**Anxiety Status of Junior Archers in COVID-19 During Training Isolation Period Towards the Shooting Performance**

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**ABSTRACT**

Studies have indicated that the Pandemic Covid-19 has miserable effects on athlete performance due to the movement control order (MCO) announced by the Malaysia Government. Dealing with self-training without the coach's guidance leads the archers to lose concentration, diminished self-confidence, and elevated anxiety levels. All these factors contribute to the inconsistent shooting performance during the training session. This study attempted to identify the archer's anxiety status during the training isolation period on the shooting performance. A total of 32 participants from the recurve archery category were recruited and enrolled in a web-based cross-sectional study during the phase of the national lockdown. The revised competitive state anxiety inventory-2 (CSAI-2R) instrument was applied to participants to examine the psychological aspect. The physiological aspect was measured using a digital pulse oximeter to obtain the heart rate data. The anxiety status during training isolation can indicate an archer's performance and be monitored by the coaches. Training Isolation showed a significant effect on anxiety status and shooting performance. These findings are useful for sports institutions in developing a better training environment for athletes and understanding the pandemic's impact on athletes' mental health during home isolation. Future studies may compare the effects of physiological status on athlete sports performance during MCO.

**Keywords:** Anxiety, athlete, COVID-19, health, sport performance

1. **INTRODUCTION**

At the moment of typing, in the middle of March 2022, nearly 450 million people worldwide had been infected by this potent and rapidly spreading disease, which had paralyzed economies and normal daily activities in many cases. Athletes are among the people that have been badly affected by this pandemic, as the Movement Control Order (MCO) has resulted in the training centre and school closure. Hence, athletes cannot proceed with their regular training routine and must be extra vigilant in dealing with the pandemic [1]. During the MCO period, athletes rely heavily on self-training and require suitable guidance from the coaches to maintain their psychological and physiological fitness. A study in Canada stated that lockdown situations mediated changes in athlete training schedules, especially with not conducive environment, different rhythm in training activities and physical changes due to restriction movement during MCO, resulting in detrimental to athletes' mental condition and health [2, 3]. In the latest survey from Washif, et al. [4], more than 50% out of 12 526 athletes wanted remote coaching (online synchronous) during their training session with the coach's guidance consistently. This study was conducted to investigate the anxiety status in COVID-19 activity isolation towards the shooting performance of junior archers in Malaysia's sports schools. The announcement of MCO showed the athlete facing difficulty in trained alone, hindering athlete concentration due to lack of resources such as equipment, facilities, space, and support team from friends resulting in an inconsistency athlete anxiety status become worst when it comes to measuring their scoring performance [5, 6].

Archery is a precision sport, the required skill of shooting arrows with a bow. High-performance shooting in archery is experienced in accurately shooting an arrow at a specific [7]. Archery is a highly-skilled, non-contact, individual static sport that has recently grown in popularity [8, 9]. Based on when the archer is standing on the shooting line, the phases of the shot cycle in archery are characterized as pre-shot, set-up, draw, aiming, clicker release time, and follow-through [9, 10]. Those steps required consistent training to maintain athlete discipline and attitude during real games. Kuan and Kueh [11] presented the concept of archer's performance determinants. The author has discussed various contributing elements that may increase or decrease an archer's performance during training or competition. Anxiety is a negative emotional state that can negatively impact an athlete's performance by causing cognitive and physiological symptoms [12]. Cognitive anxiety can be described as negative expectations and fears about performance, inability to concentrate, interrupted attention, and possible failure consequences and those thoughts tend to inhibit performance [13].

In contrast, the physiological effects of somatic anxiety include sweaty hands, tense muscles, shortness of breath, elevated heart rate, butterflies in the stomach, and shakiness. Somatic anxiety is distinguished by an individual's perceptions [14, 15]. Multidimensional Anxiety Theory is based on distinguishing between three components of anxiety, cognitive anxiety and somatic anxiety. The Multidimensional Anxiety Theory distinguished the two components of anxiety, cognitive anxiety and somatic anxiety. According to this idea, these components impact performance [16]. Most of the past studies have concentrated on elite athletes while disregarding those who have had less success. According to athletes of varying ability levels will exhibit competitive anxiety [17]. As a result, it is important to consider athletes' emotional states and provide proper and adequate psychological support. According to the available literature, there is also limited research comparing competitive anxiety among athletes at the sports school level. In addition, the researcher is left with questions on how the current pandemic COVID-19 affects athletes' anxiety status toward their sports performance and how the coach takes action for the sake of their athlete performance? To remedy this gap in the research, this research explores the anxiety status of junior archers in covid-19 during the training isolation period towards the shooting performance.

