

A Thematic Review of Hiking Activities and Rehabilitation

Nor Faridah Ahmad Roslan¹, Mohamad Nasaruddin Mahdzir²

¹Department of Rehabilitation Medicine, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Selangor, Malaysia

²Faculty of Economics and Management, Universiti Kebangsaan Malaysia, Bangi Campus, Selangor, Malaysia

¹Corresponding author: nfarz@uitm.edu.my

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Abstract

Hiking trend nowadays is on the rise. With an increasing awareness of the benefits of outdoor activities for physical and mental health, more people are turning to hiking to stay active, reduce stress, and connect with nature. However, there has been a dearth of research into the interplay between hiking and rehabilitation. Articles published in English between 1968 and 2021 that studied the impact of hiking and rehabilitation were searched using the Web of Science (WoS) and Scopus databases. This review used ATLAS.ti 23 to synthesise data from 14 scholarly articles about the effects of hiking and rehabilitation. The reviewers found 85 unique codes to describe these effects and grouped into 10 code groups and four themes: health, job, sport, and other related outcomes. The findings revealed patterns and trends on the effects of hiking activities on rehabilitation. This research contributes to future studies by analysing patterns and trends that may encourage and drive future studies in hiking activities and rehabilitation.

Keywords: hiking, rehabilitation, outdoor, physical therapy

1.0 INTRODUCTION

Over 200 countries and regions have now been affected by Coronavirus Disease 2019 (COVID-19). On March 11, 2020, the World Health Organisation officially labelled it a pandemic (WHO, 2020). Most governments have instituted socially isolating policies like travel quarantine, restrictions on recreational activities, and gathering bans to stem the spread of the virus. People's outlook and routines regarding leisure activities had been drastically altered because of these policies. Following the global COVID-19 outbreak, it was noted that interest in hiking and other outdoor activities surged (Chu et al., 2021). Many people believe that being in hiking can help them feel better physically and emotionally (Lesser et al., 2020).

Hiking refers to any long-distance uphill or downhill walking in the great outdoors. Hiking is rated as moderate to vigorous activity with estimated 6 METs as per Compendium of physical activity (Ainsworth et al., 2011). Hiking is considered accessible due to the limited skills and equipment required, as well as the low cost. Hiking is one of the few activities that allows patients to simultaneously meet physical activity recommendations and obtain the potential health benefits of spending time in natural settings (Mitten et al., 2016). Physician can do a lot to improve their patients' long-term wellbeing by recommending preventative and restorative physical activities like hiking. Unfortunately, hiking is not the preferences prescribed activities for those with health conditions due to multi-factors barriers.

The term rehabilitation refers to a set of interventions intended to optimise functioning and reduce disability in individuals with health conditions in interaction with their environment. (WHO, 2023). In order to achieve 3rd Sustainable Developmental Goal (SDG), ensuring healthy lives and promote well-being for all at all ages, rehabilitation play important role in universal health coverage. Rehabilitation enables people to engage with social activities as one part of participation component in the International Classification of Functioning, Disability and Health (ICF) framework and hiking should be considered as recommendation activities. People who have more of a personal and physical connection to nature are less likely to suffer from state and trait anxiety. Recent research has shown that people whose lives include at least 120 minutes of nature exposure per week are healthier and happier than those whose lives lack such exposure (Lesser et al., 2020; White et al., 2019). However, few studies describe the circumstances and causes of health, job, and nature-related affects, despite the widespread popularity of hiking and the high number of hiking-related issues. While many issues

have been addressed in the literature to date, there has yet to be a comprehensive review article dedicated to hiking and rehabilitation. Because of this, the study's primary objective is to respond to issues raised in hiking and rehabilitation literature over the past five (5) decades. Thus, the following research question is formulated. **What are the most common concerns about hiking and rehabilitation that have been raised in publications from 1968 to 2022?**

2.0 METHODOLOGY

As introduced by Zairul (2022), this paper made use of ATLAS.ti 23, a popular and powerful piece of software for doing just that. Braun and Clarke (2013) define thematic analysis as "the method of discovering patterns and developing themes by reading widely on a subject". To further comprehend the hiking publication pattern that aided in rehabilitation, it was necessary to determine the pattern and develop a category. The Web of Science (WoS) and Scopus databases, as well as a subject search, were used to locate and retrieve articles from scholarly journals that covered significant developments in the field of hiking and rehabilitation between 1968 and 2021. The WoS and Scopus databases were selected due to their comprehensiveness and superior filtering options for scholarly articles (AlEssa & Durugbo, 2021; Oladinrin et al., 2021). Besides being a central repository for most academic work, WoS is favoured over competing search engines due to its superior accuracy. WoS also provides more precise data centralization results and has the most trustworthy download function (Chen et al., 2008; Oladinrin et al., 2021)(Jin et al., 2017; Oladinrin et al., 2021). Scopus, on the other hand, has more than 75 million records across health and science, biology, physics, and the social sciences, as well as 24,600 titles from 5,000 publishers. Scopus is able to generate relatively accurate citation searches and offers a wide variety of analytical tools (AlEssa & Durugbo, 2021).

As a first step, we conducted a literature search to determine the relevance of hiking to the field of rehabilitation. After searching for "hiking" AND "rehabilitation" in the WoS and "hiking" AND "rehabilitation" in Scopus, if available, scholarly articles were culled from both databases. The review establishes criteria for inclusion of academic journal publications in English for quality and consistency with related reviews of hiking and rehabilitation. Review articles don't include things like conference papers, book chapters, reports, etc. A central tenet of systematic review articles is the establishment of inclusion and exclusion criteria. Twenty Scopus articles, eleven WoS articles, and fifteen duplicates were found after the initial search. Due to the scope of this review, only articles published in peer-reviewed journals were considered; 32 articles were eliminated because they provided insufficient evidence, relied on anecdotes, or failed to address the topic of hiking and rehabilitation at all. As a result, only 14 articles remained for evaluation. The articles in this review were searched, screened, and filtered based approach proposed by Mahdzir and Ghani (2022). (**Table 1**).

