Factors Affecting Sleep Quality among Adolescent Athletes

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Mstudy used a cross-sec quality and sports performance among adolescent recreation team-sports athletes in Hong Kong. By invest the factors that affect sleep quality, it intended to arouse awareness of coaches and athletes the importa sleeping so that they can improve training and competition performance.

Hundred and twelve male and female participants with age range from 12 to 17 were involved study. A One-way ANCOVA model was designed to analyze the relationships among sleep quality and ýve (consume of caffeine or alcohol, extreme mood, sleeping environment, anxiety due to academic, and anxie to sports) and multiple regression analysis was adopted to predict the sleep quality through the coeféient o variables.

Consumption of drinks or food that contained caffeine or alcohol, experiencing extreme moo

and implanting new memories [10]. While sleeping, newly formed memories were being organized in the brain resulting in better recall and accurate memory in the coming day. Problem solving abilities and concentration were being enriched as well [11].

Sleep quality includes sleep latency, sleep duration, habitual sleep e ciency, sleep disturbances, use of sleeping medication, and daytime dysfunction. e "Pittsburgh Sleep Quality Index" (PSQI) is the most common and reliable sleep quality questionnaire [12]. It assesses sleeping qualities and disturbances in a one-month interval. e total score of PSQI is from 0 to 21, the higher score, the poor sleep quality. Sleep disruptions have negative impacts on physical functioning and psychological functioning of human body. As sleep disruptions would a ect the release of hormones, sense of hunger was aroused and caused over-eating [13]. Diet balance and body weight would be a ected if athletes su ered from disrupted sleep for a long period. e immune system would correspondingly be compromised and become weak, more illnesses would be infected [7]. Moreover, bad sleep quality a ected motor performance and increased risks of injuries. It negatively in uenced the circadian rhythm directly, as well as increased fatigue, decreased reaction time, and decreased maximal oxygen uptake (VO_2max) [14,15]. Human who su ered from disrupted sleep have negative mood states like depression and decreased motivation, leading to psychological stress [14]. Previous studies indicated that negative mood directly a ected athletes' performance [16]. Brain regulated emotional states were highly sensitive to the quality and quantity of sleep [17].

Sleep hygiene is a term used to describe a collection of behaviours related to the promotion of good sleep [18]. It is usually recommended that good habits and behaviours can enhance sleep quality and quantity. According to the Centre for Clinical Interventions (CCI), good sleeping hygiene such as avoiding consume of ca eine and nicotine, no naps, and sleep rituals can improve sleep quality. In a local study, Suen et al. [19] examined the awareness and knowledge of sleep hygiene among university students. ey observed that sleep hygiene practice was signi cantly associated with sleep quality. Poor sleep hygiene practices led to a higher prevalence of insomnia and sleeping problems [18]. Based on the National Sleep Foundation [20], sleep hygiene promoted healthy sleep and daytime alertness. It can also prevent the development of sleep problems and disorders.

Sleeping is a major role of recovery, repair and physiological growth of athletes and it has great in uence on sports performance. ere are two main factors which a ected sleep quality, namely intrinsic factors and extrinsic factors. Tension and stress are the main intrinsic reasons a ecting sleep quality among college students [21]. Athletes were o en a ected by the pressure which come from family commitments, training, social life, and ful l the demand of academic studies [22]. Worries and nervousness become major contributors to pre-sleep cognitive arousal, leading to interfere of sleep [23]. ese aspects created anxieties and prolonged sleep latency, waking up early, and frequent awakenings during the night and restricted the quality of sleeping. ese symptoms were de ned as clinical primary insomnia [24]. Furthermore, it has been shown that mood and sleep have close relationship to each other. If the athlete has chronic training fatigue or being overtrained for a long period, he will experience low mood and depression, which would cause sleeping disturbance and insomnia [25]. In contrast, excitation will raise a person's arousal and cause the person hard to fall asleep [26].

Athletic performance is highly and directly depended on "sleep-

less sleep disturbances. Yet, individuals with lower physical activity levels exhibited longer sleep [55].

For athletes, better sleep will better decision-making ability, higher the attention and speed of reaction time, and improve sports performance. A study showed that a er increasing the sleeping time to 10 h per night for 5-7 weeks, basketball players had faster sprinting times, higher free throwing percentage, higher 3-point eld goal percentage, faster reaction times, and decrease in daytime sleepiness [56]. If energy expenditure of athletes increased in daytime, the blood levels of growth hormone rise during the following night. But if the athletes lost slow-wave sleep, these levels fell signi cantly [27]. However, there is not much studies conducting about the relationships of sleep quality and sports performance among recreation athletes.

