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Knowledge, Attitude, and Practice of Environmental Sustainability Measures Among Physical Therapists in Healthcare

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Abstract

Background: Climate change, global warming, and environmental degradation are major threats to 21st-century health and civilization. Addressing these issues among healthcare workers is vital for achieving the Sustainable Development Goals (SDGs).

Objectives: This study explored the knowledge, attitudes, and practices of environmental sustainability in healthcare among physical therapists in Saudi Arabia, highlighting the importance of addressing climate change and environmental challenges to support 21st-century health and achieve the SDGs.

Methods: A cross-sectional study was conducted in Riyadh from 2023 to 2024, involving licensed physical therapists. A 22-item questionnaire was distributed using Google Forms and Qualtrics. Participants were required to be Saudi citizens, licensed by the Saudi Commission for Health Specialties (SCFHS), and to complete the entire questionnaire.

Results: Out of 354 physical therapists, 178 were males (50.3%). The most common subspecialty was orthopedics (24.3%), and the most common work setting was government hospitals/clinics (42.1%). Only 29.9% of participants were familiar with environmental sustainability in healthcare, highlighting a significant knowledge gap, and 21.8% were aware of all SDGs. Many agreed that physical therapy professionals should advocate for environmental sustainability (43.2%). Over a third practiced reducing non-biodegradable materials (34.2%). Females had more knowledge about the three Rs of waste management (86.9% vs. 74.7%, P = 0.004).

Conclusions: Knowledge of environmental sustainability in healthcare is moderate to poor among physical therapists in Saudi Arabia, highlighting a critical gap in awareness. These findings underscore the need for targeted educational interventions and policy reforms to integrate sustainability into healthcare practices in Saudi Arabia. However, the study's cross-sectional design, reliance on self-reported data, and focus on a single professional group may limit generalizability and introduce bias, warranting cautious interpretation and further investigation.

Keywords: Knowledge, Attitude, Practice, Environment, Sustainability, Physical Therapy

1. Background

The healthcare sector is a significant contributor to carbon emissions and waste, making it imperative for healthcare professionals to adopt sustainable practices. Healthcare-associated hazardous and toxic waste, carbon emissions, plastic waste, and other detrimental byproducts negatively impact health and well-being (1, 2). Healthcare professionals can play a crucial role in alleviating the risks of climate and environmental changes (3). The World Health Organization (WHO) has emphasized four pressing measures for healthcare: (1) Training healthcare professionals about climate change, (2) prioritizing measures to mitigate climate change in healthcare, (3) empowering healthcare professionals to advocate for climate change, and (4) safeguarding the health and well-being of future generations (4).

Physical therapists, as key healthcare providers, are uniquely positioned to influence sustainable practices through patient education, resource conservation, and

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advocacy for environmentally friendly policies (5-9). This can be argued by utilizing the four tenets of sustainable healthcare (10), i.e., (1) prevention – physical therapists lead in the promotion of health and disease prevention by interventions like fall prevention, which can significantly minimize new cases of fractures and related resource- and cost-intensive management (11), (2) patient self-care – osteoarthritis education by physical therapists can enable patients to self-manage and be compliant (12), leading to improved health, reduced visits to hospitals, and treatments, (3) lean service delivery – with effective utilization of the competence of physical therapists across the spectrum of healthcare, improved outcomes, minimal pharmaceutical use, and fewer resource consumption can be promoted (13), and (4) low carbon alternatives – non-pharmacological pain management by physical therapists can substantially reduce carbon emissions from healthcare (14), and exercise programs can minimize the requirement for surgery (15).

To the best of our knowledge, only a few studies have focused on healthcare professionals' knowledge and attitudes and determined their role in actively participating in environmental sustainability by implementing it in their healthcare practices (16-18). Therefore, it is important to gain insight into the knowledge, attitudes, and practices of Saudi Arabia's healthcare professionals, specifically among physical therapists, regarding environmental sustainability. This is because physical therapists could offer sustainable development at various levels, for instance, by encouraging patients to modify their behavior and lifestyle habits to preserve both their health and well-being and the environment. Moreover, physical therapy advocates non-pharmacological therapeutics and is a resource-conserving option, thereby substantially helping to reduce healthcare's environmental footprint. We hence believe that it is paramount to gather dynamics of sustainable development perspectives and approaches among physical therapists in the healthcare setting in our population.

