ORIGINAL ARTICLE

Knowledge, Attitudes, and Implementation Challenges of Preventive Rehabilitation Programs among Malaysian Collegiate Football Players: A Cross-Sectional Analysis

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ABSTRACT

INTRODUCTION: Football is a high-risk sport for lower limb injuries, prompting the use of Football Injury Prevention Programs (FIPP). Despite evidence of effectiveness, implementation remains inconsistent. This study aimed to (i) explore Malaysian collegiate football players' knowledge, attitudes, and challenges regarding FIPP and (ii) examine the influence of demographic and institutional contexts, particularly between public and private institutions. **MATERIALS AND METHODS:** A cross-sectional survey using an online structured interview was conducted among Malaysian collegiate football players aged 18 and above who were actively participating at the college or university level. The survey comprised seven sections: demographics, football background, FIPP implementation, injury rates, knowledge of FIPP, attitudes, and barriers to implementation. Data were analysed using descriptive, cross-tabulations, and correlation statistics. **RESULTS:** Out of 103 responses, 80 met the inclusion criteria. The respondents were predominantly Malay (51.2%) and Chinese (36.3%), with a mean age of 23.4±4.55 years. Notably, 82.5% reported previous football-related injuries, while 81.3% utilized some form of injury prevention, primarily running (56.3%) and strength training (52.5%). Despite 67.5% acknowledging the benefits of FIPP, 46.3% perceived their knowledge as insufficient, and only 36.3% had received any formal training. Furthermore, a significant positive correlation was found between knowledge and attitudes toward FIPP ($r = 0.438$, $p < 0.001$). Key barriers included insufficient knowledge (41.3%) and limited access to qualified instructors (40.1%). **CONCLUSION:** Despite positive attitudes toward preventive rehabilitation, knowledge deficits and implementation barriers persist, underscoring the need for targeted education to improve FIPP adoption and reduce injury rates.

Keywords
football, injury prevention, knowledge, attitudes, FIFA 11+

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INTRODUCTION

Football is widely played globally, with over 275 million players across 211 FIFA member associations.[1] Despite its appeal, football has a high injury risk, especially to the lower limbs, making injury prevention essential for player safety.[2,3] In Malaysia, football-related injuries were notably high during the 2018 Malaysian Games, with 64.6 injuries per 1000 match hours reported.[3] Data from the 2018-2019 season indicated an injury rate of 0.58 injuries per player among youth players (U19 and U22), primarily affecting the knee and ankle joints.[4] Similar trends were observed in the 2010 Football Association of Malaysia league, with a rate of 61 injuries per 1000 match hours.[5] These statistics underscore the need for targeted injury prevention programs, especially for youth and collegiate football athletes in Malaysia.

Youth and collegiate players face a significantly higher injury risk than professionals.[6] This risk arises from factors like developmental differences (e.g., growing bones and muscles), less refined motor skills (e.g., coordination challenges during quick movements), and a higher likelihood of overuse injuries due to ongoing physical development and limited injury prevention knowledge (e.g., improper warm-ups or inadequate

recovery).[6,7] Injuries in youth players can lead to extended absences, long-term effects on physical development, and psychological impacts like reduced motivation or confidence.[6,8] Studies show that lower limb injuries are common among players, with males more prone to thigh muscle injuries, while females more frequently experience joint or ligament injuries in the knee and ankle.[8] Injury risk is also higher during matches than in training for both youth and professional players.[2,6]

In response, FIFA, in collaboration with the Santa Monica Sports Medicine Foundation and the Oslo Sports Trauma Research Center, launched the FIFA 11+ program in 2006.[9] This preventive warm-up program addresses strength, stability, and biomechanical deficiencies to mitigate injury risks.[9] The program includes three core components: running drills, strength and balance exercises, and plyometric exercises, each targeting key aspects of injury prevention.[9] Running drills focus on warm-up and neuromuscular activation, incorporating progressive intensity and direction changes to enhance cardiovascular fitness, agility, and motor control.[9] Strength and balance exercises target muscle groups such as the hamstrings, quadriceps, and core muscles to improve muscular strength, balance, and coordination, reducing injury risks associated with muscle imbalances and instability.[9] Plyometric exercises emphasize explosive movements, such as jumps and bounds, to enhance power, agility, and dynamic stability while improving proprioception and landing mechanics, which are critical for reducing lower limb injuries, particularly ACL tears.[9] Research shows that the FIFA 11+ program effectively reduces injuries, including ACL tears, hamstring injuries, and ankle sprains,[10] while enhancing dynamic balance, agility, proprioception, and hamstring strength.[11-13]