Table 1. Search strings phase from Web of Science and Scopus databases.

WoS	Search Strings	TITLE-ABS-KEY (hiking AND rehabilitation) AND (LIMIT-TO(DOCTYPE,"ar")) AND (LIMIT-TO(SUBJAREA,"MEDI")) AND (LIMIT-TO(LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE,"j"))		
	Filtering	Searching: 35 articles	Rejected: 27 articles	Accepted: 8 articles
Scopus	Search Strings	(AK=(Hiking AND Rehabilitation) AND LANGUAGE: (English) AND DOCUMENT TYPES: (Article) Refined by: DOCUMENT TYPES: (ARTICLE) AND WEB OF SCIENCE CATEGORIES: (MEDICINE). Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI.		
	Filtering	Searching: 26 articles	Rejected: 20 articles	Accepted: 6 articles
WoS-Scopus	Duplication	Searching: 15 articles	Rejected: 13 articles	Accepted: 2 articles

The articles were imported as primary documents into the ATLAS.ti 23 software, where they were catalogued according to author, issue number, periodical, publisher, volume, and year of publication (**Figure 1**). Therefore, the articles can be analysed not only by the debate trend but also by the year they were published. Based on the capabilities of ATLAS.ti 23, the categorization of the 14 articles was made much more methodical and precise.

In some ways, thematic review resembled the coding methods used in qualitative studies. In the eyes of many, the process reduces information to such a fine grain that the dialectic relationship between reading and writing is lost. ATLAS.ti 23 facilitated thematic review by incorporating the original coding into "themes." The ability to step back from the raw data and ideas of the initial code to the final theme for the purpose of interpretation is a crucial part of thematic assessment. The core of writing a theme review paper is an iterative process of moving between different types of analytical work and different kinds of technological resources. Analytical reflection is a continuous process.

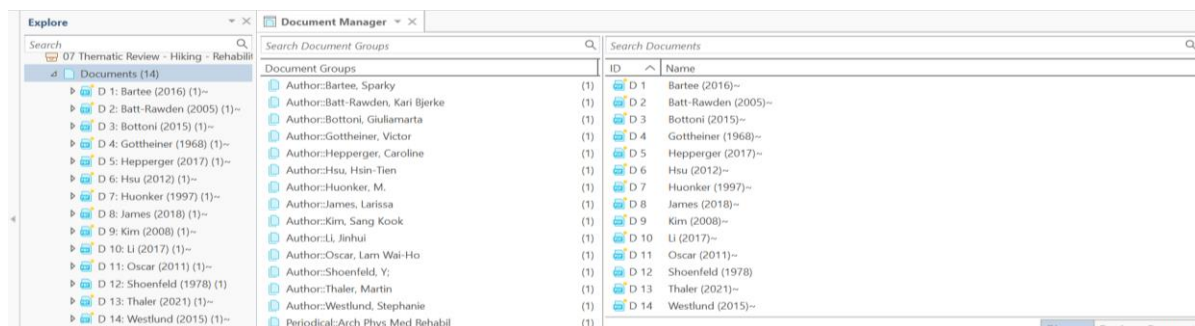


Figure 1: Documents extracted from Mendeley metadata into ATLAS.ti 23.

3.0 RESULTS AND DISCUSSION

Journals And Scholars

There are 14 articles on the topic of hiking and rehabilitation that have been published in scholarly journals. Knee Surgery, Sports Traumatology, and Arthroscopy by Thaler et al. (2021), the most recent publication retrieved in 2021. The American Journal of Cardiology by Gottheiner (1968) was the earliest publication found. As can be seen in **Table 2**, Except for two articles in 2015 and 2017, only one article per year (1968-2021) dealt with hiking and rehabilitation. Journals were categorised in this review as either medical, surgical, sport, or jobs related. There were seven articles published out the 14 leading journals (Arch Physical Medicine Rehabilitation, Baylor University Medical Center Proceedings, Cancer Nursing, Disability and Rehabilitation, International Journal of Rehabilitation Research, Journal of Occupational Rehabilitation, The American Journal of Cardiology). The subsequent three papers published in sport-related journals (Games for Health Journal, Journal of Sport Rehabilitation, Medicine & amp Science in Sports & amp Exercise) also contributed significantly to the field of hiking and rehabilitation. Journal of Orthopaedics, Trauma and Rehabilitation and Knee Surgery, Sports Traumatology, Arthroscopy both had two articles related to surgical cases. Based on the research conducted for this article, it can be concluded that a jobs-related journal is potentially relevant because it has 1 article from Work by Westlund (2015). This demonstrates that research on hiking and rehabilitation are not just prevalent in the medical domains, but also extends across a wide range of disciplines.

Table 2: Articles reviewed based on journals and scholars.

