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PERCEPTION TOWARDS WATER SAFETY AND RISK OF INJURY AMONG NDUM STUDENTS

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ABSTRACT

This study investigates NDUM (National Defence University Malaysia) students' perceptions of water safety and injury risk, focusing on their involvement in water recreational activities and swimming proficiency. A total of 351 students (202 male, 149 female), aged 18 to 28, participated in this research using random sampling. The study assessed self-reported participation in activities such as swimming and kayaking and evaluated students' perceptions of water safety and injury risk. Results indicate a high perception of injury risk (M = 19.75, SD ± 3.363), which is 53.3% above the mean, and a low perception of water safety (M = 32.03, SD ± 6.520), which is 57.8% below the mean. Swimming (21.4%) and kayaking (22.8%) emerged as the most popular water activities among students. Gender differences were significantly associated with perceptions of water safety ($t(350) = 3.114$, $p < 0.05$). Additionally, swimming ability ($\chi^2(1, N = 351) = 4.669$, $p < 0.05$) and experiences related to drowning influenced perceptions of water safety. Environmental factors, such as living near water resources, also showed significant differences in perceptions of water safety ($\chi^2(1, N = 351) = 4.187$, $p < 0.05$). However, there were no significant variations in perceptions of injury risk related to these factors. These findings underscore the need for targeted interventions to enhance water safety perceptions and potentially mitigate injury risk perceptions among students.

1.0 INTRODUCTION

Activities involving water have long provided people with joy and relaxation (Campón-Cerro et al. 2020). Activities like swimming in a pool, taking a leisurely dip in the ocean, or participating in water sports such as kayaking, boating, and fishing can provide a welcome respite from the daily grind. However, individuals as well as those in charge of the recreational program need to address the potential risks and safety concerns that lie beneath the surface of these enjoyable activities (Cheng et al. 2022). The basis of appropriate aquatic recreation and activities is water safety. The primary goal is to equip individuals with the knowledge and skills necessary to enjoy aquatic environments responsibly and safely, while acting as a buffer against uncontrollable occurrences. Several essential components of this all-encompassing approach come together to support the development of a safety and awareness culture in and around bodies of water (Solomon et al. 2013). Moreover, water safety requires following safety procedures and using the appropriate gear. Life jackets, swimming proficiency, and awareness of weather conditions are crucial preventative measures for outdoor activities such as kayaking, boating, and fishing (WHO, 2003).

Activities in open water are always a part of the recreational program. Open water rarely has depth markers, according to Safe Kids Worldwide (2018), making it more challenging for parents to tell when a child is getting too deep. For example, although swimming pools are typically supervised areas with

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lifeguards on duty, natural waterways like lakes and oceans can have unpredictable features, such as strong currents, sudden depth changes, and aquatic life, all of which can be highly hazardous.

Additionally, open water typically involves longer distances than a pool and determining the distance to the coast can be difficult. This can increase the likelihood of drowning, even for excellent swimmers. Although the entrance to a beach is usually gentle (slopes down into the water), this can change with the tides for tidal rivers or the ocean, or with the seasons for rivers and lakes. For example, a beach may have a long, gradual entry in the spring, but as the water level drops, a sharp drop-off near the shore may occur.

People must therefore be fully aware of the reasons why open water is riskier and what they can do to lessen the risks. Open water exposes people to risks not found in swimming pools. People should therefore be aware of the risks involved when swimming in open water, such as lakes, rivers, reservoirs, and swamps. Safe Kids Worldwide (2018) states that if a person falls into open water, their vision may be impaired by the murkiness. This is because light is scattered by suspended particles in murky water, including sand, silt, and algae, making it harder for the eyes to focus and see clearly. Aside from that, the most prominent possible hiding place for hazards like rocks, logs, uneven surfaces, and abrupt drop-offs is open water. Furthermore, certain plants and litter in open water can make swimming challenging or even frightening for swimmers. As highlighted in a study by Weiffen et al. (2006), muddy water can lower visual acuity by as much as 70%. This is because light scattering causes out-of-focus and fuzzy pictures. Furthermore, earlier research found that murky water may reduce visual contrast, making it more difficult to distinguish between objects.