Although the FIFA 11+ program has proven effective, its adoption remains relatively low.[14,15] Its successful implementation depends on factors like players' and coaches' knowledge, attitudes, and perceived barriers.[16-18] Research highlights several barriers to effective FIFA 11+ implementation, including time constraints, insufficient skills and knowledge, and lack of program progression.[19] Coaches often cite challenges like limited staff and player cooperation, while players report issues such as decreased motivation and perceived exercise difficulty.[20] However, comprehensive data on how knowledge, attitudes, and barriers influence the adoption of injury prevention programs among Malaysian collegiate football players remain scarce.[3,18] Additionally, there is limited information on how institutional factors, such as the differences between public and private institutions, affect the adoption and implementation of FIPP. Exploring these differences provides valuable insights into how institutional settings shape players' knowledge, attitudes, and barriers, particularly in the Malaysian collegiate football context. Public and private institutions in Malaysia are known to attract distinct student demographics, with variations in access to resources, cultural diversity, and institutional priorities, which may influence the implementation of injury prevention programs. Identifying such differences can help tailor interventions to improve the adoption and effectiveness of FIPP.

This study aims to examine the knowledge, attitudes, and challenges faced by Malaysian collegiate football players regarding the implementation of FIPP. Additionally, it investigates whether differences in demographic and institutional contexts, particularly between public and private institutions, influence these factors. By addressing these objectives, this study aims to contribute to reducing injury rates and enhancing the adoption of effective injury prevention strategies in Malaysian collegiate football.

MATERIALS AND METHODS

Study design

This cross-sectional study used an online survey method. Data were collected via an online structured interview which was distributed from February to August 2024.

Target population

The target population for this study comprised collegiate football players from public and private colleges and universities in Malaysia. Inclusion criteria were: (i) Malaysian collegiate football players aged 18 years or older; (ii) targeting both male and female players; (iii) actively engaged in football training sessions or

matches at the college or university level within the preceding six months; and (iv) the ability to read and comprehend texts fluently in either English or Malay language. Exclusion criteria were: (i) non-players (e.g., coaches or support staff); (ii) individuals not actively engaged in football during the study period; and (iii) players who participated in football only for leisure purposes and not at a collegiate competitive level.

Sample size

The estimated population of collegiate football players in Malaysia comprises approximately 0.1% to 0.05% of the student body. The sample size was calculated using formula, $n=(Z^2P(1-P))/d^2$.[21] For this calculation, the margin of error was set at 0.05, the estimated proportion of the population (P) was 0.05, and a confidence level of 95% was chosen, corresponding to a Z-score of 1.96. Based on these parameters, the calculation yielded a sample size of approximately 73 football players.[22] Additionally, an online calculator was employed to verify the sample size, using an acceptable error level of 5% (d=0.05), an expected proportion in the population of 0.05 (p=0.05), and a Type I error rate of 5% (α=0.05). This also resulted in a required sample size of 73 players. To account for non-responses, the sample was rounded up to 75 players.

Sampling method

A convenience sampling method was employed for respondents' selection based on predefined inclusion and exclusion criteria. Initial contact with university representatives was made through email and social media channels, where the study's objectives were explained. Upon obtaining consent and support from these representatives, a link to the online structured interview was disseminated to the football players via email and social media platforms. Clear instructions on completing the survey were provided, and response rates were actively monitored, and periodic reminders were sent to enhance participation. To reduce selection bias, multiple outreach methods were used to recruit a diverse range of participants, including different types of universities (public and private) and ensuring representation of both male and female players. This approach aimed to maximize participation while ensuring that the sample represented the target population effectively.