No.	Years	Scholars	1968	1978	1997	2005	2008	2011	2012	2015	2016	2017	2018	2021	Totals
1	Arch Phys Med Rehabil	Shoenfeld, Y;	0	1	0	0	0	0	0	0	0	0	0	0	1
2	Baylor University Medical Center Proceedings	Bartee, Sparky	0	0	0	0	0	0	0	0	1	0	0	0	1
3	Cancer Nursing	Hsu, Hsin-Tien	0	0	0	0	0	0	1	0	0	0	0	0	1
4	Disability and Rehabilitation	James, Larissa	0	0	0	0	0	0	0	0	0	0	1	0	1
5	Games for Health Journal	Li, Jinhui	0	0	0	0	0	0	0	0	0	1	0	0	1
6	International Journal of Rehabilitation Research	Batt-Rawden, Kari Bjerke	0	0	0	1	0	0	0	0	0	0	0	0	1
7	Journal of Occupational Rehabilitation	Kim, Sang Kook	0	0	0	0	1	0	0	0	0	0	0	0	1
8	Journal of Orthopaedics, Trauma and Rehabilitation	Oscar, Lam Wai-Ho	0	0	0	0	0	1	0	0	0	0	0	0	1
9	Journal of Sport Rehabilitation	Bottoni, Giuliamarta	0	0	0	0	0	0	0	1	0	0	0	0	1
10	Knee Surgery, Sports Traumatology, Arthroscopy	Thaler, Martin Hepperger, Caroline	0	0	0	0	0	0	0	0	0	1	0	0	2
11	Medicine & amp Science in Sports & amp Exercise	Huonker, M.	0	0	1	0	0	0	0	0	0	0	0	0	1
12	The American Journal of Cardiology	Gottheiner, Victor	1	0	0	0	0	0	0	0	0	0	0	0	1
13	Work	Westlund, Stephanie	0	0	0	0	0	0	0	1	0	0	0	0	1
	Totals		1	1	1	1	1	1	1	2	1	2	1	1	14

Age Group

In the period between 1968 and 2021, the two age groups most frequently studied in relation to hiking and rehabilitation were Adults (25-64 years) with 6 articles and Seniors (65 years and over) with 5 studies. Two studies involving young adults (15-24 years old) and one involving children provide promising avenues for future research (00-14 years). In **Figure 2**, we can see a breakdown of published works by age range and publication year. Previous research suggests that the degree of difficulty or ease involved in reaching sub-areas within the hiking area is directly related to the physical and strength ability of the human body (Karolina, 2009). There will be a rise in the Adults and Senior population that enjoys outdoor activities, especially in mountainous regions (Vuorio et al., 2003). Factors like age play a role in how quickly one can cover the ground while hiking. Studies in sports medicine and transportation confirm the hypothesis that the elderly move more slowly than younger people (Bohannon & Williams Andrews, 2011). It stands to reason that the greater differences in walking speeds between age groups would be seen when hiking in mountainous landscapes as opposed to walking on even trails. This is according to empirical research conducted by Schamel & Job (2017) and meta-analysis research by Bohannon and Williams Andrews (2011), both point to the complementary roles of age and gender as determinants of hiking participation.

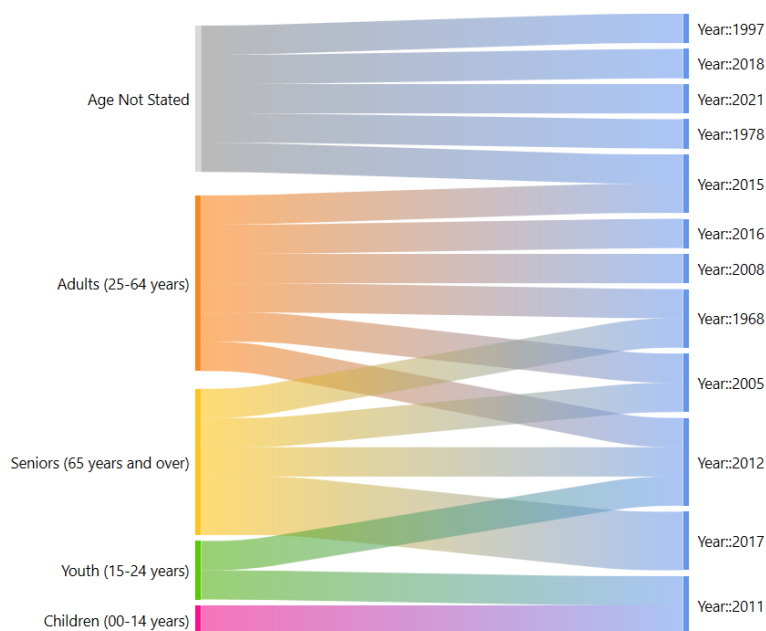


Figure 2: The distribution of articles according to age group and year of publication.

Gender

The pattern was analysed using the year, and gender of respondents (**Table 3**). This review was conducted across 14 articles published between 1968 and 2021, with most participants coming from both male and female respondents (6 articles), followed by male respondents (4 articles), and two articles involving only female respondents. However, approximately two articles did not disclose the gender of their respondents. In the context of hiking and rehabilitation, gendered research interests could be emerged as one of the potential areas to discover.

While the possibility of gender differences in walking practises has been largely ignored (Clifton & Livi, 2005; Kavanagh & Bentley, 2008), understanding whether, how, and why hiking practises differ between men and women would inform activities like hiking. The ecological model of health behaviour typically includes gender as a personal characteristic that may modify, at the individual level, the impact of broader social and environmental influences on behaviours like hiking, and walking (Frank et al., 2008; Sallis et al., 2006). But gender is a more potent social construct than that (Kavanagh & Bentley, 2008; Michau et al., 2015). The body is a code, social relationships are a framework, and resources are distributed differently based on one's gender

(Law, 1999). There are gendered connotations associated with modes of rehabilitation services, exercise equipment, and even "the street" (Law, 1999). It's common knowledge that men are more likely than women to engage in physically demanding recreational pursuits like hiking (Pollard & Wagnild, 2017). In addition, there were 6 articles that drew responses from both male and female respondents, which is something we would like to see more of in the future. It is possible to highlight the 'cross-border' aspect of the gendered in hiking activities as revealed by the analysis of narratives in global contexts characterised by different discursive configurations. This difference between male and female respondents should be on the agenda for future research.

