

A Study on the Effect of Exercise Prescription on Scoliosis in Adolescents

Guifang Liu¹, Yonglei Liu², Haoyuan Li^{3*}

Abstract

In order to understand the efficacy of a scoliosis exercise prescription, it is essential to understand the risk factors associated with this malady. The purpose of this quantitative study was to determine whether or not prescribed exercise would decrease the likelihood of developing scoliosis by influencing one or more sub-clinical risk factors involved with the condition. Before and after an adolescent participated in an exercise prescription for two months, nutritional intake and other health parameters were measured. Scoliosis incidence was determined in order to assess whether or not prescribed exercises reduce incidence. The study found that preprogramed exercises significantly reduced incidence by as much as 44% on average as compared to a non-prescribed condition ($p < .001$). Additionally, the longer the participant was involved in the regimen, the greater the reduction. The study also found that a non-prescribed condition (no exercise) did not yield any significant reduction level in incidence. The finding of this study supports previous research, which concluded that exercise prescription can be an effective scoliosis treatment option in adolescents with subclinical scoliosis.

Key words: Physical exercise; Social anxiety; Left behind children, Adolescents

Introduction

Exercise is a key component of any health program. When given the opportunity, many adolescents are more than willing to participate in some form of physical activity. Interestingly, while the list of benefits to exercise is long and far-reaching, one area that has not been adequately studied is its effect on scoliosis in adolescents. In an attempt to shed light on this question, we studied the difference in scoliosis severity between adolescents who participated in a physical education program (the experimental group) and those who did not participate (the control group). The study was performed from May 1999 through May 2001 in a private school (grades 5-12) of the metropolitan area of Salvador, Bahia, Brazil. Seventy-four students were estimated to have idiopathic scoliosis and were randomly divided into two groups: 35 adolescents who participated in a physical education program for three years and 39 control subjects who did not participate in any physical activities. Scoliosis evaluation was performed with the use of an anthropometrical method that has been previously described by Kielstein et al. (1992).

The evaluations were conducted on a day of rest, 6 days after the students had been removed from school for two weeks for summer break. The students' assessment was performed in the same order by two observers.

The subjects who participated in the physical education program presented a higher level of participation than those of the control group ($p < 0.05$). The average percentage of participation in the physical education program was 95.5% compared with 71.2% for the control group. There was no significant difference in gender or age between the two groups, nor was there a difference in scoliosis severity between pre- and posttesting ($p > 0.05$). A higher level of participation and adherence was observed in adolescents from the experimental group than in those from the control group, indicating that these two parameters can be effective for increasing muscular strength and endurance.

In the evaluation of different degrees of severity of scoliosis, it was observed that there was no significant difference between the pre- and posttests. It is possible that some combination of the variables involved (muscular strength, endurance, and level of participation) is a more important factor in treatment decisions than simple severity. The result did not confirm our hypothesis that a combination of increased muscular strength and endurance can improve scoliosis.

All adolescent participants received a training program of aerobic exercises and stretching, which was led by an instructor. This physical education program was conducted weekly, with one session at the end of each week. The sessions lasted approximately 40 minutes and were performed at the school gymnasium. The control group

¹ School of Sports, Zhengzhou Normal University, Zhengzhou, Henan, 450044, China.

Email: liuguifang@edu.com

² Physical Education Department, Zhengzhou Institute of Finance and Economics, Zhengzhou, Henan, 450044, China