Online structured interview

Data were collected through a structured online interview survey via Google Forms, available in English and Malay to suit participants' language preferences. The questions included multiple-choice, Likert scale, and open-and closed-ended questions, adapted from established studies to ensure relevance and validity.[19,20,23,24] Measures to minimize bias included randomized question order, anonymity to reduce social desirability bias, and neutral language. The survey was organized into seven sections; (i) demographics: basic details (e.g., age, gender, race, height, institution), (ii) football background: playing position, experience, level, and participation regularity, (iii) FIPP implementation and injury rates: injury prevention practices (e.g., running, strength exercises), injury occurrence, and frequency, (iv) knowledge of FIPP: awareness of FIPP, understanding of its goals, training received, and knowledge of the FIFA 11+ program, (v) attitudes and perceptions toward FIPP: views on FIPP's effectiveness, value, feasibility, and integration into training, (vi) barriers to FIPP implementation: identified obstacles like limited awareness, knowledge gaps, time constraints, and lack of support or motivation, and (vii) additional comments: open-ended section for further input.

Data analysis

Data were analyzed using SPSS version 26. To ensure data quality, responses were screened based on the inclusion and exclusion criteria, with incomplete or ineligible responses removed before analysis. Data entry and analysis were conducted collaboratively by two authors to enhance the reliability of the findings and to minimize data entry errors or bias. Normality tests were conducted, and duplicate entries were eliminated. Descriptive statistics, including means and standard deviations for continuous variables (e.g., age, BMI), and frequencies and percentages for categorical variables (e.g., playing position, playing level, FIPP implementation, and injury information), were calculated. Inferential statistics,

such as chi-square tests and one-way ANOVA, were performed to identify significant associations or differences between variables.

In addition, subgroup analyses were conducted to compare responses between players from public and private institutions, focusing on differences in FIPP implementation, knowledge, and injury rates. Sensitivity analyses were performed to assess the robustness of the findings by excluding participants with incomplete data or those who reported inconsistent responses. Frequency analysis was utilized to assess the distribution and percentage of responses for each item, revealing the most and least common answers. Spearman's correlation coefficient was used to examine the relationships between knowledge levels, attitudes, playing levels, playing experience, and FIPP implementation. The significance level was set at $p < 0.05$.

RESULTS

Characteristics of the respondents

A total of 103 responses were collected from the online questionnaire distributed over a six-month period (February to August 2024). After applying exclusion criteria, 23 respondents were excluded for the following reasons: 7 were not collegiate football players, and 16 had not actively participated in training or matches in the past six months. This resulted in a final sample size of 80 respondents, surpassing the target minimum sample size of 75. All respondents were male, with a mean ± SD age of 23.44 ± 4.55 years and a mean ± SD body mass index of 22.65 ± 3.31 kg/m². The ethnic distribution was 51.2% Malay (n=41), 36.3% Chinese (n=29), 8.8% Indian (n=7), and 3.8% from other ethnicities (n=3). The respondents were distributed across various playing positions: goalkeeper (12.5%), defender (36.3%), midfielder (20.0%), and forward (31.3%). The majority were amateur players (85.0%), xwith a smaller proportion being semi-professional (12.5%) and professional (2.5%). Playing experience varied among the respondents: 38.8% had over 10 years of experience, 20% had 7-9 years, and the remainder had shorter durations.

The analysis was further stratified by institution type: 55% of the respondents (n=44) were enrolled in public institutions, and 45% (n=36) were from private institutions. Respondents from private institutions were significantly older on average (F=4.55, p=0.036), and there was a notable difference in ethnic composition between the two groups: Malay participants were predominantly from public institutions, while Chinese participants were the majority in private institutions (X^2=31.61, p<0.001). No significant differences were observed between the institutions concerning playing position, playing level, or years of experience. A detailed breakdown of the respondents' characteristics, stratified by institution type, is provided in Table I.

Table I: Demographic characteristics and the implementation of football injury prevention programs among collegiate football players