Table 3: A breakdown of the articles by year and gender of respondents

No.	Years	1968	1978	1997	2005	2008	2011	2012	2015	2016	2017	2018	2021	Totals
1	Female	0	0	0	0	0	0	1	1	0	0	0	0	2
2	Male	0	0	1	0	1	0	0	1	1	0	0	0	4
3	Male & Female	1	0	0	1	0	1	0	0	0	2	1	0	6
4	Gender Not Stated	0	1	0	0	0	0	0	0	0	0	0	1	2
	Totals	1	1	1	1	1	1	1	2	1	2	1	1	14

Countries

Between 1968 and 2021, researchers in 12 different countries examined different aspects of the intersection of hiking and rehabilitation. **Table 4** displays an exhaustive list of all the countries involved. Regarding where these studies have been conducted, the most have been done in Austria (3 studies), then in Canada (2 studies) (2 studies). In the United States, Canada, Europe, Hong Kong, Israel, the Netherlands, Norway, Singapore, South Korea, Switzerland, Taiwan, Turkey, and other countries, researchers found only a single study on the topic of hiking and rehabilitation. A total of 41.67 percent of the world's hiking and rehabilitation research has been done in European countries. The next highest percentage was in the Asia-Pacific region (33.33 percent), and finally the North Americas (16.67 percent). Only 8.33 percent of researchers focused on the Middle East. Only Thaler et al. (2021) had done research across multiple countries at once up until this point.

The review's findings also highlight a dearth of research from countries with mountainous terrain, particularly in the Asia-Pacific region. Thus, there is a paucity of research on this link, as evidenced by the 14 articles we reviewed. This poses a potential risk for underreporting and incorrectly identifying the target population in studies of hiking and rehabilitation. Based on the findings of this review, it appears that further, more extensive research is required to produce complete results and validate the findings across countries. Researchers in the future may want to pay special attention to the geographic distribution of mountain areas in countries with large enough sample sizes to draw reliable conclusions. As shown in **Figure 3**, the percentage of mountainous land in each country is shown globally (Egerer et al., 2018).

Table 4: The distribution of articles according to country and year

No.	Years	1968	1978	1997	2005	2008	2011	2012	2015	2016	2017	2018	2021	Totals
1	Austria	0	0	0	0	0	0	0	1	0	1	0	1	3
2	Canada	0	0	0	0	0	0	0	1	0	0	1	0	2
3	Hong Kong	0	0	0	0	0	1	0	0	0	0	0	0	1
4	Israel	1	0	0	0	0	0	0	0	0	0	0	0	1
5	Netherlands	0	0	0	0	0	0	0	0	0	0	0	1	1
6	Norway	0	0	0	1	0	0	0	0	0	0	0	0	1
7	Singapore	0	0	0	0	0	0	0	0	0	1	0	0	1
8	South Korea	0	0	0	0	1	0	0	0	0	0	0	0	1
9	Switzerland	0	0	0	0	0	0	0	0	0	0	0	1	1
10	Taiwan	0	0	0	0	0	0	1	0	0	0	0	0	1
11	Turkey	0	0	0	0	0	0	0	0	0	0	0	1	1
12	United State of America	0	0	0	0	0	0	0	0	1	0	0	0	1
13	Country Not Stated	0	1	1	0	0	0	0	0	0	0	0	0	2
	Totals	1	1	1	1	1	1	1	2	1	2	1	4	17

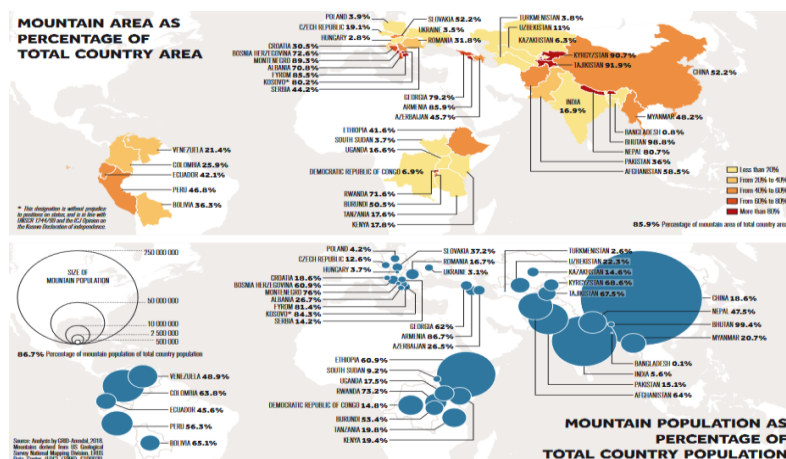


Figure 3: Percent of mountain area per country (Egerer et al., 2018)

Facilities

A thematic analysis of 14 articles found that hiking and rehabilitation research is supported by both the public and private sectors. Each review's findings are summarised in **Figure 4**. The results of these three studies show that higher academic institutions conduct most of the research in this area. This was followed by research institutions (with 2 studies per institution) such as academic medical centres, professional groups, and NGOs. The hospital and medical research institutions have the fewest studies, with only one study completed. At least three of the articles did not describe the research facilities used. Based on the results of this analysis, more research is required to compare the relative efficacy of different non-profit and for-profit healthcare facilities. In order to have the greatest impact on the effect of hiking activities towards the rehabilitation, researchers should consider how they can modify their research perspectives to fit the needs of different facilities. Additionally, public hospital, teaching hospital, and national research centre have shown promise and given their position as the primary medical specialist service provider (M.Nasaruddin et al., 2013), should make greater strides to participate in the study of hiking and rehabilitation.

