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Components of Physical Abilities on a Fast Climb 18 Peaks 12 Days at Altitudes Above 3000 MDPL

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ABSTRACT
This study aims to determine the dominant and supporting factors regarding the components of the PAMOR FPOK UPI mountain climbers' physical abilities on fast climbing. This research method uses the expost-facto method. Data collection techniques using physical abilities instruments as many as 7 respondents. The sampling method uses non-probability with purposive sampling technique. Data analysis used confirmatory factor analysis with the help of SPSS 23 software for windows. The results of this study show that the physical abilities of mountain climbers consist of 15 components, namely Circulatory respiratory endurance, General strength, Right thigh circumference, Left thigh circumference, Speed & power, Elastic strength, Body weight, BMI, Percent body fat, and supporting components including are Agility, Balance, Anxiety, Circumference of the upper right hand, Circumference of the upper left hand. The factors that have the highest contribution to the physical abilities of PAMOR FPOK UPI mountain climbers are Muscular endurance, agility, endurance cardiorespiratory fitness, muscular strength and power percentage 36.452%.

Keywords: *Physical Abilities; Climber; Fast Climbing.*

INTRODUCTION

Mountaineering activities are increasingly popular but the risks that will be faced if something happens are not very popular. There is a perception that mountain climbers have unique personality characteristics that are interesting so that people who like outdoor activities, both new climbers and those who have often climbed, feel that climbing activities are not dangerous, sometimes they ignore the special components in climbing activities. (Monasterio et al., 2014) (Festiawan et al., 2020) (Rahman et al., 2018). Basically, mountain sports activities demand a relatively high level of physical fitness and a high risk of injury, and the death rate increases if fitness is insufficient. but little information exists on aerobic

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performance requirements or physical fitness level requirements in mountaineers (Burtscher, 2004) (Puehringer et al., 2020) (Duc et al., 2011) (Schommer & Bärtsch, 2011).

The geographical location of Indonesia is an archipelagic country with varied coverage areas such as islands, waters, and mountains. With this background, to maintain the balance of ecosystems in the forests or mountains of Indonesia, we should be able to provide a different characteristic in carrying out the process of outdoor activities, especially mountain climbing. The participation of sports science is not only applied to certain sports, but this participation can be applied to the process of outdoor activities, especially activities that are challenging and related to death. Like the process of mountain climbing where mountain climbing is one of the favorite sports activities of the people in Indonesia(Kurniawan & Rohendi, 2021)(Moore et al., 2001)(Saul et al., 2019)(Kilpatrick et al., 2014).

One of the most important components that cannot be separated from outdoor activities is the physical condition component as one of the components that must be met for someone who will carry out outdoor activities. With this understanding, the preparation for physical exercise determines an important thing because the quality of good exercise will have an impact on changes in physical condition according to their needs.(Rahman et al., 2018) (Blake et al., 2017)(Hoppeller & Vogt, 2015)(Huey & Eguskitza, 2001).

The principle of training in mountain climbing is the same as the principle of exercise as in general, only that the difference is that there is a special need for mountaineering in terms of the nature and character of climbing activities. (Subarjah, 2013)(Rokowski et al., 2017)(Robertson, 2005)(Sumann et al., 2015). Regarding the topic of this research, it discusses the biomotor and anthropometric components of mountain climbers carried out by the PAMOR FPOK UPI student activity unit. Based on initial observations, it has its own characteristics, namely the form of climbing carried out on tropical mountains continuously with climbing time as the achievement of climbing success and the number of mountains as the target of climbing success. On this basis, the researcher has the assumption that there is a need for a scientific study of the components of the PAMOR FPOK UPI mountain climbers' physical abilities in the 2019 PAMOR Expedition fast ascent.

METHOD

This study uses a quantitative descriptive study with an expost facto design. The participants of this research are students of FPOK UPI Bandung who are members of UKM

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PAMOR FPOK UPI. And the study involved 7 participants of the 2019 PAMOR Expedition climbers. The population in this study were all 7 climbers of PAMOR EXPEDITION. The sample in this study used a purposive sampling technique for the following reasons: 1) Researchers understand the needs of this study in terms of population characteristics; 2) This study aims to determine the physical abilities of mountain climbers in the 2019 PAMOR FPOK UPI fast ascent. The number of samples is the total population of 7 people. The research procedures in this study are as follows: (1) The researcher gave an information sheet about this research to PAMOR EXPEDITION 2019 climbers. Climbers signed their consent to be willing to be the sample in this study; (2) Researchers make permission to request research data from UKM PAMOR FPOK UPI; (3) Data analysis adapted to the characteristics of the data owned, and (4) Determine the research formulation based on the conclusions from the results of data processing. The purpose of factor analysis is data summarization, which is to identify the relationship between variables by conducting correlation tests and data reduction.