2. Objectives

The findings of this study will be helpful in two ways: (1) Mapping the current state of environmental sustainability measures in Saudi Arabia, and (2) outlining context-driven recommendations for healthcare professionals concerning education, research, and practice. The present original research study was conducted using a survey questionnaire to explore the knowledge, attitudes, and practices of environmental sustainability in healthcare among licensed and practicing physical therapists in Saudi Arabia.

3. Methods

3.1. Ethical Approval and Considerations

Before the initiation of the study, ethical approval was obtained from the Ethical Review Committee of the Saudi Ministry of Health (MOH), Riyadh, Saudi Arabia (Reference # 23-82-E). Informed consent was obtained from all eligible and willing participants. The identity of the participants was protected by removing identifiable information from the research data, including data storage in a password-protected computer.

3.2. Study Design and Setting

This observational cross-sectional questionnaire-based research study was conducted in Riyadh, Kingdom of Saudi Arabia, between 2023 and 2024 to determine the knowledge, attitudes, and practices regarding environmental sustainability among physical therapists in Saudi Arabia. The study enrolled licensed physical therapists working in the country. Participants were selected using a non-probability convenience sampling technique.

3.3. Participants

A total of 354 physical therapists (70.8% response rate) participated in the study. The questionnaire was sent to 500 therapists across the Kingdom via email and WhatsApp and was also distributed through the Qualtrics platform in collaboration with the Saudi Commission for Health Specialties (SCFHS) to maximize reach.

3.4. Eligibility Criteria

The study included participants who were licensed physical therapists registered with the SCFHS, Saudi citizens, provided informed consent, and completed the full questionnaire.

3.5. Study Questionnaire

The questionnaire was designed by experts in physical therapy and environmental sustainability to align with Saudi Arabia's 2030 vision. It was based on a literature review and expert consultations to ensure

relevance and clarity. After pilot testing with a small group of physical therapists, adjustments were made. The final version included 22 close-ended questions across four sections.

3.5.1. Section 1: General Information

This section gathered basic demographic information from participants, including their gender, subspecialty, and current work setting.

3.5.2. Section 2: Knowledge of Environmental Sustainability

This section assessed physical therapists' knowledge of environmental sustainability in healthcare through eight key questions. It explored their awareness of health-related sustainability, the Saudi Green Initiative, and the sustainable development goals (SDGs). It also examined whether their facilities have sustainability systems, how they apply sustainable practices in their work, and their understanding of environmental degradation, sustainable healthcare, and the "three Rs" (reduce, reuse, recycle).

3.5.3. Section 3: Attitudes Towards Environmental Sustainability

This section evaluated physical therapists' attitudes toward environmental sustainability in healthcare through six questions. It explored their views on their role in promoting sustainability, the inclusion of therapist well-being in the SDGs, the benefits of recycling, personal responsibility for environmental care, accountability for implementing sustainability, and willingness to financially support environmental initiatives.

3.5.4. Section 4: Practices of Environmental Sustainability

This section assessed the environmental sustainability practices of physical therapists through five questions. It examined whether the healthcare sector integrates sustainability, how therapists apply waste management (reduce, reuse, recycle), their disposal of waste, energy and water conservation habits, and management of biomedical waste.

3.5.5. Scoring and Analysis of Knowledge, Attitude, and Practice Domains

To clarify, the knowledge, attitude, and practice (KAP) domains were analyzed descriptively using frequency and percentage distributions: Knowledge was measured based on 8 categorical questions. Responses such as "Yes/No", or multiple-choice selections were tabulated to reflect awareness levels. Attitude was assessed through 6 questions using a Likert scale or agreement scale (e.g., strongly agree to strongly disagree). Percentages of responses in each category were calculated. Practice was gauged via 5 self-reported questions on actual behaviors. The percentage of participants performing specific sustainable actions was calculated. We did not compute a composite or cumulative score across domains; instead, we presented each KAP component independently to explore actual trends in knowledge, perceptions, and behaviors.