1. **RESEARCH METHOD**

Junior archers from all levels of experience completed an experimental research design and web-based cross-sectional study during phase two of total lockdown in Malaysia. The online survey consists of the archer's background and the revised competitive scale anxiety inventory-2 (CSAI-2R) instrument. Heart rate readings were tested on the archers before and after the shooting session. The shooting score performance will be reported along with the heart rate in the online survey.

* 1. **Participants**

We recruited participants from Sports School Malaysia Pahang (SSMP), located in Pahang, Malaysia. The city is in the East of the country, and this school emphasizes athletes who have excelled in the sport wherein they participate. During recruitment, 41 archers were involved in different levels of achievement in the archery competition, ranging from lower to top archers categories who volunteered to participate in this study. Inclusion criteria were at least 13 years until the enrolment for PRA-University archery athletes at the SSMP. However, due to study commitments and self-quarantine after being infected with COVID-19 infection, 9 participants dropped out. After removing responses that did not meet the inclusion criteria, the remaining sample consisted of 32 archers who completed the study with a 78 per cent response rate.

Regarding study-related characteristics, athletes from the archery sport and different levels of expertise in terms of competition level and highest shooting record were included. The participant was classified into categorify: top and lower category junior archer. Only archery in recurve category was eligible to participate. Participation was voluntary, anonymity was guaranteed, and informed consent was obtained to participate in the study. There were no monetary incentives for taking part in the study.

* 1. **Procedure**

Figure 1 describes the flow of the study procedure. Data were collected individually with the coach's guidance through an online platform: Google Meet. There is a face-to-face coaching session from this platform during athlete's training (synchronize). Participants were briefed prior to the familiarisation session, informed of their ethical rights, and provided informed consent. Participants provided demographic information (e.g., age, sex, weight, and height), athlete status (e.g., experience, the highest level of competition, total training (hour/week) and personal score). Participants then completed the CSAI-2R and recorded their heart rate (HR) before and after every shooting session.

Lower-Level Junior Archer

(n=16)

Top-Level Junior Archer

(n=16)

**Before Shooting**

-Administer CSAI-2R

-Monitor Heart Rate (HR)

**During Shooting**

30 arrows

(3 ends per set, total 10 sets)

**After Shooting**

-Monitor Heart Rate (HR)

**Data Analysis**

**Familiarisation session**

Basic technique exposure to archery  
 (3 ends per set, total 6 shots)

**Recruitment and Sample (N=32)**

8th Supervised sessions

(2 months)

Figure 1. Flowchart of the study procedure

* 1. **Instruments**

There are two parts of the instrument used in this study; the first part included demographic information about the archers, including age, gender, weight, height, the experienced, highest level of competition and best personal record. The next part of the instrument consisted of three subcomponents to indicate the anxiety level, which is the author used Revised Competitive State Anxiety Inventory 2 (CSAI-2R).

* + 1. **Revised Competitive State Anxiety Inventory 2 (CSAI-2R)**

Each participant was compulsory to complete in answer the CSAI-2R questionnaire 10 minutes prior shooting session. The CSAI-2R is a 17-item Likert questionnaire used to measure perceived intensities of Somatic State Anxiety (SSA), Cognitive State Anxiety (CSA), and self-confidence (SC) promptly before a competition. The SSA scale is concerned with physiological symptoms of arousal (items 1, 4, 6, 9, 12, 15, and 17). It is composed of items such as the "My body feels tight" question number (Q. 17). In contrast, the SCA scale (items 2, 5, 8, 11, and 14) addresses cognitive symptoms of arousal, such as " I am concerned about performing poorly " in question number (Q. 11). The SC scale (items 3, 7, 10, 13, and 16) rate the perceived ability of the athlete to meet situational demand and includes statements such as "I am confident about performing well" in question number (Q. 10).

