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Cross-lagged analysis of the relationship between risk perception, physical activity, and adolescent mental health

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Abstract---Background: According to a study of global adolescent mood problems during the pandemic, the prevalence of anxiety symptoms was 31% and depressive symptoms were 34% during the novel coronavirus pandemic, both significantly higher than before the pandemic. However, while physical activity has been clearly shown to be effective in moderating adolescent mental health problems, it is unknown whether physical activity is still effective for mental health under the risk perception of illness. Therefore, this study investigated the association between risk perception, physical activity, and adolescent mental health. Methods: Two questionnaires were administered to the same students in five high schools in December 2022 as well as in January 2023. <N=344>, which investigated the risk perception level, physical activity intensity, and mental health level of adolescents during the New Crown pandemic. Results: There were significant gender differences ($p < 0.01$) for adolescents' risk perceptions, with gender difference effects of 0.255 ($d = 0.416$) and 0.195 ($d = 0.402$) for the two measures, and gender differences in mental health, with gender difference effects of 0.159 ($d = 0.262$) and 0.179 ($d = 0.278$). In contrast, gender differences in physical activity levels were not significant ($p > 0.05$); risk perception, physical activity, and adolescents' mental health levels met stable correlations across months with simultaneous correlations ($p < 0.001$). In contrast, in the cross-lagged study, physical exercise levels, as well as mental health levels, were higher in males than in females, and adolescents' risk perception T1 was able to predict physical exercise and mental health (β values of 0.28, 0.19, $P < 0.01$, respectively) physical exercise T1 was able to predict mental health T2 ($\beta = 0.33$, $P < 0.01$), and risk perception T1 → physical exercise T2 → mental health T2 (mediating value effect of 0.012, Z value of 0.112) and the indirect effect

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Bootstrap 95% CI, not 0 value from this pathway, indicating a significant mediating effect of physical exercise between risk perception and mental health. Conclusion: It indicates that there is a longitudinal causal relationship between adolescent disease risk perception, physical activity, and psychological health, and it is relevant to improve psychological health by increasing adolescent physical activity awareness based on gender.

Keywords---opioid sparing, multimodal analgesia, reduces chronic, postoperative.

Introduction

Along with the opening of the worldwide pandemic, several locales optimize epidemic prevention and control even more, tending to open up and rationalize the prevention and control layout. During the period of increasing liberalization, however, many locations are witnessing brief "outbreaks" of disease. In this social milieu, new coronaviruses are changing and spreading more rapidly, and the public's perception of social disease risk is also growing. As one of the vulnerable groups, the risk of social diseases has discouraged adolescents from engaging in outdoor Physical activity, creating a certain psychological anxiety that, over time, results in mental health issues. [1]The most fundamental notion in trauma theory is "psychological trauma," which refers to the irreparable damage caused to the victim's mind by an incident or disaster.

The victim might be an individual or a group. Some research has indicated that teen-agers may experience illness during or even before openness, resulting in psychological harm and a reluctance to engage in outside activities. [2] And according to the social risk theory, the risk capacity created by epidemics creates expansive threats when conditions permit; such risks induce the development of risk consciousness in adolescents, resulting in an overall identity in coping with risks and a risk perception that tends to avoid them. Similarly, La Caille et al. discovered that during the epidemic, teenage groups had increased in-active time and decreased physical activity, which contributed to greater anxiety levels. In response to [3] and the new crown epidemic, schools at all levels adopted a new paradigm of online instruction.

