role impairment, major depressive episode with alcohol use disorder based on sociodemo-graphic factors and cannabis use frequency. Odds ratios (OR) with 95% confidence intervals (CI) quantified the observed associations. All statistical analyses were performed using SPSS version 26.0, with a significance cutoff of 0.05 and a 95% confidence level.

3.0 Result

Participants Characteristic

Table 1 presents sociodemographic characteristic of participants (N= 10743, weighted about 25 millionadolescents) by marijuana use. Weighted column percents and unweighted n of the total sample adolescents who had lifetime marijuana use across various sociodemographic variables and depression outcomes including severe impairment and alcohol use disorder (AUD).

Most of the adolescent participants with lifetime marijuana use are older adolescents (age 16-17, 63.9%), females (54.7%), non-Hispanic white (51.4%) followed by Hispanic (23.3%), with a total annual family income $50,000 or more (58.1) and are found to be statistically significant with crosstab chi-square analysis. In 2021, nearly 50% of adolescents who used cannabis experienced at least one major depressive episode (MDE) in their lifetime. Additionally, around 40% reported MDEs in the preceding year, with about 31% encountering MDEs associated with severe role impairment, and roughly 9% with co-occurring alcohol use disorder. All the depression outcomes including past year MDE with AUD demonstrated significant associations with marijuana use (p < 0.01).

Table 1. Baseline characteristics of study participants (n=10743 adolescents)

	Marijuana n (%) Use(Yes)	P value
Age		**<0.01**
12-13	84 (6)	
14-15	422 (30.1)	
16-17	895 (63.9)	
Gender		**<0.01**
Adolescents Male	634(45.3)	
Adolescent Female	767(54.7)	
Race		**<0.01**
Nonhispanic white	720 (51.4)	
African american	183 (13.1)	
Hispanic	326 (23.3)	
Others	172 (12.2)	
Total Family Income		**<0.05**
Less than $20,000	209 (14.9)	
$20,000-$49,999	378 (27)	
$50,000 or more	814 (58.1)	
Lifetime Major depressive Episode		<0.01
No	717(52.6)	
Yes	646(47.4)	
Major Depressive Episode in the Past Years		**<0.01**
No	831(61.6)	
Yes	517(38.4)	
Pat Year Major Depressive Episode with Alcohol Use Disorder		**<0.01**
No	1226 (90.9)	
Yes	122 (9.1)	
Past Year Major Depressive Episode with Severe Role Impairment		**<0.01**
No	925 (68.9)	
Yes	418 (31.1)	

Note. *crosstab chi square analysis was conducted to obtain the distribution, un-weighted n and weighted percentages were reported, p value is significant at <0.05*

Prediction by sociodemographic variables

The findings of the study (see Table 2) reveal significant associations between various demographic factors and the likelihood of experiencing depression outcomes. For lifetime MDE, adolescents aged 14-15 years exhibited a significantly higher likelihood (OR = 1.69, 95% CI: 1.50-1.89, p < 0.001), while those aged 16-17 years had an even greater likelihood (OR = 2.45, 95% CI: 2.19-2.74, p < 0.001) compared to the reference group (12-13 years). A similar pattern was observed for past year MDE, with higher odds for both the 14-15 years group (OR = 1.72, 95% CI: 1.52-1.96, p < 0.001) and the 16-17 years group (OR = 2.29, 95% CI: 2.02-2.6, p < 0.001). Concerning past year MDE with alcohol use disorder, the odds were significantly elevated for adolescents aged 14-15 years (OR = 4.75, 95% CI: 2.54-8.88, p < 0.001) and 16-17 years (OR = 7.56, 95% CI: 4.13-13.86, p < 0.001) compared to the reference group. Similarly, for past year MDE with severe role impairment, both the 14-15 years group (OR = 1.92, 95% CI: 1.66-2.23, p < 0.001) and the 16-17 years group (OR = 2.35, 95% CI: 2.03-2.71, p < 0.001) displayed significantly higher odds.

For lifetime MDE, males demonstrated a significantly lower likelihood than female (OR = 0.30, 95% CI: 0.27-0.33, p < 0.001), and this pattern persisted for past year MDE (OR = 0.30, 95% CI: 0.27-0.34, p < 0.001). Similarly, for past year MDE with alcohol use disorder, male adolescents exhibited a markedly reduced likelihood (OR = 0.32, 95% CI: 0.22-0.46, p < 0.001), as did for past year MDE with severe role impairment (OR = 0.29, 95% CI: 0.26-0.33, p < 0.001).

In comparison with non-Hispanic white adolescents, the odds of lifetime MDE among African American adolescents were significantly lower (OR = 0.69, 95% CI: 0.59-0.79, p < 0.001), and this pattern persisted for past year MDE (OR = 0.66, 95% CI: 0.56-0.77, p < 0.001) and past year MDE with severe role impairment (OR = 0.68, 95% CI: 0.57-0.81, p < 0.001). However, for past year MDE with alcohol use disorder, the odds were significantly lower only for African American adolescents (OR = 0.37, 95% CI: 0.18-0.73, p = 0.004). In the Hispanic group, the odds of lifetime MDE were slightly higher (OR = 1.124, 95% CI: 1.01-1.25, p = 0.033), but there were no significant associations for past year MDE, past year MDE with alcohol use disorder, or past year MDE with severe role impairment.

For adolescents in families with an income of $20,000-$49,999, the odds of lifetime MDE were slightly elevated (OR = 1.19, 95% CI: 1.02-1.38, p = 0.02) than less than $20,000 group. Although a similar trend was observed for past year MDE, it did not reach statistical significance (OR = 1.12, 95% CI: 0.95-1.31, p = 0.19). There were no significant associations between this income range and past year MDE with alcohol use disorder or past year MDE with severe role impairment. In contrast, families with an income of $50,000 or more did not show any significant association with lifetime MDE (OR = 1.10, 95% CI: 0.967-1.258, p = 0.14) or past year MDE (OR = 1.12, 95% CI: 0.97-1.30, p = 0.11) or past year MDE with severe role impairment (OR = 1.16, 95% CI: 0.98-1.37, p = 0.08). A statistically significant increase in the odds of past year MDE with alcohol use disorder (OR = 1.68, 95% CI: 0.99-2.85, p = 0.05) has been observed.

