

# Intergenerational Transmission of Mental Health Literacy and Its Mechanism: The Mediating Effect of Parent-Child Relationship and the Moderating Effect of School Mental Health Service

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**Background:** Adolescents' mental health literacy is a topic of growing interest and studies have begun to explore the factors that influence adolescents' mental health literacy. This study investigated the relationship between parents' mental health literacy and adolescents' mental health literacy, as well as the mediating roles of parent-child relationship, and the moderating roles of school mental health service.

**Methods:** Questionnaires were distributed to adolescents and their parents at two time points with an interval of one month. In the first survey, 835 parents completed a mental health literacy scale and a parent-child relationship scale. In the second, 841 adolescents completed a school mental health service questionnaire and an adolescent mental health literacy assessment questionnaire. A total of 617 paired data points were matched (parents' age:  $M = 40.47$ ,  $SD = 5.10$ ; adolescents' age:  $M = 13.34$ ,  $SD = 0.99$ ).

**Results:** Bootstrapping results showed that parents' mental health literacy was positively associated with adolescents' mental health literacy. In addition, parent-child intimacy mediated the relationship between parents' mental health literacy and adolescents' mental health literacy. School mental health service moderated the relationship between parents' mental health literacy and parent-child intimacy and adolescents' mental health literacy.

**Conclusion:** Intergenerational transmission of mental health literacy from parents to adolescents and its conditions were revealed. These findings provide new insights for the intervention of adolescents' mental health literacy, and may lead future research to investigate the role of parents within the family context, as well as the influence of home-school cooperation on adolescents' mental health literacy.

**Keywords:** mental health literacy, intergenerational transmission, parent-child relationship, school mental health service

## Introduction

Mental health literacy refers to knowledge and beliefs about mental disorders that facilitate their recognition, management, or prevention,<sup>1</sup> which encompasses the following five components: the public's knowledge of how to prevent mental disorders; recognition of when a disorder is developing; knowledge of help-seeking options and treatments available; knowledge of effective self-help strategies for milder problems; first aid skills to support others affected by mental health problems.<sup>2</sup> Previous studies have revealed that mental health literacy is a significant predictor of mental health status. Specifically, mental health literacy is positively associated with positive indicators of mental health, such as well-being and resilience,<sup>3,4</sup> mental health literacy is negatively associated with negative indicators of mental health, such as anxiety, depression<sup>5</sup> and psychological behavior problems,<sup>6</sup> respectively. Thus, improving mental health literacy is one key factor to promoting mental health. Moreover, the self-harm and suicide behaviors of adolescent have become an important issue of concern in the international

community.<sup>7-9</sup> Evidence has shown that a higher level of mental health literacy can help to reduce the occurrence of self-harm and suicide behaviors.<sup>2</sup> Therefore, how to improve individuals' mental health literacy, and thereby raise their mental health levels, has become a widespread concern among scholars.

## Parents' Mental Health Literacy and Adolescents' Mental Health Literacy

Parents play an important role in affecting physical and mental growth and development of adolescents, and intergenerational transmission is a typical mechanism of this effect. Intergenerational transmission refers to the transmission of various outcomes (eg, abilities, ideas, behaviors) from parents to their children.<sup>10</sup> On the one hand, according to the family systems theory,<sup>11</sup> a family is a system of interrelated members, and changes in one member inevitably affect other members. Also, the interaction not only exists between parents and adolescents. Parents who undergo behavioral and emotional changes sometimes cause behavioral and emotional changes in their children.<sup>12</sup> Parents with a negative attitude towards life and psychological problems have difficulty communicating positively with other family members, which is detrimental to both mental and physical health of adolescents. For instance, Chang and Fu examined the intergenerational transmission of depression and found that parental depression as a major risk factor disrupts normal family life, affects communication with adolescents, and increases the risk of adolescents' depression, creating a cycle of intergenerational transmission of depression.<sup>13</sup>

On the other hand, based on the social learning theory,<sup>14</sup> home learning environment is the first place where observational learning occurs in adolescents, and parents are considered as vital agents of observational learning for adolescents. Their behaviors, attitudes, and beliefs are transmitted to adolescents through observing, imitating and conversations. Therefore, parents with psychological problems may be unable to handle stressful events positively, adolescents may be more likely to model negative behaviors from their parents by observing and imitating them, and learn adverse psychological outcomes, such as anxiety, depression and stress.<sup>15</sup> For instance, investigators have focused their attention on the intergenerational transmission of anxiety, and they found that observational learning of anxious behavior from parents with anxiety disorders also plays an important role in the intergenerational transmission of anxiety.<sup>16,17</sup>

In conclusion, there is extensive evidence for the intergenerational transmission of psychological problems (eg, anxiety, depression), and the studies have demonstrated that mental health literacy is one of the most important indicators of an individual's mental health.<sup>5</sup> However, the intergenerational transmission in mental health literacy has not been well-studied. In this study, we examine the intergenerational transmission of mental health literacy and propound the following hypotheses based on the family systems theory<sup>11</sup> and the social learning theory.<sup>14</sup>

H1: Parents' Mental Health Literacy Would Be Positively Related to Adolescents' Mental Health Literacy.