During dormitory studies, students usually increase their screen time, and excessive screen entertainment time is also a risk factor for anxiety in teens. [4] An examination of global teenage mood disorders during the epidemic revealed a 31% prevalence of anxiety symptoms and a 34% prevalence of depressive symptoms, both significantly higher than before the epidemic. [5] Emotional problems such as anxiety and depression are significant risk factors for initiating suicidal behavior in adolescent populations; however, a study conducted by Yufu Dong during the SARS epidemic revealed that Physical activity significantly mitigated the negative mental health states such as tension and anxiety caused by public emergent crisis events. During the new crown pandemic, regular physical activity was also suggested as a technique for controlling mental health. [6] However, it is unknown if Physical activity is still beneficial for mental health

in light of the disease risk perception. Determining the relationship between risk perception, physical activity, and adolescent mental health was the purpose of the present study. The condition of adolescents' mental health must be taken into account by society during specific periods. This study utilized a longitudinal design and cross-lagged analysis to investigate the relationship between Physical activity and disease risk perception and mental health, respectively, in adolescent populations to provide a reference for mitigating adolescent mental health problems within the context of openness prevention and control.

Materials and Methods

Adolescence is the transitional era in which children shift into adult duties, and also refers to the human life group undergoing this transformation. In general, adolescents are separated into two periods, ages 14 to 17 and 18 to 25; this study focuses on adolescents aged 14 to 17 years. [7] Five high schools in three regions of China were selected by random sampling for two questionnaire surveys. Survey T1 was conducted in December 2022, 200 questionnaires were distributed in high schools, 32 invalid questionnaires were excluded, and 168 valid questionnaires were obtained; survey T2 was conducted in January 2023 to re-survey the respondents of survey T1, 200 questionnaires were distributed, 24 invalid questionnaires were excluded, and 176 valid questionnaires were obtained. As the final valid sample size, 344 data were used. 178 (51.75%) male students and 166 (48.25%) female students gave their informed agreement to participate in this study.

A personal information survey, a teenage physical activity rating survey, a mental health assessment scale, and a new coronary pneumonia outbreak risk perception scale comprised the survey in this investigation. Scale for Adolescent Physical Activity (Grading Scale). Concerning the questionnaire entries about physical activity in the 2020 National Fitness Activity Status Survey prepared by the Institute of Sports Science of the State General Administration of Sports and the National Center for Physical Fitness Monitoring, and the measurement indexes of exercise behavior proposed by Qiu Fen et al [8], the physical activity questionnaire for college students was designed with 12 questions, including three dimensions of physical activity. We utilized a 5-point Likert scale. Cronbach's for the whole scale was 0.926 (T1) and 0.930 (T2) (T2). The split-half dependability was 0.902% (T1) and 0.911% (T2) (T2). The stability coefficient for 200 teenagers who were retested at 30-day intervals was 0.835 (p0.01).

The Mental Health Assessment Form (MHAF) was administered using the Generalized Anxiety Disorder-7 (GAD-7), which is based on the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) and Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5). Previous research has demonstrated that it is a reliable and valid instrument for identifying the likelihood or propensity for generalized anxiety disorder. The scale contains seven symptoms, each of which is assessed on a four-point scale ranging from 0 to 3, for a total score of 21. The GAD-7 scores were classified into four groups based on the scoring criteria: 0–4 for no significant anxiety symptoms, 5–9 for mild anxiety, 10–14 for moderate anxiety, and 15–21 for severe anxiety. Cronbach's for the whole scale was 0.914 (T1) and

0.925 (T2) (T2). The split-half consistency was 0.922% (T1) and 0.941% (T2) (T2). The coefficient of stability was 0.871 (p0.01). The Coronavirus Risk Perception Scale (CRPS), developed by Cui Xiaoqian [9] et al, was selected. It consists of 9 questions that assess 3 dimensions of severity, susceptibility, and controllability on a 5-point Likert scale, with the severity, susceptibility, and controllability of risk perception ranging from "low (1)" to "high (5)".

Results

Common test for bias

To avoid the bias of the two surveys towards a single dimension, the procedure strength and Harman's one-way test were used to evaluate the questionnaire format, which was delivered online using Questionnaire Star and had bolded question stems and titles. Except for demographic data, one-way unrotated exploratory factor analysis was conducted using the one-way test method of Harman for all questions of both administrations, excluding demographic characteristics. There was 1 eigen-root component, and the eigenvalues of the major factors were T1=19.323% and T2=21.542%. According to the principle of the common method bias test, the primary features accounted for less than 40% of the variance, indicating that the common method bias of the survey test is acceptable [10].