CSAI-2R item is rated on a 4-Likert scale. The questions consisted of three sub-components of anxiety ranging from 1. "not at all" to 4. "very much so". The total scores for the subscale are determined by averaging the items in each subscale. Then, divide by the number of 3 sub-components and multiply by ten. Higher scores indicated higher intensities of somatic state anxiety, cognitive state anxiety, and self-confidence. Finding from this study showed excellent internal consistency with Cronbach’s alpha coefficients for each sub-component of CSAI-2R ( SSA= 0.964, CSA=0.962 and SC= 0.887). Table 1 shows that Cronbach's alpha coefficients for all anxiety sub-components were above the minimum of 0.7.

Table 1. Reliability test for three sub-components of anxiety

|  |  |  |
| --- | --- | --- |
| Anxiety Sub-component | Items | Cronbach's alpha |
| Somatic | 7 | 0.964 |
| Cognitive | 5 | 0.962 |
| Self-confidence | 5 | 0.887 |

* + 1. **Heart rate monitor**

Using an ordinary heart rate device can avoid the possibility of provoking and hindering participants' psychological states by fitting them with unfamiliar scientific device sensors. The heart monitor included in this research was a digital pulse oximeter which gives a heart rate reading and allows for simple heart rate measurement with greater comfort to the subjects. Each participant consistently measured their heart rate by inserting their right index finger into the digital smart pulse oximeter. Before and after the shooting session, measurements were taken and recorded into the provided google form.

* + 1. **Archery shooting performance**

The study only involved archers from the recurve category to obtain the targeted data. Participants were asked to shoot 30 arrows per set based on a modified scoring system. A total of 8 sets were shot for two months (8 sessions). Due to lockdown, the target board was placed 10 metres from the shooting position due to a limited area and space around the archer's house. The recurve bows were used for this study. An experienced coach reminds the basic steps and standard techniques through online Google Meet (GM) platforms. Six shots (2 ends were given three arrows with each end) were allocated to each participant during the familiarisation session before starting the actual shooting session.

* 1. **Data Analysis**

The analysis for this study was analyzed using the Statistical Package for Social Science (SPSS) Version 24.0. All the obtained data were examined for normality through the Shapiro-Wilk test except for the variables analyzed through the repeated measure analysis of variance (ANOVA). The correlation study between variables was analyzed by using the Pearson correlation coefficient. CSAI-2R questionnaires were scored individually and evaluated using a scoring system to determine the anxiety status among the junior archers. CSAI-2R score, heart rate and total score for both top and lower categories were analyzed using a repeated measure ANOVA. Besides that, the results for the arousal state were based on the difference in gained heart rate between before and after shooting sessions. Statistical significance was accepted at (p <0.05).

1. **RESULTS AND DISCUSSION**

The reporting of the research findings of the study begins with the demographic and characteristics data of the respondents, subsequently by the levels of respondent anxiety status towards the scoring performance. The study also reported correlation analyses to measure the relationship for each variable consisting of somatic anxiety, cognitive anxiety, self-confidence, and the shooting score performance of junior archers toward home training isolation during MCO.

* 1. **Demographic and characteristic**

Table 2 shows the participants' demographic and characteristics data tabulated using frequency distribution. Three-quarters of the participants were male (65.5%). Likely, male participants always dominate in sports, especially in archery. The participants were classified into the top and lower categories based on the highest personal score during the competition. The majority of the participants were in the range of 16-17 years old, and the average age for both categories is (16.6 years) for the top and (16.3 years) for the low category. Therefore, all the participants were junior athletes. Meanwhile, there is no obvious difference in height and weight for both categories, (164.5cm) to (166.3cm) and (65kg) to (63.8kg) with experience of 6 years and 5 years.