³ Faculty of Sports and Health Sciences, Guangxi University for Nationalities, Guangxi Nanning, 530006, China

participated in a supervised aerobic exercise program during academic hours (2 classes per week) and the other 2 hours were spent in the regular school activities. The instructor who was responsible for the physical training program was also responsible for measuring all students' scoliosis on a daily basis throughout the entire study period. Loneliness is one of the most prominent negative emotions of left behind children. Loneliness is a subjective emotional experience of loneliness, loss, alienation and dissatisfaction based on children's self perception of their social and friendship status in peer groups. It is a negative emotional response. This negative emotional experience will make children fall into strong pain, especially the loneliness experience in childhood. It is associated with social anxiety and abandonment, so that children can not find a sense of social belonging (Mojahed, Zaheri, & Moqaddam, 2021). As shown in Figure 1, social anxiety can make individuals avoid social behavior, resulting in loneliness and affecting their mental health. It is found that social anxiety has a significant positive correlation with primary school students' loneliness, and has a positive and significant predictive effect on primary school students' loneliness. This suggests that understanding the relevant factors affecting social anxiety is of great significance to reduce individual social anxiety and reduce their loneliness experience. Among the many factors affecting social anxiety, self-esteem is one of the important factors (Ng & Joung, 2020). It refers to the positive evaluation and experience of self-worth obtained by individuals in the process of socialization, which plays a protective role in individual mental health. Previous studies have found that self-esteem has a significant negative correlation with social anxiety, and has a significant negative predictive effect on social anxiety, indicating that individuals with high self-esteem have a lower level of social anxiety. It can be inferred that improving individual self-esteem is helpful to reduce their social anxiety. In addition, it is worth noting that there is a significant negative correlation between self-esteem and loneliness. Self-esteem has a significant negative predictive effect on loneliness, indicating that the higher the level of self-esteem, the lower the level of individual loneliness. This shows that the impact of self-esteem on loneliness of rural left behind children in grades 4-6 mainly depends on social anxiety. Left behind children with high levels of social anxiety show more social avoidance and fear of negative evaluation, which will lead to their lack of self-confidence and impaired self-esteem, and will further aggravate their inner loneliness experience (Rasti-Emad-Abadi, Naboureh, Nasiri, Motamed, & Jahanpour, 2017). This inspires us that while worrying about the loneliness of

left behind children, we should start from improving their social ability, exercise and cultivate their social skills, effectively alleviate their social anxiety, let them seek self-confidence in social communication, promote the improvement of self-esteem, and minimize the negative impact of loneliness. The improvement of social skills will enable left behind children to obtain more peer friendships, so that the level of self-esteem will be maintained at a high level, and the loneliness experience caused by their separation from their parents will be balanced to a great extent, which is of great significance to improve and maintain the mental health level of left behind children (Wang & Wang, 2022).

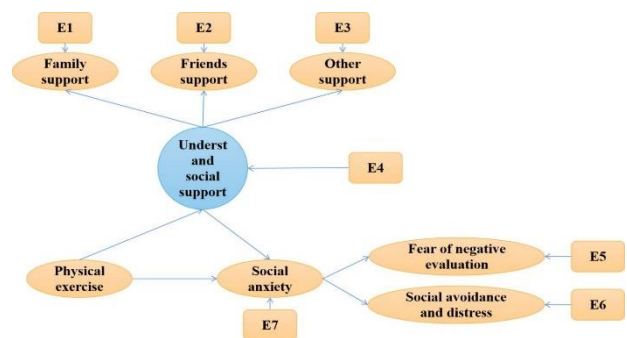


Figure. 1 Intermediary model of left behind children's sense of social support

Among the various factors affecting individual mental health, the positive effect of physical exercise has been paid more and more attention and recognized. The researchers point out that individuals can develop positive psychological qualities such as self-efficacy, self-confidence and psychological toughness in the process of participating in physical exercise, which plays an important role in improving the level of mental health. Although there is little literature on the impact of physical exercise on social anxiety of left behind children, some studies at home and abroad with teenagers as the research object show that physical exercise can reduce social anxiety to a certain extent. The waters I study found that baseball, softball and sand table games can effectively reduce social anxiety (Waters, Barsky, Ridd, & Allen, 2015). Modini M and others also confirmed that participating in group sports can alleviate children's social anxiety (Modini & Abbott, 2017). Hajiabolhasani Nargani Z found that the higher the intensity of sports, the lower the prevalence of social anxiety (Hajiabolhasani-Nargani, Najafi, & Mehrabi, 2016). Based on the current research, this paper proposes a method to explore the impact of physical exercise on social anxiety of rural left behind children and the intermediary role of psychological capital (Figure 1 and Figure 2). Physical exercise scale (Table 1), perceived social support scale (Table 2 and table 3) and children's social