3.6. Outcome Measures

The key outcome measures of this research study were:

1. Determining the extent of knowledge of environmental sustainability in the field of healthcare among physical therapists.

2. Assessing the attitude of physical therapists towards environmental sustainability in healthcare.

3. Evaluating the environmental sustainability practice in healthcare among physical therapists.

3.7. Definitions of Key Term

1. Climate change: Lasting change in temperature and weather because of human activities (19).

2. Carbon emission: Release of carbon dioxide into the atmosphere.

3. Carbon footprint: Total amount of carbon emissions accumulated over a period of time from a product (20).

4. Environmental degradation: The deterioration of air, water, and soil, leading to degradation of ecosystems and biodiversity loss (21).

5. Environmental sustainability: The responsible use of resources and protection of our natural environment for future generations (22).

6. The SDGs: Set of 17 interlinked goals for fair and sustainable health for everyone at a global level (23).

7. Saudi green initiative: To promote sustainability awareness in the Kingdom of Saudi Arabia (24).

3.8. Data Collection and Management

Data were gathered via the Google Forms and Qualtrics survey platforms, synchronized with a

password-protected Gmail account. Whenever a participant submitted a response, an automatic email notification was generated, and the response was stored in an Excel spreadsheet. Subsequently, the data from the Excel spreadsheet were imported into the Statistical Package for Social Sciences (SPSS) software for analysis.

3.9. Statistical Analyses

Data entry and management were carried out using Microsoft Excel Office 365, while data analysis was performed using the SPSS for Windows, version 24.0 (IBM Corp., Armonk, N.Y., USA). Qualitative variables were expressed as numbers and percentages. Gender- and work environment-based differences in KAP of environmental sustainability in healthcare among physical therapists were also explored using the chi-square or Fisher's exact test as appropriate.

4. Results

4.1. Demographic Characteristics of Study Participants

A total of 354 physical therapists consented and participated in the study, with a nearly even gender distribution: One hundred and seventy-six females (49.7%) and 178 males (50.3%). The most common subspecialty was orthopedics (n = 86, 24.3%), followed by sports injury (n = 71, 20.1%), neurology (n = 69, 19.5%), and pediatrics (n = 65, 18.4%). Table 1 presents the demographic features of the participating physical therapists.

4.2. Knowledge of Environmental Sustainability in Healthcare Among Physical Therapists

Notably, only 29.9% of participants had heard about the concept of environmental sustainability in healthcare, and 21.8% were aware of all 17 SDGs. A large number of physical therapists were aware of the Saudi Green Initiative (n = 323, 91.2%). Overall, 82.8% (n = 293) of physical therapists consider environmental sustainability in their healthcare practices when using or purchasing equipment, resources, consumables, and devices. Table 2 summarizes the knowledge of environmental sustainability among participants.

4.3. Attitude Towards Environmental Sustainability in Healthcare Among Physical Therapists

The majority agreed that physical therapy professionals have a role in advocating for and implementing environmental sustainability in the healthcare field (n = 153, 43.2%). The idea that recycling programs positively impact the environment was supported by 344 (97.2%) of the physical therapists. A significant number (85.6%, n = 303) recognized their own responsibility towards environmental sustainability. Table 3 illustrates the attitude of physical therapists towards environmental sustainability.

