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RESEARCH **Open Access**

Exploring Key Determinants of Trail Run Athlete's Preparedness to Perform Pre-Hospital First Aid for Ankle Sprain

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Abstract
Trail runs have a high risk of injury like ankle sprains. Proper ankle sprain first aid requires preparedness to prevent more serious danger and ensure its success in the pre-hospital setting. This study aimed to explore key determinants of trail run athletes' preparedness to perform pre-hospital first aid for ankle sprain using the PRECEDE-PROCEED Model theory. The research method used a descriptive correlational which approached cross-sectionally. The research recruited 120 trail run athletes of two professional clubs who were selected by simple random sampling. Data was collected using questionnaires. The variables measured were knowledge, belief, value, attitude, and confidence. Bivariate analysis used chi-square and spearman-rho tests. Multivariate analysis used a logistic regression test. All of the statistical analyses used α = 0,05. The research results show that half of the respondents was 18 – 35 years old. The factors correlated to the trail run preparedness to perform pre-hospital first aid for ankle sprain was as follows. The majority had a medium level of knowledge (54,2%) and a significance level of p = 0.000. Similar trends were found between belief, value, and confidence in which there were no low levels of those variables with the same significance value of p = 0.000. Lastly, respondent's percentages of attitudes were almost equally distributed between negative (45%) and positive (66%) with a significance level of p = 0,000. In multivariate analysis, all the variables had p-values < 0,05. The OR was as follows, knowledge 14,713; belief 77,919; value 27,554; attitude 7,213; and confidence 12,408. The conclusion is found that knowledge, belief, value, attitude, and confidence were significantly correlated with the athlete's preparedness Together all variables were correlated significantly to the athlete's preparedness to perform pre-hospital first aid for ankle sprain. In conclusion, to improve athlete safety during trail runs is by improving the preparedness for any adverse event including trail runs. All of the factors could increase preparedness, but some factors resulted in higher preparedness. The factors that have more effect on preparedness than the others are belief and value.

Keywords: Ankle Sprain, First Aid, Health Promotion, Preparedness, Pre-hospital, Trail Run.

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1. INTRODUCTION

Trail runners face potential injuries from uneven terrain, climate hazards, and anatomical issues, requiring self or fellow runner first aid. Running experience, race finishing time, and asphalt training contribute to acute running-related injuries (RRIs) (C. Viljoen, Janse van Rensburg, van Mechelen, Verhagen, Silva, et al., 2022; C. T. Viljoen, Janse van Rensburg, et al., 2021). Gradual-onset RRIs (GORRIs), linked to repetitive stress, threaten trail runners, with factors like longer race distance and chronic diseases heightening risks (C. T. Viljoen, Sewry, et al., 2021). Non-professional runners, lacking proper technique knowledge, also face susceptibility (Rachmawaty et al., 2023; C. T. Viljoen, Sewry, et al., 2021). Since ankle sprain is one of the most common sport injuries, especially that involve the excessive use of foot, added by the nature of the trail run terrain, it is concluded that ankle sprain in trail run is common (Sawyer & Sawyer, 2023; C. Viljoen, Janse van Rensburg, van Mechelen, Verhagen, Silva, et al., 2022; C. T. Viljoen, Janse van Rensburg, et al., 2021). Enhancing trail runners' safety involves prioritizing first aid preparedness, addressing training factors, and promoting proper technique. Despite the significance of pre hospital first aid, no research identifies factors improving athletes' preparedness. This study explores behavioral factors influencing trail runner preparedness to perform pre hospital first aid for ankle sprain, using the PRECEDE-PROCEED Model theory.

Statistics of injuries experienced by running athletes amounted to 54.3% with percentage of detail: ankles (49.5%), knees (17.9%), and lower legs (9.5%) (Sanchez-Garcia et al., 2022) The injury survey in Indonesia shows that 6.4% of injuries occur in the wild, while the types of injuries that often occur are abrasions/bruises by 56.1%, lacerations/cuts by 19.7%, sprains by 36.1%, lower limbs by 64.5% and upper limbs by 33.69% (Hardyanto & Nirmalasari, 2020).