anxiety scale are adopted (Table 4) a questionnaire survey was conducted among 600 students from grade 3 to grade 9 in 6 rural primary and secondary schools in a province. 590 valid questionnaires were collected, with an effective rate of 98.3%. The age ranged from 9 to 15 years, with an average of (11.58 ± 1.83) years. The study was conducted anonymously in the classroom.

Subjects and methods

Subjects

From October to November 2020, 600 students from grades 3 to 9 in 6 rural primary and secondary schools who are left behind at home by their parents in Liaoning province were selected for questionnaire survey. 590 valid questionnaires were collected, and the effective rate was 98.3%. The age ranged from 9 to 15 years, with an average of (11.58 ± 1.83) years.

Experimental method

Physical exercise rating scale

Physical exercise rating scale (Part 3) investigate the physical exercise of rural left behind children. The scale includes three dimensions: exercise intensity, exercise time and exercise frequency. It adopts a 5-level scoring system. The exercise time corresponds to 0 ~ 4 points respectively, and the exercise intensity and exercise frequency correspond to 1 ~ 5 points respectively. The total evaluation score of physical exercise is 100 points. The following evaluation criteria are adopted: ≤ 19 points indicates that the amount of exercise is small; 20 ~ 42 points, indicating moderate amount of exercise; ≥ 43 points indicates a large amount of exercise. The test-retest reliability of the scale is 0 and the reliability is good.

Perceived social support scale (PSSs)

PSSs was used to evaluate the sense of social support of rural left behind children. The scale includes 12 questions in three dimensions: friend support, family support and

other support. Likert grade 7 scoring method (1 ~ 7 points) was adopted, with a total score of 12 ~ 84. The higher the score, the more social support. The scale was optimized, and the "colleagues, relatives and leaders" in the question was changed to "classmates, relatives and teachers", so that the scale was suitable for measuring students.

The α coefficient of the scale is 0.877, and the α coefficients of the three dimensions are 0.820, 0.742 and 0.798 respectively.

Social anxiety scale for children (SASC)

SASC was used to evaluate the social anxiety of left behind children. The scale includes two dimensions: fear of negative evaluation, social avoidance and distress, with a total of 10 questions. A 3-level scoring system is adopted, 0-never, 1-sometimes, 2-always. The lowest total score is 0 (the lowest possibility of anxiety) and the highest is 20 (the highest possibility of anxiety). The α coefficient of the scale is 0.807, and the α coefficients of the two dimensions are 0.770 and 0.689 respectively.

Statistical analysis

Using SPSS26.0 and AMOS25.0 for analysis. Quantitative data are expressed in $X \pm s$. Pearson was used to analyze the correlation of variables, multiple linear regression method and structural equation model were used to test the intermediary effect of variables, and hierarchical regression method was used to analyze the regulatory effect. $P < 0.05$ was statistically significant (MIRAY, Çetin, & Doğan, 2015).

Results

Correlation analysis

Physical exercise is negatively correlated with social anxiety ($r = -0.206, P < 0.01$). It is positively correlated with psychological capital ($r = 0.348, P < 0.01$); Social anxiety is negatively correlated with psychological capital ($r = -0.348, P < 0.01$). See Table 1.

