The Relationship between Home-Based Learning Satisfaction and Mental State of Primary and Secondary School Students during Epidemic Outbreak: An Analysis of Mediating Effect of Self-Management

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Abstract:

This study explores the home-based learning satisfaction and mental health status of primary and secondary school students during epidemic outbreak, and analyzes the intermediary role of self-management in learning satisfaction and mental health. Questionnaires among 14,594 primary and middle school students from 11 schools in Shaoguan City were conducted to study their home-based learning and mental health status during epidemic outbreak. Spss and Amos software were used for specific analysis of data and for structural model verification. The results show that: (1) the scores of home-based learning satisfaction, self-management and mental health of primary and middle school students were in the upper-middle level; (2) there were significant pairwise correlations among home-based learning satisfaction, self-management and mental health status of primary and secondary school students; (3) self-management plays a partial mediating role for learning outcomes, teachers' teaching and mental health, with a mediating rate of 98.8%. Therefore, improving students' self-management awareness and management skills of primary and secondary school students plays an important role in improving students' learning satisfaction and mental health.

Keywords: *Learning satisfaction, Self-management, Mental health status, Intermediary role, COVID-19 epidemic.*

I. INTRODUCTION

In 2020, a new type of coronary epidemic broke out, and the school suspended classes and started online teaching for nearly four months. Researches show that most students have difficulty in adapting

to environmental changes, which leads to negative emotions, negative cognition and avoidance behaviors, and even parent-child conflicts and extreme behaviors, so that students need to have a stronger psychological barrier to protect their study and life development [1].

Learning satisfaction is very important in individual learning life and has the most direct relationship with students themselves. Compared with the previous study in school, the learning style, learning environment and learning interaction of home-based learning have all undergone great changes. Learning supervisors have changed from teachers to parents or students themselves, so there are higher requirements for students' interpersonal communication skills and self-management ability. Teenagers are in a period of rapid physiological and psychological changes, often experiencing complex contradictions and inner conflicts, so they are in urgent need of effective self-management to control themselves.

Based on previous literature analysis, this study holds that the self-management of primary and secondary school students is closely related to their learning satisfaction and psychological state. However, in the past, there were few researches on the role value of self-management in learning satisfaction and mental state, and cultivating students' self-management ability has positive value for mental health, learning efficiency and other issues. This study takes self-management as the mediating variable, studies whether the learning satisfaction can influence the mental health status through self-management, discusses the importance of improving the learning satisfaction of primary and secondary school students, and further understands the formation mechanism of mental health status during epidemic outbreak and the role of self-management, so as to facilitate the psychological intervention work of primary and secondary school students at present and in the future, ensure children to live more actively and healthily and promote their all-round development.

II. METHOD

2.1 Research Objects

A total of 14,594 primary and middle school students were randomly sampled from 11 schools in Shaoguan City. After excluding one invalid questionnaire (the information answer was incomplete), a total of 14,593 valid questionnaires were retained, with an effective rate of about 100%. Among them, there were 7,054 boys (48.3%) and 7,540 girls (58.7%). There were 5,130 primary school students, accounting for 35.2%, and 9,463 junior high school students, accounting for 64.8%.

2.2 Measurement Questionnaire

2.2.1 Learning satisfaction scale

In this study, we developed a learning satisfaction scale [2], with five grades of measurement. Among them, 1 indicates "very unsatisfied" and 5 indicates "very satisfied". The degree increases in turn. The scale consists of 10 items, covering four dimensions: teacher's teaching (3 items), interpersonal relationship (2 items), learning environment (2 items) and learning results (3 items). Teachers' teaching is characterized and measured from two aspects, namely knowledge level and teaching methods; interpersonal relationship is characterized and measured from parental guidance; learning environment is characterized and measured from two aspects, namely classroom environment and family environment; The learning results are characterized and measured from two aspects, namely specific ability improvement and overall achievement feeling. The total score of the questionnaire is 50. The higher the overall score is, the higher the students' expectation value for individual learning is, and the more consistent the actual state is. The Cronbach reliability coefficient range of the questionnaire items and the total scale is [0.743, 0.924], indicating good structural validity of the scale.