Descriptive and correlational analysis of mental health, physical activity, and risk perception

Independent samples The t-test was used to investigate gender differences in each variable (see Table 1), and the results revealed stable gender differences in mental health (P＜0.001), risk perception (P＜0.001), and physical activity (P＜0.001) for both T1 and T2. Comparison with the means in Table 2 revealed that males reported greater mental health scores than females, although females had higher scores on two repeat-ed assessments of risk perception. Mental health and risk perception had effect sizes of 0.159 (d=0.262) and 0.179 (d=0.278) for men and 0.255 (d=0.416) and 0.195 (d=0.402) for women, respectively.

Table 1
Gender-independent sample t-test

Variables	HV-test	Levene-test		T-test				
		F	P	T	df	P	95%CI	
							LLCI	ULI
T1 mental health	variance chi-squared	2.593	0.109	4.265	344	0.001[2)]	0.676	0.886
T2 mental health	variance chi-squared	0.422	0.969	2.512	344	0.004[2)]	0.518	0.883
T1 physical activity	variance chi-squared	0.438	0.509	-0.653	344	0.292	-0.348	0.693

T2 physical activity	variance chi-squared	0.231	0.969	-1.056	344	0.515	-0.394	1.130
T1 risk perception	variance chi-squared	0.910	0.341	2.513	344	0.001[1)]	0.116	0.885
T2 risk perception	variance chi-squared	0.584	0.445	2.868	344	0.001[1)]	0.355	0.916

To exclude interference from demographic variables, a partial correlation analysis was undertaken for the three variables of mental health, physical activity, and risk perception, and gender was added for comparison to obtain more precise results. (Refer to Table 2.) T1 mental health and T2 mental health were strongly positively associated ($P<0.001$), as were T1 risk perception and T2 risk perception.

The positive correlation between T1 mental health, T1 Physical activity, and T1 risk perception in the first questionnaire survey ($P<0.001$) and T2 mental health, T2 Physical activity, and T2 risk perception in the second questionnaire survey ($P<0.001$) indicated the consistency of the recovered data and the synchronization of the correlations.

Table 2
Results of descriptive statistics and partial correlation analysis for each variable

Variables	T1 mental health	T2 mental health	T1 physical activity	T2 physical activity	T1 risk perception	T2 risk perception
T1 mental health	1					
T2 mental health	0.672[1)]	1				
T1 physical activity	0.432[1)]	0.423[1)]	1			
T2 physical activity	0.436[1)]	0.363[1)]	0.589[1)]	1		
T1 risk perception	0.552[1)]	0.332[1)]	0.214[1)]	0.374[1)]	1	
T2 risk perception	0.307[1)]	0.351[1)]	0.178[1)]	0.545[1)]	0.274[1)]	1
General M±SD	2.812±0.189	1.534±0.165	2.375±0.124	3.684±0.21	3.707±0.119	1.810±0.152
Male M±SD	2.815±0.242	1.548±0.199	2.381±0.150	3.703±0.242	3.694±0.151	1.819±0.191
Female M±SD	2.804±0.291	1.547±0.304	2.363±0.223	3.657±0.403	3.733±0.194	1.891±0.249

A longitudinal investigation of risk perception, Physical activity, and teenage mental health

A cross-lagged analysis of adolescents' risk perception, physical activity, and mental health was conducted, and the data model was constructed by pre-correlation analysis with bias scores by packing and dimensionality reduction techniques using AMOS25.0 statistical software (Figure 1).