Trail run athletes are at high risk of ankle sprain injuries and if the incident happens in the pre hospital setting, he can deliver first aid immediately. The ability of an athlete to perform first aid independently is determined by his preparedness. A systematic review found that a more knowledgeable person will engage in health-related behavior (Kim et al., 2022). Previous research found that knowledge, attitude, and self-efficacy plays as predisposing factor for women performing physical activity (Emdadi et al., 2015). Additionally, a person with diabetes will follow a routine health activity if the person has good knowledge, attitude, and self-efficacy. Unfortunately, there has been no research on the factors that influence the preparedness of trail run athletes to do first aid on ankle sprain. Therefore, there needs to be research on the factors that affect athletes first aid preparedness on ankle sprain. The PRECEDE-PROCEED Model theory by Lawrence Green will be used to explore this phenomenon because knowledge, attitudes, beliefs, values and self-confidence are predisposing factors to behavior change (Kim et al., 2022; Terry, 2021). This study aimed to explore key determinants of trail run athlete's preparedness to perform pre hospital first aid for ankle sprain using the PRECEDE-PROCEED Model theory.

2. RESEARCH METHOD

This quantitative, descriptive-correlational research using a cross-sectional method was carried out on 120 respondents, namely trail run athletes, obtained from a simple random sampling of 166 athletes who were members of the MANTRA club and the BDG Explorer club. Data collection was carried out in April 2023 – May 2023. This study aimed to explore key determinants of trail run athletes' preparedness to perform pre-hospital first aid for ankle sprain using the PRECEDE-PROCEED Model theory.

The sample was calculated using the Slovin formula and adding 10% of the sample size for contingency for respondents who dropped out. Recruited respondents must have the inclusion criteria as active club members for > 1 year, and have done a trail run in the last 3

months. Meanwhile, respondents who were not involved were those who were injured and could no longer do trail runs.

This research investigates 6 variables, namely 5 independent variables and 1 dependent variable. The independent variable consisted of trail runners' knowledge, attitudes, beliefs, values and self-confidence. Furthermore, the dependent variable is the trail runner's preparedness to perform pre-hospital first aid for ankle sprain.

The instrument for this research is a questionnaire. The questionnaire was designed by researchers based on the PRECEDE-PROCEED model and has passed variability and reliability tests. Validity and reliability tests were carried out on 20 trail run athletes who were not members of MANTRA and BDG Explorer. Validity uses Pearson Product Moment (r) with $\alpha = 0.05$ and r table 0.444. The reliability test is based on Crobach's alpha with $\alpha > 0.6$.

The data was collected directly to the respondents using google form. During the survey the researcher accompanied the respondents and took around 5 minutes to complete the form. The data was analyzed through bivariate and multivariate processes. Bivariate analysis used Chi-Square and Spearman Rho tests. Meanwhile, for multivariate analysis using the logistic regression test. All of the statistical analysis using $\alpha = 0,05$. The analysis results were then processed using SPSS (Statistical Package for Social Science) version 26 software.

The study complied with the ethical norm and was granted ethical clearance by the number 2842-KEPK by the Ethical Commission of the Faculty of Nursing Universitas Airlangga on 12 April 2023.

3. RESULTS AND DISCUSSION

Table 2. Demographic Characteristics of Respondents (n=120)

Demographic characteristics	Category	Frequency (f)	Percentage (%)
Trail run clubs	MANTRA	20	16,7
	BDG *Explorer*	100	83,3
Age	18-25 Years	50	41,7
	26-35 Years	29	24,2
	36-45 Years	24	20
	46-55 Years	15	12,5
	≥ 56 Years	2	1,7
Total		120	100%

Table 2 shows the largest number of respondents came from the BDG Explorer club, 83.3% (100 respondents), while 16.7% (20 respondents) came from the MANTRA club. The majority of respondents, 41.7% (50 athletes) were aged 18 – 25 years. Only 1.7% (2 athletes) were ≥ 56 years old.