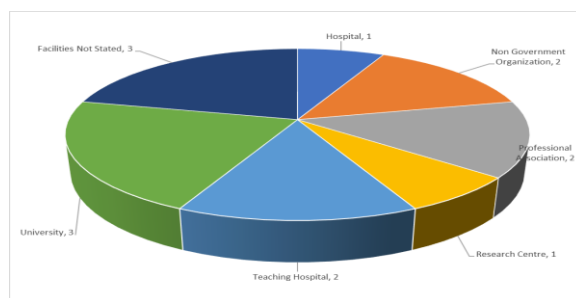


Figure 4: The distribution of articles according to sector

Research Design

The research design was analysed using the year and type of research method used by the researchers (**Table 5**). The 14 articles covering this empirical research published between 1968 and 2021 were reviewed, and the results showed that 11 of them used a quantitative study design, followed by 3 articles that used a qualitative study design. Physical intervention (6 articles), self-administered questionnaires (3 articles), experimental (1 article), and online intervention (1 article) have all been emphasised in the quantitative studies involving respondents in rehabilitation area. While qualitative research (3 articles) on hiking and rehabilitation has used in-depth interviews.

In recent years, quantitative research has become increasingly popular for topics in hiking and rehabilitation. However, no studies have yet adopted a mix-method approach that combines quantitative and qualitative research techniques. This analysis also revealed methodological obstacles and openings that

researchers can exploit to enhance the credibility and efficacy of future research. Cross-cultural research is necessary to disentangle and comprehend the roles of different context across cultures, countries, and each healthcare facility, even though some respondent characteristics appear to be universally endorsed in the literature, as suggested by the majority of the articles reviewed in this study. The quantitative approach, associated with the empirical deductive paradigm, positivism, and large sample sizes, is used to generalise the population and make comparisons across populations (Chipunza & Matsumunyane, 2018).

Future qualitative and mixed-method approaches could potentially validate the findings of the current quantitative study and contribute to the limitations of prior research on hiking and rehabilitation services. Not all members of the community are uniform, which may limit the applicability of the study's findings to settings that are dissimilar to those of the study (Falls & Allen, 2020). The qualitative method relied on arithmetic averaging to counteract a possible single-response or common-method bias (Machovcová et al., 2018). The transferability of the current 14 articles' findings to other populations or countries depends on those contexts and the identified foundational pattern of hiking and rehabilitation services transitions, which can be further investigated. Potential researchers may consider a larger number of respondents in a variety of contexts in order to generalise and increase the likelihood that critical research findings will be adopted as future community, institution, or national health policy initiatives. As a result of the complexity, uncertainty, and interconnectedness of the factors that contribute to, and are affected by, the outcomes of hiking activities, it may be possible for rehabilitation physicians to use a mix-method archiving process to better meet the needs of their patients.

Table 5: Types of research design according to year

No.	Years	1968	1978	1997	2005	2008	2011	2012	2015	2016	2017	2018	2021	Totals
1	Qualitative Study Design	0	0	0	1	0	0	0	1	1	0	0	0	3
2	Quantitative Study Design	1	1	1	0	1	1	1	1	0	2	1	1	11
	Totals	1	1	1	1	1	1	1	2	1	2	1	1	14

Themes

14 research articles have been vetted for accuracy in an iterative review process. Similarities and differences were compared to ensure consistency in the resulting subcategories. This review has identified many studies that have investigated various factors related to hiking activities and rehabilitation. Articles on the topic of hiking and rehabilitation have been categorised according to their research methods. From this literature review, we can conclude that the physical, social, and psychological benefits are the most important outcomes in the field of rehabilitation. The dynamics and social cohesion of hiking may have supportive effects that encourage and sustain adherence and positive attitudes towards physical activity (Eigenschenk et al., 2019), companionship, and a shared experience of wellness (Thomsen et al., 2018). People could be encouraged to hike more if interventions were tailored to their needs and targeted at the most sedentary or at those most motivated to change and that customise-based approaches, such as the physical, social, and psychological supports. As a result of this understanding, a large amount of research has been done on the positive effects of hiking and rehabilitation on human movement, performance, emotions, and wellbeing. All of the aforementioned causes have been linked to the growing significance of hiking activities (James et al., 2018). Therefore, the factors benefit hiking can be broken down into the physical, social, and psychological domains (**Table 6**).

Table 6: The theme according to year

No.	Years	1968	1978	1997	2005	2008	2011	2012	2015	2016	2017	2018	2021	Totals
1	Physical	1	1	1	0	1	1	1	1	1	1	1	1	11
2	Psychological	0	0	0	1	0	0	1	1	0	1	0	0	4
3	Social	0	0	0	1	0	0	0	1	0	1	0	0	3
	Totals	1	1	1	2	1	1	2	3	1	3	1	1	18

Respondent / Informer

Findings from this thematic review show that cardiac patients drew the attention of the most studies (3 articles), followed by young people (2 articles) (**Table 7**). 9 empirical studies were found for each respondent subgroup: those working in the automotive industry; those who had survived cancer; the elderly; uniformed personnel, military veterans; those undergoing orthopaedic surgery; those on long-term medical leave; those with disabilities; and surgeons. All 14 research articles were analysed, and the participants were classified into 3 groups: health-related, job-related, and sport-related respondents or informers. This analysis highlights the paucity of studies that have investigated how hiking affects health, job, and sport in the rehabilitation services.

Hiking in a forest environment led to improvements in immune function and reduced the risk of lifestyle-related diseases. Outdoor physical activity, including hiking, has been found to have positive effects on physical and mental health. Previous research found that spending time in green spaces, such as forests or parks, was associated with reduced levels of stress, anxiety, and depression (Lee et al., 2009). Participating in hiking activities improved physical fitness, mental health, and overall quality of life in older adults. Hiking also can be an effective way to improve mental health outcomes such as depression, anxiety, and stress (Twohig-Bennett & Jones, 2018).

