

INTERVENTION EFFECT OF RESEARCH-BASED PSYCHOLOGICAL COUNSELING ON ADOLESCENTS' MENTAL HEALTH DURING THE COVID-19 EPIDEMIC

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received: 11.4.2021;

revised: 25.5.2021;

accepted: 28.5.2021

SUMMARY

Background: This study aims to explore the intervention effect of research-based psychological counseling on adolescents' mental health during the COVID-19 epidemic.

Subjects and methods: From May to July 2020, 160 young students were selected from 5 middle schools in Shandong Province of China as the participants of this study and were randomly divided into the experiment and control groups with 80 members in each group. The routine in-campus education of health knowledge related to the epidemic was conducted in the control group, while the experiment group received both the routine education and the intervention of psychological counseling in combination with outdoor exercise.

Results: No significant difference exists between the experiment and control groups ($P > 0.05$) before the intervention, but the scores of the experiment group in anxiety and depression are lower than those of the control group ($P < 0.05$) after the intervention; the PSQI score of the experiment group is significantly lower after the intervention, suggesting that the effect on the experiment group is better than the control group ($P < 0.05$); the scores of the experiment group in psychological resilience and its 5 dimensions are higher than those of the control group ($P < 0.05$).

Conclusions: This intervention model has a good intervention effect on adolescents' mental health and psychological resilience. At the same time, this study enlightens the introduction of the research-based psychological counseling model when helping adolescents solve mental health problems and highlights the important role of exercise in improving adolescents' mental health and psychological resilience.

Key words: psychological counseling mode -, outdoor exercise - mental health – adolescents - COVID-19

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INTRODUCTION

The New Coronavirus pneumonia (COVID-19) was defined by the WHO as an international public health emergency (Lazzari et al. 2020). Given the strong transmission and variability of the virus, the lack of special drugs, and the high mortality rate without timely treatment, COVID-19 has aroused widespread attention and concern among the public (Cullen et al. 2020, Pfefferbaum & North 2020). At the same time, the extensive exposure to a variety of online information about the epidemic situation has brought people profound psychological impacts. Clearly, this public health emergency not only has important impacts on physical health but also a series of effects on mental health. Among the widely affected groups, special attention should be paid to the group of adolescents (Imran et al. 2020, Ding & Yao 2020). During the COVID-19 outbreak, adolescents have experienced fear, worry, uncertainty, physical and social separation, delayed school opening, and the resulting changes in their routine schedules (Francic et al. 2020). These changes and experiences have remarkable effects on adolescents both physically and psychologically. On the one hand, studies have shown that adolescents'

sleep quality has been significantly reduced since the outbreak (Stern et al. 2020, Abuhmaidan & Al-Majali 2020). On the other hand, follow-up research has revealed that during COVID-19, adolescents' mental health level has been decreasing as reflected in the rise of their depression and anxiety level and the decline in their positive psychological experience such as life satisfaction (Magson et al. 2020, Courtney et al. 2020). Psychological resilience is an important psychological trait that helps individuals resist external pressure and restore their psychological functions (Yang et al. 2021). The results of some investigations show that individuals with a high psychological resilience level report having a high mental health level despite the stress brought by the epidemic, indicating that psychological resilience is a protective factor for individuals to effectively cope with the impact of the epidemic (Ran et al. 2020). However, excessive consumption of psychological resilience also somewhat brings about a decrease in this resource (Kocjan et al. 2020, Quevedo-Blasco et al. 2017). Therefore, intervention is an important measure to help adolescents actively cope with the influence of COVID-19 and improve their psychological resilience and mental health level.