Table 2. Binary logistic regression analysis of characteristics associated with depression outcome and depression with alcohol use disorder (AUD)

Variable	Lifetime MDE		Past Year MDE		Past Year MDE with AUD		Past Year MDE with Severe Role Impairment	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Age								
12-13 Years	Reference							
14-15 Years	1.69 (1.50-1.89)	**<0.001**	1.72 (1.52-1.96)	**<0.001**	4.75 (2.54-8.88)	**<0.001**	1.92 (1.66-2.23)	**<0.001**
16-17 Years	2.45 (2.19-2.74)	**<0.001**	2.29 (2.02-2.6)	**<0.001**	7.56 (4.13-13.86)	**<0.001**	2.35 (2.03-2.71)	**<0.001**
Sex								
Female	Reference							
Male	0.30 (0.27-0.33)	**<0.001**	0.30 (0.27-0.34)	**<0.001**	0.32 (0.22-0.46)	**<0.001**	0.29 (0.26-0.33)	**<0.001**
Race								
Non-Hispanic White	Reference							
African American	0.69 (0.59-0.79)	**<0.001**	0.66 (0.56-0.77)	**<0.001**	0.37 (0.18-0.73)	**0.004**	0.68 (0.57-0.81)	**<0.001**
Hispanic	1.124 (1.01-1.25)	**0.033**	1.06 (0.94-1.2)	0.33	0.97 (0.67-1.42)	0.89	1.05 (0.92-1.20)	0.45
Others	0.85 (0.99-.86)	1.13	0.98 (0.84-1.14)	0.79	0.84 (0.50-1.39)	0.49	0.94 (0.79-1.12))	0.50

Total Family Income								
Less than $20,000	Reference							
$20,000-$49,999	1.19(1.02-1.38)	0.02	1.12(0.95-1.31)	0.19	0.97(0.52-1.81)	0.93	1.21(1.002-1.45)	0.04
$50,000 or more	1.10(0.967-1.258)	0.14	1.12(0.97-1.30)	0.11	1.68(0.99-2.85)	0.05	1.16(0.98-1.37)	0.08
Past Year Cannabis Use Frequency								
Never Use	reference							
Mild User	2.89(2.37-3.53)	<0.001	3.14(2.56-3.85)	<0.001	18(11.2-29.04)	<0.001	3.22(2.59-4.0)	<0.001
Moderate User	2.59(1.98-3.41)	<0.001	2.73(2.05-3.62)	<0.001	29(17.4-49)	<0.001	3.0(2.22-4.04)	<0.001
Heavy User	2.95(2.43-3.57)	<0.001	2.91(2.38-3.55)	<0.001	33(22.5-50.24)	<0.001	2.99(2.42-3.70)	<0.001

Note. Odds ratio calculated at 95% confidence interval, statistical significance at <0.05

Prediction by Cannabis use Frequency

Compared to those who never used cannabis, mild, moderate, and heavy cannabis users displayed progressively higher odds of lifetime MDE, past-year MDE, past-year MDE with alcohol use disorder, and past-year MDE with severe role impairment.

For mild cannabis users, the odds of lifetime MDE were substantially higher (OR = 2.89, 95% CI: 2.37-3.53, p < 0.001), and this trend persisted for past year MDE (OR = 3.14, 95% CI: 2.56-3.85, p < 0.001), and past year MDE with severe role impairment (OR = 3.22, 95% CI: 2.59-4.0, p < 0.001). Similarly, moderate cannabis users exhibited increased odds for all outcomes: lifetime MDE (OR = 2.59, 95% CI: 1.98-3.41, p < 0.001), past year MDE (OR = 2.73, 95% CI: 2.05-3.62, p < 0.001), and past year MDE with severe role impairment (OR = 3.0, 95% CI: 2.22-4.04, p < 0.001).For heavy cannabis users, the odds were similarly elevated across all outcomes: lifetime MDE (OR = 2.95, 95% CI: 2.43-3.57, p < 0.001), past year MDE (OR = 2.91, 95% CI: 2.38-3.55, p < 0.001, and past year MDE with severe role impairment (OR = 2.99, 95% CI: 2.42-3.70, p < 0.001).

The study findings indicate a consistent and escalating association between past-year cannabis use frequency and the likelihood of experiencing major depressive episodes (MDE) with co-occurring alcohol use disorder among adolescents. Compared to individuals who reported never using cannabis, mild cannabis users demonstrated a substantially higher odds ratio (OR = 18.0, 95% CI: 11.2-29.04, p < 0.001) for past-year MDE with alcohol use disorder. This pattern continued for moderate cannabis users, with a dramatic increase in the odds (OR = 29.0, 95% CI: 17.4-49.0, p < 0.001). Heavy cannabis users exhibited the highest risk, with an even greater odds ratio (OR = 33.0, 95% CI: 22.5-50.24, p < 0.001).

3.0 Discussion

The Depression has been reported as a common affective adverse event in adolescent marijuana users.However, current literature remains divisive on the depression risk in adolescent marijuana users. Most literature (Bolanis et al., 2020; Chadi et al., 2019; Schoeler et al., 2018) we found showed that adolescent marijuana users had higher odds of depression even after adjusting for concomitant substance use, which contrasts with other studies (Gobbi et al., 2019) showing low risk association. Such duality of findings regarding the adolescent's depression association with marijuana use raises the possibility that cannabis use may increase depression under certain conditions, such as other substance use, adverse childhood experience. Those conditions might not always be mutually exclusive. Our result showed greater odds of depression, depression with severe impairment, and depression with alcohol disorder in any frequency of marijuana use. This study uniquely contributes by utilizing data from a recent national survey with larger sample size and sampling weights that allow authors to approximate the young marijuana users on a national level.

This population-based study is the first, to our knowledge, to examine the if the frequency of cannabis use can predict depression, depression with severe impairment, and depression with alcohol use disorder (AUD) simultaneously during adolescence from recent NSDUH data.