Table 1

Correlation between physical exercise, social anxiety and psychological capital

	1	2	3	4	5	6	7
Exercise intensity							
Exercise time	0.206						
Motion frequency	0.051	0.165					
Physical exercise score	0.564	0.824	0.348				
Fear of negative evaluation	-0.087	-0.241	-0.078	-0.242			
Social avoidance and distress	-0.035	-0.178	-0.104	-0.192	0.497		
Social anxiety	-0.089	0.291	-0.068	-0.254	0.900	0.834	
Psychological capital	0.147	0.367	0.078	0.321	-0.196	-0.178	-0.217

The intermediary role of psychological capital

The first step is to take physical exercise as an independent variable and social anxiety as a dependent variable; The second step is to take physical exercise as an independent variable and psychological capital as a dependent variable; The third step takes physical exercise and psychological capital as independent variables and social anxiety as dependent variables. The results of mediation effect test show that the results of the three steps are statistically significant ($P < 0.05$). Therefore, it can be seen that

psychological capital plays a partial mediating role between physical exercise and social anxiety of left behind children. See Table 2.

Bootstrap method was used to test the significance of intermediary effect. The results showed that the total effect of physical exercise on social anxiety of left behind children was -0.329, of which the direct effect was -0.279, accounting for 80.71% of the total effect, and the indirect effect through psychological capital was -0.071, accounting for 19.29% of the total effect. See Table 3.

Table 2

Analysis of the intermediary role of psychological capital in the relationship between physical exercise and social anxiety

Dependent variable	Independent variable	Non standardized coefficient		Standardization coefficient	t	P
		B	Standard error			
Social anxiety	Physical exercise	-0.076	0.011	-0.284	-8.402	<0.001
Psychological capital	Physical exercise	0.030	0.002	0.377	8.579	<0.001
Social anxiety	Physical exercise	-0.068	0.004	-0.315	-4.691	<0.001
	Psychological capital	-2.001	0.296	-0.251	-5.212	<0.001

Table 3

Intermediary effect of psychological capital

Effect	Effect value	95% confidence interval		P value
		Lower limit	Upper limit	
Direct effect	-0.279	-0.120	-0.284	0.010
Indirect effect	-0.071	-0.055	-0.029	0.010
Total effect	-0.329	-0.311	-0.371	0.010

In order to further test the mediating role of perceived social support, regression analysis was carried out with

social anxiety as the dependent variable and physical exercise and perceived social support as the independent variables. The results show that physical exercise can affect social anxiety through three intermediary paths, namely friend support, family support and other support. In summary, in the process of physical exercise affecting social anxiety, understanding various factors of social support have some mediating effects (Marofi, Mokhtari-Dinani, & Ghazavi, 2018). See Table 4.

Table 4

Regression analysis of variables in the mediating model of children's sense of social support

Dependent variable	Independent variable	Non standardized coefficient		Standardization coefficient	T value	P
		B	Standard deviation			
Social anxiety	Constant	31.22	0.605		40.351	<0.01
	Physical exercise	-1.162	0.331	-0.234	3.879	<0.01
	Support from friends	-0.118	0.044	-0.287	4.568	<0.01
Social anxiety	Constant	20.779	0.511		37.003	<0.01
	Physical exercise	-1.590	0.247	-0.324	6.078	<0.01
	Family support	-0.133	0.029	-0.341	4.596	<0.05
Social anxiety	Constant	21.209	0.511		39.476	<0.01
	Physical exercise	-1.089	0.251	-0.174	4.398	<0.01
	Other support	-0.110	0.024	-0.149	4.282	<0.01

The test results of each path are shown in Figure 2, and the model fitting index is $\chi^2 / DF = 0.2942$, lower than the minimum allowable value of 3, indicating that the analysis result is acceptable. Root mean square approximation error < 0.001 , lower than the minimum allowable value of 0.08. The comparison fitting index = 1, incremental fitting index = 1, goodness of fit index = 0.997, and the adjusted goodness of fit index = 0.992, all of which are > 0.9 , indicating that the model fits well with the data. According to the principle of regulatory effect analysis, it is assumed that understanding social support is a regulatory variable, physical exercise is an independent variable and social anxiety is a dependent variable. Firstly, the independent variables and regulatory variables are decentralized. Then, construct the product of centralized independent variables and regulatory variables (physical exercise centralization \times perceived social support centralization). Finally, carry out hierarchical regression analysis. The results show that understanding social support has a significant regulatory effect on the relationship between physical exercise and social anxiety ($P < 0.05$).