Consequently, it is becoming increasingly accepted that improving awareness and enhancing the capacity for informed personal decision-making are essential elements in ensuring the safe use of aquatic habitats for recreational purposes, as well as an essential management intervention (WHO, 2003). The general public relies on its own perceptions as well as information from the news media, local government notice boards, environmental organisations, and tourism promotions regarding health and safety risks and facilities. Information booklets are distributed, customers are trained in safe behaviour and practices, warning notices are posted, hazardous areas are designated, and lifeguards are stationed by local governments, non-governmental organisations (NGOs), and the tourism industry. Furthermore, the media can play a significant role in raising public awareness and spreading information about public awareness campaigns.

With swimming and kayaking being popular recreational activities among the students, understanding their perceptions of safety and risk is essential for ensuring their well-being. As these activities carry inherent risks, addressing safety concerns can help prevent accidents and injuries. Moreover, at NDUM, there are facilities for water activities, including a swimming pool and a lake, as well as fully equipped facilities for kayaking activities. This exposed students to the risk of injury related to water activities. The study reveals that students have a high perception of injury risk and a low perception of water safety. This disparity is crucial to address because it affects how students engage in and manage water-related activities, potentially leading to over-caution or risky behaviour.

2.0 METHODOLOGY

2.1 Participants

Students at the National Defence University of Malaysia represented the study's population. Approximately 4000 students represented the student population at NDUM. As a result, according to Krejcie & Morgan (1970), the representative sample size is 351. Respondents, aged 18 to 28, participated (n = 202 males, n = 149 females). To gather data on students' self-reported involvement in water recreational activities, swimming proficiency, and perceptions of water safety and injury risk during water activities, the researcher employed random sampling in this study.

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2.2 Survey Instruments and Measures

The data were collected using survey questionnaires as the primary instrument to assess the relationship between perceptions of water safety and the risk of injury during water activities among NDUM students. The questionnaire is adopted from McCool et al (2008). The questionnaire consists of four sections. Since the NDUM students communicated in Bahasa Melayu on a daily basis, this language was chosen for use in writing the questionnaire. The sections include demographic factors, information on competency and experience in water, information on water safety, and perception of water safety and risk of injury and drowning during water-based recreational activities.

The original language of the instruments was English (McCool et al. 2008). Professional translators translated the question back-to-back into Bahasa Melayu. The experts were school English teachers who were fluent in both English and Bahasa Melayu.

Pilot research was conducted to determine the effectiveness of the study. Questions from the set were used in a pilot study with 30 respondents (not from NDUM), despite having been pretested, before the research questionnaires were sent out. The internal consistency of this pilot study, $\alpha = 0.7$, indicates an acceptable value for both perceptions of water safety and injury risk.

2.3 Types of Water Activities in Outdoor Recreational Program

The water activities mentioned by the students primarily involved recreational activities, including both swimming and non-swimming activities such as fishing, boating, canoeing, and kayaking. According to the data presented in Fig. 1, the majority of respondents (22.8%, n = 80) reported enjoying kayaking as a recreational activity. Additionally, 21.4% (n = 75) reported participating in swimming activities. Other activities included boating (14%, n = 49), diving (7.7%, n = 27), fishing (10.3%, n = 36), and various other water-related activities (13.1%, n = 46).