The existing methods to intervene in adolescents' mental health problems include group psychological counseling, drug therapy, and behavioral intervention, to name a few (Carpio-de-Los-Pinos et al. 2017). While psychological intervention is typically based on a certain consulting theory and model, the research-based psychological counseling model is an Inquiry-style and fully opened psychological counseling model (Yang et al. 2014). This model is a theoretical conception extracted by Yang et al. (2015) in their over ten-year practice of psychological counseling targeted at adolescents. The objective of this theoretical model is to stimulate the potential and motivation of self-examination and self-exploration, guide individuals to actively identify their own problems and seek solutions, and improve their psychological quality. The characteristic of this psychological counseling model lies in its emphasis that the individual is the researcher of his/her own psychological problem, and the latter is the starting point for the psychological counseling model (Yang et al. 2014). Yang et al. (2015) adopted the research-based psychological counseling model to carry out a group intervention in college students with stronger suicide ideation. Their results show that the intervention can significantly reduce the level of suicide ideation in college students. The research-based psychological counseling model can also relieve the negative impact on adolescents' mental health and strengthen the positive effect of positive psychological resources (Yang et al. 2015).

Meanwhile, some scholars argued that long-term inactivity also aggravates the mental health crisis among adolescents. Thus, regular exercise is conducive to treating or preventing anxiety and depression and may produce the same effect as drug therapy and psychotherapy (Yang et al. 2015). For example, outdoor exercise in which individuals are exposed to the outdoor environment has a strong potential protective effect on adolescents' mental health (Dabija & Bejan 2018, Liu et al. 2020). Therefore, apart from the intervention based on traditional professional knowledge, exercise should also be incorporated as a supplementary psychological intervention to help adolescents cope with their psychological crisis in a public health emergency. At present, a few reports are available on the combination of the research-based psychological counseling model and exercise. With an attempt to combine the advantages of both methods, namely, the research-based psychological counseling model and outdoor exercise, this study was conducted to investigate the impact of this new model on adolescents' emotions, sleep, and psychological resilience during the epidemic. This study is expected to provide some empirical bases and reference for other researchers to implement relevant intervention measures and solve mental health problems in adolescents during a public health emergency.

SUBJECTS AND METHODS

Participants

The participants of this study were randomly selected from three communities in Jinan and Yantai in Shandong Province from May to July 2020. Their ages were within the range of 12–18 years old. They were surveyed with SAS and SDS scales. Finally, 187 students were gathered with a score ≥ 50 in SAS and SDS scales. After the team gave a uniform description and explanation of the experiment, 160 adolescents with anxiety symptoms voluntarily participated in the intervention. They were randomly divided into the experiment and control groups with 80 members in each group. Among them, 153 participants were eventually followed up. Specifically, 4 and 3 participants in the experiment and control groups, respectively, withdrew from the experiment. Table 1 shows the demographic investigation results including gender and age of the two groups. The consent was obtained from the adolescents themselves, their guardians, and heads of their community before the experiment. All the participants voluntarily participated in the experiment.

Methods

(1) Only routine community health education was carried out in the control group, converting knowledge of public health and personal health and infectious disease prevention knowledge with the focus on respiratory and digestive tracts.

(2) Apart from routine community health education, the experiment group also received intervention of the research-based psychological counseling model and outdoor exercise. The participants of this study were randomly divided into the experiment and control groups. The experiment group was given psychological training targeted at improving psychological resilience, whereas no psychological training measure was taken in the control group. According to research-based psychological counseling theory and the characteristics of adolescents' mental health and psychological resilience, group psychological counseling was conducted once a week, approximately 1 hour each time, for a total of 8 weeks. The specific scheme is as follows: the first unit is the preparation stage to establish a good cooperative relationship between the investigator and the participants. The second to seventh units are the stages of self-evaluation, primarily including exploring positive emotions, guiding individuals to discover their own advantages, and improving their positive energy; helping them seek tolerance, perceive gratitude, and experience the greatness of life from the dedication of medical workers during the epidemic; identifying positive cognition, changing irrational cognition, and cultivating positive and rational cognitive ways; searching active response, cultivating adolescents' ability to take mature coping methods in the face of difficulties, strengthening their psychological resilience, and leading them to actively

solve problems or seek help; instructing individuals to develop mutual trust, cooperating, sharing, and helping; establishing a positive life; and training their ability in career planning. The eighth unit is concentrated on consolidation and summarization.