Table 3. The significant factor influencing athlete's preparedness to perform pre-hospital first aid

Variable	Category	Preparedness Level % (n)			Total	p-value	r value
		Low	Medium	High			
Knowledge	Low	0% (0)	17,5% (21)	1,7% (2)	19,2% (23)	0,000	
	Medium	0% (0)	24,2% (29)	30% (36)	54,2% (65)		
	High	0% (0)	0,8% (1)	25,8% (31)	26,7% (32)		
Belief	Low	0% (0)	0% (0)	0% (0)	0% (0)	0,000	0,744
	Medium	0% (0)	41,7% (50)	13,3% (16)	55% (66)		
	High	0% (0)	0,8% (1)	44,2% (53)	45% (54)		

		0% (0)	0% (0)	0% (0)	0% (0)		
Value	Medium	0% (0)	41,7% (50)	11,7% (14)	53,3% (64)	0,000	0,770
	High	0% (0)	0,8% (1)	45,8% (55)	46,7% (56)		
Attitude	Negative	0% (0)	38,3% (46)	6,7% (8)	45% (54)	0,000	0,781
	Positive	0% (0)	4,2% (5)	50,8% (61)	55% (66)		
	Low	0% (0)	0% (0)	0% (0)	0% (0)		
Confidence	Medium	0% (0)	40,8% (49)	13,3% (16)	54,2% (65)	0,000	0,723
	High	0% (0)	1,7% (2)	44,2% (53)	45,8% (55)		

Table 3 shows the bivariate analysis employing the Chi-square test yielded a significant value of p=0.000 (p<0.05), indicating a positive association between knowledge and preparedness. Thus, the knowledge variable qualifies for multivariate analysis using logistic regression. Similarly, Spearman's rho test revealed significant values (p=0.000, p<0.05) for belief and preparedness, with a strong coefficient of 0.744, meeting the criteria for multivariate analysis. Furthermore, the relationship between scores and preparedness, as indicated by Spearman's rho test (p=0.000, p<0.05) and a coefficient of 0.770, also qualifies for multivariate analysis. The correlated factors to the trail run preparedness to perform pre hospital first aid for ankle sprain was as follows. Majority had medium level of knowledge (54,2%) and significance level of p = 0.000. Similar trends found between belief, value, and confidence in which there were no low levels of those variables with same significance value of p = 0.000. Lastly, respondent's percentages of attitude were almost equally distributed between negative (45%) and positive (66%) with a significance level of p = 0,000. These findings underscore the robust positive associations between the variables and preparedness for logistic regression analysis.

Table 4. Multivariate analysis (logistic regression)

		B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Step 1	Knowledge (X1)	2,689	1,175	5,239	1	0,022	14,713
	Belief (X2)	4,356	1,760	6,122	1	0,013	77,919
	Value (X3)	2,865	1,304	4,826	1	0,028	27,554
	Attitude (X4)	1,976	0,917	4,642	1	0,031	7,213
	Confidence (X5)	2,518	1,141	4,871	1	0,027	12,408
	Constant	-27,566	7,170	14,783	1	0,000	0,000
Regression formula	I = -27.566 + 2.689(X1) + 4.356(X2) + 2.865(X3) + 1.976(X4) + 2.518(X5)						

The negative constant value of -27.566 suggests that when all independent variables - Knowledge (X1), Belief (X2), Score (X3), Attitude (X4), and Self-confidence (X5) - are held constant or at zero, the inclination towards first aid preparedness decreases by 27.566 units (table 4). The knowledge variable regarding preparedness to perform pre hospital first aid for ankle sprain shows significance at p=0.022<0.05. It denotes that knowledge exerts a significant partial influence on trail runners' preparedness to perform pre hospital first aid for ankle sprain, with a regression coefficient of 2.689. The positive coefficient implies a direct relationship; higher knowledge correlates with increased preparedness. Furthermore, the odds ratio (OR) for knowledge is 14.713, indicating that trail runners with substantial knowledge are 14.713 times more likely to exhibit high preparedness compared to those with lesser knowledge.

Similarly, belief among trail runners regarding preparedness to perform pre hospital first aid for ankle sprain yields significance at p=0.013<0.05. Belief significantly influences trail runners' preparedness, with a regression coefficient of 4.356. The positive coefficient suggests a direct relationship; higher belief corresponds to heightened preparedness. The odds ratio (OR) for belief is 77.919, indicating that trail runners with high belief levels are 77.919 times more likely to demonstrate high preparedness compared to those with lower belief levels.