RESULTS AND DISCUSSION

The data analysis used in this study uses factor analysis (confirmatory factor analysis) where this analysis is useful for determining the dominant components in the physical abilities of the XPDC PAMOR 2019 mountain climbers. The results of the factor analysis are as follows:

Output Communalities

Table 1.
Communalities

Component	Initial	Extraction
BMI	1,000	0.997
Percentage_fat	1,000	1,000
circle_right_arm	1,000	0.988
circle_arm_left	1,000	0.988
right_thigh circumference	1,000	0.973
left_thigh circumference	1,000	0.988
endurance_cardiorespiratory_fitness	1,000	0.973
muscular_strength_and_power	1,000	0.989
muscular_endurance	1,000	0.924
speed_speed	1,000	0.994
agility_agility	1,000	0.970
balance_balance	1,000	0.723
flexibility	1,000	0.932
coordination_coordination	1,000	0.997
reaction_time_reaction_time	1,000	1,000

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Table 1. *Communalities* This shows the value of the variable component to be studied whether it is able to explain the factor or not. A variable is considered capable of explaining a factor if the value of*Extraction*greater than 0.50. Based on the output above, it is known that the Extraction value for all variables is greater than 0.50. Thus it can be concluded that all components in this study can be used to explain factors.

Output Total Variance Explained

Tabel 2.
Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loading			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.468	36,452	36,452	5.468	36,452	36,452	4.203	28.022	28.022
2	3.276	21,840	58,292	3.276	21,840	58,292	2.879	19,196	47,218
3	2,482	16,548	74,840	2,482	16,548	74,840	2.877	19,182	66,399
4	1,967	13.111	87,951	1,967	13.111	87,951	2,488	16.587	82,987
5	1,243	8.286	96,236	1,243	8.286	96,236	1987	13,250	96,236
6	.565	3,764	100,000						
7	2.836E-16	1.891E-15	100,000						
8	9.073E-17	6.049E-16	100,000						
9	4.210E-33	2.807E-32	100,000						
10	-7.065E-18	-4.710E-17	100,000						
11	-9.113E-17	-6.076E-16	100,000						
12	-1.265E-16	-8.434E-16	100,000						
13	-2.138E-16	-1.425E-15	100,000						
14	-2.979E-16	-1.986E-15	100,000						
15	-3.624E-16	-2.416E-15	100,000						

Table 2. *Total Variance Explained*shows the value of each variable or component in the analysis. In this study there are 15 components that can be analyzed. There are two kinds of analysis to explain a variance, namely:*Initial Eigenvalues*and Extraction Sums of Squared Loadings. Based on the output table of Total Variance Explained in the Initial Eigenvalues section, it shows that there are 5 (five) factors that can be formed from the 15 components analyzed. Where the condition is to be a factor, the Eigenvalues must be greater than one (Eigenvalues >1). The value of each component is:

Component 1 (one) is 5,468 > 1, meaning that the component is included in factor 1 (one) with a percentage variation value of 36.452%. Component 2 (two) is 3,276 > 1, meaning that the component is included in factor 2 (two) with a percentage variation value of 21.840%. Component 3 (three) is 2,482 > 1, meaning that the component is included in factor 3 (three) with a percentage variation value of 16.548%. Component 4 (four) is 1,967 > 1, meaning that the component is included in factor 4 (four) with a percentage variation value of 13.111%. Component 5 (five) is 1,243 > 1, meaning that the component is included in factor 5 (five) with a percentage variation value of 8.286%.

