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# ORIGINAL

# THE INFLUENCE OF CLIMATE ON OUTDOOR ATHLETIC TRAINING REGIMES IN NORWAY

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## ABSTRACT

This study investigates how the country's environment impacts Norway's outdoor athletic training regimens. Athletes and coaches in various sports have special chances and problems due to Norway's environment, which is marked by frigid temperatures, protracted winters, and varied topography. The research was based on primary data analysis to determine whether the research used smart PLS software and generated informative results, including descriptive statistics, correlation coefficient analysis, also the smart PLS Algorithm model between them. The main topics covered are the prevalence of winter sports, adjusting to low temperatures, changing training regimens according to the season, using various terrain, and psychological toughness. The overall research found climate's positive and significant influence on the outdoor athletic training regimes in Norway. Furthermore, the impact of technology developments on weather-related risk mitigation and training regimen optimization is explored. Athletes and coaches in Norway manage and succeed in outdoor sports endeavors via resilience, adaptability, and a profound grasp of how climate affects training, demonstrating the complex interactions between sport and the natural environment.

**KEYWORDS:** Climate (CC), Outdoor Athletic Training Regimes (OATR), Norway (N)

## 1. INTRODUCTION

Exercise performed outside the building to improve physical fitness is called outdoor fitness. This exercise has a similarity that is performed inside a gym or health club for the same purpose. These exercises for physical fitness don't need to be performed at a specific place. One can do these activities in a

park, in the wilderness, or any other outdoor location. A combination of strength, power, endurance, speed, and flexibility conditioning in a measured amount is called athletic training. The performance of the athletic team is strongly affected by environmental conditions like temperature, altitude, and wind. Physiological conditions are also strongly affected by high altitude where the partial pressure of oxygen is very low(Augestad, Bergsgard, & Hansen, 2006). It brings such changes in the body of players on which they have no control. Surfaces where athletes play are also increasingly susceptible to climate change. Winter flooding generates unplayable pitches with entropy in their fixtures, which can put the participants and their interests in danger. It is expected that up to 2050, a fourth portion of football league grounds will be partially or completely flooded. In conditions of too much hotness and coldness, the physical activity of athletes becomes much less and their lifestyle becomes sedentary as a result(Venter, Barton, Gundersen, Figari, & Nowell, 2021).

Some environmental factors cannot be controlled like temperature, allergens, pollution, and altitude. When these factors are at their peak, they create a serious impact on athletes' performance. Some environmental factors like temperature, if not considered seriously during a competition, can hinder players' performance. The average temperature of the human body is 37 Celsius. Any variation in this standard temperature of a human bodysuit can disturb its performance. Global warming is a gradual increase in the average temperature of the earth caused due to the release of greenhouse gases like methane, carbon dioxide, and CFCs into the atmosphere. In this condition of extreme heat, poor quality of air and pollution prove harmful to athletes' lungs and blood quality. As a result, they will become at risk of disease. Sometimes, global warming also causes a deficiency in snowfall. As a result, snow-dependent sports also attacked(Peiser, Reilly, Atkinson, Drust, & Waterhouse, 2006). As climate change worsens, sports will necessarily continue to be impacted by these events.

The biggest threat to health that a community is facing is climate change. Air pollution, disease, extreme weather events, forced displacement, pressures on mental health, and increased hunger and poor nutrition are all effects of climate change. All these outcomes will disturb the regular performance of athletes. To avoid the hindrance in the performance of athletes organizers should organize the marathons and race walking events in the Hokkaido which is located 80km away from Tokyo so that they can perform better in the less stifling temperature(Drobnic & Haahtela, 2005). One of the well-known examples of an athlete affected during the performance is a Spanish player who suffered from heatstroke and had to leave in a wheelchair during the play. No relief is given to the players during water sports. Swimmers who had to perform in the long distance had to wake up early for the event at 6:30 am to avoid morning heat strikes(Kolle, Steene-Johannessen, Andersen, & Anderssen, 2009). Volleyball players who play on the beach have to suspend training due