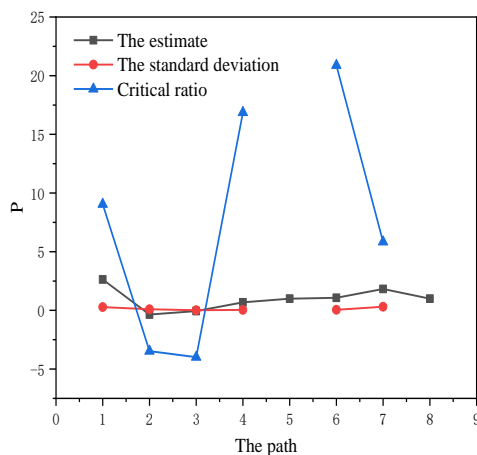


Figure 2. Test of mediating effect of children's sense of social support

Discussion

The results of this survey show that the level of physical exercise is significantly positively correlated with social anxiety. The higher the level of left behind children participating in physical exercise, the lower the level of social anxiety, which is consistent with the research results. The number, time and level of exercise were positively correlated with adolescents' mental health, and negatively correlated with depression and anxiety. The reason why physical exercise can reduce social anxiety may be that physical exercise can improve individual self-efficacy. On the

relationship between physical exercise and self-efficacy, relevant studies found that, on the one hand, self-efficacy is an important variable affecting individual participation in physical exercise. On the other hand, physical exercise can promote physiological arousal, which is an important factor affecting individual self-efficacy. The stronger the self-efficacy, the stronger the individual's ability to deal with interpersonal relationships, the higher the positive self-evaluation, and the lower the social anxiety (Manne, Mee, Bartell, Sands, & Kashy, 2016). The results of this survey show that there is a significant positive correlation between the level of physical exercise and the support of family and friends, indicating that the higher the level of physical exercise, the more left behind children understand social support. Research shows that social support from family, parents and friends is an important factor affecting teenagers' participation in physical exercise. On the contrary, active participation in physical exercise can help individuals obtain more sense of social support to a certain extent. One important reason is that many physical exercise programs provide teenagers with the opportunity to interact with their peers, so as to help them get the support of their friends. The results of this survey show that perceived social support plays an intermediary and regulatory role in the relationship between physical exercise and social anxiety of rural left behind children. Firstly, for the left behind children with high sense of social support, the example demonstration and positive encouragement from friends are conducive to improve their motivation to participate in physical exercise and increase the frequency of physical exercise. Secondly, social support from family or friends helps to enhance the positive psychological capital of left behind children, so that they have more sufficient psychological resources and self-efficacy to participate in collective physical exercise, so as to obtain positive feedback and have a positive impact. Finally, left behind children with a high sense of social support have more psychological resources to deal with interpersonal relationships and have a more positive attitude towards negative evaluation, which helps to reduce their social anxiety level (Hasanpour-Dehkordi, Jivad, & Solati, 2016). On the contrary, left behind children with low sense of social support are more vulnerable to social anxiety in the face of unknown social contact and negative evaluation, because they do not have enough psychological resources and positive cognitive self-evaluation. In short, the survey results reveal the impact of physical exercise on social anxiety of rural left behind children and its mechanism, analyze the multiple effects of social support on social anxiety, and further verify that physical exercise is an effective way to alleviate social anxiety of rural left behind children.