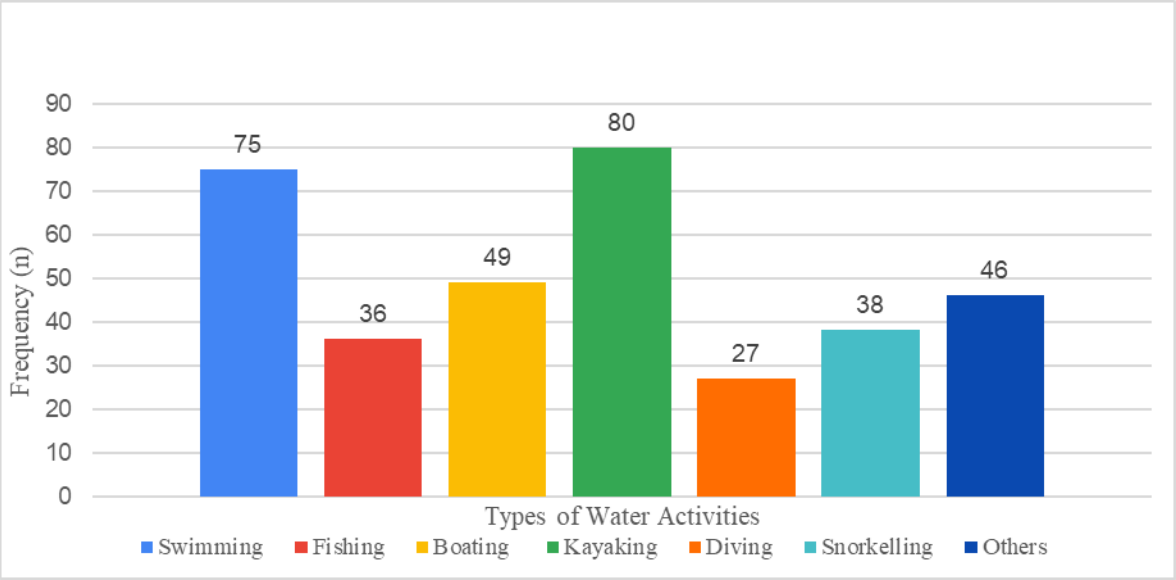

Fig. 1: Types of Water Activities in the Outdoor Recreation Program

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2.4 Types of Water Activities in Outdoor Recreational Program

The perceptions of NDUM students about water safety are shown in Table 1. When engaging in recreational water activities in open spaces, the majority of respondents (73.2%) stated that they are constantly concerned about the possibility of drowning. Furthermore, 67.9% of respondents disapproved of the claim that a competent swimmer is exempt from wearing a life jacket when boating. Additionally, 68.4% of participants reported feeling unsafe when using the water during inclement weather. Remarkably, 34.5% of respondents were unsure if their ability to swim would allow them to save others in open water. These findings align with McCool et al. (2009), who reported that many respondents lacked confidence in their ability to rescue others in open water. A five-point Likert scale was used to measure the perceptions, with the range being 'strongly disagree' to 'strongly agree'.

No	Items	Strongly Agree n (%)	Agree n (%)	Uncertain n (%)	Disagree n (%)	Strongly Disagree n (%)	Mean	SD (±)
D1	The risk of drowning is always on my mind when doing water–based recreational activities in open water	101 (28.8)	156 (44.4)	35 (10.0)	47 (13.4)	12 (3.4)	3.82	1.096
D2	Wearing a life jacket is unnecessary for good swimmers on a boat	19 (5.4)	58 (16.5)	36 (10.3)	89 (25.4)	149 (42.5)	2.17	1.285
D3	I often feel at risk of doing water-based recreational activities when the weather conditions are bad	154 (43.9)	121 (24.5)	42 (12.0)	21 (6.0)	13 (3.7)	4.09	1.061
D4	My swimming competence means I can save others in open water	34 (9.7)	83 (23.6)	121 (34.5)	59 (16.8)	54 (15.4)	2.95	1.187
D5	My current level of swimming fitness will ensure my safety in open water	47 (13.4)	131 (37.3)	116 (33.0)	10 (11.4)	17 (4.8)	3.43	1.017
D6	Other people are at greater risk than I am when doing water-based recreational activities in open water	48 (13.7)	87 (24.8)	146 (41.6)	53 (15.1)	17 (4.8)		1.033
D7	I feel safe during water -based recreational activities in open water	47 (13.4)	98 (27.9)	123 (35.0)	55 (15.7)	28 (8.0)	3.23	1.114
D8	Swimming at beaches and rivers in Malaysia is safe without learning to swim	26 (7.4)	50 (14.2)	70 (19.9)	74 (21.1)	121 (37.3)	2.33	1.305
D9	The program organiser is fully responsible for my safety during water-based recreational activities	134 (38.2)	114 (32.5)	62 (17.7)	29 (8.3)	12 (3.4)	3.94	1.094
D10	When at the beach or river, swimming in regular clothes (such as jeans, T-shirt, etc.) is possible	38 (10.8)	84 (23.9)	82 (23.4)	64 (18.2)	83 (23.6)	2.80	1.329