The outdoor exercise intervention was designed by sports experts. Specifically, the exercise items include suburban leisure tourism, badminton game, basketball game, aerobics, group rope skipping, and outdoor cross-country race competitions, among others; the exercise was carried out twice a week, approximately 50 min each time; the heart rate during exercise was controlled within 65%–73%, suggesting medium intensity for the maximum heart rate. The heart rate control was monitored by a heart rate meter. The outdoor exercise intervention was conducted twice every week, and research-based psychological counseling was carried out in the interval. The intervention test began in May 2020, and re-measurement was implemented after the experiment (July 2020) to compare to the effects.

Measuring Tools

Demographic questionnaire: The self-made demographic questionnaire covers grade, gender, age, academic achievement, family economy, and other statistics about adolescents' demographic information.

Healthy Kids Resilience Assessment (Hu & Gan 2008): It was compiled by Hu & Gan (2008). The scale includes 27 items in five dimensions: emotional control, positive cognition, goal concentration, family support, and interpersonal assistance. The 5-level scoring is used for rating. A high score means a high level of psychological resilience. The scale has good reliability and validity, and the consistency coefficient of psychological resilience has been proven in empirical tests to be 0.882.

Self-rating Depression Scale (SDS) (Zung 1965): It was compiled by Zung (1965) to reflect the depressive symptoms of those tested for nearly a week. The results of domestic research show that the internal consistency reliability of the scale is 0.862, the split-half reliability is 0.745, and the retest reliability is 0.82. A total of 20 self-rating items are included in the scale for rating. The options for each item include “never or rarely,” “occasionally,” “often,” and “most of the time,” which are respectively scored as “1–4 points.” Ten of the items are positively scored, whereas the remaining 10 are reversely scored. The total score is the sum of the positive scores of all items and is converted into the standard score by being multiplied by 1.25. Hence, the scale has a score ranging from 25 to 100 points. According to previous research, the criteria for depression severity among ordinary college students can be set as follows: those with a score of <50 points are normal; those with a score of 50–59 have mild depression; those with a score of 60–69 have moderate depression; and those with a score ≥ 70 points have severe depression.

Self-rating Anxiety Scale (SAS) (Zung 1971): the Chinese version of SAS compiled by Zung (1971) performs better in evaluating students' anxiety symptoms and has an internal consistency reliability as high as 0.788. A total of 20 self-rating items are included in the scale for rating, and 4-level scoring is used for rating. The options for each item include “never or rarely,” “occasionally,” “often,” and “most of the time,” which are respectively scored as “1–4 points.” Fifteen of the items are positively scored, whereas the remaining 5 are reversely scored. The total score is the sum of the positive scores of all items and is converted into the standard score by being multiplied by 1.25. Hence, the scale has a score ranging from 25 to 100 points. The criteria for classification are as follows: those with a score of <50 points are normal; those with a score of 50–59 have mild depression; those with a score of 60–69 have moderate depression; and those with a score of ≥ 70 points have severe depression.

Pittsburgh Sleep Quality Index (PSQI) (Buysse et al. 1989): This scale is used to evaluate sleep status in the past month. The Chinese version of PSQI can evaluate adolescents' sleep quality (Liu et al. 2020). The internal consistency reliability of the scale is 0.798–0.842, and its split-half reliability is 0.777–0.866. The scale consists of 19 self-rating items and 5 other items. Among them, 18 items are included for rating and constitute seven dimensions, including subjective sleep quality (1 item), time of falling asleep (2 items), sleep duration (1 item), sleep efficiency (3 items), and sleep disorder (9 items). Each of the dimensions is rated with a 3-level scoring ranging from 0 to 3 points. Therefore, the scale score range is 0–21. A higher score indicates worse sleep quality, and those with a score of >7 points are judged to have “sleep quality problems.”

Statistical Analysis

The data were analyzed with SPSS15.0 statistical software. The quantitative data were expressed by mean \pm standard deviation. Independent sample t test or paired t test were used for comparison between the two groups. The qualitative data were expressed by the number of cases. Then, Chi square test or Wilcoxon rank sum test were applied for comparison between the two groups. The difference is statistically significant at $P < 0.05$.

RESULTS

Demographic information of the participants

The 160 participants were randomly divided into the experiment and control groups with 80 members in each group. Then, 153 participants were finally followed up. Among them, 4 and 3 in the experiment and control groups, respectively, withdrew from the experiment. As shown in Table 1, no significant difference exists between the two groups in gender, age, academic achievement, and family economy ($P > 0.05$), suggesting that the two groups are comparable.