to the hotness of the sand where players have to stand. Sand is hosed down by officials before resuming the training. During the Tokyo Olympics, to prepare athletes to bear the searing heat they undergo a heat acclimatization regime. During the past years, athletes were prepared for the competition. They were either sent to warmer places for training, or officials made them live in environmental chambers so they could adapt to heat and humidity, which can prove helpful during the competition. But in their recent times, athletes have been acclimatized by a controlled hyperthermia process that is organized by scientists(Tin, Telseth, Tangen, & Giulianotti, 2020). Athletes do an exercise for 30 minutes at 38.5 Celsius to raise their core temperature. Then, for the next 1-2 weeks, several physiological sessions will be organized for athletes so they can undergo these adaptations. These are designed to invoke profuse sweating in athletes and help elevate core body temperature during exercise. This can be done by using the heat chamber (Absil, Diao, & Diallo, 2021).

Athletes are also acclimatized to opt for lowered rest core body temperature and heart rates(O'Keefe, Vogel, Lavie, & Cordain, 2011). To increase heat endurance and improve stamina, some athletes also took pre-event ice baths to opt for lower core body temperature. The number of hours that athletes spend training at high-intensity levels will increase progressively. Moreover, recreational athletes are more concerned about their performance and focus strongly on the intensity of their training schedule. As a result of great physical exercise, stress is imposed on the respiratory tract as carbon dioxide is released and muscles are supplied with oxygen for energy production. Increased ventilation may go above the normal resting frequency about 10-15 times. It represents the stimulus for the beginning of exercise-induced asthma for the asthma patient. Olympic and other high-level athletes are at risk of dangerous diseases due to challenging environmental conditions like heat and humidity, cold and altitude, etc (Venter, Barton, Gundersen, Figari, & Nowell, 2020). To avoid the unique environmental challenges that Olympic and other international-level athletes face, the International Olympic Committee and Medical Commission organized a panel of experts so they can review the scientific evidence, access consensus, and provide practical safety guidelines and new priorities for research. Participants were taken from all regions of Norway. Their physical activity was measured for four days continuously by using an Actigraph accelerometer(Fredriksen et al., 2000). Norway's climate is characterized by cold temperatures, different rainstorm levels, and significant daylight variations throughout the year. The country experiences distinct seasons, with cold winters and mild summers. The lakefront benefits from the warming effect of the Gulf Stream, while inland regions have more global climate conditions with colder winters. Norway's climate shapes outdoor activities and athletic training regimes, influencing everything from gear choices to training schedules. Norway has a varied climate guided by its geography, with coastal areas experiencing milder temperatures due to the Gulf Stream, while other regions have colder winters.

The country's climate can impact outdoor training, with factors like temperature, storms, and daylight hours affecting training schedules and activities. In Norway, outdoor training may need to be modified to seasonal changes, such as utilizing winter sports during colder months and outdoor activities like hiking and cycling in the milder season. The climate impact on outdoor training underscores the importance of flexibility and changing weather conditions to optimize training effectiveness and safety. Understanding the influence of climate on athletic performance is pivotal for athletes and coaches to improve training and competition strategies. Norway is an escape for outdoor enthusiasts and athletes alike, known for its stunning landscapes, immaculate fjords, and rich cultural history. But in the middle of all that breathtaking natural beauty is a climate that offers chances as well as problems to athletes exercising outside. In this paper, we examine the complex link between outdoor athletic training and Norway's climate and how it affects different sports and activities. Norway's geographic position, which stretches from the Arctic north to the temperate south, has a variety of climatic zones, each with its own unique precipitation patterns, temperatures, and weather patterns. Because of the Gulf Stream, the coastal parts have comparatively warmer winters, but interior areas struggle with lower temperatures and more snowfall, particularly in the winter. This environmental variety significantly impacts the country's various regions' outdoor training activities (Yoshioka, Yaegashi, Yoshioka, & Tsugihashi, 2019).