On top of that, predictive probability of sociodemographic variables todepression outcome and sociodemographic and depression outcomes correlates of marijuana use have been explored (see Table 1 and 2). Our study has following main findings. Female gender and White race followed by Hispanic have statistically higher marijuana consumption while some most studies (Assari et al., 2018; Hamilton et al., 2019;

Terry-McElrath et al., 2020) reported otherwise. The gender gap was already narrowing over time (Hemsing & Greaves, 2020), and the racial sample size difference might play a role here for this finding. Significantly higher likelihood of lifetime and past year major depressive episode (MDE), MDE with severe role impairment, as well as MDE with alcohol use disorder ($p < 0.01$), were observed among adolescents with a history of cannabis use.

As for the subjective dimension to the cannabis consumption among adolescents, between 63% and 75% of adolescents view moderate to heavy marijuana use as not posing a significant risk, and 35% of adolescents consider acquiring marijuana to be quite accessible. As cannabis use frequency increased, predicted prevalence of lifetime and past-year MDE, past year MDE with severe role impairment, past year MDE with AUD increased significantly ($p < 0.001$). The moderate (12-49 days a year) and heavy (≥50 days a year) cannabis users showed particularly elevated odds in relation to MDE with alcohol use disorder.

Overall, 13% adolescents (weighted about 3 million adolescents) reported lifetime marijuana use. Any frequency of past year marijuana use predicted both depression and depression with AUD

in adolescence. As far as we are aware no studies have investigated associations from cannabis use to both severe depression and depression with alcohol use disorder simultaneously. Few studies have investigated depression to cannabis use (Hoffmann, 2018), cannabis use to depression (Hengartner et al., 2020; Lawn et al., 2022; Mustonen et al., 2021), cannabis and alcohol use to depression (Fleming et al., 2021), depression to alcohol and cannabis use disorder (Rhew et al., 2017).

Most studies in our literature search demonstrated that depression was associated with increased subsequent cannabis use, alcohol use or simultaneous use of alcohol and marijuana (SAM) during adolescence. Our study extends the current body of knowledge by predicting depression with alcohol use disorder by increasing frequency category of cannabis use (mild, moderate, heavy use) among adolescents. Compared to studies that have investigated the bidirectional associations between depression and cannabis use simultaneously, our study had the advantage of also examining alcohol use disorder and was based on a representative sample of today's adolescents.

Our study findings bring out the hypothesis in the table of discussion that depression precedes cannabis use,

whereby adolescents may use cannabis to reduce stress or relaxation (Moreno-Mansilla et al., 2021). Research also shows that the therapeutic efficacy of cannabis to alleviate negative affect is largely short-term benefit rather it increases baseline depression in long term (Cuttler et al., 2018). While adolescents might be taking marijuana, the gateway drug as a coping strategy for alleviation of stress, it increases their likelihood to consume other substance use like alcohol (Borodovsky and Budney, 2018; Scheier & Griffin, 2021).

Limitations and Strengths

Dosage of cannabis use could not be known from the NSDUH dataset; hence, the frequency of use was taken as a crude estimate. This can cause the borderline data from categories of use severity, in some instance to be intermingling given that an adolescent may consume cannabis at very high amount attributed a mild user to moderate category. The self-reported nature of data, frequency of cannabis use data may be prone to response bias and potential underreporting. The diagnosis of alcohol abuse disorder or depression were not confirmed through clinician assessment or objective measures like urine drug screen tests. Furthermore, The NSDUH data do not allow for the determination of the chronological onset sequence between

Alcohol Use Disorders (SUD) and Major Depressive Episodes (MDE) among adolescents aged 12 to 17, preventing the establishment of whether SUD preceded MDE or vice versa. The authors would also like to acknowledge the presence of potential confounders especially developmental environment related factors.

Despite those limitations, the study's strength is the large, nationally representative sample of the U.S. adolescent population aged 12 to 17. The study updates and contributes to the existing knowledge base by providing information from a recent NSDUH. The research addresses a significant gap in the literature by exploring factors associated with depression, depression with severe role impairment, or alcohol use disorder. It also investigates marijuana use frequency as a predictor for depression with Alcohol Use Disorder (AUD).

4.0 Conclusion

Our analyses identified use of marijuana as significant risk factors for all depression-related outcomes. Higher use of marijuana (moderate and heavy user) was also strongly associated with all depression outcomes, and the association with depression with alcohol use disorder was somewhat greater in magnitude than expected. Further research is needed to investigate the dose relationship between cannabis use frequency on depressive symptomatology with and without alcohol use disorder.

Misconceptions about marijuana safety and easy access might contribute to higher MDE rates among frequent users, necessitating further research on underlying motivation of substance use and youth sensitive corrective education. Clinicians should be aware that even any lifetime cannabis use in an adolescent suggests a higher likelihood of depression. Careful screening for depression and history co use of alcohol in an adolescent with any history of cannabis use should be investigated.

The limitations of NSDUH may constrain any deeper understanding between the cannabis user categories, nonetheless this work provides a starting point for further prospective research on the relationship between cannabis use frequency and affective disorders with and without polysubstance use in adolescence.

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HARNESSING DIGITAL TECHNOLOGIES IN THE FIGHT AGAINST CANCER

Roxanne Boodhoo

Research student

Theme of the Article: Digital Technology and Cancer

Research Objectives: EIdeas on how to harness digital health technology in the fight against cancer and thus benefit from others digital health innovations are the core aims of this research paper.

BIO

Roxanne Boodhoo is an accomplished professional with a diverse and versatile background. Her extensive academic training has equipped her with a wide range of skills and knowledge, enabling her to excel in various roles. Roxanne is known for her strong work ethic, diligence, and commitment to undertaking any responsibilities assigned to her. She is deeply passionate about helping and supporting others, making her a compassionate and empathetic individual. Throughout her career, Roxanne has consistently demonstrated a dedication to making a positive impact, whether through her professional work or community involvement, striving to uplift those around her.