2.2.2 Self-management investigation scale

In this study, we developed a self-management scale for primary and secondary school students, with five-level scoring. 1 indicates "extremely nonconforming" and 5 indicates "extremely conforming". The degree increases in turn [3]. This survey scale has 17 items, covering four dimensions: consciousness management (4 items), planning management (5 items), life management (6 items) and emotion management (2 items). Consciousness management is measured from attention and external interference information. Planning is measured from learning planning and goal setting. Life management is measured from time management and health management. Emotion management is measured from emotional stability and emotional regulation. The total score of the questionnaire is 85. The higher the overall score is, the stronger the students' subjective initiative is, and the better they can transform, control and manage themselves. The Cronbach reliability coefficient range of the questionnaire items and the total scale is [0.747, 0.942], indicating good structural validity of the scale.

2.2.3 Mental health survey scale

In this study, we developed a mental health status scale with 15 items, covering four dimensions of positive emotion (4 items), negative emotion (4 items), avoidance behavior (4 items) and negative cognition (3 items). The scale adopts five-level scoring, with 1 indicating "extremely nonconforming" and 5 indicating "extremely conforming". The degree increases in turn [1]. The total score of the scale is

75. The higher the overall score is, the more time the students are in positive emotions during epidemic outbreak, and the fewer the negative emotions such as anxiety and worry are. The Cronbach reliability coefficient range of the questionnaire items and the total scale is [0.735, 0.942], indicating good structural validity of the scale.

2.3 Data Processing

SPSS25.0 was used to complete data entry and analysis, and descriptive statistics were used to analyze the basic situation of home-based learning satisfaction, self-management and mental health status of primary and secondary school students. Independent sample T test was used to compare the differences of students' learning satisfaction, self-management and mental health in different stages (low years of primary school, middle years of primary school, high grade of primary school, junior middle school stage and senior high school stage); Pearson correlation was used to understand learning satisfaction, self-management, mental health and the relationship among these three dimensions. The correlation coefficient proposed by Zhang Houcan et al. was used to judge the strength of the correlation [4] according to the mediation effect test procedure of Wen Zhonglin et al. and Bootstrap method combined with PROCESS plug-in, the sample size was 5000 in 95% confidence interval [5]. The structural model was verified by AMOS24.0.

To eliminate the co-variation of data caused by artificial co-variation problems such as common data sources, common measurement environment or the nature of the scale itself, and to ensure the reliability of the research results, Harman single factor method was used to test the sample data before statistical analysis. The results showed that there were 17 factors with characteristic values greater than 1, and the explanatory variance of the first common factor was only 18.53% (far lower than the standard value of 40%), which indicated that the data in this study had no obvious common method deviation and was suitable for the factor analysis.

The data were expressed by mean standard deviation. In the difference statistics, *P*<0.05 indicated significant difference.

III. RESULTS

3.1 Descriptive Analysis

The overall levels of the three scales, namely learning satisfaction, self-management and mental health, were medium to slightly higher, indicating that the home-based learning satisfaction, self-management and mental health of primary and secondary school students were basically good

during epidemic outbreak, as shown in Table I.

Table I Statistics of learning satisfaction, self-management, total score of mental state and differences of school segments

Dimension (item) and dimension total score	Total score	Segment difference statistics (f)
Total score of learning satisfaction	33.13+6.33	453.96
Total score of self-management	55.66+9.80	262.48
Total score of mental health status	49.20+9.41	180.14

The scores of the four dimensions of learning satisfaction, namely learning environment, teacher's teaching, interpersonal relationship (parental guidance) and learning results, were 7.32+1.55, 10.11+2.17, 5.97+2.02, 9.72+2.32 respectively. The results show that primary and secondary school students were basically adapted to home-based learning, teachers' online teaching and explanation methods. The score of parents' guidance was low, indicating that home-based learning was mainly realized by students' self-management; the score of learning satisfaction was moderate. The four dimensions of self-management include consciousness management, planning management, life management and emotion management. Their scores were 13.15+3.34, 15.43+3.52, 20.28+3.99 and 6.81+1.65 respectively. The results show that students' personal attention, time and affairs planning, life and emotion management were above average in home-based learning. Mental health includes four dimension, namely positive emotion, negative emotion, avoidance behavior and negative cognition, with the scores of 10.83+2.61, 13.89+3.46, 13.96+3.81 and 10.61+9.41 respectively. The results show that the score of positive emotions were low, while the scores of negative emotions, avoidance behavior and negative cognition were high, indicating that the students of primary and secondary schools had many emotional problems.