Variables		Overall (n=80)	Public institution (n = 44)	Private institution (n = 36)	X^2 or F-value	p-value
		n (%) or mean ± SD				
Age	Years	23.44 ±	22.48 ±	24.61 ±	F=4.55	0.036*
BMI	kg/m²	22.65 ±	22.21 ±	23.18 ±	F=1.74	0.191
Ethnicity	Malay	41	35 (79.5)	6 (16.7)	X^2=31.61	0.000*
	Chinese	29	6 (13.6)	23 (63.9)		
	Indian	7 (8.8)	2 (4.5)	5 (13.9)		
	Others	3 (3.8)	1 (2.3)	2 (5.6)		
Position	Goalkeeper	10	7 (15.9)	3 (8.3)	X^2=1.41	0.702
	Defender	29	16 (36.4)	13 (36.1)		
	Midfielder	16	9 (20.5)	7 (19.4)		
	Forward	25	12 (27.3)	13 (36.1)		
Playing level	Amateur	68	39 (88.6)	29 (80.6)	X^2= 2.70	0.260
	Semi-pro	10	5 (11.4)	5 (13.9)		
	Professional	2 (2.5)	0 (0)	2 (5.6)		
Playing experience	<1 year	10	8 (18.2)	2 (5.6)	X^2=7.08	0.135
	1-3 years	12	9 (20.5)	3 (8.3)		
	4-6 years	11	5 (11.4)	6 (16.7)		
	7-9 years	16	9 (20.5)	7 (19.4)		
	>10 years	31	13 (29.5)	18 (50.0)		
Implementation of FIPP	Yes	65	35 (79.5)	30 (83.8)	X^2=1.19	0.666
	No	15	9 (20.5)	6 (16.7)		
Running exercise	Yes	45	25 (56.8%)	20 (55.6)	X^2=0.01	0.910
	No	35	19 (43.2)	16 (44.4)		
Strength exercise	Yes	42	23 (52.3)	19 (52.8)	X^2=0.002	0.964
	No	38	21 (47.7)	17 (47.2)		
Plyometric exercise	Yes	27	15 (34.1)	12 (33.3)	X^2=0.005	0.943
	No	53	29 (65.9)	24 (66.7)		
Sports injury	Yes	66	37 (84.1)	29 (80.6)	X^2=0.17	0.679
	No	14	7 (15.9)	7 (19.4)		
Number of injuries	0	14	7 (15.9)	7 (19.4)	X^2=4.47	0.215
	At least 1	24	13 (29.5)	11 (30.6)		
	2 to 3	24	17 (38.6)	7 (19.4)		
	4 or more	18	7 (15.9)	11 (30.6)		

Note: Values are presented as frequency (n) and percentage (%) within each institution, except for age and BMI, which are presented as mean ± standard deviation. All variables were analyzed using cross-tabulations with the Chi-square test, except for age and BMI, which were analyzed using one-way ANOVA.

Rates of football-related injuries and implementation of FIPP

A majority of respondents (82.5%, n=66) reported experiencing at least one football-related sports injury.

Among these, 30% experienced a single injury, 30% reported 2-3 injuries, and 22.5% reported four or more injuries. No significant differences in the injury rates or number of injuries were observed between the institutions (Table I). Regarding the implementation of FIPP, 81.3% of respondents (n=65) reported incorporating at least one component. Running exercises were the most commonly performed (56.3%, n=45), followed by strength exercises (52.5%, n=42), and plyometric exercises (33.8%, n=27). There were no significant differences in the implementation of these exercises between the institutions.

Knowledge, attitude and perceptions on FIPP

The analysis of respondents' knowledge revealed that approximately 67.5% (n=54) demonstrated an understanding of the purpose and benefits of the FIPP (p=0.000) (Table II). However, 46.3% (n=37) lacked knowledge about the FIPP, particularly the FIFA 11+ (p=0.026). Regarding general awareness, 40% (n=32) of football players were aware of the FIPP, though this difference was not statistically significant (p=0.387). The primary sources of information about the FIPP, particularly the FIFA 11+, were online exposure (44%; n=35), coaches (29%; n=23), teammates (24%; n=19), and only 18% (n=14) had received formal training or education on the FIPP (Figure 1).

Table II: Summary of knowledge, attitudes, and perceptions towards the football injury prevention program among respondents

Variables	No n (%)	Neutral n (%)	Yes n (%)	p-value
Domain: Knowledge				
Awareness of FIPP	22 (27.5)	26 (32.5)	32 (40)	0.387
Understanding of the purpose and benefits of FIPP	11 (13.8)	15 (18.8)	54 (67.5)	0.000*
Self-perceived knowledge level of the FIFA 11+ Injury Prevention Program	37 (46.3)	23 (28.7)	20 (15.0)	0.026*
Domain: Attitude and Perceptions				
Effectiveness of FIPP in reducing risk of injuries	2 (2.6)	7 (8.8)	71 (88.8)	0.000*
Worthwhile of FIPP implementation	2 (2.5)	9 (11.3)	69 (86.3)	0.000*
Willingness to incorporate FIPP into training routine	4 (5.0)	9 (11.3)	67 (83.8)	0.000*
Adequacy of variation and progression of FIFA 11+	4 (5.0)	15 (18.8)	61 (76.3)	0.000*
Feasibility of FIFA11+	3 (3.8)	18 (22.5)	59 (73.8)	0.000*