4.4. Practice of Environmental Sustainability in Healthcare Among Physical Therapists

Table 4 represents the implementation of environmental sustainability practices specifically by physical therapists within their professional activities. While some questions were framed within the broader context of healthcare sector practices to provide relevant background, the results presented here focus on the direct actions taken by physical therapists. For instance, 67.1% (n = 192) of the physical therapists reported practicing the three Rs of waste management (reduce, reuse, and recycle) within their professional environment. Additionally, 34.2% (n = 121) confirmed efforts to reduce the use of non-biodegradable materials, and 73.4% (n = 260) indicated proper disposal of biomedical waste as part of their practice. These findings suggest that while a significant portion of physical therapists are engaged in sustainable practices, there is room for improvement, particularly in reducing non-biodegradable waste and enhancing recycling efforts.

4.5. Gender and Work Setting Based Differences in Knowledge, Attitude, and Practice of Environmental Sustainability in Healthcare Among Physical Therapists

The findings highlight the differences in KAP among physical therapists regarding environmental sustainability in healthcare based on gender and work environment. Females were statistically more likely to have knowledge about sustainability in healthcare settings (35.8% versus 24.2%, P = 0.017) and the three Rs of waste management (86.9% versus 74.7%, P = 0.004). Males, on the other hand, had greater awareness of the Saudi Green Initiative (95.5% versus 86.9%, P = 0.004). Females also demonstrated a more positive attitude towards environmental sustainability compared to males in terms of the positive effect of recycling programs (100.0% versus 94.4%, P = 0.002) and personal responsibility towards sustainability (96.6% versus 74.7%, P < 0.0001).

Work setting also played a significant role in shaping knowledge and practices. Participants in academic

Table 1. Demographic Characteristics of the Physical Therapists (N = 354)

Demographic Variables	N (%)
Gender	
Female	176 (49.7)
Male	178 (50.3)
Subspecialty	
Orthopedic	86 (24.3)
Pediatric	65 (18.4)
Neurology	69 (19.5)
Women health	15 (4.2)
Geriatric	7 (2.0)
Cardiopulmonary rehabilitation	15 (4.2)
Vestibular rehabilitation	12 (3.4)
Sports injury	71 (20.1)
Wound care	0 (0.0)
General	14 (4.0)
Current work environment	
Academic	38 (10.7)
Daycare	18 (5.1)
Home healthcare	13 (3.7)
Government hospital/clinic	149 (42.1)
Private hospital/clinic	117 (33.1)
Tertiary care hospital	19 (5.4)

settings were more likely to be aware of sustainability in healthcare (52.6% versus 29.0% versus 27.0%, P = 0.005). Hospital-based therapists showed higher self-reported knowledge of environmental degradation, sustainability, and sustainable healthcare (0.0% versus 0.0% versus 11.2%, P = 0.015). Conversely, more participants in academic settings were familiar with the three Rs of waste management (100.0% versus 93.5% versus 76.8%, P = 0.001). These findings suggest that work environment and infrastructure significantly influence the adoption of sustainable practices, with academic and hospital settings providing more opportunities for engagement in environmental sustainability initiatives.

5. Discussion

Like all countries, Saudi Arabia is also not immune to the impact of climate change and environmental degradation (25). Additionally, it is no longer an unknown phenomenon that the healthcare industry contributes significantly to environmental issues. According to a 2019 report by 'Health Care Without Harm,' the global healthcare industry's carbon footprint equals 4.4% of worldwide net emissions, identifying it as a critical instigator of climate change (26). As part of the system, healthcare professionals must advocate and practice to contribute to global efforts toward mitigating climate change and environmental degradation (3).

Findings from our study suggest that knowledge regarding environmental sustainability in healthcare among physical therapists is generally moderate to poor in Saudi Arabia. This result aligns with earlier research studies on healthcare professionals (16, 27). We found a lack of general awareness regarding the Kingdom's efforts toward achieving the Sustainable Development Plan 2030 and SDGs. Only a few participants reported having an integrated system for environmental sustainability in their setting. A lack of knowledge could have likely contributed to the substandard implementation of environment-friendly practices despite an understanding of the three Rs of waste management (reduce, reuse, and recycle). Research has documented that the absence of policies and frameworks, financial constraints, and time are supposedly the factors leading to suboptimal implementation of environmental sustainability in the healthcare sector (16).