According to the results of this study, it is also found that there is a significant positive correlation between physical exercise and psychological capital, indicating that participating in physical exercise is conducive to enhancing teenagers' psychological capital. This study shows that group physical exercise intervention can reduce children's emotional behavior problems and significantly improve children's positive psychological quality. The reason why physical exercise helps to improve children's positive psychological capital may be related to the following factors: first, physical exercise can enhance children's sense of strength, patience and muscle flexibility, reduce the probability of obesity and other problems, so as to enhance self-confidence, improve optimism and other positive psychological qualities, and reduce anxiety. Second, physical exercise helps to improve children's emotional regulation ability, and the positive effect on positive emotions has also been proved to be sustainable. The emotional response of individuals to various events in daily life is an important way to accumulate their positive psychological capital and maintain mental health, and physical exercise is very beneficial for individuals to actively deal with stressful events in life (Ramasamy, Panneerselvam, Govindharaj, Kumar, & Nayak, 2018). Therefore, for children, physical exercise can enhance positive self-awareness, improve positive emotions, and increase the response efficiency to stressful events, so as to improve children's positive psychological capital. The results also show that there is a significant negative correlation between psychological capital and social anxiety, that is, the higher the level of positive psychological capital of left behind children, the lower the level of social anxiety. This result is consistent with previous relevant studies, which shows that positive psychological capital is an important protective factor to reduce adolescents' emotional and behavioral problems. Children's own psychological quality is an important factor to reduce their susceptibility to negative social processes, and psychological capital is an important positive psychological quality. Moreover, social networks help to improve the mental health level of adolescents. In this study, psychological capital represents the social network in which left behind children can obtain positive psychological support. Specifically, the self-efficacy of psychological capital helps to help left behind children reduce their susceptibility to external negative evaluation and enhance their self-confidence. Resilience in psychological capital can help left behind children recover from setbacks in time in the face of social anxiety, so as to improve their psychological recovery ability. The sense of hope in psychological capital also helps to reduce the fear and worry of left behind children about future social interaction and

establish the hope of future social interaction. Optimism in psychological capital has been proved to be an important personality factor affecting social anxiety. The results also show that physical exercise can also indirectly affect the social anxiety of left behind children through the intermediary effect of psychological capital. Both personal psychological traits and external environment can affect their social anxiety, but the influence of external environmental factors can also play a role through the intermediary of personal psychological traits. Physical exercise can promote the peer relationship of left behind children, help left behind children to obtain more psychological support, change their negative self cognition and improve their sense of self-efficacy, so as to reduce social anxiety. Research shows that subjects with higher intensity of physical training have lower level of social anxiety. This result once again verifies the buffering effect of physical exercise on reducing social anxiety. Moreover, physical exercise also plays an important role in enhancing individual positive psychological capital. Psychological capital is an important coping resource for individuals in coping with life stress events, especially negative feedback in social interaction (Radley et al., 2017).

Conclusion

The results also show that physical exercise can also indirectly affect the social anxiety of left behind children through the intermediary effect of psychological capital. Both personal psychological traits and external environment can affect their social anxiety, but the influence of external environmental factors can also play a role through the intermediary of personal psychological traits. Physical exercise can promote the peer relationship of left behind children, help left behind children to obtain more psychological support, change their negative self cognition and improve their sense of self-efficacy, so as to reduce social anxiety. On the relationship between physical exercise and self-efficacy, relevant studies found that, on the one hand, self-efficacy is an important variable affecting individual participation in physical exercise. On the other hand, physical exercise can promote physiological arousal, which is an important factor affecting individual self-efficacy. The stronger the sense of self-efficacy, the stronger the individual's ability to deal with interpersonal relationships, the higher the positive self-evaluation, and the lower the social anxiety. The results of this survey show that there is a significant positive correlation between the level of physical exercise and the support of family and friends, indicating that the higher the level of physical exercise, the more left behind children understand social support.

Acknowledgements

The work was supported by Liaoning Province Education Science and Research Department Young Scientific and

Technological Talents “Nurturing” Project: Research on Multiple Supply Models of Youth Public Sports Services from the Perspective of Actor Network (Granted No.WQN2020ST08)