This paper analyzed the differences in learning satisfaction, self-management and mental health among students in low-year of primary school, middle-years of primary school, high grade of primary school, junior middle school and senior high school. The results show that the differences in different grades were extremely significant (P=0.000). Among them, the students in high grade of primary school stage are characterized by learning satisfaction (t=5.98), mental health (t=4.53) and self-management (t=7.34), which are significantly higher than the students in and senior high school stage.

3.2 Analysis of Correlation among Learning Satisfaction, Self-Management and Mental State

Correlation analysis shows that dimensions of self-management were significantly correlated with

those of learning satisfaction and those of mental health. Among them, there was a significant positive correlation between consciousness management and teachers' teaching and negative cognition, between planning management and learning results and positive emotion, between life management and learning results and negative emotion, and between emotion management and learning results and emotion.

Teaching and learning results had the greatest influence on learning satisfaction; avoidance behavior and negative emotion had the greatest influence on mental health; The most important dimensions of self-management were life management and planning management.

Table II Analysis of correlation among learning satisfaction, mental health and self-management

	Consciousness management	Planning management	Life management	Emotional management	Self-management	Mental health state	Learning satisfaction
Learning environment	.483**	.389**	.503**	.389**	.574**	.475**	.682**
Teacher's teaching	.501**	.563**	.586**	.371**	.673**	.465**	.850**
Interpersonal relationship (parental guidance)	.196**	.534**	.480**	.354**	.513**	.303**	.717**
Learning results	.487**	.608**	.612**	.410**	.702**	.516**	.856**
Positive emotion	.203**	.513**	.487**	.559**	.545**	.503**	.492**
Avoidance behavior	.476**	.206**	.361**	.523**	.471**	.819**	.359**
Negative emotion	.539**	.277**	.514**	.557**	.586**	.861**	.456**
Negative cognition	.573**	.265**	.398**	.517**	.539**	.794**	.407**
Self-management	.732**	.820**	.856**	.647**	1	.704**	.791**
Mental health state	.601**	.401**	.582**	.710**	.704**	1	.561**
Learning satisfaction	.531**	.681**	.701**	.485**	.791**	.561**	1

Remarks: * *. The correlation was significant at 0.01 level (double tail).

3.3 Test of the Mediating Effect of Self-Management between Learning Satisfaction and Mental Health

X->Y path regression equation ① Y = 21.57+0.83 * x; X->M path regression equation; ② M = 15.03+1.23 * x; X, M->Y regression equation; ③ Y=11.52+0.01*X+0.67*M

According to the data test results, equations ①, ② and ③ were established, and *P*<0.01, which

was statistically significant. The Bootstrap method was used to further verify the mediating effect of self-management. The results show that CI (0.79, 0.85) did not contain 0, and the partial regression coefficient c' was not significant. To sum up, the mediating effect of self-management was significant, accounting for 82.4% of the total effect. The mediating effect accounted for 98.8% of the total effect. This explains the variance of dependent variable of 43.0%. The mediating effect was statistically significant.

3.4 Test of the Mediating Effect of Each Dimension of Self-Management

According to the results of correlation analysis, the effects of four factors of self-management (consciousness management, planning management, life management and emotion management) on learning satisfaction and mental health were further analyzed.