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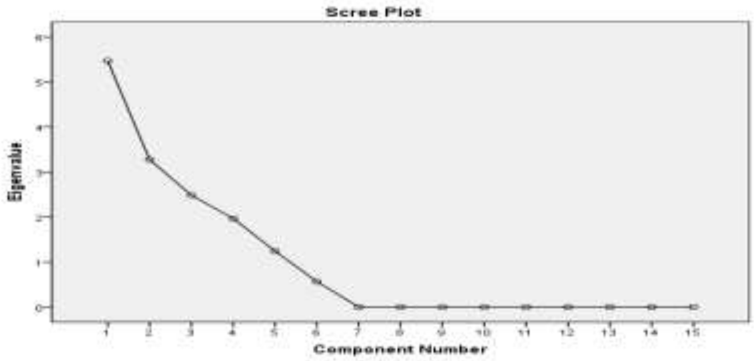
The overall variation value of factors 1, 2, 3, 4, and 5 is 96.236%. other components such as components 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 are not counted because the component's Eigenvalue < 1, so it cannot be a factor.

Scree Plot Output



Picture 1
Scree plot output

On picture *Scree Plot* can also show the number of factors that are formed by looking at the component points that have an Eigenvalue> 1.

Output Component Matrix

Table 3.
Component Matrix

Component	Component				
	1	2	3	4	5
agility_agility	-0.869	0.206	-0.149	-0.380	0.073
endurance_cardiorespiratory_fitness	-0.816	0.261	-0.143	0.327	-0.333
BMI	0.814	0.239	-0.521	0.003	0.082
muscular_endurance	0.796	0.263	0.336	-0.124	-0.306
Percentage_fat	0.765	0.285	-0.565	-0.058	0.097
circle_right_arm	0.731	0.539	0.314	0.180	0.179
circle_arm_left	0.731	0.539	0.314	0.180	0.179
balance_balance	-0.638	0.296	-0.096	0.431	-0.186
coordination_coordination	0.099	-0.848	0.497	0.147	0.012
left_thigh circumference	-0.392	0.805	0.121	-0.311	0.273
speed_speed	-0.395	0.478	0.760	0.072	0.165
right_thigh circumference	-0.260	0.190	0.438	-0.822	0.054
flexibility	-0.258	0.530	0.196	0.739	-0.021
muscular_strength_and_power	0.001	-0.605	0.343	0.304	0.642
reaction_time_reaction_time	0.487	-0.108	0.586	-0.087	-0.633

Extraction Method: Principal Component Analysis.

Tabel 3. *Component Matrix* This shows the correlation value or the relationship between each variable or component with the formed factors. From the output, it can be seen in several components as follows:

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Agility with factor 1 is -0.869, correlation factor 2 is 0.206, correlation factor 3 is -0.149, correlation factor 4 is -0.380, and factor 5 is 0.073. Endurance cardiorespiratory fitness with factor 1 of -0.816, correlation of factor 2 of 0.261, correlation of factor 3 of -0.143, correlation of factor 4 of -0.327, and factor 5 of -0.333. BMI with factor 1 of 0.814, correlation of factor 2 of 0.239, correlation of factor 3 of -0.143, correlation of factor 4 of 0.003, and factor 5 of 0.082. Muscular endurance with factor 1 is 0.796, correlation factor 2 is 0.263, correlation factor 3 is 0.336, correlation factor 4 is -0.124, and factor 5 is -0.306. The percentage of fat with factor 1 is 0.765, correlation factor 2 is 0.285, correlation factor 3 is -0.565, correlation factor 4 is -0.058, and factor 5 is 0.097. Right arm circumference with factor 1 is 0.731, correlation factor 2 is 0.539, correlation factor 3 is 0.314, correlation factor 4 is 0.180, and factor 5 is 0.179. Left arm circumference with factor 1 is 0.731, correlation factor 2 is 0.539, correlation factor 3 is 0.314, correlation factor 4 is 0.180, and factor 5 is 0.179. Balance with factor 1 is -0.638, correlation factor 2 is 0.296, correlation factor 3 is -0.096, correlation factor 4 is 0.431, and factor 5 is -0.186. Coordination with factor 1 is 0.099, correlation factor 2 is -0.848, correlation factor 3 is 0.497, correlation factor 4 is 0.147, and factor 5 is 0.012. Left thigh circumference with factor 1 is -0.392, correlation factor 2 is 0.805, correlation factor 3 is 0.121, correlation factor 4 is -0.311, and factor 5 is 0.273. Speed with factor 1 is -0.395, correlation factor 2 is 0.478, correlation factor 3 is 0.760, correlation factor 4 is 0.072, and factor 5 is 0.054. Right thigh circumference with factor 1 is -0.260, correlation factor 2 is 0.190, correlation factor 3 is 0.438, correlation factor 4 is -0.822, and factor 5 is 0.054. Flexibility with factor 1 is -0.258, correlation factor 2 is 0.530, correlation factor 3 is 0.196, correlation factor 4 is 0.739, and factor 5 is -0.021. Muscular strength and power with a factor 1 of 0.001, a correlation of factor 2 of -0.605, a correlation of factor 3 of 0.343, a correlation of factor 4 of 0.304, and a factor of 5 of 0.642. The reaction time (reaction_time) with factor 1 is 0.487, correlation factor 2 is -0.108, correlation factor 3 is 0.586, correlation factor 4 is -0.087, and factor 5 is -0.633.