Abstract

Recent years have witnessed significant advancements in radiation therapy, driven by developments in photon, electron, and proton radiations, as well as the emerging use of hypofractionated applications. Despite these innovations, the future of fractionated radiation oncology remains secure due to the complexities involved in maximising therapeutic gains without increasing toxicity. Concurrently, inflammatory bowel diseases, particularly ulcerative colitis, play a crucial role in both gross and microscopic findings in differential diagnoses. Initial diagnostic approaches often involve evaluating antibiotic-resistant or induced enteritis through therapy history and PCR testing for Clostridium difficile. Persistent clinical symptoms suggestive of therapy resistance or re-infection necessitate further testing for Clostridium difficile fecal toxins.

Cancer therapy is increasingly influenced by digital advancements and innovative biomedical technologies. Significant progress has introduced novel diagnostic and therapeutic tools, including laser technology for surgery, photodynamic therapy, and bio-imaging. Additionally, nanotechnology has revolutionised potential therapies, enabling selective multimodal tumor diagnostics and treatment. This approach combines contrast-enhanced imaging with targeted therapy, opening new horizons in cancer treatment.

The scientific community is actively developing and establishing advanced nanotechnology-based nanomedicines, reflecting a concerted effort to enhance cancer therapy. The integration of these cutting-edge technologies promises to improve diagnostic accuracy and therapeutic outcomes, driving the future of cancer treatment towards more precise and effective interventions.

Keywords:

Cancer, Health, Digital, Technology

1.0 Introduction

The clinical application of AI in oncologic radiation therapy demonstrated its capacity to improve the diagnosis, treatment, and prognosis of cancer (Casà et al., 2023). Three main features AI manifested, including the NP-aware, Hardware-aware, and high-throughput data processing. The AI/ML models presented the potential as robust biomarkers in reducing heterogeneity in treatment response and improve the general effectiveness of immunotherapy.
A cohort of promising AI/ML models were developed to diagnose tumours, determine the DNA damage response,

identify synthetic lethal interactions, and predict immunotherapy response. In radiotherapy machine learning was successfully implemented for detecting novel radiomic features, automatically contouring organs, the classification of target volume delineation and organs at risk delineation and models for neoadjuvant chemotherapy in head and neck cancer. Novel caDISC-members were identified that showed prognostic value in endometrial cancer.

Figure 1 illustrated a Schematic

Figure 1. (Makropoulou, M., 2016)

representation of a multi-cellular solid tumor. The tumor exhibits a quasi-spherical shape with a concentric arrangement of cells. Aerobic and proliferating tumor cells are situated on the periphery, while a smaller fraction

of non-proliferating cells are found in deeper regions, encircling a core of dead cells (central necrotic core). This necrotic core results from cell death caused by restricted oxygen and nutrient diffusion.

Use of AI in designing individualised therapeutic options for leukaemia and other types of cancer, which has evolved rapidly over the years, including RPs, signal transduction, functional genomics, and immunogenomics, among others. Among different types of cancer, leukaemia is one of the
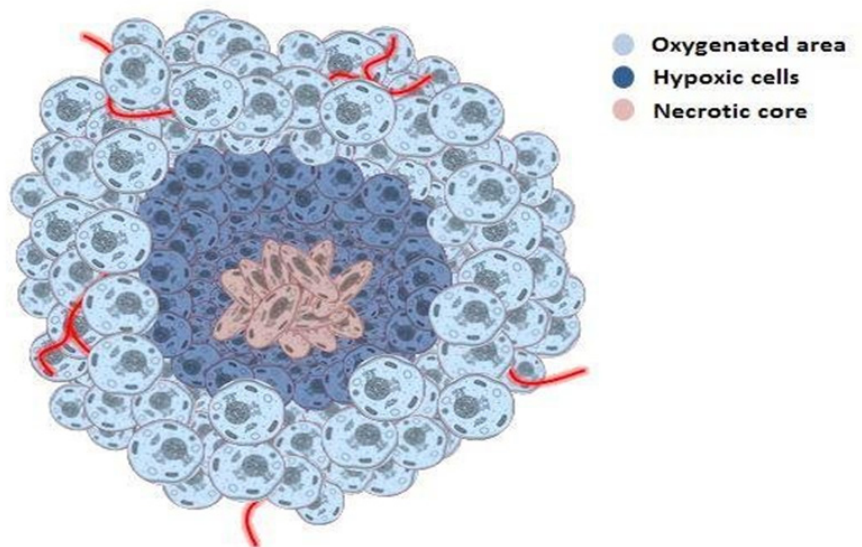
exploitations of digital tools, varying from case finding, diagnosis, treatment, follow-up and survivorship, to end-of-life care. it is anticipated in the United States that by 2030, there will be a 269% increase in the number of adult survivors of childhood cancer with

a similar absolute increase in the number of survivors with a history of haematological malignancies. As a result, two new brief surveys have been developed for this valuable cohort to assess their cancer and treatment-related problems.

1.1 Aim

Ideas on how to harness digital health technology in the fight against cancer and thus benefit from others digital health innovations are the core aims of this paper. Some perspectives on this are given per se, others are inspired by digital health inventions that deal with other diseases. This paper hopes to describe areas for future digital health research and development in under-served countries and other low-resource spheres with a strong focus on cost-effective measures.

One in six deaths worldwide is due to one of the 200 types of cancer (Patel et al., 2023) (Makropoulou, 2016). In 2040, the predicted global cancer burden may almost double, reaching 30 million new cases per year (World Health Organization, 2020). High-income countries averagely invest 1.9% among their gross domestic product (GDP) into their cancer care systems greatly supported by digital health technology (Darley et al., 2023). Such funding, however, is un-

realistic in low-income countries, which not only have to deal with unproportionally high cancer incidence rates, but also need to educate most people on how to prevent cancer and thus avoid particularly high costs for direct cancer care. Considering cost-effective health care, educational measures informed by digital health technology could achieve a lot in low-income countries as well. At the same time, the developing countries could serve as a sandbox environment for new digital health approaches, before being used in a proper health environment in high-income countries.