References

- Hajjabolhasani-Nargani, Z., Najafi, M., & Mehrabi, T. (2016). Effect of mobile parenting skills education on anxiety of the mothers with autistic children. *Iranian journal of nursing and midwifery research*, 21(6), 572. doi:<https://doi.org/10.1016/j.aip.2021.101756>
- Hasanpour-Dehkordi, A., Jivad, N., & Solati, K. (2016). Effects of yoga on physiological indices, anxiety and social functioning in multiple sclerosis patients: A randomized trial. *Journal of clinical and diagnostic research: JCDR*, 10(6), VC01. Retrieved from <https://doi.org/10.7860%2FJCDR%2F2016%2F18204.7916>
- Manne, S., Mee, L., Bartell, A., Sands, S., & Kashy, D. A. (2016). A randomized clinical trial of a parent-focused social-cognitive processing intervention for caregivers of children undergoing hematopoietic stem cell transplantation. *Journal of consulting and clinical psychology*, 84(5), 389. doi:<https://psycnet.apa.org/doi/10.1037/ccp0000087>
- Marofi, M., Mokhtari-Dinani, M., & Ghazavi, Z. (2018). Evaluation of the Effect of Individual and Group Tour on the Anxiety Scores of 4–7-year-old Hospitalized Children and their Mothers. *Iranian journal of nursing and midwifery research*, 23(6), 426. doi:https://doi.org/10.4103%2Fijnmr.IJNMR_51_16
- MIRAY, Ö., Çetin, Z., & Doğan, Ö. (2015). The effect of adolescents reading children s literature to their younger siblings on their book reading habits. *Creative Education*, 6. doi:<http://dx.doi.org/10.4236/ce.2015.618206>
- Modini, M., & Abbott, M. J. (2017). Negative rumination in social anxiety: A randomised trial investigating the effects of a brief intervention on cognitive processes before, during and after a social situation. *Journal of Behavior Therapy and Experimental Psychiatry*, 55, 73-80. doi:<https://doi.org/10.1016/j.jbtep.2016.12.002>
- Mojahed, A., Zaheri, Y., & Moqaddam, M. F. (2021). Effectiveness of group psychodrama on aggression and social anxiety of children with attention-deficit/hyperactivity disorder: A randomized clinical trial. *The Arts in Psychotherapy*, 73, 101756. doi:<https://doi.org/10.1016/j.aip.2021.101756>
- Ng, S.-L., & Joung, S.-J. (2020). Two rare teleosts *Paraulopus brevirostris* (Aulopiformes: Paraulopidae) and *Acropoma lecorneti* (Perciformes: Acropomatidae) from Taiwan, Northwestern Pacific Ocean. *FishTaxa*.
- Radley, K. C., O'Handley, R. D., Battaglia, A. A., Lum, J. D., Dadakhodjaeva, K., Ford, W. B., & McHugh, M. B. (2017). Effects of a social skills intervention on children with autism spectrum disorder and peers with shared deficits. *Education and Treatment of Children*, 40(2), 233-262. doi:<https://doi.org/10.1353/etc.2017.0011>
- Ramasamy, S., Panneerselvam, S., Govindharaj, P., Kumar, A., & Nayak, R. (2018). Progressive muscle relaxation technique on anxiety and depression among persons affected by leprosy. *Journal of exercise rehabilitation*, 14(3), 375. doi:<https://doi.org/10.12965/jer.1836158.079>
- Rasti-Emad-Abadi, R., Naboureh, A., Nasiri, M., Motamed, N., & Jahanpour, F. (2017). The effects of preanesthetic parental presence on preoperative anxiety of children and their parents: A randomized clinical trial study in Iran. *Iranian journal of nursing and midwifery research*, 22(1), 72. doi:https://doi.org/10.4103/ijnmr.IJNMR_178_14
- Wang, W., & Wang, Y. (2022). Research on image capture technology of intelligent terminal and multi exposure fusion to improve the resilience of agriculture production systems. *Journal of Commercial Biotechnology*, 27(2). doi:<https://doi.org/10.5912/jcb1045>
- Waters, L., Barsky, A., Ridd, A., & Allen, K. (2015). Contemplative education: A systematic, evidence-based review of the effect of meditation interventions in schools. *Educational Psychology Review*, 27, 103-134. Retrieved from <https://link.springer.com/article/10.1007/s10648-014-9258-2>