In Norway, winter sports are very important to the country's athletic culture. Events like ski jumping, biathlon, and cross-country skiing draw athletes from all over the world. The nation's lengthy winters and copious amounts of snowfall make these sports ideal, encouraging a culture of excellence and producing elite players. However, there are drawbacks to the severe winter weather as well. For example, athletes have to modify their training plans to account for the intense cold, short days, and erratic weather. Norway's national activity, cross-country skiing, requires tough training regimens adjusted according to the weather. Athletes frequently navigate snow-covered paths in below-freezing temperatures and strong gusts, putting their physical and mental fortitude to the test. Training locations like the well-known Holmenkollen Ski Arena in Oslo, which offers cutting-edge amenities in the middle of Norway's winter paradise, act as hubs for both professional athletes and ambitious amateurs. Climate factors such as temperature, humidity, altitude, and air quality can remarkably impact an athlete's physiological responses, endurance, hydration level, and overall performance. Considering these climate variables, athletes can adjust their training regions, hydration plans, and competition strategies to perform best in Norway's different environmental conditions. Understanding how climate affects performance can help put a stop to heat-related disease, dehydration, and other health risks during training and competition. Overall, incorporating climate consideration into athletic preparation in Norway is essential for achieving peak performance and ensuring athletic wellbeing. This data on physical activity was accumulated

during all seasons to see the results according to the changing temperatures like winter, spring, and fall. A general linear model saw the association between physical activity and the season. The physical activity of a year-old child was significantly higher in spring than in winter and fall. In the other two seasons, physical activity becomes low in the hours after school and also on weekends(Bergeron et al., 2012).

### 1.1 Research Objective

The purpose of this research is to understand the effects of climate on athletes during outdoor performance and their solutions.The research determines that the Influence of Climate on Outdoor Athletic Training Regimes in Norway. The research paper divided into five specific chapters first portion represent the introduction related to the climate and outdoor athletic training regimes this section also preset objective of research. The second portion present literature review the third section present methodology related to variables. the fourth chapter describe result and its description also that last section summarized overall research and present some recommendation related to the Influence of Climate on Outdoor Athletic Training Regimes in Norway.

## 2. Literature review

Researchers reveal that various environmental factors affect the physical fitness of athletes.by understanding the influence of different environmental factors, the physical health of athletes is determined. Climatic factors influence cardiorespiratory fitness in adults. effective strategies have been developed to understand the effect of climate on athletes' physical health(Aspvik et al., 2018).studies explain that most people face vitamin D deficiency because of a lack of sunlight. The deficiency of vitamin D in athletes disturbs their physical health. also, vitamin D deficiency is mostly prevalent in athletes playing indoor sports (Aydın, Dinçel, Arıkan, Taş, & Deniz, 2019).Studies show that drastic health changes are observed in people who face climatic change, and the consequences of physical activity-based behavior of athletes are altered due to climatic factors. Chronic diseases are prevalent in people showing low physical activeness(Bernard et al., 2021).Studies claim that sports schools in Norway offer sports programs to train athletes in the latest sports activities. The football players who are trained with school sports training programs show improvement in their sports playing skills. The development of athletes as sports players is possible by training them with the help of sports training programs(Bjørndal & Gjesdal, 2020).Studies suggest that the lives of people living in cities are being alerted to due to climatic changes occurring all around the world. In Norway, people face a lot of problems due to climatic shifts. Climatic shifts pose a great risk to people's health(Bremer et al., 2020).Scholars' studies show that highly intense sports training results in sports

specialization.