Table 1: Perception of Water Safety During Water Activities

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The results (Table 2) indicate that the level of perception regarding water safety among NDUM students is relatively low, with a mean score of 32.03 (SD ± 6.520). Specifically, 57.8% of students scored below the mean, suggesting a widespread lack of awareness about the importance of water safety. This finding aligns with previous research by Farizan et al. (2020), which emphasised the need to enhance water safety education, particularly among young people. This study highlights the importance of raising awareness and education about water safety to inform students better and enhance their safety practices.

Perception	Frequency (n)	Percent (%)
Low	203	57.8
High	148	42.2

Table 2: Level of Perception on Water Safety based on Total Mean Score

2.5 Perception of Risk of Injury During Water Activities

Based on Table 3, the majority of respondents, 49.0%, reported being caught in a rip current, and 43.3% experienced problems with their breathing apparatus, indicating they are at extreme risk. Respondents also believe that encountering unexpected marine objects might pose a high risk to them.

No	Items	No Risk n (%)	Slight Risk n (%)	High Risk n (%)	Extreme Risk n (%)	Mean	SD (±)
E1	Tipped upside down in a canoe 100m from the shore of the lake	18 (5.1)	125 (35.6)	155 (44.2)	53 (15.1)	2.69	0.787
E2	Caught in a rip current at a surf beach	9 (2.6)	24 (6.8)	146 (41.6)	172 (49.0)	3.37	0.725
E3	Help someone in trouble at a local swimming pool	25 (7.1)	138 (39.3)	148 (42.2)	40 (11.4)	2.58	0.785
E4	Fell into deep water fully clothed while walking along a riverbank	36 (10.3)	148 (42.2)	123 (35.0)	44 (12.5)	2.50	0.841
E5	Swept off isolated rocks by a wave while fishing	91 (25.9)	132 (37.6)	96 (27.4)	32 (9.1)	2.20	0.928
E6	Meets unexpected marine objects such as big fish or poisonous predators)	5 (1.4)	66 (18.8)	149 (42.5)	131 (37.3)	3.16	0.772
E7	Experiencing problems with the breathing apparatus (for example, when water enters the diving mask) during diving activities	8 (2.3)	43 (12.3)	148 (42.2)	152 (43.3)	3.26	0.760

Table 3: Perception of Risk of Injury During Water Activities

The level of perception of risk of injury, based on the total mean score (M=19.75, SD±3.363), as shown in Table 4, indicates that respondents have a high level of perception of risk of injury (above the mean), which is reported by 53.3% of the total 351 respondents, in accordance with earlier research outcomes that emphasise the need for more thorough research on the function of risk perception and the particular aspects of the construct that are connected to water-related activities in recreational programs.

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Risk	Frequency n	Percent (%)
Low	164	46.7
High	187	53.3

Table 4: Level of Perception on Risk of Injury Based on Total Mean Score

2.6 Statistical Analysis

All data were tested for normal distribution and are reported as means ± standard deviations. *t–test was used to identify the differences of gender factors,* and Chi-Square to examine the differences of swimming ability and environmental factors with perception towards water safety and risk of injury during water activities. All statistical analyses were performed using SPSS software (version 26.0, SPSS Inc., Chicago, IL), with a significance level set at $P < 0.05$.