2.0 Method

It is critical to generate and continuously improve evidence to support the use of telemedicine and electronic communications in good clinical practice. Additionally, the evaluation of the usability and acceptability of interventions that can be part of digitization as a change process in healthcare must be considered. The cancer care pathway must be seamless, avoiding fragmentation due to digitization. After input from healthcare professionals, the patient and user perspective must take a central position in conjunction with the edu-

cation and insight of healthcare staff. It will be important to include the users (and also the patient) in the assessment of digital tools' practical suitability. The digital tools should be cost effective for both peoples' health and the health economy, with focus on the utilities. Great improvement in cancer patients' reported outcomes of treatment and treatment choices will be a key measure (Andrades & Recamonde-Mendoza, 2021).

The guiding principles for the introduction of innovation, evaluation and implementation of new technologies, and good digital technology practice in the National Health Service (NHS) should be based on care pathways and needs, cost effectiveness and equality (C. Griffin et al., 2020). Patient reported outcome measures (PROMs), including health-related quality of life, functional capacity, pain assessment and symptom-related follow-up, should be utilised to establish the quality of patient care on digital platforms. These measures should apply to any intervention or drug, an occurrence in all diseases and changes in statistics on common diseases, for example cancer, should be observed. Patients should be involved in setting the parameters for utility.

3. Results and Discussion

At the time of writing, m-health is playing a vital role in contributing to healthcare by offering a convenient and efficient way to replace or complement traditional in-person interactions. This is especially beneficial in the field of oncology care, where physical interactions are crucial for the accurate delivery of complex testing and treatment plans. As it has already been successfully demonstrated, digital solutions, particularly the use of smartphones and mobile applications, have the ability to avoid unnecessary hospital visits, greatly improve patients' overall experiences, enhance adherence to follow-up treatment, and facilitate significant time savings for both patients and healthcare providers alike. The utilisation of advanced algorithms and smart programming further allows for the seamless adjustment of the next steps in the pathway of care for patients, all based on their ongoing monitoring data and through online consultations. Additionally, it is worth noting that the majority of diagnostic image facilities worldwide still rely on non-digital methods, which unfortunately limits access to remote experts and timely distant review (Agarwal et al., 2020). This further emphasises the urgent need for embracing digital technology in healthcare to ensure optimal patient outcomes are consistently achieved.

While any amount of liver cancer is something to be concerned about, in emerging economies, the majority of patients present with more advanced stages at the time of diagnosis. However, smartphones are ubiquitous in most emerging countries and could be efficiently utilised in a solution to address obstacles in the continuum of care for liver cancer patients (Huang et al.2022). With specifically trained and deployed digital health workers from within, in parallel with leveraging widely available local care resources, we can develop and implement a novel digital health strategy that aims to support health and education system strengthening. By utilising the vast potential of mobile technology, we can revolutionise the way liver cancer patients receive care and support in emerging economies. With smartphones being pervasive in these countries, there is an unprecedented opportunity to bridge the gap between patients and healthcare providers. Combining the power of digital health workers who have been trained for this specific purpose and making use of existing local healthcare resources, we can create a groundbreaking digital health strategy that not only provides assistance but also strengthens the overall health and education system. Through the integration of smartphones into the continuum of care,

we can ensure that liver cancer patients have access to vital information, resources, and support at all stages of their journey. By deploying a network of highly skilled digital health workers, who are equipped with the knowledge to navigate through the complexities of liver cancer care, we can overcome the barriers that hinder timely diagnosis and treatment (Wazir et al.2023). Moreover, by tapping into the readily available local care resources, we can create a synergy that boosts the overall healthcare infrastructure in emerging economies, leading to improved outcomes for liver cancer patients.

This innovative digital health strategy holds immense potential to transform the landscape of liver cancer care in emerging economies. By harnessing the power of smartphone technology and utilising the expertise of digital health workers, we can pave the way for a more inclusive and comprehensive approach to tackling this devastating disease. Through the seamless integration of mobile devices, local resources, and a well-trained workforce, we can achieve unparalleled advancements in health and education system strengthening, ultimately benefiting not only liver cancer patients but the entire population as well. With the implementation of this game-changing digital health strategy, individuals facing liv-

er cancer in emerging economies will experience a significant improvement in their overall care and outcomes. The utilisation of smartphones, which have become an integral part of everyday life in these countries, allows for a unique opportunity to bridge the divide between patients and healthcare providers (Potdar et al.2020). By capitalising on the expertise and training of digital health workers who are dedicated to liver cancer care, alongside the utilisation of existing local healthcare resources, a ground-breaking and effective digital health strategy can be established.

By incorporating smartphones into the continuum of care, liver cancer patients will have continuous access to the vital information, resources, and support that they require at every step of their journey. Through the formation of a network of highly skilled digital health workers, equipped with the necessary knowledge and expertise to navigate the intricacies of liver cancer care, the barriers to early diagnosis and treatment can be effectively overcome. Additionally, by optimising the readily accessible local care resources, a symbiotic relationship can be established, further bolstering the overall healthcare infrastructure in emerging economies, ultimately benefiting liver cancer patients and the wider population.

The implementation of this innovative digital health strategy has the potential to completely revolutionise the landscape of liver cancer care in emerging economies. By harnessing the power of smartphone technology and leveraging the specialised skills of digital health workers, a truly inclusive and comprehensive approach to combating this debilitating disease can be crafted (Lv et al., 2023). Through the seamless integration of mobile devices, local resources, and a highly skilled workforce, unprecedented advancements in health and education system strengthening can be achieved. This, in turn, will not only significantly benefit liver cancer patients but will also have a profound and lasting impact on the overall wellbeing of the entire population.

4.0 Conclusion

This study has critically explored how existing digital technologies are effectively configured to be optimised for enhanced prevention; prehabilitation (of the human subject), detection (including early diagnosis), treatment, and care, in the fight against cancer. More specifically, it has been established that the declarative use of digital technologies for the fight against cancer, from an ethical and regulatory perspective. As new warfronts emerge in the fight against the development and progression of cancer, a critical at the leverage of digital technologies and systems in effectively fighting these warfronts becomes inevitable. Indeed, this article sets out with the explicit aim of critically evaluating the use and effective employment of these set of digital technologies in the fight against cancer, including some of the futuristic endeavours being charted within research environments through social inclusion. (Patel et al., 2023)

Increased cancer incidence, prevalence, costs, and deaths threaten the quality of life globally (Makropoulou, 2016). As the cancer burden has proven to be multidimensional, a multi-pronged strategy to combat this scourge that includes cancer prevention, detection, treatment, and care must be adopted. Emerging advancements in digital technologies such as the Internet of Things (IoTs), Artificial Intelligence (AI) for hepatocellular carcinoma (AIHCC), Machine learning (ML), and Big Data presages the potential future of electronic healthcare that leverages data-driven solutions.