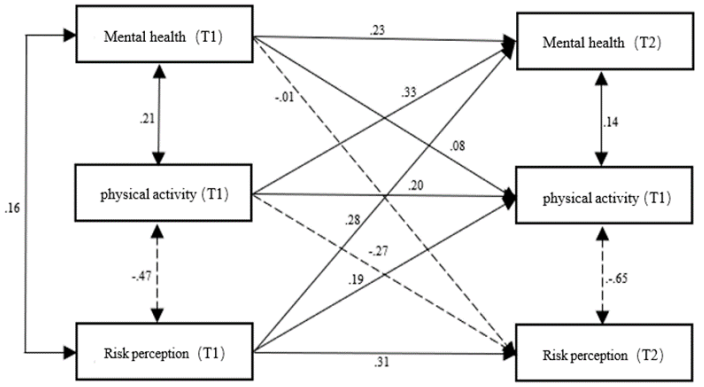

Figure 1. Model of cross-lagged effects of risk perception physical activity and mental health in adolescents

In cluster analysis, it was necessary to restrict various parameters to find the most appropriate model, by comparing the pre-defined model, path coefficient equal mod, to the model with the fewest restrictions. Comparing the fitness of six models—the present model, the path coefficient equality model, the covariance equality model, and the variance equality model—led to the selection of the measurement error model as the analytical model. Model fit results were favourable, X2/df=1.713 (p0.01); absolute fit index RMSEA=0.082; relative fit index CFI=0.911, GFI=0.931, NF1=0.935, IF1=0.959, TLI=0.956; risk perception T1, Physical activity T2, and mental health T2,3; and risk perception T1, Physical activity T2, and mental health T2,3; The variables were created as distinct models of mediating effects, and the Bootstrap method was used to examine the mediating effect of Physical activity T2 between risk perception T1 and mental health T2.

The Bootstrap approach was founded on the analysis of the correlation between a*b. On the one hand, the Sobel test is conducted, which has high data needs, a big sample size, and a normal distribution, resulting in low testing efficiency. The sampling test procedure for the initial sample is contrasted with this. The Bootstrap sampling approach is a more prevalent test due to its efficiency, and there are no limits on the distribution pattern of the sampling for the mediating effect. The bootstrap sampling method is based on a repeated sampling of the initial sample, and the significance of the coefficient of the mediating effect is evaluated using a 95% confidence range (CI) [11]. Hayes (2009) suggested that the initial sample is sampled up to a thousand times for the Bootstrap mediation effect test. If the results of the Bootstrap mediated effects test re-veal that the Bootstrap test CI does not contain the value 0, the indirect impact will begin to take effect (Chen, R. et al., 2013). In this study, the technique of calculating the mediating effect Bootstrap 95% CI was based on sampling the sample 1000 times for the mediating effect test, and the findings are presented in Table 4. The point estimate of the direct effect of risk perception T1 Physical activity T2 mental health T2 was 1.010, the mediating effect was 0.012, the Z value was 0.112, and the indirect effect Bootstrap 95% CI generated by this path was not 0, indicating that Physical activity significantly mediated the relationship between risk perception and mental health.

The results indicate that the effect of mental health T1 on Physical activity T2 (β=0.08) and Physical activity T2 (β=0.19) is statistically significant, as are the effects of Physical activity T1 on mental health T2 (β=0.33) and risk perception T1 on mental health T2 (β=0.28) and Physical activity T2 (β=0.19). There was no statistically significant relationship between mental health T1 (β=-0.01) and physical activity T1 (β=-0.27) and risk perception T2 (P>0.05).

Discussion

The examination of the data revealed a longitudinal causal link between perceived disease risk, physical exercise, and teenagers' mental health. It suggests that physical activity can still affect mental health despite risk perception. And female adolescents had a larger risk perception than male adolescents, which is consistent with the findings of other researchers. [12] There are several reasons why female adolescents may have a higher risk perception than male adolescents. Females tend to have greater empathy, which may make them more aware of potential dangers and risks in their surroundings. [13] Furthermore, societal and cultural variables may have a role, as females are typically socialized to be more careful and aware of potential threats. Girls are typically exposed to more risk information and receive more safety-related messages than boys, according to studies.