## The Effect of Parent-Child Relationship

Parent-child relationship is regarded as an enduring bond between parents and children,<sup>18</sup> which is defined as the quality of the interaction and emotional connection between parents and their children.<sup>19</sup> The parent-child relationship has a great impact on adolescents' health and development, and this relationship is also influenced by parents.<sup>20</sup> Therefore, the second purpose of the present study was to examine the mediating role of the parent-child relationship in the relationship between parents' mental health literacy and adolescents' mental health literacy.

Parents' mental health literacy may have a significant impact on parent-child relationship. Previous studies have shown that mental health literacy is closely related to mental health outcomes. For example, individuals with more mental health literacy tend to be more psychologically resilient and exhibit higher levels of well-being.<sup>3,4</sup> Furthermore, parents with high mental health literacy may have positive beliefs and attitudes about parenting, and have enough time to communicate with their children, which contributes to a positive parent-child relationship.<sup>21</sup> Thus, there is a strong link between parents' mental health literacy and parent-child relationship. Specifically, parents with higher mental health literacy have higher levels of mental health, have optimistic life attitudes and positive coping styles.<sup>4</sup> At the same time, they address problems effectively in their parenting activities and tend to be more involved in parenting, which promotes a harmonious development of parent-child relationship. In contrast, parents with poor mental health literacy have lower levels of mental health, they are unable to deal effectively with parenting problems, and tend to adopt negative parenting styles, which may increase parent-child conflicts and affect the development of parent-child relationship.<sup>11</sup>

Positive parent-child relationship is a protective factor for adolescents' mental health literacy, and plays a very crucial role in adolescents' development. Mehrotra et al showed that positive and smooth communication in the family is important for the formation of positive parent-child relationship, and reduces the potential impact of mental illnesses on adolescents, and provides a beneficial environment for the development of mental health literacy in adolescents.<sup>22</sup> Another study also demonstrated that parents are more involved in adolescents' mental health education to increase communication with adolescents, which in turn maintains harmonious parent-child relationship, and improves the level of mental health literacy in adolescents,<sup>23</sup> and reduces their depression, anxiety.<sup>24</sup> Therefore, we propose that parent-child relationship is a significant mediator of the effect of parents' mental health literacy on adolescents' mental health literacy. Specifically, a positive parent-child relationship is an important protective factor for the development of adolescents' mental health literacy. In contrast, a negative parent-child relationship may be a risk factor for adolescents' mental health literacy. Thus, for this study, we hypothesized:

H2: Parent-child relationship would mediate the relationship between parents' mental health literacy and adolescents' mental health literacy.

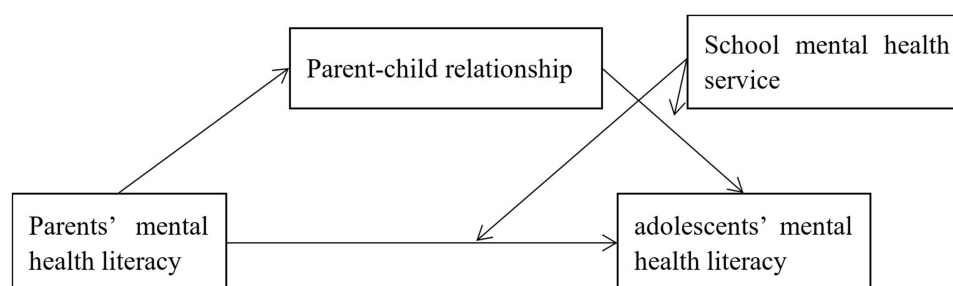
## The Effect of School Mental Health Service

School mental health service provides mental health teaching, mental health evaluation, psychological guidance, and psychological crisis intervention by teachers based on the theory and method of psychology to promote the level of mental health of teachers and students.<sup>25</sup> The school environment has a major influence on mental health literacy of individuals. Through the mental health service system, the school provides psychological support for students' growth, cultivates their healthy psychology, and prevents psychological disorders among students.<sup>26</sup> Previous research has shown that school mental health service improved adolescents' emotional health and increased life satisfaction, thereby promoting their mental health.<sup>27</sup> Seedaket et al found that school-based mental health promotion programs could significantly improve adolescents' help-seeking behaviors, mental health stigmatizing attitudes, and mental health literacy.<sup>28</sup> As such, the current study examined the effects of school mental health service on adolescents' mental health literacy, and propounded the following hypotheses:

H3: School Mental Health Service Would Be Positively Related to Adolescents' Mental Health Literacy.