The results show that consciousness management played partial mediating effect between teachers' teaching and negative cognition in the self-management of primary and middle school students with the mediating effect of 30.8%, accounting for 77.5% of the total effect. This explains the variance variation of dependent variable of 46.3% (see Figure 1).
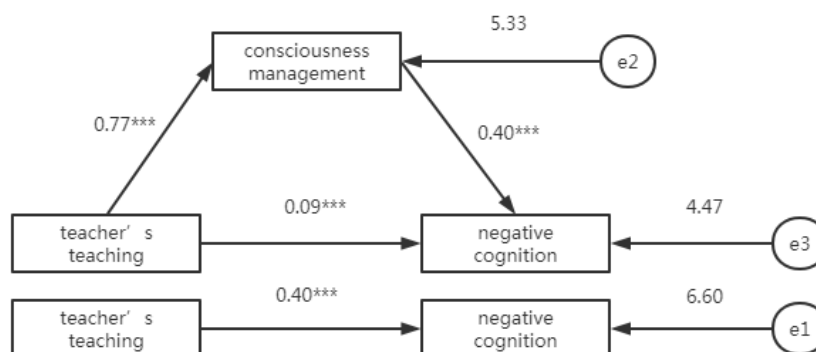

Fig 1: construction of partial mediation model of consciousness management between teachers' teaching and negative cognition

In the self-management of primary and middle school students, planning management played a partial mediating effect between learning results and positive emotions. The mediating effect was 29%, accounting for 63.0% of the total effect. This explains the variance variation of dependent variable of 33.4% (see Figure 2). In the self-management of primary and middle school students, life management played a partial mediating effect between learning results and negative emotion. The mediating effect was 40%, accounting for about 55.6% of the total effect. This explains the variance variation of

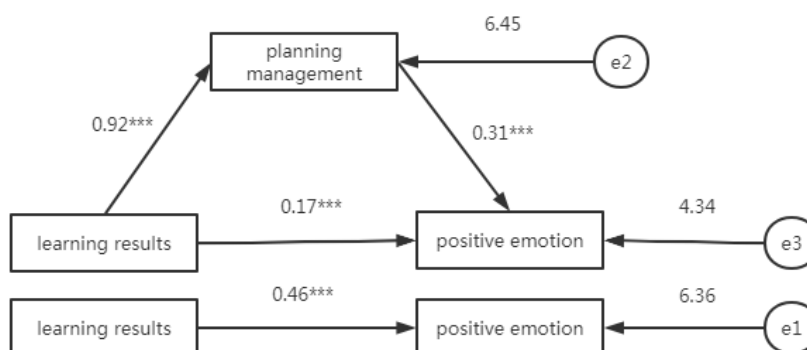dependent variable of 31.3% (see Figure 3).

Fig 2: model construction of partial mediation of planning management between learning outcomes and positive emotions
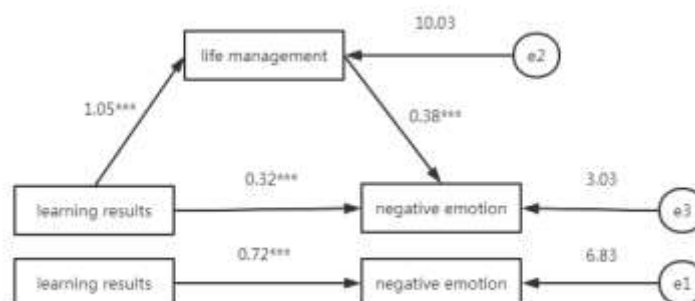

Fig 3: model construction of partial mediation of life management between learning results and negative emotion