A lot of athletes face stress and anxiety due to the process of sports specialization. intense sports training badly impacts the mental health of athletes, making them psychologically ill (Brenner, LaBotz, Sugimoto, & Stracciolini, 2019).Studies explain that the narrowing of the airway causes EIB, which is caused by exercise. EIB patients mostly suffer from asthma condition(Côté, Turmel, & Boulet, 2018).Scholars predict that cold conditions are one of the causes of athletes' poor performance in sports. Health problems occur in athletes practicing in cold environments. To avoid the negative influence of cold environments on athlete health, athletes are provided with warm-up exercises before playing any sport in a cold environment. Warm-up sessions make the athlete's body adaptable to a cold environment and reduce the chances of health damage(Gatterer et al., 2021).studies elaborate that outdoor exercises are regarded as green exercises. the green exercise is preferred for providing sports training to athletes. the exposure of athletes to nature while doing exercise helps improve their physical and mental health (Lahart, Darcy, Gidlow, & Calogiuri, 2019).scholars predict that positive youth development is achieved by providing youth with physical training in educational institutes. Most schools offer physical training programs to help athletes physically fit.in Norway, various schools offer physical fitness programs that improve athletes' psychological health (Larsen & Holsen, 2021).studies show that environmental conditions greatly impacts athlete health. developing effective strategies for improving environmental conditions positively influences the health of sports-playing athletes. most athletes prefer outdoor training to indoor training sessions because outdoor training programs improve the athlete's training process and improve his health (McCullough, Bergsgard, Collins, Muhar, & Tyrväinen, 2018).scholars work explain that vitamin D deficiency in youth is related to the climatic changes. The less exposure to sunlight results in vitamin d deficiency in most youth .also, dietary habits influence the vitamin D level in youth .poor dietary habits results in vitamin D deficiency (Milani et al., 2021).scholars predict that climatic factors influence most youth's behavioral activities.

The youth who actively indulge themselves in some physical activity show sustainable behavior. It is evident from studies that nature provides man with peace of mind; also, good climatic conditions improve the mental health of adults. Good mental health conditions result in improved and sustainable behavioral activities in athletes (Nigg & Nigg, 2021).studies suggest that various strategies have been developed to promote PA in youth.in most schools, PA-related programs are used to indulge youth in PA at a young age. Promoting PA in public through educational institutes holds immense importance. In Norwegian schools, students are provided with PA programs that guide them about the significance of PA in their daily life. Many students in Norway participate in sports because of awareness regarding the PA. However, the

extent of PA-related activities varies among students of different ages. Preschoolers indulge in less intense PA, whereas high school youth indulge in more PA to improve their physical health (Nilsen, Anderssen, Ylvisaaker, Johannessen, & Aadland, 2019).Studies explain that in Norway, different policies have been developed to improve the public's health. These health-improving policies focus on improving both physical as well as mental health of people.PE-related programs educate people about the importance of PA in their daily lives. A large population of youth faces a lot of mental health problems due to stress and anxiety.to overcome the mental health problems faced by youth, they are provided with PA programs that improve their mental health conditions (Røset, Green, & Thurston, 2020).

Moreover, promoting health trough physical education programs helps adolescents to become healthy and fit at early age. The health issues faced by the youth of the present world i basuco of lack of PA in their daily life.by providing proper PA-based knowledge and training to young children, it becomes possible to overcome health issues in youth. also, implementing the proper health promoting strategies in schools and other PA providing institutes raises awareness in general public regarding physical fitness.in the Norwegian region health-promoting policies are developed for promoting physical fitness activities in athletes (Schmidt, Reinboth, Resaland, & Bratland-Sanda, 2020).studies explain that outdoor teaching methods have been widely adopted in educational institutes to indulge students in PA.in Norway outdoor teaching method is considered necessary for enhancing youth knowledge on outdoor physical activities and about their importance (Sjöblom, Eklund, & Fagerlund, 2023).studies elaborate that the involvement of children in outdoor activities makes them physically fit and positively impacts their mental well-being. ECEC is an institute that promotes PA-based catties in youth.in these institutes, youth indulge in different sports to ensure they are getting physical education (Storli & Hansen Sandseter, 2019).studies reveal whether conditions influence the athlete's game-playing skills. Athletes find it difficult to perform their best in harsh and cold climatic conditions. Moreover, the cold conditions psychologically impact the athlete's health badly impact sports performance (Ylvisåker, Nilsen, Johannessen, & Aadland, 2022).studies show that climatic changes have resulted in the onset of global warming. This onset of global warming has disturbed people's physical activity patterns (An, Shen, Li, & Bandaru, 2020).

## 3. Methodology

The research describes The Influence of Climate on Outdoor Athletic Training Regimes in Norway. The research based on primary data analysis for determine the research used smart PLS software and generate informative result included descriptive statistical analysis, the correlation coefficient also that smart PLS Algorithm model between them.