The ecological system theory<sup>29</sup> suggests that individuals influence and are influenced by a nested series of inter-connected social systems. The systems include microsystems, mesosystems, exosystems, and macrosystems. The impacts of these systems on individuals range from the most immediate (microsystems) to the broadest (macrosystems). Applied to the present study, the microsystems influence on adolescents include the home and school.<sup>30</sup> The mesosystem is the connection across microsystem, such as the relationships between family and school. A past study has found the high importance of effective cooperation between school and family, which has a positive impact on parents' mental health education, and decreases adolescent mental health.<sup>31</sup> Thus, we further investigated the moderating effect of school mental health service on the relationships between parents' mental health literacy and adolescents' mental health literacy.

Parents are the main agents of family education for adolescents. Parents with good mental health literacy are able to resolve problems in family education, and develop the interactions with adolescents and transmit mental health knowledge that will enable adolescents to acquire mental health literacy. Meanwhile, the large amount of time that adolescents spend in school makes schools increasingly influential for them,<sup>32</sup> which may enhance the influence of parents on their adolescents' mental health literacy. The high availability and quality of school mental health service facilitate greater cooperation between home and school, and it may strengthen the impact of parents' mental health literacy on adolescents' mental health literacy, increase their knowledge about mental health, reduce the stigma associated with mental illness, which in turn promotes adolescents' mental health literacy. In contrast, low availability and quality of school mental health service make cooperation between home and school poorer, and it may weaken the impact of parents' mental health literacy on adolescents' mental health literacy, reduce opportunities for accessing health-related information, and increase the risk for mental health issues, which in turn prevents adolescents' mental health literacy. In addition, we experimentally explored the moderating effect of school mental health service in the relationships between



**Figure 1** The Framework of Present Study.

parent-children relationship and adolescents' mental health literacy, investigate whether the moderating effect differs between direct and indirect pathways, and provide empirical evidence about the positive impact of school mental health service. Thus, for this study, we hypothesized:

H4: School mental health service would moderate the positive relationship between parents' mental health literacy and adolescents' mental health literacy, as well as parent-children relationship and adolescents' mental health literacy.

Figure 1 shows the basic framework of this study.

## Methods

### Participants

In this study, the participants (middle school students and their parents in Henan Province, China) were asked to complete two surveys with a four-week time lag between each measurement point. In the first survey, a total of 896 parents completed the parents' mental health literacy scale and parent-child relationship scale, respectively. We excluded all questionnaires with incomplete answers or missing data, and 835 questionnaires were retained. In the second survey, a total of 1052 adolescents completed the school mental health service questionnaire and adolescents' mental health literacy assessment questionnaire, respectively. We excluded all questionnaires with incomplete answers or missing data, and 841 questionnaires were retained.

### Procedure

According to the social role theory,<sup>33</sup> mothers are identified as the family's primary caregiver, and they take a larger responsibility for child care than fathers. As a growing number of mothers enter the workforce, more fathers have taken on the role of primary caregivers.<sup>34</sup> Therefore, the present study collected the paired data of primary caregivers and adolescents at two different time points, in order to examine whether parent-child relationship mediated the relationship between primary caregivers' mental health literacy and adolescents' mental health literacy, and whether this mediating process was moderated by school mental health service.

The questionnaires of both adolescents and parents contained the item "primary caregiver". For the first survey, adolescents were asked to take the questionnaires home and hand them to their primary caregivers. Parents were asked to indicate their child's primary caregiver, and they had the options "themselves", "spouse", or "other". For the second survey, adolescents were also asked who their primary caregivers were. In total, 617 pairs of data were retained. Among the primary caregivers, 487 were mothers and 130 were fathers aged  $40.47 \pm 5.10$  years. Regarding the adolescents, there were 310 boys and 307 girls aged  $13.34 \pm 0.99$  years.

All the participants had provided a written informed consent. They were informed that the purpose of the survey was to investigate family education, and that participation was voluntary. The procedures were clearly explained, and the participants could interrupt or quit the survey at any point without explaining their reasons. The survey was approved by the Research Ethics Committee of the academic institution that the authors are affiliated with (numbered as 20221010003).

## Measures

In this study, two different scales were used to measure the mental health literacy of parents and adolescents: the adult version and the adolescent version. The reason for this approach lies in the fact that mental health literacy, defined as knowledge and beliefs which aid their recognition, management, or prevention about mental disorders,<sup>1,2</sup> is a personal perception influenced by factors such as individual development and environment. Given these differences, the mental health literacy of parents (adults) and adolescents may vary. To ensure the applicability of the scales and improve the accuracy of the results, we chose to use separate scales for the two groups: the adult version<sup>35</sup> and the adolescent version.<sup>31</sup> Both scales were developed based on Jorm et al's definition of mental health literacy<sup>1,2</sup> and align with the objectives of our study.