Output Component Transformation Matrix

Table 4.

Component Transformation Matrix

Component	1	2	3	4	5
1	**0.746**	-0.453	-0.395	0.017	0.286
2	0.502	**0.400**	0.397	0.635	-0.164
3	0.229	0.157	**0.609**	-0.525	0.526
4	0.214	0.756	-0.517	0.336	-0.055
5	0.307	-0.197	0.218	-0.456	0.782

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Component Transformation Matrix shows that:

- Component 1 (one) correlation value is 0.746 > 0.5
- Component 2 (two) correlation value is 0.400 > 0.5
- Component 3 (three) correlation value is 0.609 > 0.5
- Component 4 (four) correlation value is 0.336 > 0.5
- Component 5 (five) correlation value is 0.782> 0.5

Because the correlation value of all components > 0.5, it can be concluded that the five factors formed are feasible to summarize the fifteen variables analyzed.

Output Rotated Component Matrix

Table 5
Rotated Component Matrix

Component	Component				
	1	2	3	4	5
circle_right_arm	0.035	0.062	0.048	0.136	**0.981**
circle_arm_left	0.035	0.062	0.048	0.136	**0.981**
muscular_endurance	**0.682**	-0.236	-0.008	0.185	0.608
agility_agility	**0.548**	0.289	-0.638	0.151	-0.397
BMI	-0.528	-0.369	**0.633**	0.401	-0.145
Percentage_fat	-0.483	-0.384	**0.602**	0.467	-0.198
flexibility	0.269	**0.923**	0.044	-0.009	-0.082
endurance_cardiorespiratory_fitness	**0.765**	-0.543	0.098	0.269	-0.109
balance_balance	-0.314	**0.754**	0.048	0.167	-0.159
right_thigh circumference	-0.157	-0.369	0.138	**0.881**	0.128
speed_speed	0.185	**0.807**	0.512	-0.202	0.075
left_thigh circumference	0.157	0.230	0.421	**0.769**	-0.377
muscular_strength_and_power	**0.038**	-0.085	-0.049	-0.959	-0.240
coordination_coordination	-0.202	-0.197	**0.410**	-0.853	-0.147
reaction_time_reaction_time	0.231	-0.113	**0.965**	-0.050	0.028

Determination of the distribution of components in this study is determined by looking at the largest correlation value between the variables and the formed factors. The results of factor analysis can be seen that the correlation value between the five factors shows which factor is larger, as in the results of the table above, the first factor is filled in by the componentmuscular endurance, agility, endurance cardiorespiratory fitness, muscular strength and power. The second factor is filled with components of flexibility, balance, and speed. The third factor is filled by the components of BMI, fat percentage, coordination, and reaction time. The fourth factor is filled by the components of the circumference of the right thigh and the circumference of the left thigh. The fifth factor is filled by components of right arm circumference and left arm circumference.