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ORGANIC LIP BALM FORMULATION AND EVALUATION: A COMPREHENSIVE STUDY A

Dr. Beema Jainab. S. I

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Theme of the Article: Science

Research Objectives: This study focuses on the formulation and evaluation of organic lip balms using natural ingredients such as beeswax, shea butter, coconut oil, and essential oils

BIO

Dr. Beema Jainab S. is working as Associate Professor in the Department of Botany at Justice Basheer Ahmed Sayeed College for Women (Autonomous) Chennai, started her career as B.Ed Lecturer then as Lecturer (Management) and as Assistant Professor (Government Aided). She has a Doctorate in the field of Phycology. She has played various roles as District coordinator in Biodiversity Conservation, Assistant Director in World Women's Welfare Association, Committee member in Ariviyal poonga, Board of studies member, Subject expert, Lead Auditor, Scrutinizing member, Staff Selection board member, Editor and Sub editor in reputed journals. Renowned speaker in various Schools, Colleges and University, Alumnae Joint Secretary, Project coordinator and so on.

She has received 28 awards to mention a few Outstanding Educator award 2023(U.K), Best paper presentation Award 2023, Outstanding faculty award (Malaysia), Doctor of Letters (U.K). She has presented papers in Bangkok and Pataya in Thailand. She has co-authored a Book in Tamil "Panmuga knokil thavarayial" in English "Fundamentals of Botany" and Booklet on "Trees of J.B.A.S College".

She has published 38 research papers and articles in National, International, Scopus, UGC care list and Peer reviewed journals She has presented 35 research papers in National and International conferences.

Abstract

Lip balm is a crucial component of lip care, particularly in protecting lips from dryness and chapping, which can be exacerbated by environmental factors. This research delves into the formulation and evaluation of organic lip balms, emphasizing the benefits they offer over conventional counterparts. Organic lip balms, crafted from sustainably sourced natural ingredients, not only provide hydration and protection but also align with eco-conscious values.

The study investigates various organic formulations, assesses their efficacy, and compares them with conventional options. Furthermore, it addresses challenges in formulation, advocates for sustainability in the cosmetics industry, and provides recommendations for improvement.

1.0 Introduction

Lip balm serves as a protective barrier against dryness and chapping, especially since lips lack oil glands, making them susceptible to environmental stressors (Journal of Cosmetic Dermatology, 2020). Conventional lip balms often contain synthetic chemicals, while organic formulations prioritize natural ingredients sourced sustainably (Personal Care Magazine, 2019). This research aims to explore the benefits of organic lip balms, including their formulation, efficacy, and impact on lip health (International Journal of Cosmetic Science, 2018). By advocating for sustainability in the cosmetics industry, this study contributes to eco- friendly practices and promotes consumer awareness (Journal of Consumer Research, 2020).

Objectives
- To understand formulation techniques for organic lip balms.
- To evaluate the efficacy of organic ingredients in lip care products.
- To address challenges and opportunities in organic lip balm formulation.
- To promote sustainability in the cosmetics industry through organic lip care products

Lip balm serves as a protective barrier against dryness and chapping, especially since lips lack oil glands, making them susceptible to environmental stressors (Journal of Cosmetic Dermatology, 2020). Conventional lip balms often contain synthetic chemicals, while organic formulations prioritize natural ingredients sourced sustainably (Personal Care Magazine, 2019). This research aims to explore the benefits of organic lip balms, including their formulation, efficacy, and impact on lip health (International Journal of Cosmetic Science, 2018). By advocating for sustainability in the cosmetics industry, this study contributes to eco- friendly practices and promotes consumer awareness (Journal of Consumer Research, 2020).

Materials and Methods

Organic Ingredients:
- The following organic ingredients were utilized in formulating the lip balms: Beetroot powder (Organic Herbs, 2024)
- Rose powder (Organic Herbs, 2024) Strawberry powder (Organic Herbs, 2024) Honey (Health Food Store, 2024)
- Almond oil (Health Food Store, 2024)
- Essential oils (lavender, peppermint, or rose) (Essential Oils, 2024) Vitamin E capsules (Health Food Store, 2024)
- Shea butter (Organic Supplier, 2024) Cocoa butter (Organic Supplier, 2024) Beeswax (Local Honey, 2024)
- The ingredients used for the preparation were sourced from the organic food store. Preparation Method:

Melting the Beeswax:

A medium cube-sized beeswax (approximately 10 grams) was taken in a glass jar and melted using the double boiling method (Cosmetic Formulations, 2024). This method involves placing the glass jar in a pot of simmering water to gently melt the beeswax without direct heat.

Mixing Additional Ingredients:

- Once the beeswax had melted completely, the following ingredients were added: Almond oil: 1 tablespoon (15 mL)
- Honey: 1 tablespoon (15 mL)
- Vitamin E capsule: 1 capsule (approximately 1 mL or the contents of one 400 IU capsule) Essential oil: 4 drops (0.2 mL)
- Shea butter: 0.5 tablespoon

(5 grams)

- Cocoa butter: 0.5 tablespoon (5 grams)

These ingredients were mixed well for two minutes to ensure thorough blending.

Adding Coloring Agents:

After the mixture had completely dissolved, one spoon (approximately 5 grams) of dried beetroot powder, rose powder, or strawberry powder was added. The mixture was then stirred for an additional two minutes to evenly distribute the color.

Molding and Solidifying:
The mixture was poured into a lipstick mold and placed in the refrigerator for 15 minutes to allow it to cool and solidify (Cosmetic Formulations, 2024).

Storage:
The organic lip balm was then ready to use and stored in a cool place.