Exposure to nature during outdoor activities such as hiking can help reduce job-related stress and improve job satisfaction. Individuals who engaged in outdoor activities had lower levels of perceived stress, greater job satisfaction, and lower burnout levels than those who did not engage in outdoor activities. The physical activity, including outdoor activities such as hiking, was associated with a reduced risk of work-related musculoskeletal disorders and chronic diseases (McDonald & Salisbury, 2019). Hiking activities also were associated with reduced levels of job strain and burnout in outdoor recreation employees (de-Pedro-Jiménez et al., 2021).

Outdoor activities, including hiking, can help improve sport performance and reduce the risk of sports-related injuries. Hiking activities can lead to improved sport performance and reduced risk of sports-related injuries. The training on natural terrain, such as hiking trails, improved performance in a variety of physical tasks, including balance and jumping ability. In recreational runners, concurrent training for 12 weeks improves body composition and performance variables that can be obtained through running-specific strength and endurance training. (Prieto-González & Sedlacek, 2022). The regular outdoor activities, such as hiking and walking, were associated with improved sport performance and a lower risk of injury in recreational runners (Eigenschenk et al., 2019).

Table 7: The distribution of articles according to group of respondents and year

No.	Years	1968	1978	1997	2005	2008	2011	2012	2015	2016	2017	2018	2021	Totals
1	Automotive Workers	0	0	0	0	1	0	0	0	0	0	0	0	1
2	Cancer Survivors	0	0	0	0	0	0	1	0	0	0	0	0	1
3	Cardiac Patient	1	0	1	0	0	0	0	0	1	0	0	0	3
4	Geriatric Patient	0	0	0	0	0	0	0	0	0	1	0	0	1
5	Jobs with Uniforms	0	0	0	0	0	1	0	0	0	0	0	0	1
6	Military Veteran	0	0	0	0	0	0	0	1	0	0	0	0	1
7	Orthopaedic Patient	0	0	0	0	0	0	0	0	0	1	0	0	1
8	Person with Disabilities	0	0	0	0	0	0	0	0	0	0	1	0	1
9	Prolonged Illness Leave	0	0	0	1	0	0	0	0	0	0	0	0	1
10	Surgeon	0	0	0	0	0	0	0	0	0	0	0	1	1
11	Young Person	0	1	0	0	0	0	0	1	0	0	0	0	2
	Totals	1	1	1	1	1	1	1	2	1	2	1	1	14

Qualitative Findings

Hiking is an activity that can have numerous benefits for human health, including improving cardiovascular fitness, reducing stress, and promoting overall well-being. Hiking as a recreational activities or part of sport activities interconnect with rehabilitation in many ways. The following section will delve deeply into these 3

overarching themes, which emerged from a thematic review of ATLAS.ti 23 using the highlighted keywords: issues, outcomes, and intervention in hiking and rehabilitation.

Health-related Issues and Outcomes:

Hiking can place significant strain on the body, particularly the lower extremities. Overuse injuries such as plantar fasciitis, patellar tendinitis, and iliotibial band syndrome can develop over time, resulting in chronic pain and functional limitations. This is supported by Bottoni et al. (2015) and Oscar et al. (2011). Accidents can happen while hiking, and these can result in acute injuries such as sprains, strains, fractures, and dislocations. These types of injuries may require surgical intervention and rehabilitation treatment to help individuals recover. Hiking at high altitudes can put a significant strain on the cardiovascular system, particularly in individuals with pre-existing heart conditions. Individuals with cardiovascular issues may require rehabilitation treatment especially when preparing to return to strenuous activity. Due to the unpredictable nature of hiking scenarios, it is challenging for rehabilitation personnel to simulate the activities in the gym for training purposes. Furthermore, hiking give positive mental health, such as joy, optimism, and self-esteem, as well as increased vitality and decreased stress, have been linked to time spent in nature. Nevertheless, research examines the effects on people's mental health is sparse (Lesser et al., 2020).

Therefore, hiking prevention protocol should be set up to prevent common physical injuries (Bottoni et al., 2015; Oscar et al., 2011). For individuals with cardiovascular issues related to hiking, cardiac rehabilitation may be necessary to help manage their symptoms and improve their overall health. However, the training protocol should be tailored to the energy consumption and the different terrain that replicate the real hiking scenario. Furthermore, study in the patient with total knee replacement showed that hiking activities can improve their daily functions (Hepperger et al., 2017). Therefore, hiking is a recommended activities by orthopaedic surgeon (Thaler et al., 2021).The type of rehabilitation intervention needed will depend on the individual's specific needs and circumstances. In conclusion, while hiking can provide numerous benefits for human health, it can also lead to health-related issues that may require rehabilitation treatment. Individuals must seek assistance from qualified professionals in order to receive the appropriate treatment. The health-related issues and outcomes in hiking and rehabilitation are summarised in **Figure 5** and **Figure 6**.

Job-related Issues and Outcomes:

This review reveals the intriguing fact that the researcher is likely to link the subject sample to the type of occupation. Individuals spent more time at work, which may have direct or indirect effects on their physical or mental health. Westlund (2015) observes that veteran military personnel discovered unintentionally felt better in nature, after which they deliberately sought out similar experiences. Moreover, Batt-Rawden and Tellnes (2005) investigates exposure to nature as a component of healing or recovery for people with prolonged sickness. In addition, those whose occupations involve hiking, such as park rangers, trail builders, and wilderness guard, may be at risk for musculoskeletal injuries and other health problems related to prolonged and repetitive physical activity in outdoor environments.