3.0 RESULTS

3.1 Gender Factors on Perception of Water Safety and Risk of Injury During Water Activities

An independent sample t-test was conducted to compare perceptions of water safety and the risk of injury between female and male participants. The results from Table 5 indicate significant differences ($t(350) = 3.144$, $p < 0.05$). Specifically, male students had a higher mean perception score ($M = 32.9$, $SD = 0.69$) compared to female students ($M = 30.8$, $SD = 0.57$). Brought to the fore, this might be that male students are more actively exposed to water-related activities and may have stronger awareness or concern regarding water safety in recreational programs, such as kayaking, swimming, and others, compared to females.

	Perception of Water Safety		*t*-test
	Mean	SD (±)	
Male	32.9	0.69	3.114*
Female	30.8	0.57	

*p-value significant <0.05

Table 5: Perception of Water Safety with Gender

In the context of Table 6, the results indicated no significant differences in the perception of injury risk among both genders of NDUM students. Although this finding contradicts previous studies, which suggest that male and female perceptions of injury risk may differ (Harris & Jenkins, 2006), this discrepancy may be attributed to the differences in demographic background and experiences among the respondents in these studies.

	Risk of Injury		*t*-test
	Mean	SD (±)	
Male	19.8	0.51	0.318
Female	19.6	0.44	

*p-value significant <0.05

Table 6: Perception of Risk of Injury with Gender

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3.2 Swimming Ability on Perception of Water Safety

A Chi-square test of independence was conducted to evaluate the relationship between swimming ability and perceptions of water safety during aquatic activities. Table 7 shows that more than half of the respondents reported having low perceptions of water safety. The relationship between swimming ability and perceptions of water safety was found to be significant, $\chi 2$ (1, N = 351) = 4.669, $p < 0.05$. The findings also revealed that 79.73% of respondents who can swim reported a low level of perception of water safety. NDUM students also rated their swimming proficiency on four levels: very good, good, fair, and cannot swim. The analysis further revealed significant differences between these levels of swimming ability and perceptions of water safety, with $\chi 2(3, N = 351) = 8.406$, $p < 0.05$. Additionally, when respondents self-reported the distance they could swim, ranging from less than 25 meters to over 200 meters, significant differences were observed between swimming distance and perceptions of water safety, $\chi 2$ (4, N = 351) = 10.040, $p < 0.05$. However, no significant differences were found between the places where respondents usually swim and their perceptions of water safety, $\chi 2$ (4, N = 351) = 3.956, $p > 0.05$. Similarly, there were no significant differences between attending swimming classes and perceptions of water safety, $\chi 2$ (1, N = 351) = 1.960, $p > 0.05$. Interestingly, respondents with previous experiences of drowning showed significant differences in their perceptions of water safety, $\chi 2(1, N = 351) = 3.823$, $p < 0.05$. Probably, based on their swimming ability, they have concerns about water safety and reduce the chances of drowning while engaging in water activities (Farizan et al. 2020).

3.3 Swimming Ability on Perception of Risk of Injury

To assess the relationship between swimming ability and perceptions of injury risk during water activities, a Chi-Square test of independence was used. Table 7 presents the variables related to swimming ability and perceptions of risk of injury. The analysis results indicated no statistically significant differences among the examined variables. After careful inspection and analysis, the data do not reveal any statistically significant differences or patterns. Swimming ability, with the variables of whether they can swim, how well they can swim, how far they can swim, where they can swim, whether they have ever attended swimming class, and whether they have experience with drowning, does not have any differences in how they perceive the risk of injury.