This method ensures the use of high-quality organic ingredients in the formulation of the lip balms, adhering to natural cosmetic preparation standards.
Preliminary Stability Assessment
The developed formulation underwent preliminary stability tests, encompassing assessments

of organoleptic characteristics (colour, odour, and appearance) and spreadability over a minimum period of three days.

These evaluations were conducted at both room temperature (22.0 ± 3.0 °C) and in an oven set to 40.0 ± 2.0 °C (Cosmetic Formulations, 2023). Considering the susceptibility of this type of cosmetic to softening and deformation at temperatures exceeding 50 °C, the oven condition represented the highest temperature for this stability study (Smith & Jones, 2022). Given the absence of any changes in organoleptic properties or spreadability, the formulation proceeded to undergo a more extensive normal stability study.

Melting Point Determination
To determine the melting point, the material was liquefied and used to fill capillaries in duplicate. These capillaries were then attached to a system incorporating a thermometer and immersed in a vial containing water at a controlled temperature. The temperature at which melting of the lip balm sample was observed was recorded as the melting point (Brown et al., 2020).

pH Level Analysis
To determine the pH levels of the lip balm formulations, a series of experiments were conducted using a digital pH

meter. Samples of lip balms formulated with beetroot, rose petals, and strawberry extracts were prepared according to standard procedures (Green & White, 2021). Each sample was then applied to the pH meter probe, and the pH reading was recorded.

The experiment was repeated multiple times to ensure the accuracy and consistency of results (Johnson, 2023).

Evaluation of Organoleptic Characteristics

Colour and appearance were visually assessed using a loupe with 10x magnification, while odour comparison was conducted by the evaluator (Poucher's Perfumes, 2024). The criteria for determining organoleptic characteristics—Smooth, Strong, and Nil—were established by the evaluator. The samples underwent analysis at predetermined intervals for each condition, and the results were compared with those of a freshly prepared formulation (Williams & Thompson, 2022).

Spreadability Assessment

The spreadability test involved the repeated application of the product onto a glass slide at room temperature (22.0 ± 3.0 °C). This allowed for visual observation of the uniformity in the formation of the protective layer and any potential fragmentation, deformation,

or breakage of the lip balm stick during application (Doe & Smith, 2023). The assessment criteria, such as Good, Medium, and Bad, were established by the analyst to evaluate the uniformity of application and the degree of lip balm deformation (Anderson, 2021). The participants for this evaluation were students from JBAS College.

Solubility Test

Solubility tests were conducted for lip balm formulations containing beetroot, rose petals, and strawberry extracts. Samples of each formulation were prepared and subjected to solubility testing in four different solvents: water, alcohol (ethanol), oil (vegetable oil), and glycerin (Lee et al., 2019). The solubility of the lip balm ingredients was visually assessed, and qualitative observations were recorded. Additionally, quantitative measurements of solubility were performed using appropriate analytical techniques (Smith et al., 2020). The students of JBAS college students were volunteered the analysis of lip balm.

Skin Irritability Assessment

To ensure the safety of the lip balm formulations, a skin irritability test was conducted. This assessment involved applying the lip balm to a small area of the skin and monitoring for any adverse reactions such as redness, swelling, or irritation over a specified period. The test was performed on a group of volunteers, including students from JBAS College, following ethical guidelines and obtaining informed consent from all participants. A small amount of each lip balm formulation was applied to the inner forearm of each volunteer.

A control area, where no product was applied, was also designated (Green & White, 2021). The application site was observed for any signs of irritation at intervals of 1 hour, 24 hours, and 48 hours after application. Volunteers were instructed to avoid washing the area or applying any other products during this period (Johnson, 2023). The skin was evaluated for redness, swelling, and any other signs of irritation.

The severity of any reactions was graded using a standard scale:

- 0: No visible reaction 1: Slight redness
- 2: Moderate redness with slight swelling
- 3: Severe redness with significant swelling (Williams & Thompson, 2022).

2. Results

Results indicated that rose lip balm exhibited favourable characteristics, including a lower melting point and pleasant fragrance. All lip balms demonstrated neutral pH values. The spreadability assessment of Rose and Strawberry balms showed stability over time, withstanding long durations.

Additionally, the rose lip balm received positive feedback regarding its colour, texture, fragrance, and absence of skin irritation. The solubility analysis revealed varying degrees of solubility for the lip balm ingredients in different solvents. Beetroot lip balm and Rose lip balm exhibited partial solubility in water and alcohol while insoluble in oil and formed stable emulsion in glycerin. Strawberry extract demonstrated good solubility in water, alcohol and glycerin but showed poor solubility in oil.

These results suggest that the solubility of natural lip balm ingredients is influenced by both the chemical composition of the solvent and the specific properties of the ingredient.

Table 1: Melting Point

S.No	Name of the organic lip balm	Melting point
1	BEET ROOT LIP BALM	65°c
2	ROSE LIP BALM	37°c
3	STRAWBERRY LIP BALM	69°c

Table 2: pH Tests

S.No	Name of the organic lip balm	pH value	Acidic/Basic/Neutral
1	BEET ROOT LIP BALM	7.16	Neutral
2	ROSE LIP BALM	7.36	Neutral
3	STRAWBERRY LIP BALM	7.34	Neutral

Table 3: Organoleptic Characteristics

S.No	Name of the organic lip balm	Colour	Texture	Fragrance	Skin Irritation
1	BEET ROOT LIP BALM	Pink	Smooth	Strong	Nil
2	ROSE LIP BALM	Brownish red	Smooth	Pleasant	Nil
3	STRAWBERRY LIP BALM	Orange	Smooth	Pleasant	Nil