Table 1. Comparison of demographic information between the experiment and control groups

		Experimental group (76)	Control group (77)	t/ χ^2 /Z	P
Gender	Male	41	39	0.167	0.683
	Female	35	38		
Age		15.7±2.05	15.9±1.07	0.755	0.451
Self-rated academic achievement	Very good	18	27	1.352	0.176
	Good	20	19		
	Commonly	17	16		
	Poor	17	6		
	Very poor	4	9		
Family economy	Very good	12	9	0.679	0.486
	Good	20	19		
	Commonly	24	27		
	Poor	9	10		
	Very poor	11	12		

Table 2. Comparison of anxiety and depression between the two groups before and after the intervention

Index	Group	Before Intervention	After Intervention	Difference before and after intervention	P value of inter-group comparison
Anxiety	Experimental group (76)	64.03±9.96	56.83±10.96	7.20±5.56	<0.001
	Control group (77)	64.05±9.45	60.81±9.51	3.25±3.74	<0.001
	t	-0.016	-2.397	5.165	
	P	0.987	0.018	<0.001	
Depression	Experimental group (76)	62.91±6.69	54.91±9.00	8.00±5.77	<0.001
	Control group (77)	64.16±7.21	60.01±8.87	4.14±4.44	<0.001
	t	1.110	3.533	4.641	
	P	0.269	0.001	0.002	

Table 3. Comparison of sleep quality between the two groups before and after the intervention

Group	Before Intervention	After Intervention	Difference before and after intervention	P value of inter-group comparison
Experimental group (76)	8.84±3.47	6.21±3.86	2.17±1.93	<0.001
Control group (77)	8.45±3.73	7.64±4.01	0.73±1.13	<0.001
t	0.665	-2.243	5.658	
P	0.507	0.026	<0.001	

Comparison of anxiety and depression between the two groups before and after the intervention

Table 2 shows no significant difference in anxiety and depression between the experiment and control groups ($P>0.05$) before the intervention. Decreases were noted in the scores of both groups in anxiety and depression after the intervention, and the differences are statistically significant ($P<0.001$). The decreases of the experiment group in anxiety and depression are greater than those of the control group. The scores of the experiment group in anxiety and depression are both lower than those of the control group, and the differences are statistically significant ($P<0.05$), indicating that the intervention effect on the experiment group is better than that on the control group.

Comparison of sleep quality between the two groups before and after the intervention

Table 3 shows no significant difference in the PQSI score between the experiment and control groups before the intervention ($t=0.665$, $P=0.507$). Decreases were noted in the PQSI score of both groups after the intervention, and the differences are statistically significant ($P<0.001$). From the changes in the PQSI score and the scores of both groups after the intervention, the intervention effect on the experiment group can be seen as better than that on the control group, and the difference is statistically significant ($P<0.05$).

Comparison of psychological resilience between the two groups before and after the intervention

Table 4 shows no statistical significance in psychological resilience and its five dimensions between the experiment and control groups before the intervention

Table 4. Comparison of psychological resilience between the two groups before and after the intervention

Indicator	Group	Before Intervention	After Intervention	Difference before and after intervention	P value of inter-group comparison
Goal concentration	Experimental group (76)	16.38±4.58	19.68±4.30	3.30±1.52	<0.001
	Control group (77)	16.83±4.25	18.26±3.92	1.43±1.22	<0.001
	t	-0.629	2.142	8.408	
	P	0.530	0.034	<0.001	
Interpersonal assistance	Experimental group (76)	17.42±4.50	21.12±4.38	3.70±2.38	<0.001
	Control group (77)	18.14±4.70	19.36±4.73	1.22±1.11	<0.001
	t	-0.970	2.381	8.259	
	P	0.334	0.019	<0.001	
Family support	Experimental group (76)	12.09±3.94	15.66±3.80	3.57±1.81	<0.001
	Control group (77)	12.86±4.61	14.27±4.47	1.42±1.07	<0.001
	t	-1.103	2.064	8.950	
	P	0.272	0.041	<0.001	
Emotional control	Experimental group (76)	17.92±5.53	21.12±5.78	3.2±2.82	<0.001
	Control group (77)	17.95±5.41	19.05±5.28	1.1±1.17	<0.001
	t	-0.031	2.309	6.017	
	P	0.976	0.022	<0.001	
Positive cognition	Experimental group (76)	18.72±5.08	22.47±4.45	3.75±3.72	<0.001
	Control group (77)	19.26±7.11	20.14±6.64	0.88±2.51	0.003
	t	-0.536	2.548	5.592	
	P	0.593	0.012	<0.001	
Psychological resilience	Experimental group (76)	82.54±8.14	100.05±7.88	17.51±5.43	<0.001
	Control group (77)	85.04±10.46	91.09±9.57	6.05±3.5	<0.001
	t	-1.648	6.321	15.542	
	P	0.101	<0.001	<0.001	