Variables	**Perceptions on Water Safety**			**Perceptions on Risk of Injury**		
	Low (n=203)	**High (n=148)**	**p-value**	**Low (n=164)**	**High (n=187)**	**p-value**
Did you can swim?			4.669*			0.538
Yes	141 (69.46%)	118 (79.73%)		118 (71.95%)	141 (75.40%)	
No	62 (30.54%)	30 (20.27%)		46 (28.05%)	46 (24.60%)	
How well you can swim?			8.406*			1.675
Very good	16 (7.88%)	21 (14.19%)		19 (11.59%)	18 (9.63%)	
Good	45 (22.17%)	43 (29.05%)		38 (23.17%)	50 (26.74%)	
Fair	100 (49.26%)	65 (43.92%)		75 (45.73%)	90 (48.13%)	
Cannot swim	42 (20.69%)	19 (12.84%)		32 (19.51%)	29 (15.5%)	

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How far can you swim			10.040*		5.984
<25m	90 (44.33%)	48 (32.43%)	69 (42.07%)	69 (36.9%)	
25m to 50m	68 (33.5%)	46 (31.08%)	47 (28.66%)	67 (35.83%)	
51m to 100m	25 (12.32%)	30 (20.27%)	22 (13.41%)	33 (17.65%)	
101m to 200m	8 (3.94%)	7 (4.73%)	8 (4.88%)	7 (3.74%)	
>200m	12 (5.91%)	17 (11.49%)	18 (10.98%)	11 (5.88%)	
Where did you swim?			3.956		0.925
Swimming pool	124 (61.08%)	87 (58.78%)	98 (59.76%)	113 (60.43%)	
River	33 (16.26%)	16 (10.81%)	24 (14.63%)	25 (13.37%)	
Lake	8 (3.94%)	8 (5.41%)	6 (3.66%)	10 (5.35%)	
Beach	32 (15.76%)	32 (21.62%)	30 (18.29%)	34 (18.18%)	
Others	6 (2.96%)	5 (3.38%)	6 (3.66%)	5 (2.67%)	
Did you ever attend swimming class?			1.960		0.872
Yes	93 (45.81%)	79 (53.38%)	76 (46.34%)	96 (51.34%)	
No	110 (54.19%)	69 (46.62%)	88 (53.66%)	91 (48.66%)	
Did you have experience from drowning?			3.823*		1.707
Yes	128 (63.05%)	108 (72.97%)	116 (70.73%)	120 (64.17%)	
No	75 (36.95%)	40 (27.03%)	48 (29.27%)	67 (35.83%)	

* p-value significant <0.05

Table 7: Swimming Ability and Perceptions of Water Safety and Risk of Injury During Water Activities

3.4 Environmental Factors on Perception of Water Safety

Table 8 presents the differences between open water sources near the respondent's residence and their perceptions of water safety. There are significant differences between these variables, $\chi 2(1, N = 351) = 4.187$, $p < 0.05$. They might be aware of the safety precautions due to the exposure to open water nearby.

3.5 Environmental Factors on Perception of Risk of Injury

None of the statistically significant differences found in the analysis between environmental factors and perceptions of risk of injury (Table 8) indicate that there are no differences among the parameters, such as whether they had a swimming pool at their residency, whether they were near open water sources, and whether their residency was in a flood area, that were examined. The data does not show any significant differences or noteworthy variations that would be considered statistically significant in this analysis, even

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after careful inspection and examination. Even though they are exposed to those environmental factors, it does not affect their perception of risk of injury, such as drowning.