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Based on this description, the conclusions from the analysis can be seen as follows:

Tabel 6
Physical Abilities

FACTOR	PHYSICAL ABILITIES
1	Muscular endurance, agility, endurance cardiorespiratory fitness, muscular strength and power
2	Flexibility, balance, speed
3	BMI (Body Mass Index), Fat percentage, coordination, reaction time
4	right thigh circumference, left thigh circumference
5	right arm circumference, left arm circumference

The conclusion from the results of data analysis using factor analysis techniques, the main components include: Muscular endurance, agility, endurance cardiorespiratory fitness, muscular strength and power, Flexibility, balance, speed, BMI (Body Mass Index), fat percentage, coordination, reaction time, and the supporting components of which are right thigh circumference, left thigh circumference, right arm circumference, left arm circumference on fast climbing mountain climbers on the 2019 PAMOR expedition. The main components in preparation for climbing according to Sulaeman (1985, 124-126) in (Sukarmin, 2016)is to be in good physical and mental condition. Climbing a mountain is a hard and strenuous sport, therefore it is only natural for climbers to demand excellent physical and mental abilities so that they are not easily discouraged if they encounter difficulties on the way so that they are successful in carrying out their mission. In addition, at high altitudes with less oxygen, we sometimes find it difficult to catch our breath. If we have trained our bodies to deal with such stresses at lower altitudes, we are likely to be more comfortable with those pressures at higher mountains. Studies have ever been done that, an average height of 317 m is expected to be reached in one hour. The data collected through documenting the speed of the ascent indicates that this goal has been achieved on average. However, large variations were observed (180-480 m). Climbing at 300 m corresponds to an oxygen requirement of about 18 ml/min/kg. Because only 62% of an individual's maximum oxygen intake (VO2 max) is used during a prolonged ascent, a VO2 max of about 30 ml/min/kg is required to perform the ascent at a normal pace. Taking into account that VO2 max decreases at a rate of 1% per 100 m of altitude above 1,500 m, these values should be increased by 20% when climbing the mountain at 3500 m. Thus, endurance capacity may be a limiting factor, especially when aerobic fitness declines with age or due

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to pre-existing disease Climbing at 300 m corresponds to an oxygen requirement of about 18 ml/min/kg. Because only 62% of an individual's maximum oxygen intake (VO2 max) is used during a prolonged ascent, a VO2 max of about 30 ml/min/kg is required to perform the ascent at a normal pace. Taking into account that VO2 max decreases at a rate of 1% per 100 m of altitude above 1,500 m, these values should be increased by 20% when climbing the mountain at 3500 m. Thus, endurance capacity may be a limiting factor, especially when aerobic fitness declines with age or due to pre-existing disease Climbing at 300 m corresponds to an oxygen requirement of about 18 ml/min/kg. Because only 62% of an individual's maximum oxygen intake (VO2 max) is used during a prolonged ascent, a VO2 max of about 30 ml/min/kg is required to perform the ascent at a normal pace. Taking into account that VO2 max decreases at a rate of 1% per 100 m of altitude above 1,500 m, these values should be increased by 20% when climbing the mountain at 3500 m. Thus, endurance capacity may be a limiting factor, especially when aerobic fitness declines with age or due to pre-existing disease A VO2 max of about 30 ml/min/kg is required to perform at a normal pace. Taking into account that VO2 max decreases at a rate of 1% per 100 m of altitude above 1,500 m, these values should be increased by 20% when climbing the mountain at 3500 m. Thus, endurance capacity may be a limiting factor, especially when aerobic fitness declines with age or due to pre-existing disease A VO2 max of about 30 ml/min/kg is required to perform at a normal pace. Taking into account that VO2 max decreases at a rate of 1% per 100 m of altitude above 1,500 m, these values should be increased by 20% when climbing the mountain at 3500 m. Thus, endurance capacity may be a limiting factor, especially when aerobic fitness declines with age or due to pre-existing disease(Burtscher, 2004). Based on the results of these studies, it is very clear that the role of physical conditions can affect the achievement of climbing.

CONCLUSIONS AND SUGGESTIONS

Based on the results of data analysis and discussion, it can be concluded that the physical abilities component of mountain climbers in the fast climbing of the 2019 PAMOR expedition in terms of the percentage value of each factor that the physical abilities component that contributes to fast climbing, the first factor consists of: Muscular endurance, agility (agility), endurance cardiorespiratory fitness, muscular strength and power; The second factor consists of:Flexibility, balance (balance), speed (speed); the third factor consists of: BMI (Body Mass Index), fat percentage, coordination, reaction time; the fourth factor consists of: right thigh circumference, left thigh circumference; and the fifth factor consists of: right arm circumference, left arm circumference.

This research is expected to be useful for further research on the analysis of the physical components of mountain climbers in fast climbing in terms of biomotor components and body composition and can be used as a reference and information for athletes, coaches, academics, and also climbers especially those who are happy with fast climbing. biomotor components and body composition can support the success of climbers in fast climbing activities.