According to a study by Orr et al. (2021), soldiers are at increased risk of musculoskeletal injuries due to the physical demands of their jobs, including hiking, lifting, and carrying heavy loads. Similarly, workers may experience musculoskeletal injuries due to the repetitive nature of their work, as noted by a review by Soares et al. (2019). Rehabilitation intervention for individuals whose jobs are related to hiking may include therapy to address musculoskeletal injuries and to improve overall fitness and movement mechanics. Psychological support and counselling may also be important for individuals whose jobs are related to hiking, particularly in the case of traumatic injuries or accidents. As suggested by Swan et al. (2017), psychological interventions can improve the recovery and well-being of individuals who have experienced traumatic events. The job-related issues and outcomes in hiking and rehabilitation are summarised in **Figure 5** and **Figure 6**.

Nature-related Issues and Outcomes:

There is a growing body of research suggesting that exposure to nature activities, such as spending time in green spaces, hiking, and gardening, can have positive effects on physical and mental health. There are two widely accepted theory which are attention restoration theory and stress reduction theory. Attention restoration theory

proposes that natural environments can help restore depleted cognitive resources, and stress reduction theory proposes that people experience coherence and continuity in life when they perceive life to be comprehensible, manageable, or meaningful. Most of reviewed articles on nature's effect explore this topic through qualitative research (Batt-Rawden & Tellnes, 2005; James et al., 2018; Westlund, 2015). James et al. (2018) mentions that people with disabilities have limited exposure to nature and face numerous barriers.

A systematic review conducted by Ohly et al. (2016) found that hiking has a positive impact on physical health, such as improved cardiovascular health and weight loss. Additionally, hiking has been found to have a positive impact on mental health, including reduced stress levels and improved mood (Barton & Pretty, 2010; Bratman et al., 2015). Few studies acknowledge that exposure to nature as new avenue to recovery process or healing from physical or mental stress (Batt-Rawden & Tellnes, 2005; Hsu et al., 2012; James et al., 2018; Westlund, 2015). In order to encourage people with disabilities to go hiking, a device was developed to make trails more accessible and to reduce the barriers (James et al., 2018). The nature-related issues and outcomes in hiking and rehabilitation are summarised in **Figure 5** and **Figure 6**.

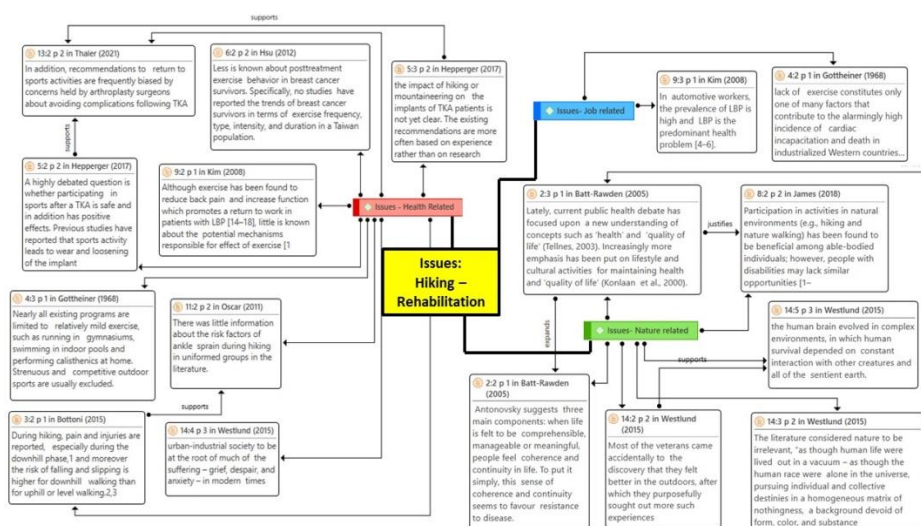


Figure 5 A network view on related issues in hiking and rehabilitation.

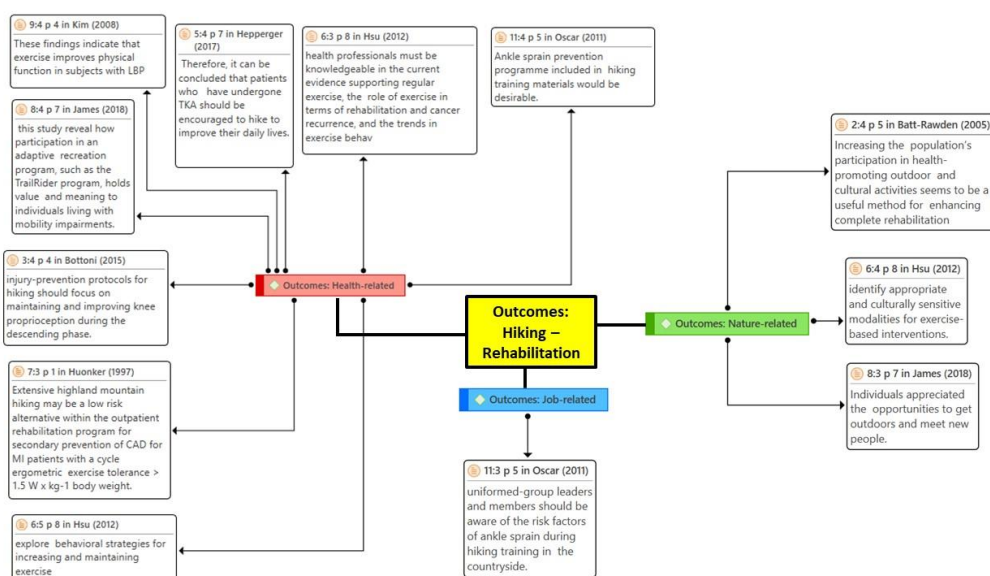


Figure 6 A network view on related outcomes in hiking and rehabilitation.