### Parents' Mental Health Literacy

The Chinese version of Mental Health Literacy Scale (MHLS)<sup>36</sup> was used to measure mental health literacy among parents. The Chinese version of MHLS includes the 35 items (eg, "To what extent do you think it is likely that personality disorders are a category of mental illness?") and 6 subscales (the capacity to recognize mental health disorders; knowledge of risk factors; familiarity with self-treatment; awareness of available professional help; knowledge of how to seek information; and attitudes that promote recognition or effective aid-seeking behavior). The 1–15 items are rated on 4-point Likert scale, 1 refers to "completely impossible/not helpful at all", while 4 refers to "very likely/very helpful". The 16–35 items are rated on 5-point Likert scale, 1 refers to "strongly oppose", while 5 refers to "strongly agree". The total score of MHLS ranges from 35 to 160, with higher scores indicating higher levels of mental health literacy. The Cronbach's  $\alpha$  of MHLS was 0.80 for this study.

### Adolescents' Mental Health Literacy

The Adolescent Mental Health Literacy Assessment Questionnaire (AMHLAQ)<sup>31</sup> was used to measure mental health literacy among adolescents. The measure consists of 22 items measuring four dimensions (knowledge, recognition, attitude and practice). An example of this is, "I could control my negative emotions and behaviors". Each item is rated on a five-point Likert scale ranging from 1 to 5 where 1 means strongly disagree and 5 means strongly agree, with a higher score representing greater mental health literacy. In this study, the Cronbach's  $\alpha$  was 0.85.

### Parent-Child Relationship

The Child-parent Relationship Scale (CPRS)<sup>37</sup> was used to measure parent-child relationship. The CPRS comprises 26 items categorized into three subscales: intimacy, dependence and conflict. An example of this is, "I share an affectionate, warm relationship with my child". Zhang et al reported that the reliability of the dependency dimension was low, thus only two dimensions of intimacy and conflict were used in the present study.<sup>38</sup> Each item is rated on a five-point Likert scale ranging from 1 to 5 where 1 means definitely does not apply and 5 means definitely applies, with a higher score representing greater intimacy or conflict in the parent-child relationship. In this study, the Cronbach's  $\alpha$  was 0.85 and 0.90 for the two dimensions, respectively.

### School Mental Health Service

School mental health services indicate that schools have established mental health service systems and offered high-quality mental health programs tailored for adolescents. These services assist students in accessing, comprehending, and applying knowledge about mental health, facilitating the identification, prevention, or management of mental illnesses, and ultimately increasing their mental health literacy levels. Therefore, higher scores of school mental health services indicate the amount of mental health services provided by the school, and can also represent the amount of mental health services that adolescents can access to a certain extent. The Middle School Mental Health Service Questionnaire<sup>39</sup> was used to measure school mental health service. The measure consists of 14 items (eg, "Do you know where the school psychological counselling room is?" and "Have you received psychological counselling from the school?"). Each item is rated on a three-point Likert scale ranging from 1 to 3 where 1 means never and 3 means always, with a higher score representing greater school mental health service. In this study, the Cronbach's  $\alpha$  was 0.84.

# Data Analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 26.0, with PROCESS macro.<sup>40</sup> First, the common method bias was examined, and missing data analysis was conducted. Second, the descriptive statistics and a correlation matrix were calculated. Third, PROCESS 4.0. was used to test the mediation effects and the moderated mediation effects.

# Results

## Missing Data Analysis

Since some participants did not complete both surveys, the Welch's *t*-test was conducted to examine whether the missing data could bias our results by comparing the participants who completed the questionnaires with those who dropped out. The results showed that there were no significant differences between the parents' education level ( $t = 1.74$ ,  $df = 899.37$ ,  $p = 0.08$ ), the identity of a primary caregiver ( $t = 0.42$ ,  $df = 379.95$ ,  $p = 0.68$ ), the mental health literacy ( $t = 0.13$ ,  $df = 321.64$ ,  $p = 0.90$ ), the parent-child intimacy ( $t = 1.33$ ,  $df = 374.25$ ,  $p = 0.18$ ), and the parent-child conflict ( $t = -0.94$ ,  $df = 377.59$ ,  $p = 0.35$ ). These results suggest that the removal of incomplete questionnaires may not bias the results.

## Common Method Bias

Although this study used the paired data from different sources and a multiple time point method to collect data, all questionnaires were self-assessment scales that could produce common method bias. Therefore, before testing the hypotheses, the common method variance was examined using the unmeasured latent method factor.<sup>41</sup> A measurement model was constructed, and each item was loaded on its respective construct (ie, parents' mental health literacy, parent-child relationship, school mental health service, and adolescents' mental health literacy). Furthermore, the common method variance factor was created and allowed to load on all items, and these paths were constrained to be equal. The latent factors were not allowed to correlate with other factors. The variance explained by the latent method factor was 14.29%, which is lower than the median of 25% reported in a previous study.<sup>42</sup> Therefore, we concluded that the effect of common method bias was negligible.

## Descriptive Statistics and Correlation Analysis

Table 1 shows the descriptive statistics and Pearson's correlations for all the variables. The parents' mental health literacy was positively correlated with the adolescents' mental health literacy ( $r = 0.30$ ,  $p < 0.001$ ). These results preliminarily supported hypothesis 1.