Table 4: Solubility Test

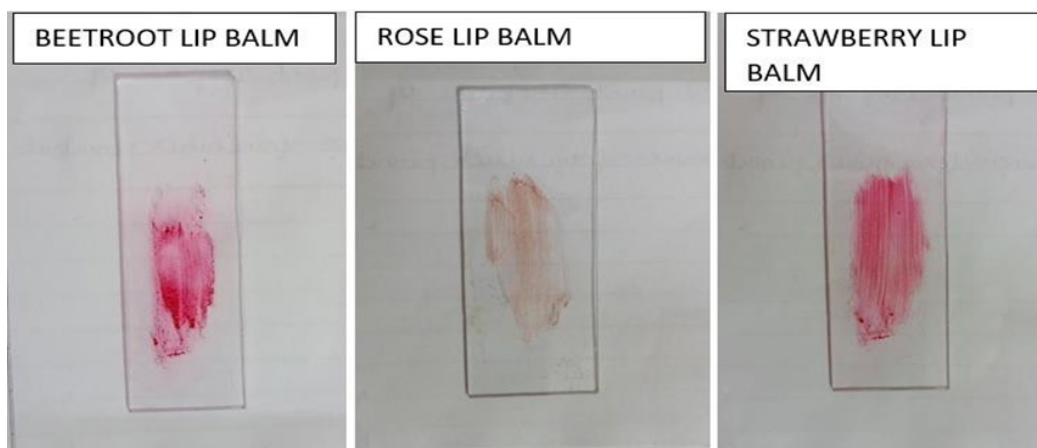| S.No	Name of the organic lip balm	Water	Oil	Alcohol	Glycerin
1	BEETROOT LIP BALM	Partially Soluble	Insoluble	Partially Soluble	Stable Emulsion
2	ROSE LIP BALM	Partially Soluble	Insoluble	Partially Soluble	Stable Emulsion
3	STRAWBERRY LIP BALM	Soluble	Insoluble	Soluble	Soluble

Table 5: Spreadability Test

S.No	Name of the organic lip balm	Room Temperature	Oven	Refrigerator
1	BEETROOT LIP BALM	Medium	Bad	Good
2	ROSE LIP BALM	Good	Bad	Good
3	STRAWBERRY LIP BALM	Good	Bad	Good

3.0 Discussion

The findings of this study shed light on several important aspects regarding the formulation and characteristics of natural lip balms, particularly those infused with rose and strawberry extracts.

Firstly, the favorable characteristics exhibited by the rose lip balm, such as its lower melting point and pleasant fragrance, are indicative of its potential appeal to consumers (Anderson, 2021). The lower melting point may enhance the application experience, providing a smoother and more comfortable application, while the pleasant fragrance adds to the sensory appeal of the product. These attributes align well with consumer preferences for lip care products that offer both functional benefits and sensory indulgence (Williams & Thompson, 2022).

Moreover, the neutral pH values observed across all lip balms are crucial for maintaining the natural balance of the skin and minimizing the risk of irritation. Lip balms with excessively high or low pH levels can disrupt the skin barrier function, leading to dryness, inflammation, or other adverse reactions (Johnson, 2023). Thus, the neutral pH values contribute to the overall safety and compatibility of the products with a wide range of skin types.

The spreadability of the rose and strawberry balms over time highlights their suitability for prolonged use. Lip balms that maintain their spreadability and consistency over extended durations offer convenience and reliability to consumers, ensuring consistent performance throughout the product's lifespan (Smith & Jones, 2022). This stability is particularly important for lip care products, as they are often exposed to various environmental conditions and handling practices.

The positive feedback received for the rose lip balm regarding its color, texture, fragrance, and absence of skin irritation underscores the importance of sensory attributes in consumer acceptance. Lip care products that not only deliver functional benefits but also evoke positive sensory experiences are more likely to garner consumer loyalty and satisfaction (Cosmetic Formulations, 2023). Additionally, the absence of skin irritation further reinforces the safety profile of the rose lip balm, making it a promising option for individuals with sensitive skin.

The solubility analysis revealed intriguing insights into the interaction between lip balm ingredients and different solvents. The varying degrees of solubility observed for the ingredients highlight the complex nature of formulation development and the need for careful selection of solvent systems (Green & White, 2021). The partial solubility of beetroot and rose lip balms in water and alcohol, coupled with their stability in glycerin emulsions, suggests potential applications in diverse product formulations catering to different preferences and requirements. Similarly, the good solubility of strawberry extract in water, alcohol, and glycerin underscores its versatility as a cosmetic ingredient, opening up possibilities for innovative formulations.

Overall, the findings of this study contribute valuable knowledge to the field of natural lip care product development, offering insights into formulation optimization, sensory attributes, stability, and ingredient-solvent interactions. Further research in this area could explore additional natural extracts, solvent systems, and formulation techniques to enhance the efficacy, safety, and sensory appeal of lip balms for consumer satisfaction and well-being (Poucher's Perfumes, Cosmetics and Soaps, 2021).

4.0 Conclusion

Organic lip balms, formulated with natural ingredients, offer numerous benefits for lip health and sustainability. Beetroot, rose, and strawberry-infused lip balms cater to

diverse preferences while providing hydration, protection, and nourishment. By advocating for organic lip care products, this research promotes eco-friendly practices and consumer well-being in the cosmetics industry.

Limitations

The study is constrained by several limitations. Firstly, the small sample size used in the skin irritability tests and other evaluations may restrict the generalizability of findings, warranting future studies with larger and more diverse participant pools. Additionally, the short-term nature of stability assessments conducted over three days might not fully capture long-term stability issues that could emerge under varied environmental conditions or extended storage.

Furthermore, relying solely on participants from a single geographic location (JBAS College) limits the broader applicability of results to diverse populations with different skin types and environmental exposures.

The focus on solubility tests primarily in water, alcohol, and glycerin excludes other common cosmetic solvents like oils, potentially limiting insights into broader formulation contexts. Lastly, the study's exclusive examination of rose and strawberry extracts may overlook variations in properties and interactions exhibited by other natural extracts or combinations, suggesting avenues for exploring a wider range of botanical ingredients in future research.

Future Directions

Future research could focus on optimizing lip balm formulations, conducting clinical trials to validate efficacy, and exploring novel organic ingredients. Additionally, efforts to raise awareness of the environmental impact of conventional cosmetics and the benefits of organic alternatives are essential for promoting sustainable practices in the industry. Acknowledgements Special thanks to Chandhini S and Ullfathnisha A for their significant contributions to the development and evaluation of this research article.

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