### 3.1 Importance of Adapting Training Routines to Climate Conditions:

Adaptations of training routines to climate conditions are essential for upgrading athletic performance and minimizing the risk of injuries or health issues. Different climate conditions, such as heat, cold, humidity, or altitude, can significantly affect an athlete's training effectiveness and overall well-being. By rearranging training routines based on the present climate, athletes can better prepare their bodies for the specific challenges they will face during competition. For example, training in hot and humid conditions can help athletes adjust the heat stress, improve their sweat rate, and enhance their cardiovascular fitness.

On the other hand, training at altitude can boost red blood cell production and improve oxygen utilization, leading to better endurance performance. By adapting training routines to climate conditions, athletes can prevent heat-related disease, dehydration, or cold-related injuries. It allows them to tailor their workout to imitate the environmental conditions they will encounter during competitions, thereby improving their ability to perform at their best when it matters the most. So, the adaptation of training routines to climate conditions is a strategic approach that can enhance athletic performance, promote psychological adaptation, and ensure athletes are well-prepared to excel in different environmental settings.

In Norway, cold weather conditions are crucial for athletes to properly prepare themselves through warm-up exercises and adjust their gear and equipment to ensure ideal performance and prevent injuries. In cold weather, spending extra time warming up the body is important to increase muscle temperature and flexibility. Dynamic movements such as jogging high knees, let's swings, arm circles, and lunges can help increase blood flow and prepare the muscles for activity. Combining sports-specific movements and physically preparing for the demands of their sport in the cold. Layering clothing is key in cold weather to provide insulation and regulate the body temperature. The base layer should be breathable to keep sweat away from the skin. The middle layer should provide insulation and waterproof protection against the elements. Hat, gloves, and socks are essential for returning heat and protecting the extremities from frostbite. Proper footwear with good traction prevents slips and falls on ice or snowy surfaces. The establishment of appropriate warm-up exercises, adjusting gear for insulation and protection, and insurance equipment are suitable for cold weather conditions, and athletes can enhance their performance, stay comfortable, and reduce the risk of cold-related injuries during training and competition in Norway's cold climates.

### 3.2 Influence of Climate on Outdoor Athletic Training:

In Norway, the influence of climate on outdoor athletic training region is

significant due to the country's diverse weather conditions and natural landscape. Experience a wide range of temperatures throughout the years, from cold winters to mild summers.

Athletes need to adapt their training routines to the temperature to prevent cold-related injuries and optimize performance. In colder months, athletes may focus on indoor training or, where appropriate, clothing layers to stay warm during outdoor sessions. Norway's varied territory includes mountainous regions with higher altitudes. Training at altitude can improve endurance and red blood cell production but may also require increased intensity and recovery due to reduced oxygen levels. The weather in Norway can be unpredictable, with rain, snow, and wind affecting outdoor training sessions.

Athletes must be prepared for changing weather conditions with satisfactory gear such as waterproof clothing, gloves, and hats to stay comfortable and safe during training. Norway experiences long days in summer and short days in winter due to its high liberty. Athletes may need to adjust training schedules and routines based on daylight hours to ensure sufficient visibility and safety during outdoor training sessions. Norway's mixed land, including forests, mountains, and coastal areas, offers unique training opportunities for athletes. Training on varied land can improve strength and endurance, but athletes must consider the challenges and risks of different landscapes.