## Hypotheses Testing for Parent-Child Relationship

All hypotheses were tested using the conditional process analysis program PROCESS, which computes ordinary least squares regressions to test for the direct and indirect effects.<sup>40</sup> We employed the PROCESS Model 4 to estimate the regression coefficients and follow-up bootstrap analyses with 5000 bootstrap samples to estimate the 95% bias-corrected confidence intervals for the specific and total indirect effects. The results are presented in Figure 2.

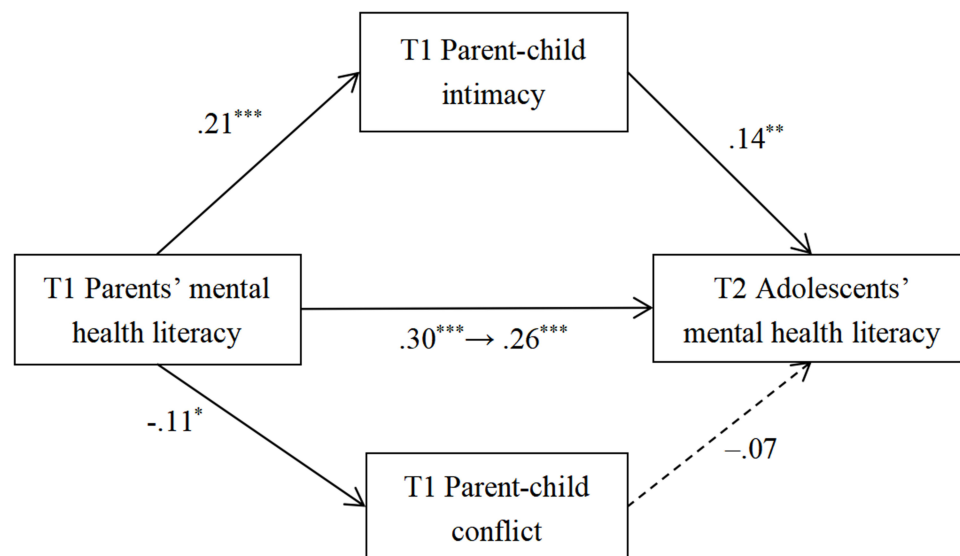
The parents' mental health literacy significantly predicted parent-child intimacy ( $\beta = 0.21$ ,  $p < 0.001$ ), and parent-child intimacy predicted increases in the adolescents' mental health literacy ( $\beta = 0.14$ ,  $p < 0.01$ ). Mediation analyses indicated

**Table 1** Descriptive Statistics and Correlations Between Study Variables

	<i>M</i> ± <i>SD</i>	1	2	3	4
1 T1 Parents' mental health literacy	3.01±0.28	1			
2 T1 Parent-child intimacy	4.05±0.67	0.21***	1		
3 T1 Parent-child conflict	2.42±0.80	-0.11**	-0.33***	1	
4 T2 School mental health service	1.99±0.50	0.09*	0.01	-0.14**	1
5 T2 Adolescents' mental health literacy	3.79±0.36	0.30***	0.21***	-0.14**	0.18***

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; T1, Time 1; T2, Time 2; *M*±*SD*, Mean±Standard Deviation.





**Figure 2** Model of the relationships between the study constructs.

**Notes:** \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; The path coefficients are standardized.

that parent-child intimacy mediated the association between the parents' mental health and the adolescents' mental health literacy (the indirect effect = 0.04, SE = 0.01, 95% CI [0.01, 0.06]).

Meanwhile, parents' mental health literacy significantly predicted parent-child conflict ( $\beta = -0.11$ ,  $p < 0.05$ ), and parent-child conflict did not predict adolescents' mental health literacy ( $\beta = -0.07$ ,  $p > 0.05$ ). Mediation analyses indicated that parent-child conflict did not mediate the association between parents' mental health literacy and adolescents' mental health literacy (indirect effect = 0.01, SE = 0.01, 95% CI [-0.01, 0.02]). Thus, hypothesis 2 is partially confirmed.

## Hypotheses Testing for the School Mental Health Service

Based on the above analysis of the mediating effects, Model 15 of PROCESS macro was used to test the moderated mediating effect. The indirect effect of parent-child conflict was not significant. Thus, it was not necessary to test for moderated mediating effect between parents' mental health literacy, parent-child conflict, adolescents' mental health literacy and school mental health service. The moderating effect of school mental health service was tested and the results are shown in Table 2. First, school mental health service significantly predicted adolescents' mental health ( $\beta = 0.16$ ,  $p < 0.01$ ), confirming hypothesis 3. Second, school mental health service had a significant moderating effect on the relationship between parents' mental health literacy and adolescents' mental health literacy ( $\beta = 0.12$ ,  $t = 3.25$ ,  $p < 0.01$ ). The same pattern was found for the indirect effect of parents'