Table 2. Demographic and characteristics data

|  |  |  |
| --- | --- | --- |
| Characteristics | Group (N=32) | |
| Top-category  (m=11, f=5)  Mean (SD)/ Median | Lower-category  (m=9, f=7)  Mean (SD)/ Median |
| Age (years) | 16.6a | 16.3a |
| Height (cm) | 164.5b (3.8) | 166.3b (6.1) |
| Weight (kg) | 65.0 b (13.1) | 63.8 b (10.4) |
| Experience (years) | 6.0 a | 5.0 a |
| Training time (Hours/week) | 16.2 b (4.9) | 13.6 b (4.1) |
| Highest Score | 350.5 b (31.9) | 333.1b (11.7) |

**\***m=male, f=female, aMedian, bMean,

However, accumulative training time indicates a difference of 16.2 hours and 13.6 hours per week for the top and low athlete categories. Top archers spent more hours on their training sessions, and the majority from the top category experienced participated in a higher competition and required optimal training. Finally, the highest personal scoring of top category athletes recorded a higher mean ( 350.5) than the low category (333.1). In total, 32 healthy participants willingly participated in this study, and the final participants consisted of 16 participants equally from both categories. Participants who managed to complete data throughout twelve weeks regarding the study variables were included in the analysis.

* 1. **Anxiety status toward shooting performance**

This section describes how athletes felt about their anxiety status during self-shooting training sessions throughout the COVID-19 pandemic outbreak. Figure 2 shows the total result for the mean (SD) of all three anxiety subscales in CSAI-2R that consists of somatic state anxiety (SSA), cognitive state anxiety (CSA) and self-confidence (SC) throughout the whole 8 sessions in two months of data collection. Top archers indicate higher self-confidence mean with 2.32 (moderately high) than low archers with 1.38. While in contrast, the low archer recorded high anxiety for both cognitive and somatic anxiety compared to the top archer. The top archer category has the ability to control their anxiety and have strong mental endurance with wide experience through this archery sport.

Figure 2. The mean of the sub-components of CSAI-2R for junior archers' top and lower categories.

The anxiety performance during training shooting depends on how the athlete perceives their somatic and cognitive anxiety, whether facilitative or debilitative. When the debilitative anxiety dominates the archers, they will lose concentration, resulting in inconsistent shooting score performance. Table 3 compares the archer's feelings between the research's first week and final week. There is a declination of anxiety status for all anxiety statement items for somatic and cognitive state anxiety. The majority of the archers feel anxiety during the first week of the observation, and the anxiety levels are in decreasing trend from week to week. Athlete anxiety performance can be well controlled when the athlete adequately gains constant monitoring from the coach [18-20]. Therefore, athletes require face-to-face monitoring from the coach despite being in different places while movement control is carried out.

Table 3. The comparison between archer's feeling on somatic and cognitive state anxiety statement during week 1 and week 8 during MCO

|  |  |  |  |
| --- | --- | --- | --- |
| Statement | Level of agreement | Week 1 (%) | Week 8 (%) |
| I feel jittery (Q1) | Not at all | 0 | 8 |
| Somewhat | 10 | 10 |
| Moderately so | 15 | 10 |
| Very much so | 7 | 4 |
| **Total** | **32** | |
| My body feels tense (Q4) | Not at all | 18 | 21 |
| Somewhat | 11 | 10 |
| Moderately so | 1 | 1 |
| Very much so | 2 | 0 |
| **Total** | **32** | |
| I feel tense in my stomach (Q6) | Not at all | 18 | 22 |
| Somewhat | 9 | 5 |
| Moderately so | 3 | 3 |
| Very much so | 2 | 1 |
| **Total** | **32** | |
| My heart is racing (9) | Not at all | 0 | 14 |
| Somewhat | 19 | 13 |
| Moderately so | 10 | 4 |
| Very much so | 3 | 1 |
| **Total** | **32** | |
| I feel my stomach sinking (Q12) | Not at all | 17 | 22 |
| Somewhat | 11 | 8 |
| Moderately so | 2 | 2 |
| Very much so | 2 | 0 |
| **Total** | **32** | |
| My hands are clammy (Q15) | Not at all | 15 | 3 |
| Somewhat | 11 | 23 |
| Moderately so | 3 | 6 |
| Very much so | 3 | 0 |
| **Total** | **32** | |
| My body feels tight (Q17) | Not at all | 11 | 22 |
| Somewhat | 11 | 7 |
| Moderately so | 5 | 1 |
| Very much so | 5 | 2 |
| **Total** | **32** | |