REFERENCES

Blake, H., Stanulewicz, N., & McGill, F. (2017). Predictors of physical activity and barriers to exercise in nursing and medical students. Journal of Advanced Nursing, 73(4), 917–929. https://doi.org/10.1111/jan.13181

Burtscher, M. (2004). Exercise capacity for mountaineering: How much is necessary? Research in Sports Medicine, 12(4), 241–250. https://doi.org/10.1080/15438620490497332

Duc, S., Cassirame, J., & Durand, F. (2011). Physiology of ski mountaineering racing. International Journal of Sports Medicine, 32(11), 856–863. https://doi.org/10.1055/s-0031-1279721

Festiawan, R., Suharjana, S., Priyambada, G., & Febrianta, Y. (2020). High intensity interval training and fartlek training: The effect on the level of VO2 Max. Journal of Sport, 8(1), 9–20. https://doi.org/10.21831/jk.v8i1.31076

Hoppeler, H., & Vogt, M. (2015). Muscle tissue adaptations to hypoxia Muscle tissue adaptations to hypoxia. October 2001.

Huey, RB, & Eguskitza, X. (2001). Limits to human performance: Elevated risks on high mountains. Journal of Experimental Biology, 204(18), 3115–3119.

Kilpatrick, MW, Jung, ME, & Little, JP (2014). High-intensity interval training: A review of physiological and psychological responses. ACSM's Health and Fitness Journal, 18(5), 11–16. https://doi.org/10.1249/FIT.0000000000000067

Kurniawan, AR, & Rohendi, A. (2021). Outdoor Recreation: Planning and Community Empowerment in Ciungwanara Educational Tourism Development. Journal of Sports, 7(1), 1. https://doi.org/10.25157/jkor.v7i1.5305

Monasterio, E., Alamri, YA, & Mei-Dan, O. (2014). Personality characteristics in a population of mountain climbers. Wilderness and Environmental Medicine, 25(2), 214–219. https://doi.org/10.1016/j.wem.2013.12.028

Moore, K., Thompson, C., & Hayes, R. (2001). Diabetes and extreme altitude mountaineering. British Journal of Sports Medicine, 35(2), 83. https://doi.org/10.1136/bjsm.35.2.83

Puehringer, R., Berger, M., Said, M., & Burtscher, M. (2020). Age-Dependent Health Status and Cardiorespiratory Fitness in Austrian Military Mountain Guides. High Altitude Medicine and Biology, 21(4), 346–351. https://doi.org/10.1089/ham.200.0092

Rahman, FA, Sugiyanto, & Kristiyanto, A. (2018). Mountaineering physical activities as community recreational sports. Journal of Education: Theory, Research, & Development, 3(3), 398–405.

Robertson, EY (2005). Physiological and Performance Effects of Altitude Training and Exposure in Elite Athletes. MSci Physiology & Sports Science.

Rokowski, R., Maciejczyk, M., Szygula, Z., & Sacz, N. (2017). Body build, strength and endurance performance in elite sport and alpine climbers – a pilot study. Journal of Kinesiology and Exercise Sciences, 79(27), 31–39.

Saul, D., Steinmetz, G., Saul, D., Steinmetz, G., Lehmann, W., & Schilling, AF (2019). Determinants for success in climbing: A systematic review Journal of Exercise Science & Fitness Determinants for success in climbing: A systematic review. Journal of Exercise Science & Fitness, 17(3), 91–100. https://doi.org/10.1016/j.jesf.2019.04.002

Schommer, K., & Bärtsch, P. (2011). Basic Medical Advice for Travelers to High Altitudes. Deutsches Aerzteblatt Online, December 2011. https://doi.org/10.3238/arztebl.2011.0839

Subarjah, H. (2013). Summary for Policymakers. In Intergovernmental Panel on Climate Change (Ed.), Climate Change 2013 - The Physical Science Basis (pp. 1–30). Cambridge University Press. https://doi.org/10.1017/CBO9781107415324.004

Sumann, G., Hochholzer, T., Faulhaber, M., & Burtscher, M. (2015). High-altitude mountaineering made safer. Trauma, 17(1), 4–16. https://doi.org/10.1177/1460408614531878.