**Table 2** Testing the Moderated Mediation Effects of Parents' Mental Health Literacy on Adolescents' Mental Health Literacy

Regression Equation		Fitting Index			Significance of Regression Coefficient		
Dependent Variable	Independent Variable	R	R <sup>2</sup>	F	$\beta$	95% CI	t
Adolescents' mental health literacy	Parents' mental health literacy	0.39	0.15	21.84***	0.26***	[0.24, 0.43]	6.98
	Parent-child intimacy				0.14**	[0.07, 0.23]	3.60
	School mental health service				0.16**	[0.05, 0.16]	3.98
	Parents' mental health literacy × School mental health service				0.12**	[0.12, 0.48]	3.25
	Parent-child intimacy × School mental health service				0.14**	[0.06, 0.19]	3.67

**Notes:** \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Abbreviations:** R, Coefficient of Determination; R<sup>2</sup>, R-squared; F, F-statistic; 95% CI, 95% Confidence Interval; t, t-statistic.

**Table 3** The Moderating Effect of School Mental Health Service

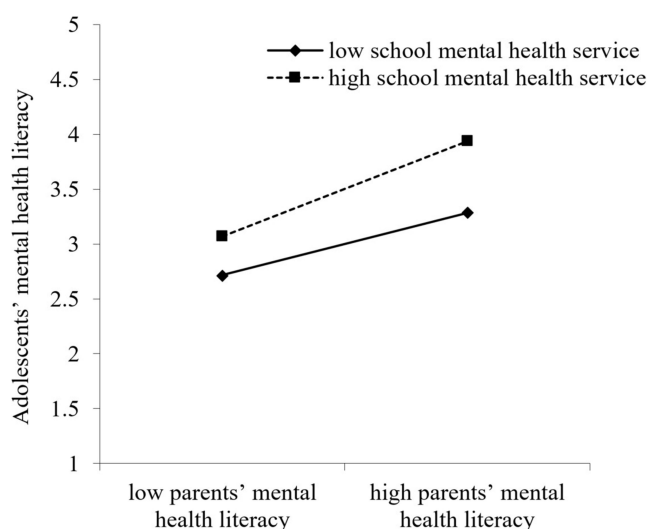
	Values Mod	$\beta$	SE	Boot LLCI	Boot ULCI	p
Parents' mental health literacy	M-1SD	0.16	0.03	0.03	0.29	0.012
	M	0.23	0.04	0.15	0.31	0.006
	M+1SD	0.31	0.06	0.20	0.41	0.004
Parent-child intimacy	M-1SD	0.07	0.06	-0.04	0.18	0.251
	M	0.14	0.04	0.07	0.23	0.002
	M+1SD	0.22	0.05	0.13	0.33	0.002

**Abbreviations:** M, Mean; SD, Standard Deviation; Values mod, value of moderator; SE, Standard Error; Boot LLCI, Bootstrapping Lower Limit of the Confidence Interval; Boot ULCI, Bootstrapping Upper Limit of the Confidence Interval.

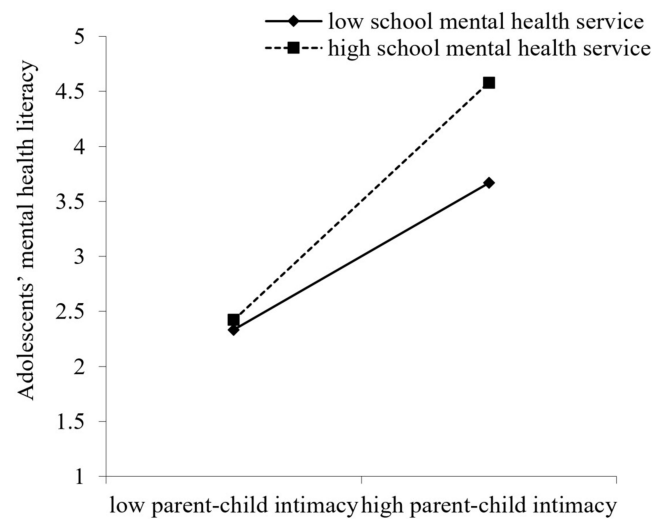
mental health literacy and adolescents' mental health literacy via parent-child intimacy ( $\beta = 0.14$ ,  $t = 3.67$ ,  $p < 0.01$ ). Thus, hypothesis 4 is partially confirmed.

Simple slope tests were conducted to further explore the moderating effect of school mental health service (Table 3). We investigated the impact of parents' mental health literacy on adolescents' mental health literacy at different school mental health service levels. Specifically, we tested whether there are significant differences in the impact of parents' mental health literacy and parent-child intimacy on adolescents' mental health literacy when school mental health service is one standard deviation below the mean and one standard deviation above the mean. The results indicated that school mental health service moderates the positive relationship between parents' mental health literacy and adolescents' mental health literacy, as well as parent-children relationship and adolescents' mental health literacy. As can be seen in Figure 3, the results revealed that the positive predictive effects of parents' mental health literacy on adolescents' mental health literacy decreased as school mental health service increased from low ( $\beta = 0.16$ ,  $p < 0.01$ ) to high ( $\beta = 0.31$ ,  $p < 0.01$ ), although they remained significant.