Table 4 indicates the detailed mean and standard deviation scores for top and lower category shooting performance. The shooting score performance for the second session in the second month indicates the increment for both top and lower-level categories. The results indicate an improvement in weekly performance by the athletes shooting performance after this study was done with full online supervision from the coach. The anxiety of athlete status showed a declining trend when the coach made regular monitoring and recorded the total scoring from the beginning to the end of the study session was implemented. It can be concluded that athletes need guidance from the coach despite making training sessions separately due to MCO. With adequate monitoring, athletes have high confidence during the training session.

Table 4. Shooting score performance by session for top and lower category

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Session | Category | Archery shooting performance score, mean (SD) | SSA | CSA | SC |
| Month 1 | Top-level | 236.7 (46.1) | 2.9 | 2.6 | 2.8 |
| Lower level | 172.8 (48.5) | 3.1 | 2.9 | 2.3 |
| Month 2 | Top level | 248.4 (47.8) | 2.6 | 1.6 | 3.2 |
| Lower level | 175.2 (40.2) | 3.0 | 2.2 | 3.0 |
| Total | Top-level | 238.4 (44.9) | 2.75 | 2.1 | 3 |
| Lower level | 174.0 (44.3) | 3.1 | 2.5 | 2.7 |

Table 5 shows the mean heart rate of both archers' categories achieved before and after shooting sessions. During the data analysis, before and after heart rates level were collected. The mean (SD) for before and after shooting session heart rates were 91.5 (22.8) and 104.6 (20.2) beats per minute for top junior archers, whereas in the lower category of archers were 75.1 (11.3) and 95.2 (16.4). The result indicated that top-level archers face a higher heart rate than lower-level archers. Top-level archers have high determination to get high scoring during the shooting session.

Table 5. Mean (SD) of participant's arousal state before and after shooting

|  |  |  |  |
| --- | --- | --- | --- |
| Heart Rate (beats/min) | | | |
|  | **Top Junior Archer** | **Lower Junior Archer** |
| Before Shooting Performance | 91.5 (22.8) | 75.1 (11.3) |
| After Shooting Performance | 104.6 (20.2) | 95.2 (16.4) |

* 1. **Correlation analysis**

The Correlation analysis was performed to measure the relationship between three subcomponents of anxiety (SSA, CSA, and SC) and the score of junior archers during their training isolation period, as tabulated in Table 6. In general, the strength of the relationship among those variables varied from very weak to a moderate range. Based on the result of the correlation analysis, SSA and CSA (r=0.67; p=0.00) had a moderate relationship, accompanied by SC and CSA (r=0.55; p=0.72). Meanwhile the relationship between SC and score (r=0.36; p=0.02), followed by CSA and score (r=0.31; p=0.554) and SSA and score (r=0.24; p=0.487) was found to have a very weak relationship.

Table 6. Correlation analysis between somatic, cognitive, self-confidence and score

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Score | SSA | CSA | SC |
| Score | 1 |  |  |  |
| SSA | 0.24  0.49 | 1 |  |  |
| CSA | 0.31  0.55 | 0.67  .000 | 1 |  |
| SC | 0.36\*  0.02 | 0.21  0.28 | 0.55  0.72 | 1 |
| Total, N | 32 | 32 | 32 | 32 |

\*. Correlation is significant at the 0.05 level (2-tailed).

The relationship among those variables described that the junior archers' somatic and cognitive anxiety affected their training isolation during COVID-19. Moreover, Self-confidence was found to have a connection with the shooting score performance of the junior archers to overcome debilitative anxiety during training isolation. Meanwhile, both anxiety levels were the main reason the archers experienced inconsistent shooting performance. This explains the weak relationship between SSA and score, followed by CSA and score. This is because the pandemic was perceived to be threatening, and when someone has unstable anxiety, they tend to have inconsistent shooting performance and poor scores. Figure 3 summarises the correlation analysis result using a simple correlate model.