Adolescents require sleeping for growth. Sleeping allows the physiological processed and caused revitalization during slow wave sleep which facilitated by metabolic activity. Physiological revitalization hits its peak during slow-wave sleep while the body's metabolism is at its lowest. ere is also a signi cant peak in the secretion of growth hormone [27]. e secretion of growth hormone will improve the endocrine system during this period [57]. More than 95% of the daily hormones production occurred during Non-Rapid Eye Movement-sleep (NREM-sleep), especially in the rst cycle of slow-wave sleep [58], hence, sleep quality and quantity are important for the growth of adolescent.

is study aims to explore the factors that a ecting sleep quality of adolescent student-athletes, and to arouse the awareness of athletes and coaches about the importance of sleeping. It is expected that with better

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A multiple regression analysis was used to predict the sleep quality through the coe cient of the variables. ere were signi cance e ects among factors in "drinking/eating drinks/food which contains ca eine or alcohol", "poor sleeping environment", "sleeping duration", and "self-rated sleep quality".

Discussion

ese ndings provide useful information about the association between sleep quality and sports performance among adolescent recreation team sports athletes in Hong Kong. Factors that in uence sleep quality are also evaluated. As expected, better sleep quality has positive e ects on athletes' performance such as better decision-making, higher attention and speed of reaction time [56]. e study intended to examine student-athletes' general sleeping pattern and the factors that a ect sleep quality. PSQI was adopted to measure sleep quality and it is shown that over 70% student-athletes are su ering from poor sleep quality. Factors such as consume of contain ca eine or alcohol, sleeping environment, and stress and anxiety a ect sleep quality most signi cantly [7,22,31].

Sleeping problems is getting more severe in Hong Kong [4,5], especially for student-athletes in secondary schools as they have heavy burdens in both academic and sports and cannot get a balance between the two. School-aged children and adolescents require having about 10 h of sleeping every night for healthy body development [3]. However, respondents of this study are su ering from insu cient sleep with average sleep duration of 6.4 h a day only and 58.9% respondents are having less than 7 h of sleep a day.

Mean PSQI score of sleep quality is around 5 globally. e higher score, the worser the sleep quality. A score that higher than 5 is considered as "bad" sleeper" while lesser than 5 is considered as "good" sleeper [12,60]. Mean score of respondents in this study was 5.4 which indicated they were experiencing poor sleep quality and having moderate di culties in sleeping. Almost half of the respondents described their sleep quality as "fairly bad" and "very bad" which showed that they were not satis ed with their sleep quality. None of them required to have medication to assist in sleeping in the past month. People without sleeping disorder can fall asleep in 10 to 20 min [12] and in average, respondents could sleep around 14 min a er they were in bed. It indicated that respondents in this study did not have problems in delayed sleep onset.

It was presumed that factors, namely "drinking/eating drinks/food which contain ca eine or alcohol", "experience extreme mood before sleep", "poor sleeping environment", "nervous/anxiety due to academic" and "nervous/anxiety due to sport" would a ect the sleep quality in this study.

Consume of ca eine or alcohol before going to bed would a ect sleep quality, which would lead to decrease in sleep latency, and longer sleep onset latency [2,32] as ca eine or alcohol would shorten REM sleep (deep sleep) and prolong non-REM (light sleep) and directly impact the sleep quality.

Mood can strongly a ect sleeping and it was found in previous studies that poor sleep quality was associated with signi cantly higher self-reported negative moods [21]. Sleep-deprived individuals su ered from extreme mood before sleep also reported that they consistently experiencing depression, stress, anxiety, worries, frustration, irritability, and having lower con dence [7]. In this study, respondents experienced extreme mood such as shock and depression before sleeping, did a ect the sleep quality and it also caused sleeping disturbance and insomnia. However, the prediction of experiencing extreme mood before sleeping was low, which indicated that sleep quality was not a ected by this factor.

Sleeping can be directly a ected by the surrounding, and lighting, noise, room temperature are the main in uences that disturbed sleep [29,30]. In Venter's studies [7], it is found that noise and lighting were the main aspects that caused team-sports players experiencing problems in falling to sleep. In this study, poor sleeping environment has signi cant acute impacts on sleep quality. e prediction of poor sleeping environment to make sleep quality worser was signi cantly high which indicated person sleeping in poor environment was more likely to su er from distressing sleep quality.

Some main reasons for poor sleep quality of university students were found to be bad academic results, doing assignments a er 8 pm at night, and high academic stress [61]. In the study conducted by Bompa and Ha [22] also found that pressure from family commitments, training, social life, and catch up with demand of academic studies could a ect sleep quality. However, these aspects were unable to predict in uences in sleep quality in this study.

Sleep hygiene is a term used to describe a collection of behaviors related to the promotion of good sleep [18], yet has always been ignored. In a study [60], it was indicated that student-athletes of team sports had high median scores in global sleep quality due to anxiety in sports. Worry and anxiety were also major contributors to pre-sleeping cognitive arousal that interfered sleeping [23]. Compare to anxiety due to academic, anxiety due to sports appeared to be more in uential but this factor did not have signi cant prediction to sleep quality.

ere are several limitations in this study. is study focused on students of two secondary schools in Hong Kong, which limits the generalization of results. Short questionnaire was used to assess factors that a ect students' sleep quality before the season when the Hong Kong Diploma of Secondary Education Examination were held. Findings may be limited due to self-reporting and respondents may potentially susceptible to pressure and bias. It is important to include objective measurements [62-67]. Sleep monitor machine would help llo study [60]ressure fTeported Bra33a

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