Males were less concerned about viral infections than females, females perceived the end of the epidemic to be closer than males, and female adolescents had high-risk perceptions of viral susceptibility due in part to their dissatisfaction with the government's real-time release of information, the speed of emergency plans, and the implementation of comprehensive prevention and control. [14] According to physiological theories, females have higher estrogen levels, which have been linked to heightened anxiety and stress responses. It has been discovered that estrogen increases the activity of the hypothalamic-pituitary- adrenal (HPA) axis, a major component of the body's stress response. This increased activity might result in elevated amounts of the stress hormone cortisol, which can induce feelings of worry. Another possible explanation is that women have more receptors for the neurotransmitter serotonin, which is related to mood regulation and anxiety, in their brains.

Lower serotonin levels are linked to increased anxiety and de-pression, as demonstrated in [15], therefore the higher receptor density in female teenagers may render them more susceptible to these sensations during the transmission of social disorders. Thus, gender and the social information teenagers are exposed to are intimately associated with psychological issues emerging from adolescents' risk perception. In addition, the study indicated that male adolescents engaged in more physical activity than female adolescents, a finding that is consistent with earlier re-search. [16] Males are socialized to value physical activity and strength, whereas girls are socialized to value attractiveness and thinness. This may result in varied physical activity attitudes and motives. Male adolescents have stronger self-esteem and self-efficacy, which can drive them to participate in physical exercise, but female adolescents have different preferences and lower self-efficacy, which may make them less inclined to participate in physical activity. In addition, school closures and other interruptions to everyday life during social disease

epidemics may make it harder for adolescents to maintain a regular physical activity routine. Boys may be more likely to find opportunities to engage in physical activity, such as playing sports, visiting body-building rooms, or using internet training videos, whereas girls may encounter greater obstacles to physical activity.

Conclusions

Consistent with earlier findings, regression analysis revealed that adolescents' perceptions of risk affect their mental health. [17] Individuals with higher risk perceptions are likely to suffer more anxiety, despair, and stress, as demonstrated by Study 17. Due to disruptions in their everyday life and social networks, as well as the uncertain-ty and dread induced by illness, adolescents may be more susceptible to the effect of the social risk of disease on their mental health. Increased risk perception among teenagers can result in elevated levels of anxiety, worry, and fear, which can have a severe effect on their mental health. In addition, teenagers with a high perception of danger may be more inclined to adopt maladaptive coping techniques, such as avoidance, which may exacerbate their mental health issues.

Conversely, teenagers with reduced risk perceptions may be more likely to adopt healthy coping methods, such as physical activity and social support, which can have a good impact on their mental health, with physical activity being recognized as the "top choice" for molding mental health. Cross-lagged studies have also identified physical exercise as a mediator of risk perception management in teenagers' mental health. Physical activity" is frequently utilized as a way of self-regulation, assisting schoolchildren in stabilizing their moods and enhancing their physical condition. Mental health is the subjective reaction of the brain to external reality, and awareness represents the pinnacle of mental development. Mental health consists of cognitive reappraisal, emotional control, and volitional molding [18] processes.

The analysis of cognitive reappraisal through distraction theory reveals that attention is the pointing and focusing of mental activity on a specific object with two characteristics: pointing and focusing and that when a person points and focuses his or her consciousness on a particular activity, his or her awareness of everything else around him or her decreases proportionally. Ac-cording to the notion of distraction, exercise can divert and distract an individual's attention from unfavorable stimuli, allowing them to ignore unpleasant stimuli and focus on positive stimuli, so improving their mood. [19] Individuals have limited cognitive resources for attention, and when these resources are exhausted, new stimuli cannot be absorbed.