Figure 4 shows the moderating effect of school mental health service on the relationship between parent-child intimacy and adolescents' mental health literacy. With a high level of school mental health service, parents' mental health literacy was significantly associated with adolescents' mental health literacy ( $\beta = 0.22$ ,  $p < 0.01$ ). With low school mental health service levels, parents' mental health literacy was not associated with adolescents' mental health literacy significantly ( $\beta = 0.07$ ,  $p > 0.05$ ).

**Figure 3** Interactions between parents' mental health literacy and adolescents' mental health literacy.





**Figure 4** Interactions between parent-child intimacy and adolescents' mental health literacy.

## Discussion

Mental health problems among adolescents are becoming an area of concern in global health, especially with the outbreak of COVID-19, as adolescents mental health problems are rising.<sup>43</sup> Adolescence is a critical point in time when enhancement of mental health literacy<sup>44</sup> is needed, as improving mental health literacy has the potential to prevent adolescents' mental disorders and promote their mental health. Thus, this study focused on the underlying mechanisms of mental health literacy, and provided theoretical and empirical support for interventions for adolescents' mental health literacy. The results generally supported the hypotheses and showed that the intergenerational transmission of mental health literacy, specifically mental health literacy among parents was significantly associated with mental health literacy among adolescents. Meanwhile, adolescents' mental health literacy can be affected by parents' mental health literacy through parent-child intimacy, and school mental health service could strengthen the impact of parents' mental health literacy and parent-child intimacy on adolescents' mental health literacy.

## Effect of Parents' Mental Health Literacy on Adolescents' Mental Health Literacy

Our results are consistent with the hypothesis that parents' mental health literacy was positively related to adolescents' mental health literacy. This is evidence of intergenerational transmission of mental health literacy. Firstly, based on the family systems theory,<sup>11</sup> the family is a system with members being interdependent, and each member affects other members. The family system is a cyclical phenomenon in which the family affects the adolescent and the adolescent affects the family. Previous research indicated that adolescent depression levels can be affected by parental depression.<sup>13</sup> This research supports the existence of intergenerational transmission of depression and provides indirect evidence for the intergenerational transmission of mental health literacy. Parents who have a high level of mental health literacy pay more attention to the psychological needs and provide greater support for the development of mental health literacy of adolescents, which may help adolescents to foster psychological well-being and positively face difficulties and setbacks, thus enhancing adolescents' mental health literacy.<sup>45</sup>

Secondly, the social learning theory suggests that adolescents learn strategies for managing emotions, coping with problems, and resolving disputes from observing others, and parents are their primary models.<sup>14</sup> Previous studies have found that anxiety runs in families, passing from parents to adolescents, and observational learning of anxious behavior is a key factor in the intergenerational transmission of anxiety.<sup>16,17</sup> This finding also supports the intergenerational transmission of mental health literacy. Parents with high mental health literacy may have the knowledge to identify risk factors for mental illness and reduce mental health stigma. Moreover, adolescents may acquire the knowledge about mental illnesses by imitating their parents' attitudes and behaviors towards mental illnesses, which increases their mental health literacy. The results of the present study highlight the importance of parents' mental health literacy in enhancing the mental health literacy of adolescents. It is essential for parents to be aware of the value of mental health literacy in the adolescents' development.

## The Effect of Parent-Child Relationship

The present study examined the role of parent-child relationship in the intergenerational transmission of mental health literacy, and the results revealed that parent-child intimacy had a significant mediating role in the relationship between parents' mental health literacy and adolescents' mental health literacy, while parent-child conflict did not have any significant mediating role in this relationship. Firstly, parents' mental health literacy influenced adolescents' mental health literacy through parent-child intimacy. Parents with higher levels of mental health literacy were more likely to have higher levels of mental health,<sup>3,4</sup> which may motivate them to adopt effective parenting styles and enhance positive connections with their children, and thus improve the parent-child intimacy.<sup>46</sup> Moreover, the parent-child intimacy with love, warmth and understanding played a positive role in creating a good family atmosphere for adolescents, which helped to improve their mental health literacy,<sup>22,23</sup> and promote their development of physical and mental health.<sup>47</sup>

Secondly, contrary to expectations, parents' mental health literacy did not influence adolescents' mental health literacy through parent-child conflict. Specifically, parents' mental health literacy significantly negatively predicted parent-child conflict, and parent-child conflict had no significant prediction on adolescents' mental health literacy. Parents with lower levels of mental health literacy were more likely to have lower levels of mental health,<sup>5,6</sup> which may lead them to use negative parenting styles and disrupt positive interactions with adolescents, and thus increase parent-child conflict.<sup>48</sup>