Somatic

*r* = 0.24

*p* =0.49

*r* = 0.67

*p* =0.00

Self-confidence

*r* = 0.55

*p* =0.72

*r* = 0.31

*p* =0.55

*r* = 0.36

*p* =0.02

Cognitive

Shooting

Score

*r* = 0.21

*p* =0.28

Figure 3. Summary of correlation analysis between anxiety subcomponent and score

1. **LIMITATION**

Throughout the research study, the author faces some limitations that can be covered for future studies. First, during the lockdown, athletes have to adapt to various external factors, especially with limited space to shoot the arrow and lack of proper facilities, archery target butt and others. However, this is overcome by restructures and arranging the specific distance for the shooting activity. Second, this research faces a limited physiological parameter to measure the anxiety level since all the respondents were in their respective homes with limited access and called it a device. As the COVID-19 will be shifted to endemic mode, future research in this area is suggested to extend a longitudinal approach and gain more anxiety parameters such as blood pressure, heart rate variability, and skin reaction to define the anxiety status. In addition, it would be beneficial to have an additional instrument to get the exact anxiety status among the athletes. By comparing with a few anxiety instruments, the result of the study could be more accurate and highly valuable for the coach's reference source.

1. **CONCLUSION**

Anxiety among athletes could have a detrimental effect on psychological and physiological performance. As a matter of fact of the COVID-19 pandemic and social isolation practices, athletes experienced anxiety, and anxiety may increase substantially the pandemic's duration and social isolation. In this study, the authors found that junior archers experienced anxiety and self-confidence due to changes in archers shooting performance during pandemics and MCO. Due to limited physical training and spending more time sitting and screen time at home, the athletes show declination of stamina and focus on their shooting performance. So, during this pandemic phase, the athlete's lifestyle changed abruptly, and they needed to allocate a great deal of time to recover their performance. With all these alterations in regular training activities, the athlete's mental health is also affected. Decreasing physical activities, the rate of anxiety increased significantly. Those who maintain their normal training lifestyle without being affected by home isolation do not show much change in anxiety level and maintain their shooting performance well. Anxiety can positively or negatively impact a player's performance, and it is about how the athlete perceives the anxiety, either facilitative or debilitative anxiety. The study finding also affirmed that the shooting training isolation influences the level of anxiety and resulting inconsistent score performance during the current pandemic breakout. It is worth noting that the present study was carried out at the end of the third phase of the MCO period before 3 months entering the endemic phase of COVID-19. At the end of the survey, the Malaysian government gradually announced the reopening of a few main sectors, including the activity for the sports sector. However, the execution of activities is carried out in a new normal.

Besides that, these findings confirmed that those who exercise alone experience more anxiety and lack self-confidence. This is due to an improvement and development in terms of rumbling rate and athlete confidence from the first to the final session of the study and athlete achievement. This indicates better athletes' mental and physical health development when face-to-face monitoring sessions are implemented, even if only using the online platform. Nevertheless, this is enough to help the athletes maintain their performance despite being in this pandemic. Furthermore, correlation analysis revealed a significant link between somatic, cognitive, self-confidence, and score. The strongest relationship was found between self-confidence and scores, somatic status and cognitive state anxiety. This emphasizes the importance of controlling mental health among athletes in maintaining athletic performance despite being unable to participate in physical training sessions with the coach during MCO. In order to combat the COVID-19 epidemic, athletes and coaches must implement a variety of positive measures and practices to ensure that athletes' performance remains in good condition. Therefore, this study suggests that athletes who experience sports anxiety should get further consultation with a clinical sports psychologist or any qualified clinicians depending on the available expertise in that community resources. The coach can make a new appropriate structure of the athlete's game plans and training strategies with this knowledge. Considering the outcomes of the research findings, psychological support practices to reduce anxiety about health and getting coronavirus in this pandemic and social isolation may contribute to a shorter duration of athletes' return to competitions and races after the pandemic.

**ETHICS STATEMENT**

The research works involving human subjects were reviewed and approved by the Universiti Pendidikan Sultan Idris, Malaysia, in the Research Management and Innovation Center (RMIC) Ethics Committee of the Human Research Ethics division. The participants were provided with their written parental consent. (Ethic Reference No: 2021-0246-01)

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