($P>0.05$). Increases were noted in the scores of both groups in psychological resilience and its five dimensions after the intervention, and the differences are statistically significant ($P<0.001$). The changes of the experiment group in psychological resilience and its five dimensions are greater than those of the control group. The scores of the experiment group in psychological resilience and its five dimensions are all higher than those of the control group, and the differences are statistically significant ($P<0.05$), indicating that the intervention effect on the experiment group is better than that on the control group.

DISCUSSION

According to the results of this study, no significant difference exists in the depression and anxiety levels between the experiment and control groups before the intervention. After 8 weeks of intervention, the depression and anxiety levels of the experiment group are significantly lower than their values before the intervention and significantly lower than those of the control group. This finding indicates that the research-based psychological counseling model in combination with outdoor exercise could effectively reduce the emotional disorder in adolescents. These results are consistent with the findings obtained by Wang et al. (2020) and Wei et al. (2020). The reason why the psychological counseling model in combination with outdoor exercise can effectively reduce the depression and anxiety in adolescents is related to the following two aspects. The first aspect

is the advantage of the research-based psychological counseling model reflected in the rationale of this model that the individual is the researcher. Incorporating the research-based psychological counseling model into the intervention design fully mobilizes adolescents' internal motivation to actively engage in self-exploration, self-evaluation, and self-reflection; guides them to perceive various positive emotions they have experienced during COVID-19; and reduces the impact of negative emotional experience through the expansion and construction of positive emotions (Wu et al. 2020). Meanwhile, the intervention design in which the research-based psychological counseling model is adopted can guide adolescents to positively recognize their negative emotions such as depression and anxiety, analyze the sources of their depression and anxiety, and assist them to deal with ideological cognitive confusion (Hassan et al. 2021). After continuous practice, adolescents would slowly acquire the concept that "I am a researcher," apply it to daily life, and gain added competence in handling depression and anxiety. The second aspect lies in the advantage of outdoor exercise intervention. Outdoor exercise has been proven effective in reducing emotional disorders such as depression and anxiety (Hegberg et al. 2018), primarily because outdoor exercise allows adolescents to immerse in nature, engage in person-nature interaction, and obtain positive psychological emotions from awe and beauty by feeling the magic and strength of nature (Fraser et al. 2020). The open space of the outside world adds attractiveness to outdoor exercise for

adolescents and effectively improves their persistence to participate in psychological intervention.

According to the results of this study, no significant difference exists in the baseline level between the two groups before the intervention. After 8 weeks of intervention, we noted a significant increase in the sleep quality and a decrease in the sleep disorders of the experiment group that received research-based psychological counseling in combination with outdoor exercise. These results are consistent with the findings of Liu et al. (2020). The intervention of the research-based psychological counseling model can steadily lead adolescents to become the discoverers and researchers of their own problems, help them realize the direct and indirect negative effects of the COVID-19 epidemic, and slowly assist in liberating themselves from rumination. The COVID-19 epidemic has been shown to have a significant impact on family relationships, especially parent-child relationships. Parents often suffer from depression and helplessness due to the enormous external economic pressure (Cluver et al. 2020). This emotion also affects their children's feelings through intergenerational transmission. The research-based psychological counseling model first helps adolescents recognize the impact of the COVID-19 epidemic on their parents and family economy. Then, it guides them to understand that the decline in their sleep quality is closely related to the COVID-19 outbreak which is an uncontrollable objective factor, thereby reducing their ideological burden. Second, exercise, especially outdoor exercise, consumes adolescents' excessive energy, regulates their hormonal secretion, relaxes their nervous brain, and accelerates their sleep recovery (Dominski et al. 2020).