When individuals dedicate cognitive resources to vital activities, such as exercise, negative emotions are eliminated from awareness and only the positive feelings associated with exercise are experienced. Then, there will be a reconsideration of the new cognition, which will shift the focus away from the negative event and significantly improve students' anxiety and despair. [20] Second, social interaction theory for emotion regulation dis-covered that the intrinsic social ties prominent in physical activity and the mutual support amongst individuals

engaging in exercise have a significant influence on the effect of exercise on mental health. There are favorable impacts of social support on mental health [21], including emotional support, information, and companionship, which all moderate the development of depression and anxiety symptoms [22]. It can be demonstrated that physical activity has some effect. [23]

According to the prominent researcher Skaalvik, who argued that self-efficacy is the belief in one's abilities, including the ability to plan, organize, and produce relevant activities essential to achieve goals, self-efficacy was evaluated in terms of will shaping. [24] Students in high school complete the workout program due to their self-confidence and gain satisfaction from the sense of completion. Some studies have demonstrated that the more peer support students experience during exercise, the more persistent their exercise behavior, and some researchers have hypothesized that social support mediates the effect of exercise on the mental health of college students. [25] Compared to male college students, female college students received greater social support from their peer group and more encouragement for their exercise, healthy eating habits, and body image. [26]

Using a longitudinal design scheme and a typical quasi-experimental study-cross-lagged analysis, this study investigated the intrinsic relationship between adolescent risk perception, physical activity, and mental health; the findings are pertinent for revealing the influence of social factors on the formation of adolescent mental health. Admittedly, this study was limited to teens and did not include college-aged youngsters as a study group. In the future, the study sample should be increased to analyze the characteristics of individual variations among adolescents of varying academic levels, to gain a thorough understanding of the characteristics of adolescents' mental processes.

Author Contributions

Conceptualization, SIYUAN LI.; Methods, SIYUAN LI.; Software, SIYUAN LI.; Validation, SIYUAN LI.;SIYUAN LI and formal analysis, Chao Wang.; Investigation, Chao Wang.; Resources, SIYUAN LI.; Data management, SIYUAN LI.; Writing-Original draft preparation, SIYUAN LI.; Writing - review and editing, SIYUAN LI.; Visualization, SIYUAN LI.; Supervision, SIYUAN LI.; Project management, SIYUAN LI.; Funding acquisition, year-on-year All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

Data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Reference

1. Fischhoff, B. Risk perception and communication unplugged: twenty years of process Risk analysis. (1995) 15(2): 137-145.
2. Li Biangyuan. A review of domestic trauma theory research in the past five years. Journal of Guangdong Institute of Petrochemical Technology. (2017) 27(2): 30-32.
3. LaCaille, L. J., Hooker, S. A., Marshall, E., LaCaille, R. A., & Owens, R. Change in perceived stress and health behaviors of emerging adults amid the COVID-19 pandemic. Annals of Behavioral Medicine. (2021) 55(11): 1080-1088.
4. Gao, Y., Fu, N., Mao, Y., & Shi, L. Recreational screen time and anxiety among college athletes: Findings from shanghai. International Journal of Environmental Research and Public Health. (2021) 18(14): 7470.
5. Doree, R. E. The Relationship between Cell Phone Use and Motivation to Exercise in College Students. The University of North Dakota. (2019).
6. Dong Yufu. A study on the relationship between physical activity status and psychological health of college students. China Health Education. (2005) 21(6): 468-470.
7. Teenagers - Search - General Library of Tools China Knowledge
8. Qiu, F., Cui, D.G., & Yang, J. Examination and revision of the Exercise Commitment Scale (ECS) in the context of physical activity among Chinese university students. Journal of Wuhan Institute of Physical Education. (2013) 46(12): 51-58.
9. Cui Xiaoqian, Hao Yanhua, Tang Siyu, Fan Kai Sheng, Tang Yurong, Ning Ning, & Gao Lijun. 2011 A new species of the genus Cicilia (Hymenoptera, Ichneumonidae) from China. Reliability testing and application of the New Coronary Pneumonia Risk Perception Scale - An empirical study based on a large data sample. Chinese Public Health. (2021) 37(7): 1086-1089.
10. Zhou, H., & Long, L.R. A statistical test and control method for common method bias. Advances in Psychological Science. (2004) 12(6): 942-950.
11. Ma, Zewei, & Quan, Peng. The mediating role of depression in the relationship between core self-evaluation and suicidal ideation in adolescents: An empirical study based on the Bootstrap and MCMC methods. Psychological Science. (2015) 38(2): 379-382.
12. Liu, B., Liu, H., Han, B., Zhao, T., Sun, T., Tan, X., & Cui, F. Trends and factors associated with risk perception, anxiety, and behavior from the early outbreak period to the controlled period of the COVID-19 epidemic: four cross-sectional online surveys in China in 2020. Frontiers in Public Health.