Interestingly, the majority of the participants demonstrated a positive attitude towards the adoption

Table 2. Knowledge of Environmental Sustainability in Health Care Among Physical Therapists (N = 354)

Questions	N (%)
Have you ever heard about sustainability in the field of health?	
No	248 (70.1)
Yes	106 (29.9)
Are you aware of the goals outlined in the sustainable development plan for 2030 and the efforts of the kingdom to achieve them?	
No	200 (56.5)
Yes	154 (43.5)
Which of the seventeen SDGs do you know?	
No poverty (SDG 1)	63 (17.8)
Zero hunger (SDG 2)	31 (8.8)
Good health and well-being (SDG 3)	137 (38.7)
Quality education (SDG 4)	149 (42.1)
Gender equality (SDG 5)	120 (33.9)
Clean water and sanitation (SDG 6)	107 (30.2)
Affordable and clean energy (SDG 7)	48 (13.6)
Decent work and economic growth (SDG 8)	127 (35.9)
Industry, innovation and infrastructure (SDG 9)	149 (42.1)
Reduced inequalities (SDG 10)	46 (13.0)
Sustainable cities and communities (SDG 11)	120 (33.9)
Responsible consumption and production (SDG 12)	60 (16.9)
Climate action (SDG 13)	112 (31.6)
Life below water (SDG 14)	84 (23.7)
Life on land (SDG 15)	97 (27.4)
Peace, justice, and strong institutions (SDG 16)	86 (24.3)
Partnerships for the goals (SDG 17)	88 (24.9)
All of the above	77 (21.8)
None of the above	53 (15.0)
Do you know about the Saudi Green Initiative?	
No, I have not heard of it before.	31 (8.8)
Yes, I have heard of it before.	323 (91.2)
Does your facility have an integrated system to maintain sustainability?	
No	254 (71.8)
Yes	100 (28.2)
In your practice as a physiotherapy specialist, do you consider environmental sustainability when using/purchasing equipment, resources, consumables, and/or devices?	
No	61 (17.2)
Yes	293 (82.8)
Describe your knowledge about: Environmental degradation, environmental sustainability, and sustainable healthcare?	
I don't know.	25 (7.1)
My knowledge is limited.	191 (54.0)
My knowledge is moderate.	106 (29.9)
I know them well.	32 (9.0)
Are you familiar with the three Rs of waste management? Reduce, reuse, and recycle?	
No	68 (19.2)
Yes	286 (80.8)

Abbreviation: SDG, sustainable development goal.

of environmental sustainability practices in the healthcare setting. They understood the importance and impact of recycling programs on the environment. They realized that it is a shared responsibility of the government (MOH), healthcare professionals, community leaders, and individuals to take care of the environment in the healthcare system. This agrees with an earlier research study (16). However, the agreement

Table 3. Environmental Sustainability Attitude in Health Care Practices Among Physical Therapists (N = 354)

Questions	N (%)
Do you believe that physical therapy professionals should play a leadership role in advocating for and implementing environmental sustainability in the health care sector?	
Strongly agree	127 (35.9%)
Agree	153 (43.2%)
Neutral	65 (18.4%)
Disagree	9 (2.5%)
Strongly disagree	0 (0.0%)
Do you think that caring for the physical and mental health of physiotherapists should be part of the SDGs?	
No	4/301 (1.7%)
Yes	297/301 (98.7%)
Do you believe that recycling programs have positive impact on the environment?	
No	10 (2.8%)
Yes	344 (97.2%)
Do you realize that one of your responsibilities is to take care of the environment in the health care sector?	
No	51 (14.4%)
Yes	303 (85.6%)
Who should be responsible for caring for environmental and implementing sustainability in the health care sector?	
Government (ministry of health)	64 (18.1%)
Health care professionals	26 (7.3%)
Leader in communities (consultants, presidents etc.)	17 (4.8%)
Individuals (patients)	4 (1.1%)
All the above	292 (82.5%)
None of the above	0 (0.0%)
I am willing to contribute a little of my income to the environment.	
No	179 (50.6%)
Yes	175 (49.4%)

Abbreviation: SDG, sustainable development goal.

towards the leadership role of physical therapists in advocating and implementing environmental sustainability in the healthcare sector met with a moderate response.