Rehabilitation Interventions

Rehabilitation is the archetypal of a complex intervention. Rarely the hiking activities investigated specified in the rehabilitation research, which hinders both the research itself and its wider acceptance. Indeed, it is challenging to locate precise descriptions of the nature of rehabilitation for most conditions. Rehabilitation is an educational, problem-solving process that emphasises activity limitations and aims to maximise patient social participation and well-being, thereby reducing caregiver/family stress (Wade, 2005). There are several obstacles to overcome because the rehabilitation intervention encompasses so many activities such as specific treatments, theoretical basis (clinical evidence), and the place of the activity being studied within the organization of the service itself (Wade, 2005).

For hikers to adhere with rehabilitation programme, they should have decent knowledge about the treatment (Christakou & Lavallee, 2009). Rehabilitation program can be served as preparation for hiking activities or post event treatment, which due to injury related activities. Various approaches to rehabilitation programmes are discussed in this review. Cardiac risk assessment is an essential to predict the individual cardiac performance during moderate to high intensity which can be objectively performed by exercise testing. The frequency and intensity of the activity should be established. Hiking was performed either weekly or 2 to 3 times per week (Hepperger et al., 2017; Kim et al., 2008). It is advisable to perform some searching or survey on the trail area as a part of risk assessment. Stretching, resistance, and endurance training are the main components of the rehabilitation program's pre- or post-phase treatment.

The interventions by Kerse et al. (2010) and Varas et al. (2018) integrated explicit prescription of outdoor walking within 3 to 5 days per week for 30 minutes and revealed large effects on physical activity at the end of the intervention and 12-month follow-up. According to Geohagen et al. (2022), a walking programme may be a key component of community rehabilitation with a dose-response relationship. Besides that, the behaviour change practices are effective at increasing physical activity among community dwelling older adults (Zubala et al., 2017). This also applies to rehabilitation interventions for reactive populations, where behaviour change techniques were more effective than exercise alone in improving real-world walking habits after stroke (Stretton et al., 2017). The rehabilitation interventions are summarised in **Figure 7**.

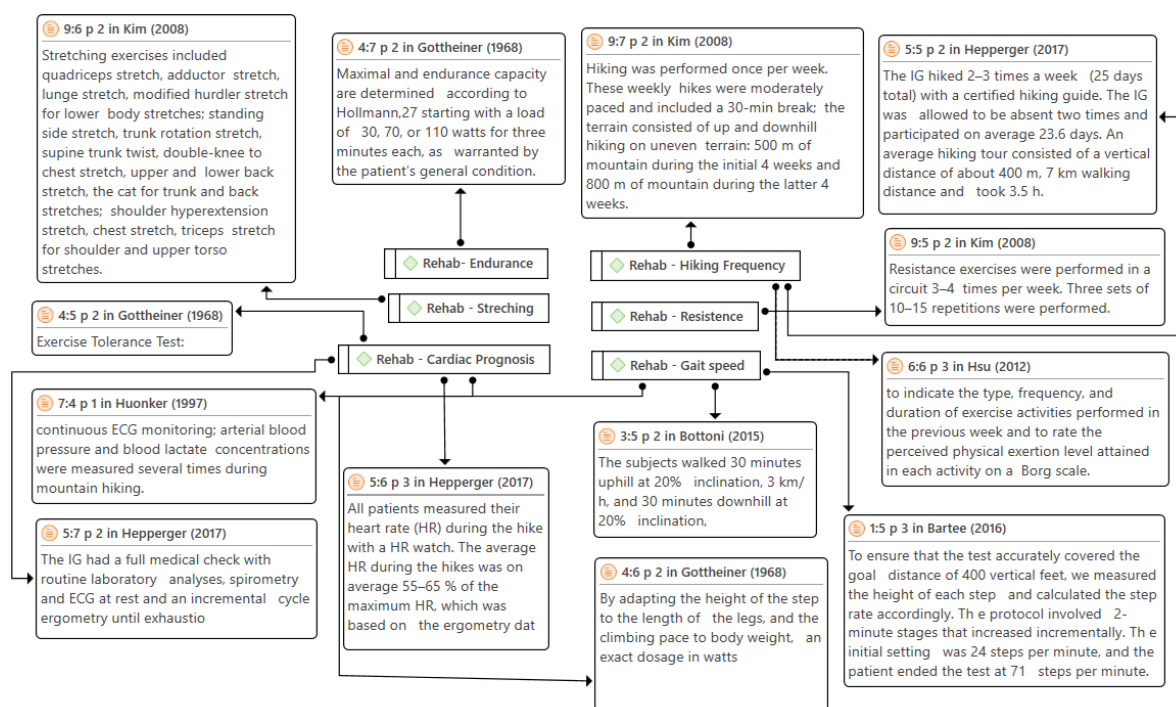


Figure 7 A network view on rehabilitation interventions.

4.0 CONCLUSION

In summary, hiking can be an effective form of rehabilitation for individuals recovering from job-related and health-related conditions. Exposure to nature through hiking activities will help individuals with physical and mental health conditions to recover and improve their overall quality of life. However, there are limitations that must be addressed in order to ensure that hiking programs are safe, effective, and accessible to all individuals. Hiking may not be appropriate for all individuals, particularly those with certain medical conditions or physical limitations. The effectiveness of hiking as a form of rehabilitation may vary depending on factors such as the type of hiking program, the level of difficulty of the trails, the duration of the hikes, and the frequency of participation. Hiking may not be appropriate for all stages of the rehabilitation process and may need to be combined with other forms of therapy to be most effective. From 1968 to 2021, this review positively addressed critical research issues, outcomes, and interventions associated with hiking and rehabilitation. As a result, this thematic review provides a variety of approaches, which address important research gaps, limitations, and recommendations. Certainly, these will need to be thoroughly investigated in the future.

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