(2022) 9: 2028.
13. Hagan Jr, J. E., Quansah, F., Frimpong, J. B., Ankomah, F., Srem-Sai, M., & Schack, T. Gender risk perception and coping mechanisms among Ghanaian university students during the COVID-19 pandemic. MDPI. (2022) 10(4):687.
14. Brown, G. D., Largey, A., & McMullan, C. The impact of gender on risk perception: Implications for EU member states' national risk assessment processes. International Journal of Disaster Risk Reduction. (2021) 63: 102452.
15. Cuesta, A., Alvear, D., Carnevale, A., & Amon, F. Gender and public perception of disasters: a multiple hazards exploratory study of EU citizens. Safety. (2022) 8(3): 59.
16. Xia, Xiangwei, Jinling, & Liu, Shan.. An empirical study on physical activity behavior of postgraduate students in colleges and universities. Journal of East China Normal University. (2018) 36(5): 114-128.
17. Wang, C.S., & Yan, J.H. The relationship between perceived risk of new coronary pneumonia epidemic and physical activity and mental health among college students. School Health in China. (2022) 43(11): 1664-1667.
18. Liu, Yinghai, & Guo, Yanlan. 2011 A new genus of the genus A. (Hymenoptera, Braconidae) from the United States. Research progress on physical activity in adolescent mental health from the perspective of exercise psychology. Journal of Educational Sciences, Hunan Normal University. (2022).
19. Coulter, K. S. Intimidation and distraction in an exercise context. International Journal of Sport and Exercise Psychology. (2021) 19(4): 668-686.
20. Falsafi, N. A randomized controlled trial of mindfulness versus yoga: effects on depression and/or anxiety in college students. Journal of the American Psychiatric Nurses Association. (2016) 22(6):483-497.
21. Dour, H. J., Wiley, J. F., Roy-Byrne, P., Stein, M. B., Sullivan, G., Sherbourne, C. D., ... & Craske, M. G. Perceived social support mediates anxiety and depressive symptom changes following primary care intervention. Depression and anxiety. (2014) 31(5):436-442.
22. Rueger, S. Y., Malecki, C. K., Pyun, Y., Aycock, C., & Coyle, S. A meta-analytic review of the association between perceived social support and depression in childhood and adolescence. Psychological bulletin. (2016) 142(10): 1017.
23. Zhu, Jia-Rui, & Hu, Kai. A study on the effect of physical exercise on the emotional regulation of college students during the new pneumonia epidemic. Journal of Natural Sciences, Harbin Normal University. (2021).
24. Skaalvik, C. School principal self-efficacy for instructional leadership: relations with engagement, emotional exhaustion and motivation to quit. Social Psychology of Education. (2020) 23(2): 479-498.
25. Sabo, A., Kueh, Y. C., Arifin, W. N., Kim, Y., & Kuan, G. The validity and reliability of the Malay version of the social support for exercise and physical environment for physical activity scales. PloS one. (2020)15(9): e0239725.
26. Gruber, K. J. Social support for exercise and dietary habits among college students. Adolescence, (2008) 43(171): 557-575.