### 3.3 Smart PLS Algorithm Model

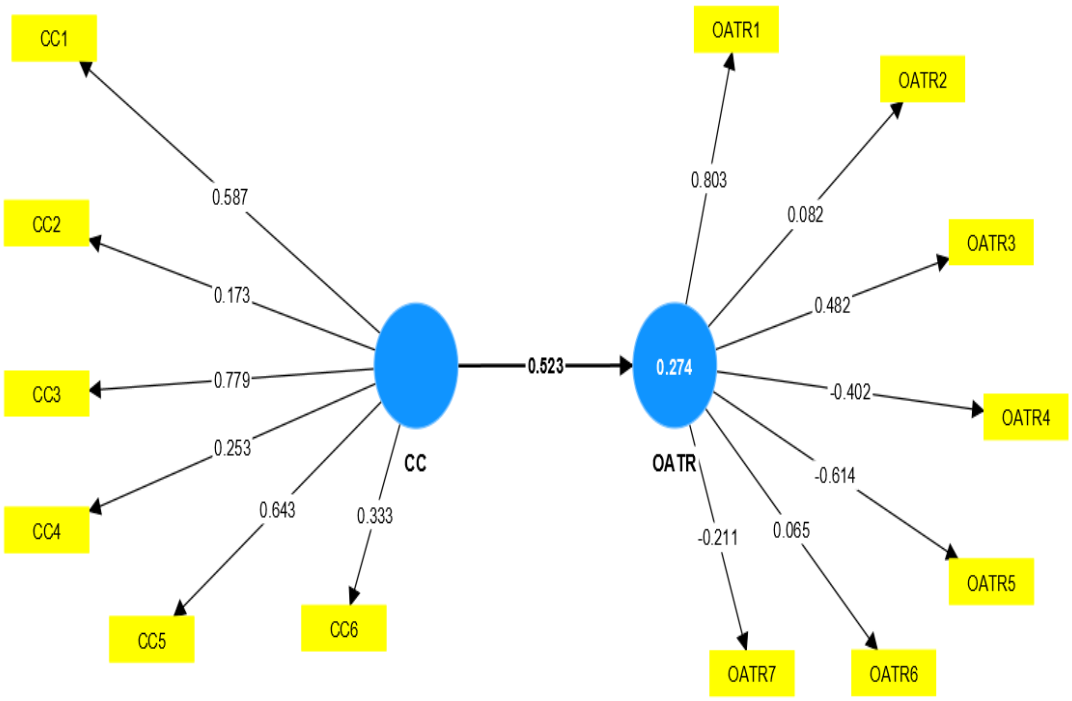


**Figure 1**

The above model represents the smart PLS Algorithm model between dependent and independent variables. The CC is the main independent variable model, and there is a 58%, 17%, 77%, 25%, 64%, and 33% relationship between them. The CC shows a 52% positive and significant link with the OATR. Similarly, the OATR shows 80%, 8%, 48%, 40%, 61%, and 21%, some positive and some negative links with them.

### 3.4 Descriptive Statistic

**Table 1**

| NAME | NO. | MEAN | MEDIAN | SCALE MIN | SCALE MAX | STANDARD DEVIATION | EXCESS KURTOSIS | SKEWNESS | CRAMER-VON MISES P VALUE |
|---|---|---|---|---|---|---|---|---|---|
| **CC1** | 0 | 1.551 | 1.000 | 1.000 | 3.000 | 0.608 | -0.484 | 0.641 | 0.000 |
| **CC2** | 1 | 1.449 | 1.000 | 1.000 | 3.000 | 0.537 | -0.806 | 0.618 | 0.000 |
| **CC3** | 2 | 1.633 | 2.000 | 1.000 | 3.000 | 0.629 | -0.603 | 0.490 | 0.000 |
| **CC4** | 3 | 1.592 | 2.000 | 1.000 | 3.000 | 0.636 | -0.535 | 0.623 | 0.000 |
| **CC5** | 4 | 1.469 | 1.000 | 1.000 | 3.000 | 0.575 | -0.329 | 0.788 | 0.000 |
| **CC6** | 5 | 1.469 | 1.000 | 1.000 | 3.000 | 0.575 | -0.329 | 0.788 | 0.000 |
| **OATR1** | 6 | 1.592 | 1.000 | 1.000 | 4.000 | 0.726 | 1.126 | 1.153 | 0.000 |
| **OATR2** | 7 | 1.469 | 1.000 | 1.000 | 3.000 | 0.610 | -0.042 | 0.958 | 0.000 |
| **OATR3** | 8 | 1.571 | 1.000 | 1.000 | 3.000 | 0.639 | -0.477 | 0.692 | 0.000 |
| **OATR4** | 9 | 1.673 | 2.000 | 1.000 | 3.000 | 0.711 | -0.838 | 0.584 | 0.000 |
| **OATR5** | 10 | 1.388 | 1.000 | 1.000 | 3.000 | 0.600 | 0.799 | 1.330 | 0.000 |
| **OATR6** | 11 | 1.571 | 2.000 | 1.000 | 3.000 | 0.606 | -0.545 | 0.567 | 0.000 |
| **OATR7** | 12 | 1.510 | 1.000 | 1.000 | 3.000 | 0.643 | -0.200 | 0.912 | 0.000 |