Furthermore, the value related to preparedness for perform pre hospital first aid for ankle sprain among trail runners shows significance at p=0.028<0.05. The score variable significantly influences trail runners' preparedness, with a regression coefficient of 2.865. A positive coefficient signifies a direct relationship, indicating that higher scores correlate with increased preparedness. The odds ratio (OR) for the score is 27.554, implying that trail runners with higher scores are 27.554 times more likely to exhibit high preparedness compared to those with lower scores.

Additionally, attitude among trail runners regarding preparedness to perform pre hospital first aid for ankle sprain is significant at p=0.031<0.05. Attitude significantly influences trail runners' preparedness, with a regression coefficient of 1.976. The positive coefficient indicates a direct relationship; a more positive attitude corresponds to higher preparedness. The odds ratio (OR) for attitude is 7.213, suggesting that trail runners with a positive attitude are 7.213 times more likely to demonstrate high preparedness compared to those with a negative attitude.

Lastly, self-confidence among trail runners regarding preparedness to perform pre hospital first aid for ankle sprain shows significance at p=0.027<0.05. Self-confidence significantly influences trail runners' preparedness, with a regression coefficient of 2.518. The positive coefficient implies a direct relationship; higher self-confidence corresponds to increased preparedness. The odds ratio (OR) for self-confidence is 12.408, indicating that trail runners with high self-confidence are 12.408 times more likely to exhibit high preparedness compared to those with low self-confidence.

2. DISCUSSION

The PRECEDE-PROCEED model is widely used to understand health behavior so a correct health education is possible (Azar et al., 2018; Green & Kreuter, 2005; Monteiro et al., 2014). The study aimed to explore the correlation of knowledge, belief, value, attitude, and self-confidence—among trail runners towards preparedness in perform pre hospital first aid for ankle sprains. The analysis shown that athlete's knowledge, particularly their grasp of complications associated with ankle sprains, as a determinant of preparedness. Those with high preparedness predominantly possess sufficient knowledge (Rostami-Moez et al., 2017). Effective prevention and rehabilitation programs, with the latter noting the high recurrence rate and associated disability. Ankle sprain evaluation, rehabilitation, and prevention could be enhanced by considering the role of athlete knowledge in preparedness (Chen et al., 2019; Pell & Beach, 2022; Tomás & Visco, 2022).

Additionally, the study emphasizes the significant influence of athlete's belief on their preparedness, with high belief levels correlating with increased preparedness. There were no instances of low preparedness coupled with low belief, highlighting a positive correlation between belief and preparedness. Research has shown a positive correlation between an athlete's belief and their preparedness (Emdadi et al., 2015). Despite this, the perceived quality of athlete leaders is positively related to team outcome confidence (Fransen et al., 2014; C. Viljoen et al., 2024; C. Viljoen, Janse van Rensburg, van Mechelen, Verhagen, Korkie, et al., 2022). Additionally, actively do trail running activities at least around 10.5 km / week makes healthier and more prosperous feelings (self-rated wellness and health) (Smiley et al., 2020).

The research found that knowledge, belief, value, attitude, and confidence were significantly correlated with the athlete's preparedness Together all variables were correlated significantly to the athlete's preparedness to perform ankle sprain first aid. To improve athlete's safety during trail run is by improve the preparedness of any adverse event including trail run. All of the factors could increase the preparedness, but some factor resulted higher preparedness. The factors that have more effect to preparedness than the others are belief and value (Fransen et al., 2014; Sawyer & Sawyer, 2023; C. Viljoen et al., 2024; C. Viljoen, Janse van Rensburg,

van Mechelen, Verhagen, Korkie, et al., 2022; C. Viljoen, Janse van Rensburg, van Mechelen, Verhagen, Silva, et al., 2022; C. T. Viljoen, Sewry, et al., 2021).

The limitation of this study only recruited athletes from two trail run clubs, which might cause bias since there are clubs who is not as well prepared as the two recruited clubs.

4. CONCLUSION

In conclusion, the research shown the intricate interplay of knowledge, belief, value, attitude, and self-confidence among trail run athletes, revealing their significant impact on preparedness for ankle sprains first aid. All of the factors could increase the preparedness, but some factor resulted higher preparedness. The factors that have more effect to preparedness than the others are belief and value. Furthermore, high levels of knowledge, belief, perceived value, positive attitude, and self-confidence correlate with heightened preparedness. Athlete should enhance the knowledge, trigger the belief, improve the value, change the attitude, and teach to be confident.

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