The results show that the research-based psychological counseling model in combination with outdoor exercise has significantly improved the total score of the experiment group in psychological resilience as well as the score in its five dimensions including goal concentration, interpersonal assistance, family support, emotional control, and positive cognition. The increases of the experiment group are significantly higher than those of the control group. These results are consistent with the findings of previous research on exercise intervention in adolescents' psychological resilience (Belcher et al. 2020) and the findings of studies on the intervention effect of research-based psychological counseling model on adolescents' psychological resilience. The results of this study further prove that the research-based psychological counseling model is effective in increasing positive psychological resources in adolescents (Xu et al. 2016). The research-based psychological counseling model emphasizes that adolescents themselves can study and intervene in their own problems as researchers. It also arouses their curiosity and enthusiasm to explore their own problems through activities. In the self-evaluation stage, adolescents are guided to understand the five specific aspects of psychological resilience, explore suitable self-improvement methods, and slowly develop an adaptive cognitive system and

behavior model (Xu et al. 2016). The participation in related activities can largely improve adolescents' self-efficacy and belief that they have the ability to conduct self-evaluation and recovery, which is conducive to promoting their psychological resilience and enriching their positive psychological resources (Ren et al. 2020). Outdoor exercise also enables adolescents to increase self-control by enhancing their sense of self-control. Self-control is also an important psychological resource that can effectively improve adolescents' coping performance in the face of stress. At the same time, exercise promotes sleep improvement and thus increases available psychological resources (Liu et al. 2018). These positive psychological resources can help adolescents cope with all kinds of negative emotions experienced during the COVID-19 epidemic while enhancing their psychological resilience.

Notably, although the control group did not receive intervention, their psychological resilience also changed significantly after 8 weeks, and similar results were found in their depression, anxiety, and sleep quality. These results show that adolescents possess extra ability in psychological recovery after accepting the education of health knowledge related to COVID-19. Moreover, adolescents' positive psychological quality may be developed and strengthened naturally over time. Meanwhile, enhancing positive psychological quality and emotional experience has an effect of expanding and generalizing, thus reducing negative psychological experience and maintaining mental health (Höltge et al. 2020, Moratis & Egmond 2018). Accordingly, we should pay attention to the exploitation of adolescents' advantages and potential to help them perform better in resisting the negative effects of external public emergencies.

CONCLUSION

In this study, the research-based counseling model in combination with outdoor exercise was used to carry out an 8-week psychological intervention among adolescents. The results show significant decreases in the anxiety and depression levels, a significant increase in the sleep quality, and a significant increase in the psychological resilience level of the adolescents in the experiment group. Despite the significant decreases in depression and anxiety and the increases in the sleep quality and psychological resilience of the control group, the changes are significantly lower than those of the experiment group. These results verify the intervention effectiveness of the research-based psychological counseling model in combination with outdoor exercise on adolescents' physical and mental health and psychological resilience. The results of this study inspire educators to adopt the research-based psychological counseling model or develop other flexible psychological intervention methods in practical education to solve adolescents' mental health problems. For example, online psychological counseling services can

be carried out by using the advantages of QQ group and other Internet-based channels. Attention should also be paid to the critical role of exercise in improving adolescents' mental health and psychological resilience.

Acknowledgements:

This work was supported by 2020 Key Research & Development Plan Project of Shandong Province (soft science project: 2020RKB01317).

Conflict of interest: None to declare.

Contribution of individual authors:

Jianpeng Zhang: conceptualization, methodology, formal analysis, investigation, data, writing - original draft preparation, writing - review and editing.

Zixiang Zhou: conceptualization.

Wei Zhang: methodology, writing - review and editing.

All authors have read and agreed to the published version of the manuscript.

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