The above result describes the descriptive statistical analysis result presenting mean values, median values, maximum rate, minimum rate, and standard deviation rate of each variable. The CC1, CC2, CC3, CC4, CC5 and CC6 are all considered independent variables. According to the result, mean values are 1.592, 1.469, 1.551, and the positive average mean values.

The overall minimum value is 1.000, and the maximum value is 3.000 respectively. The standard deviation rate is 0.608, 0.537, 0.629, 0.636, 0.575. These are all present at 60%, 53%, and 62%, respectively, which deviate from the mean. The skewness rates are 0.641, 0.618, 0.490, 0.623 and 0.788, respectively.

The overall probability value is 0.000, showing a 100% significant level between them. the OATR1 is the main dependent variable. The result describes that its mean value is 1.592, the standard deviation rate is 72%, deviating from the mean, and the skewness value is 1.153 skewness rate between them. The OATR2, OATR3, OATR4, OATR5, OATR6, and OATR7 these are all considered as dependent variables according to the result its, mean values is 1.571, 1.673, 1.388, 1.510 its shows that positive average rate between them. the standard deviation rates are 61%, 63%, 71%, 60%, and 64% deviate from mean.

### 3.5 Correlation Coefficient

**Table 2**

| | CC1 | CC2 | CC3 | CC4 | CC5 | CC6 | OATR1 | OATR2 | OATR3 | OATR4 | OATR5 | OATR6 | OATR7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CC1** | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **CC2** | 0.242 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **CC3** | 0.262 | 0.126 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **CC4** | 0.212 | 0.417 | 0.084 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **CC5** | 0.077 | -0.154 | 0.251 | 0.077 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **CC6** | 0.077 | -0.154 | 0.082 | -0.090 | 0.321 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **OATR1** | 0.232 | -0.001 | 0.565 | -0.140 | 0.214 | 0.019 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **OATR2** | -0.147 | -0.020 | 0.130 | 0.020 | -0.046 | -0.046 | 0.064 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **OATR3** | 0.293 | 0.145 | 0.065 | 0.222 | 0.159 | -0.063 | 0.151 | -0.165 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **OATR4** | 0.133 | 0.224 | -0.040 | -0.114 | -0.324 | 0.125 | -0.179 | -0.353 | -0.083 | 1.000 | 0.000 | 0.000 | 0.000 |
| **OATR5** | -0.138 | -0.097 | -0.055 | -0.120 | -0.291 | -0.232 | -0.199 | -0.051 | -0.152 | 0.345 | 1.000 | 0.000 | 0.000 |
| **OATR6** | 0.032 | 0.152 | -0.092 | 0.129 | 0.167 | 0.050 | -0.026 | -0.008 | 0.105 | 0.244 | -0.048 | 1.000 | 0.000 |
| **OATR7** | -0.040 | 0.046 | -0.142 | -0.090 | 0.015 | -0.261 | 0.009 | -0.2 | 0.085 | 0.186 | 0.175 | 0.142 | 1.000 |

The above result describes that correlation coefficient analysis result present 1.000 is 100% significant relation between them. overall result shows some positive and some negative interrelation between dependent and independent variables.

### 3.6 Advantages and disadvantages

The weather in Norway significantly impacts outdoor athletic training regimens and training methods for a variety of sports. Norway has a chilly climate with lengthy winters and a varied topography that includes fjords and mountains. For coaches and players, these weather conditions provide possibilities as well as obstacles.

1. Dominance of Winter Sports: Norway's frigid weather and copious amounts of snow provide ideal conditions for winter sports like ice skating, snowboarding, and skiing. These athletes frequently use Norway's extensive network of ice rinks and cross-country ski trails as part of their outdoor training regimens.