In the self-management of primary and middle school students, emotion management played partial mediating effect between learning results and positive emotion. The mediating effect was 22%, accounting for 47.8% of the total effect. This explains the variance variation of dependent variable of 43.0% (see Figure 4). In the self-management of primary and middle school students, emotion management played a partial mediating effect between learning results and negative emotions. The mediating effect was 30.1%, accounting for 43.1% of the total effect. This explains the variance variation of 41.4% of the dependent variable (see Figure 5).
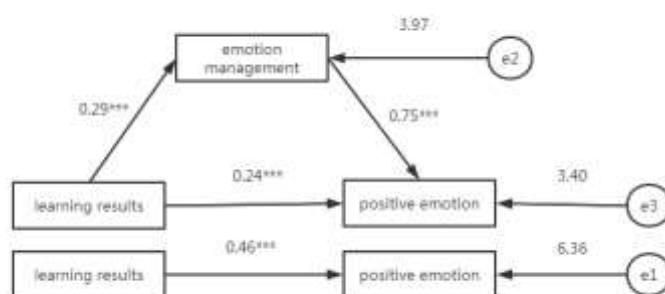
Fig 4: model construction of partial mediation of emotion management between learning results and positive emotion
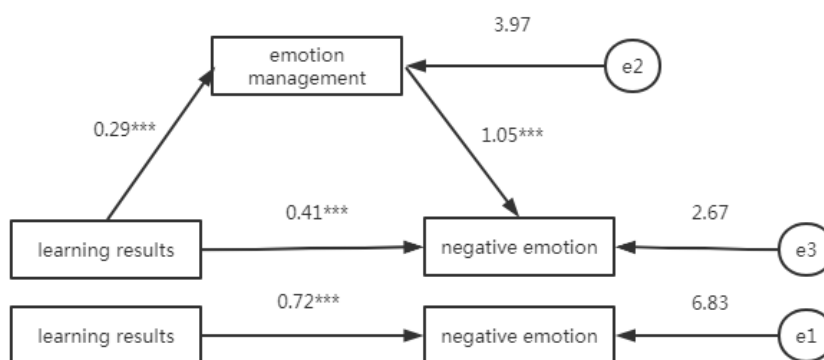

Fig 5: Model construction of partial mediation of emotion management between learning results and negative emotion

3.5 Construction of Model among Self-Management, Learning Satisfaction and Mental Health

The mediation effect model is shown in Figure 6. Its model fitting index is $\chi 2$ /df=21.36, NFI=0.997, RFI=0.982, IFI=0.997, TLI=0.983, CFI=0.997, RMSEA =0.038, indicating good model fitting degree. Further path analysis shows that learning satisfaction significantly positively predicted self-management (β=0.98, p<0.001); self-management significantly positively predicted home-based learning satisfaction (β=0.99, p<0.001); and learning satisfaction significantly negatively predicted mental health level (β=-0.27, p<0.001). It shows that self-management ability played a partial mediating role between learning satisfaction and mental health, and its mediating effect value was 0.97, 95% CL [1.092, 1.162].

IV. DISCUSSION

4.1 Primary and Middle School Students Basically Had Good Home-Based Learning Satisfaction, Self-Management and Mental Health

Primary and middle school students basically had good home-based learning, self-management and mental health during epidemic outbreak. There were significant differences in learning satisfaction, self-management and mental health among students in different grades. Among them, the most significant difference is that the scores of students in high grade of primary school were higher than those of students in senior high school. Perhaps, compared with the students in senior high school, students in the high grade of primary school have less academic burden and lower learning pressure, resulting in fewer negative emotions and behaviors such as anxiety and depression. Moreover, they are mainly restricted and managed by theirs parents at home during the epidemic outbreak. Thus, making the high grade of primary school high-level graders in primary school study and live under strong support, their learning satisfaction are higher.
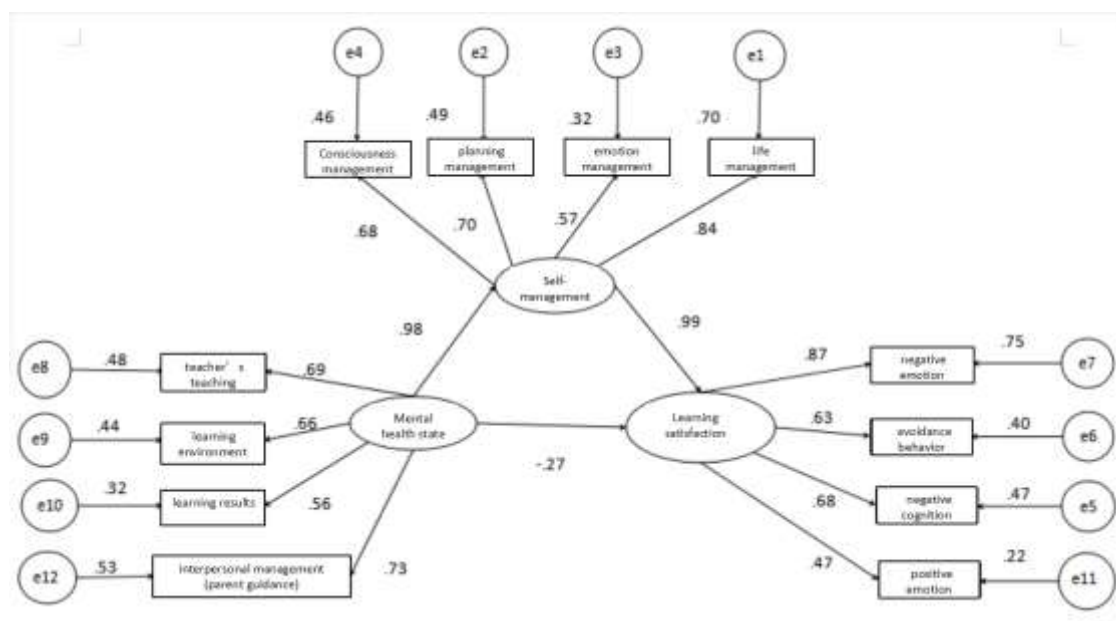