Variables	Perceptions on Water Safety			Perceptions on Risk of Injury		
	Low (n=203)	High (n=148)	p-value	Low (n=164)	High (n=187)	p-value
Did you have swimming pool at your residency?			0.269			0.042
Yes	38 (18.72%)	31 (20.95%)		33 (20.12%)	36 (19.25%)	
No	165 (81.28%)	117 (79.05%)		131 (79.88%)	151 (80.75%)	
Is there open water source near to your residency (< 1KM)?			4.187*			0.068
Yes	130 (64.04%)	110 (74.32%)		111 (67.68%)	129 (68.98%)	
No	73 (35.96%)	38 (25.68%)		53 (32.32%)	58 (31.02%)	
Did your residency at the flood risk area?			0.132			0.364
Yes	38 (18.72%)	30 (20.27%)		34 (20.73%)	34 (18.18%)	
No	165 (81.28%)	118 (79.73%)		130 (79.27%)	153 (81.82%)	

Table 8: Environmental Factors on Perceptions of Water Safety and Risk of Injury During Water Activities

4.0 DISCUSSIONS

4.1 Perceptions on Water Safety and Risk of Injury During Water Activities between Gender

Gender differences in risk-taking propensity have been widely documented, with studies consistently showing that males are more likely than females to engage in risky behaviours. For example, Byrnes et al. (1999) found that male participants tend to take more risks, a pattern that has been observed across various contexts, including water activities. This finding aligns with this current study, where males demonstrated a higher propensity for risk-taking in water-related scenarios compared to females. However, the perception of water safety is not solely determined by gender; personal experiences and the level of water safety education also shape it. Moran (2008) and Olaves et al. (2019b) emphasise that individuals who have undergone thorough water safety training or who have experienced water-related accidents may develop a heightened awareness of safety, leading to more cautious behaviour. This observation complements the study's findings, which show that participants with such backgrounds tend to prioritise safety, regardless of gender. Furthermore, Stanley & Moran (2021) suggest that the influence of personal experiences on safety perception can vary between genders, with males potentially requiring more significant experiences to alter their risk-taking behaviour. In contrast, females may be more responsive to safety education and experiences, leading to a more cautious approach to water activities. This nuance is reflected in this study, where females generally exhibited more conservative attitudes toward water safety, aligning with the literature's assertion that they are more likely to prioritise safety over risk.

4.2 Perceptions on Water Safety and Risk of Injury During Water Activities with Swimming Ability

According to the study's findings, the opinions of NDUM students regarding water safety and their swimming ability differ significantly. This suggests that respondents' opinions about the safety of the water

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are influenced by their swimming ability. Their level of concern for water safety is influenced by their ability to swim a certain distance. If they are proficient swimmers, they are aware of the safety measures to follow when participating in aquatic activities. Additionally, their personal experience with drowning has made them more watchful and aware of water safety (Petrass & Blitvich, 2014). Contrarily, no significant differences were found between the risk of injury and swimming ability. This runs counter to earlier research by Stanley & Moran (2018), who found that swimmers perceive a high risk of injury when participating in aquatic activities. The likelihood of drowning, the dangers of open water, including rip currents, water surges, and other water-related injuries, are likely to blame for this low exposure and awareness.

4.3 Perceptions on Water Safety and Risk of Injury During Water Activities with Environmental Factors

The results show that the respondents' perceptions of water safety differ significantly depending on the open water resources located near their place of residence. There may be instances of water-related incidents, including drownings, tsunamis, flash floods, rip currents, and other related incidents. Most likely, the respondent believed that their perception of water safety precautions may be influenced by adjacent open water sources (Olowoporoku, 2018). This increased awareness may result from personal experience or from information disseminated by the community about previous water-related incidents. Either way, it reinforces the concept that being aware of open water sources requires increased caution and adherence to safety protocols. As a result, individuals residing near these bodies of water may become more aware of the risks associated with participating in aquatic activities, which could influence their approach to water safety.

5.0 CONCLUSION

In conclusion, most participants exhibited a high perceived risk of harm and a low awareness of water safety, with significant differences observed across various factors, including gender, environment, and swimming proficiency. These results underscore the importance of swimming as a life skill and the need for targeted water safety education. Improving safety perceptions and reducing aquatic risks requires raising awareness through community programs and education; future studies should focus on how effectively these interventions work for various demographic groups.

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