2. Adaptation to Cold Temperatures: Norwegian athletes who practice outside must learn to withstand the country's occasionally extremely low temperatures. To avoid cold-related ailments like frostbite and hypothermia, this adaptation entails utilizing specialized equipment, modifying training intensity, and donning the proper layers of clothing.

3. Seasonal Variation in Training: Athletes' training plans are impacted by the climate's seasonal variations in Norway. In the winter, when there are less daylight hours, athletes could have to exercise under artificial lights or in the dark. On the other hand, summer's prolonged daylight hours allow for longer training sessions in natural light.

4. Variation in topography: Norway's diversified topography, which includes mountains, woods, and coastal areas, provides athletes with a range of training settings. While coastal places offer distinct obstacles like wind and stormy waves for water-based sports like sailing and rowing, mountainous regions offer opportunity for altitude training.

5. Weather-Dependent Training planning: In Norway, planning for outdoor training must frequently be adaptable to account for shifting weather patterns. Training sessions may need to be altered by coaches in response to variables including temperature swings, wind speed, and precipitation.

6. Indoor Training Options: Although outdoor training is more common, Norwegian athletes frequently use indoor facilities for specialised training or in bad weather. When weather outside is bad, sportsmen have options due to indoor facilities like gyms, swimming pools, and indoor tracks.

7. Psychological Resilience: Athletes must possess psychological resilience to train in Norway's harsh environment. An athlete's resilience and resolve may be put to the test when they must endure inclement weather, such as high winds and persistent snowfall.

8. Technological Advancements: Coaches and athletes may minimize weather-related dangers and optimize training regimens with the help of technological advancements like weather forecasting systems and high-performance cold-weather gear.

## 4. Conclusion

In conclusion, Norway's climate has a big impact on outdoor athletic training regimens, which in turn shapes how players prepare for and perform in a variety of sports. For athletes and coaches managing Norway's harsh climate, psychological toughness, utilization of varied terrain, seasonal variety in training programs, and adaptation to severe temperatures are critical components. In conclusion, Norway's weather has a significant influence on outdoor sports training regimens, offering coaches and athletes alike possibilities as well as problems. Training methods for a variety of sports, from summertime activities like sailing and rowing to winter sports like skiing and ice skating, are influenced by the region's low temperatures, protracted winters, and varied terrain. Athletes use the nation's natural resources and technical innovations to their advantage while adjusting to the cold, fluctuating daylight hours, and unpredictable weather.

The research based on primary data analysis for determine the data used Smart PLS software. The model of smart PLS Algorithm is describing positive link between them. The influence of climate on outdoor athletic training regimes in Norway is performed and multifaceted. the country's diverse weather conditions, wearing temperatures, altitude, lines, and seasonal variation present 4th challenges and opportunities for athletes. Redesigning training routines to accumulate Norway's climate is essential for increasing performance, preventing injuries, and insurance effectively in different outdoor settings. By incorporating appropriate warm-up exercises, adjusting gear and equipment, and being mindful of the impact of climate on training, athletes can enhance their performance and overall training experience in Norway's unique and dynamic outdoor environment. Athletes and coaches in Norway have demonstrated the ongoing relationship between sport and the natural environment by excelling on the world stage via resilience, adaptability, and a profound grasp of how climate affects their sport.

### 4.1 Recommendations

Given the intricate correlation between Norway's weather and outdoor sports training regimens, a number of suggestions may be made to maximise

the efficiency of training and the welfare of athletes: Climate-Responsive Training Plans: Trainers and athletes should create adaptable training schedules that take into consideration Norway's varying seasons. Depending on the current situation and weather predictions, this might entail modifying the location, intensity, and length of the exercise. Use of Indoor Facilities: To keep their training regimens consistent throughout periods of severe weather or bad weather, athletes should utilize indoor training facilities. Athletes can concentrate on particular training components in a safe and regulated setting by using indoor facilities outfitted with specialized equipment. Cross-Training and Adaptability: Motivate athletes to partake in cross-training exercises that enhance their main sport and advance resilience and general fitness. In addition to lowering the risk of overuse injuries, cross-training fosters versatility, enabling athletes to switch between training modalities with ease in response to weather conditions.

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