We also believe that the positive attitude among physical therapists must have been impacted by social media presence, besides personal motivation. Social media actively promotes the concept of global warming, climate change, and the degradation of our planet Earth. Only a few healthcare organizations were actively taking into account environmental sustainability in healthcare practices, according to participants. A lack of a conducive environment and exposure in the healthcare ecosystem to nurture such practices could be one of the reasons. This could also be why we witnessed a low number of participants applying the three Rs (reduce, reuse, and recycle) in their clinical practices and ensuring the reduction of non-biodegradable materials.

A systematic review by McGain and Naylor identified several themes for research, policy, and practice in hospitals for environmental sustainability: Design of a hospital, consumption of energy and water, procurement of goods, toxic and hazardous waste, travel, and the psychology and behavior of healthcare professionals. The study also mentioned that countries like the United Kingdom are heavily investing in determining the environmental impact of hospitals (28). Notably, many of the participants in our study were proactive in turning off electrical devices and taps when not in use to preserve energy. They were able to manage personal disposal of biomedical waste.

A recent qualitative study from Kazakhstan on health sciences students communicated that personal motivation (beliefs and ethics) is an important determinant for healthcare professionals to select sustainable healthcare practices (29). Another interesting finding we observed was the effect of gender

Table 4. Practice of Environmental Sustainability in Health Care Among Physical Therapists (N = 354)

Questions	N (%)
Is the health care sector currently taking environmental sustainability into consideration in health care practices?	
Strongly agree	48 (13.6)
Agree	105 (29.7)
Neutral	157 (44.4)
Disagree	41 (11.6)
Strongly disagree	3 (0.8)
Do you apply/practice the three Rs of waste management? Reduce, reuse, and recycle?	
No	94/286 (32.9)
Yes	192/286 (67.1)
Do you take any measures to dispose of waste in an environmentally friendly manner?	
I actively reduce the use of non-biodegradable materials.	121 (34.2)
I consider myself when purchasing/using equipment and resources.	113 (31.9)
I consider recycling when purchasing/using equipment and resources.	106 (29.9)
I consider using biodegradable materials.	60 (16.9)
Do you always turn off electrical devices or water taps when not in use to save energy and water resources?	
No	20 (5.6)
Yes	334 (94.9)
Do you currently manage your personal disposal of biomedical waste (hazardous or special) such as gloves, masks, gowns, needles, wipes, cotton, tape strips, sanitizers, soaps, gel, etc.?	
No, I don't know how to dispose of it.	94 (26.6)
Yes, I can manage it.	260 (73.4)

and work setting on KAP of environmental sustainability in healthcare. This highlights how gender differences in exposure and work infrastructure could effectively influence personal motivation and implementation towards environmental health.

From our findings, we can deduce that poor knowledge among healthcare professionals and the absence of implementation of planetary health practices could be key obstacles to the penetration of environmental sustainability in healthcare settings. This has been confirmed previously in a study from South Africa by Lister et al. (16). This provides evidence that educating healthcare professionals in Saudi Arabia is a key strategy for achieving and accelerating the Kingdom's Sustainable Development Plans for 2030 and the Saudi Green Initiative. Furthermore, the apparent need for environmental sustainability implementation in healthcare policies calls for the introduction of immediate and persistent measures from higher hierarchy levels. Saudi Arabia stands to benefit from aligning with global practices, including the integration of environmental health awareness, education, and sustainable healthcare practices into its healthcare system (6, 30).