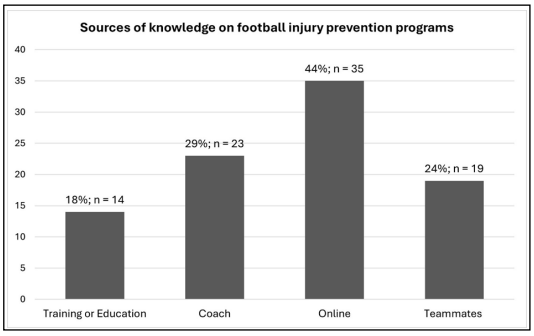

Figure 1: Sources of knowledge on football injury prevention programs

The majority of respondents demonstrated a positive attitude towards the FIPP (Table II). Specifically, 88.8% (n=71) of participants believed that the program effectively reduces the risk of injuries in football (p<0.001). Additionally, 86.3% (n=69) considered the implementation of the FIPP to be worthwhile (p=0.000). A significant 83.8% (n=67) expressed a willingness to incorporate the FIPP into their regular training routines (p<0.001). Furthermore, 76.3% (n=61) agreed that the FIFA 11+ provides adequate variation and progression for their teams (p<0.001), while 73.8% (n=59) found the program feasible for their football training (p<0.001).

Table III: Barriers to implementing football injury prevention programs.

Barriers	Barrier n (%)	Neutral n (%)	Not a barrier n (%)	p-value
Lack of awareness about the FIPP	26 (32.5)	26 (32.5)	28 (35.0)	0.951
Insufficient knowledge or understanding of proper exercise execution	33 (41.3)	23 (28.7)	24 (30.1)	0.321
Limited time availability for additional training or warm-up exercises	21 (26.3)	34 (42.5)	25 (31.3)	0.112
Lack of support or encouragement from coaches or team management	22 (27.5)	35 (43.8)	23 (28.8)	0.141
Difficulty in finding qualified instructors or trainers for implementation	32 (40.1)	29 (36.3)	19 (23.8)	0.176
Lack of player motivation due to perceived monotony or boredom of exercises	27 (33.8)	33 (41.3)	20 (25.0)	0.204

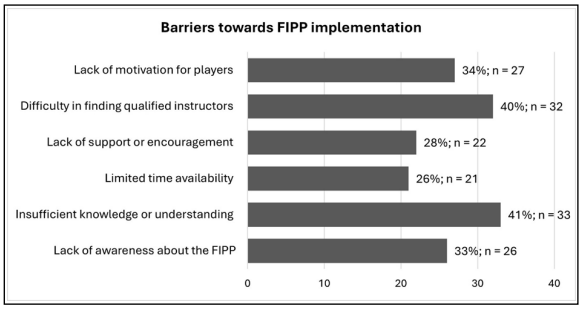

Figure 2: Barriers to the implementation of football injury prevention programs

Analysis of relationships between knowledge, attitudes, and implementation of FIPP

Spearman's rho correlation coefficient indicated a significant positive correlation (r=0.438, p<0.001) between participants' knowledge and attitudes towards FIPP implementation, suggesting that increased knowledge is associated with more positive attitudes towards the injury prevention program. However, the correlations between knowledge level, playing level, playing experience, and FIPP implementation showed no statistically significant relationships. The correlation between attitude level and playing level revealed a negligible negative association (r=-0.028, p=0.808), indicating no significant relationship. Additionally, the correlations between attitude level and playing experience (r=0.159, p=0.159) and FIPP implementation (r=0.165, p=0.144) were also not significant.