Fig 6: general data model

The general level of mental health of primary and middle school students during epidemic outbreak study at home was above average, but the scores of negative cognition, emotion and behavior were also high, which may be related to the fact that students had to be isolated at home during epidemic outbreak, and recreational activities and communication activities were reduced. These leaded to their anxiety and

distress, and they were easy to lose their temper. It may also because that staying at home for a long time leads to differences with their parents in views, which leads to parent-child conflicts and emotional problems.

The self-management level of primary and secondary school students is relatively high. Seen from the scores, primary school students had the highest score in emotional management and the lowest score in planning management. This shows that during epidemic outbreak period, due to the lack of teacher supervision and school constraints, primary school students had weak self-regulation ability and insufficient implementation. This made them difficult in making learning plans and lack of initiative of goal setting.

4.2 Influence of Learning Satisfaction on Mental Health of Primary and Secondary School Students

This study shows that there was a significant positive correlation between the level of learning satisfaction and the mental health of primary and middle school students. A better mental health indicated the higher level of learning satisfaction, which is consistent with the results of previous researches [6,7]. In this study, learning results and teachers' teaching methods had a greater influence on students' learning satisfaction, indicating that interesting teachers' teaching and good self-learning results had a better effect on improving students' learning satisfaction [8]. The operating mechanism of learning satisfaction promoting the development of mental state is that students with higher learning satisfaction have better mental health. The data show that the higher the degree of learning satisfaction is, the more the positive emotions are, and the fewer the negative emotions are, which is consistent with the previous research views [9]. Learning satisfaction has become the main influencing factor of students' mental health. For the students with long-term outbreak of negative emotions during the epidemic, learning satisfaction plays a guiding role in the adjustment and development of their mental health.

4.3 Mediating Effect of Self-Management on Mental Health

There was a significant positive correlation between self-management and students' satisfaction with home-based learning and their mental health level. The results of intermediary test and factor analysis show that the influence of learning satisfaction on mental health was realized through the intermediary variable of self-management. That is, students' learning satisfaction level was low. And the problem can be dealt with by regulating self-management ability, then the negative mental state of individuals will also reach a positive level. The results provide direct empirical support: self-management affects students' mental health. The high level of self-management is easy to promote students' positive emotions, and vice versa. Learning satisfaction and development success or failure affect emotional changes. Positive emotional experience and positive behavior changes are often consistent. Therefore, to

improve students' learning satisfaction and happiness, we may improve their self-management in their study and life, promote their positive emotions, and properly handle their negative emotions caused by the epidemic.

This study confirms that self-management, learning satisfaction and mental health are closely related. Therefore, parents and schools should pay attention to guiding and cultivating students' self-management consciousness and management ability, impart skills in consciousness management, time planning management and emotion management, provide primary and secondary school students with practical opportunities for self-management in their life, improve their learning efficiency, and helping them to achieve better self-growth and promote their physical and mental health development.

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