5.1. Study Strengths

The main strength of our study is its relevance to the emerging topic of environmental sustainability, which

is a relatively underexplored area in the healthcare setting, especially in Saudi Arabia. In addition, the study offers insight into the KAP of physical therapists towards environmental sustainability, which can bring about policy reforms and promote sustainability measures via awareness programs in healthcare settings. Moreover, this study employed a clear and reproducible survey method that can be reutilized and extended to conduct a large-scale research study. This will surely contribute to the growing pool of research in the field of environmental sustainability in healthcare settings.

5.2. Limitations

It is important to acknowledge that the present study was not devoid of limitations, and therefore, cautious interpretation of research findings is highly advised. First, a questionnaire-based cross-sectional observational study was conducted with a small sample size of 354 respondents out of over 500 physical therapists to whom the questionnaire was sent. This limited participation may introduce non-response bias and affect the generalizability of our study findings. One possible reason for the small sample size of physical therapists could be the high workload and responsibilities, especially for those working in hospital settings.

Second, the study specifically targeted physical therapists; therefore, our findings cannot be extended beyond this group of healthcare professionals due to the diverse nature of work and responsibilities. Third, the small sample size was further highlighted by sub-cohorts of physical therapists working in different settings (academic, day-care/home healthcare, and hospital). This also limits the relevance of the findings in a broader context to this sub-cohort of physical therapists.

Fourth, we used a self-reporting survey questionnaire, which is subject to reporting bias, and therefore, some of the responses might not reflect the actual representation of the respondents. Additionally, results might have been affected by selection bias. This is because physical therapists who support the cause of environmental sustainability might have been, even negligibly, psychologically influenced to participate in the study disproportionately.

Finally, the study did not engage with psychometrics experts to test the reliability and validity of the survey instrument. As such, the wording of some questions and the overall effectiveness of the survey in accurately measuring knowledge and practices related to environmental sustainability may be compromised.

5.3. Recommendations

Based on the above research limitations, we underline the following recommendations for researchers to consider:

Future research should engage with psychometrics experts to refine the survey instrument. This includes improving the wording of questions and conducting reliability and validity testing to ensure the survey effectively measures the intended constructs.

Hospitals and healthcare organizations should incorporate environmental sustainability into their training programs, including both initial education and ongoing professional development. This will help enhance the understanding and application of sustainable practices among healthcare professionals.

Besides education, there should be a focus on developing and implementing policies that encourage healthcare practices aimed at mitigating climate change. These policies should include preventive measures and sustainable practices tailored to the specific needs and context of the healthcare sector.

Given Saudi Arabia's unique environmental challenges, future research should aim to generate context-specific evidence on the impact of climate change and sustainability practices in the region. This will help in understanding local dynamics and developing targeted strategies.

Finally, further collaborative research is required to explore the national dynamics of KAP of healthcare professionals regarding environmental sustainability to offer context-driven recommendations. Conducting further in-depth multivariate analyses (e.g., logistic regression) is recommended to explore the independent effects of sociodemographic variables, which is not explicitly mentioned.

5.4. Conclusions

To conclude, the findings of the present study revealed that knowledge regarding environmental sustainability in healthcare is moderate to poor among physical therapists in Saudi Arabia. However, a positive attitude and the practice of measures, on both individual and organizational levels, were also witnessed. It is a suitable time to make a concerted

effort to build a teaching agenda related to planetary health, climate change, and environmental sustainability to produce a cadre of healthcare workforce proficient in environmental sustainability practices.

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Footnotes

Authors' Contribution: Conceptualization: A. A.; Methodology: A. A. and A. K.; Software: A. A. and A. K.; Validation: A. A. and A. K.; Formal analysis: A. A. and A. K.; Investigation: A. A. and A. K.; Resources: A. A. and A. K.; Data curation: A. A.; Writing-original draft preparation: A. A.; Writing-review and editing: A. A. and A. K.; Supervision: A. A.; Project administration: A. A. All authors have read and agreed to the published version of the manuscript.

Conflict of Interests Statement: The authors declare no conflicts of interest.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to restricted by Saudi Ministry of Health (MOH).

Ethical Approval: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of Saudi MOH, Riyadh, Saudi Arabia (Reference # 23-82-E).

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