DISCUSSION

This study underscores the persistent gap between knowledge and implementation of FIPP among collegiate football players in Malaysia. Despite the high rate of self-reported injuries (82.5%), only 36.3% of participants received formal training in FIPP, with a substantial portion (46.3%) perceiving insufficient knowledge. This finding is consistent with literature, which indicates that awareness of injury prevention strategies, such as FIFA 11+, is insufficient for effective implementation.[15,17] The discrepancy between positive attitudes toward FIPP and low implementation rates points to a need for structural and educational improvements. Enhancing player education and addressing barriers is crucial for reducing injuries and improving safety in collegiate football.

Our subgroup analysis identified significant demographic differences between private and public institution respondents. Students from private institutions were notably older, likely due to flexible scheduling appealing to working professionals seeking career changes or advancement.[25] Conversely, public universities primarily attracted younger students, likely due to competitive admission criteria or limited quotas.[25] Additionally, public universities had a majority of Malay participants, while private institutions had a majority of Chinese participants. This reflects broader socioeconomic and cultural factors influencing educational choices, with Malay families potentially prioritizing public institutions for cultural reasons, while Chinese families may prefer private institutions for perceived academic quality or language preferences.[26]

The significant knowledge gap identified in this study is concerning, given the proven efficacy of programs like FIFA 11+ in reducing lower limb injuries.[9,10] Limited formal education on these programs, with only 18% of respondents having received formal instruction, aligns with findings in both local and global contexts. Studies indicate a lack of structured training as a barrier to widespread adoption.[19,23] The correlation between knowledge and positive attitudes toward FIPP suggests that increasing educational outreach could enhance adoption and effectiveness of these programs.[15] However, our data also show knowledge alone may be insufficient, as there was no significant relationship between knowledge levels and actual implementation. This highlights logistical and structural barriers as critical factors beyond just knowledge.[13]

One of the most notable challenges identified is the limited access to qualified instructors (40.1%) and the perceived lack of motivation among players (33.8%), which aligns with barriers highlighted in prior research.[19,20] While a significant number of players engaged in components of FIPP, like running (56.3%) and strength exercises (52.5%), the absence of qualified guidance likely reduces efficacy. This indicates a systemic issue: the interest to engage with FIPP exists, yet supporting infrastructure is lacking. Coaches and physiotherapists play a pivotal role in disseminating and facilitating these programs.[16,17] Investment in coach and trainer certification specifically for FIPP could be an essential step toward overcoming barriers.[12]

Despite generally favorable attitudes toward FIPP, the study revealed a concern regarding motivation. Player perception of the monotony of injury prevention exercises, reported by 33.8% of participants, aligns with

findings where complexity or time-consuming nature often leads to lower adherence.[17,23] This issue is particularly concerning for collegiate players, who face a higher injury risk compared to professional athletes.[6] Unlike professionals, collegiate players often lack structured training and may not have ongoing monitoring or motivation from coaches, increasing their injury risk due to inconsistent adherence to prevention programs.[7]

Strengths and limitations

This study used an extensive online survey to assess key factors in FIPP implementation among Malaysian collegiate football players, examining demographics, football background, injury history, IPP knowledge, attitudes, and perceived barriers. Potential confounders like age, playing level, experience, and injury history were accounted for, enhancing insights over previous studies.[14,27] While this study offers valuable insights, several limitations should be noted. Despite a six-month data collection period and follow-up efforts, recruiting a larger and more diverse sample proved challenging. Additionally, the cross-sectional design only captures a single point in time, leaving questions about how these factors may evolve. Future research should employ longitudinal designs to examine changes in knowledge and attitudes with targeted interventions, such as coach-led workshops or athlete-focused educational campaigns.[2]

CONCLUSION

Malaysian collegiate football players exhibit positive attitudes towards FIPP, yet face barriers in knowledge, access to qualified instructors, and motivation. Addressing these gaps through targeted education, certification, and tailored programs is essential for reducing injuries and enhancing player safety. Cultivating a deeper FIPP understanding, alongside structural improvements, could foster a preventive rehabilitation culture in Malaysian collegiate football. Future initiatives should prioritize accessible and engaging injury prevention strategies that integrate well into collegiate sports.

INSTITUTIONAL REVIEW BOARD (ETHIC COMMITTEE)

Ethical approval was obtained from the Universiti Kebangsaan Malaysia Research Ethics Committee (RECUKM JEP-2023-983) on 14 February 2024, following the Declaration of Helsinki principles. Informed consent was acquired from all respondents, ensuring confidentiality and voluntary participation.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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