Further, although empirical studies have validated that parent-child conflict adversely affected adolescents' mental health,<sup>49</sup> there were also studies that found no significant association between parent-child conflict and adolescents' mental health.<sup>50</sup> Leidy et al explained the reasons for the two different results, and they demonstrated that the impact of parent-child conflict on adolescents did not lie in the conflict itself, but rather the strategies parents and adolescents used to resolve them.<sup>51</sup> In other words, the effect of parent-child conflict on adolescents was influenced by other factors such as conflict resolution strategies,<sup>51</sup> and this may be a key reason that the effect of parent-child conflict on adolescents' mental health literacy was not significant in the present study. Therefore, future research should explore factors (eg, conflict resolution strategies) to explore the potential pathway of parent-child conflict on adolescents' mental health literacy.

## The Effect of School Mental Health Service

This study explored the positive impact of school mental health service on the development of adolescents' mental health literacy. Firstly, we found the direct predictive effect of school mental health service on adolescent mental health literacy. Schools that established mental health service systems and provided high-quality mental health activities for adolescents helped them to access, understand, or apply information of mental health, facilitated the identification, prevention or management of mental health illnesses, and thus enhanced their levels of mental health literacy.<sup>52</sup> Existing literature suggests that positive school service was positively associated with odds of depression literacy and negatively associated with stigma among adolescents.<sup>53</sup> Bjornsen et al also found that school-based psychosocial interventions were important in improving mental health literacy of adolescents.<sup>3</sup> Both the previous studies and the present study suggest that the school setting is a key system to influence the development of mental health literacy in adolescents.<sup>54</sup>

Secondly, we also examined the moderating role of school mental health service. Based on the ecological system theory,<sup>29</sup> the positive interrelations between two or more microsystems with which the individual interacts support better individual development. For adolescents, the microsystems that most directly and immediately contact are school and family.<sup>30</sup> Therefore, the positive interrelation between school and family may promote adolescents' mental health literacy. Consistent with our expectations, school mental health service enhanced the strength of the relationship between parents' mental health literacy, parent-child intimacy, and adolescents' mental health literacy. Specifically, the higher the school mental health service, the stronger the positive association between the parents' mental health literacy, parent-child intimacy, and adolescents' mental health literacy. In line with Sullivan et al<sup>55</sup> they found the moderating effect of school climate on the relationship between parents' mental health and children's adverse outcomes. Our results also found a positive role for school. Thus, it is important for school to recognize the impact of mental health service on adolescents' mental health literacy, and pay attention to combine the educational power of family and school to fully develop the mental health of adolescents.

## Theoretical and Practical Implications

The present study has examined the mechanisms underlying the potential pathway of intergenerational transmission of mental health literacy, and has valuable theoretical and practical implications. Firstly, the direct effect of parents' mental health literacy on adolescents' mental health supports the family systems theory.<sup>11</sup> Family members are interconnected and influence each other, and parents are a major influence on the growth and development of adolescents' mental health literacy. Secondly, the social learning theory<sup>14</sup> is also supported, as adolescents learn more about positive knowledge, attitudes, and behaviors towards mental illness by modeling and observing their parents, and thus improve their levels of mental health literacy. Thirdly, the effect of school mental health service on adolescents' mental health supports the ecological system theory.<sup>29</sup> School mental health services strengthen the relationship between parents' mental health literacy, parent-child intimacy, and adolescents' mental health literacy, which demonstrates that the interaction between school and family has an impact on adolescents' physical and mental health. Fourthly, the results of the present study are also beneficial for the intervention and enhancement of adolescents' mental health literacy. For parents, it is necessary to emphasize the improvement of their own mental health literacy, promote positive communication with adolescents, create a harmonious family atmosphere, and increase the mental health literacy of adolescents. Moreover, from the perspective of schools, they should provide high-quality mental health services and promote home-school cooperation, establish a positive school environment for adolescents, and maximize their healthy development.

## Limitations and Future Directions

This study has the following important limitations: Firstly, the sample mainly consisted of secondary school students and their parents, which reduces the generalizability of the findings to other populations. Future research should include samples with a larger age range to enhance adequate representation and generalizability of the results. Secondly, due to the pandemic, data were collected in two time points with an interval of one month, which resulted in short intervals and fewer time points. Future research should be more rigorous in collecting this kind of data at multiple time points to further explore the intergenerational transmission of mental health literacy. Thirdly, the present study only selected the parent-child relationship as a mediating variable and school mental health service as a moderating variable to explore the intergenerational transmission of mental health literacy. Future research may consider examining factors that impact mental health literacy among adolescents from a variety of perspectives, such as teachers and peers, to further explore this topic.

## Conclusions

The present study introduces intergenerational transmission into mental health literacy, and provides a new perspective for the study of mental health literacy. We found that parents' mental health literacy could influence adolescents' mental health literacy indirectly through parent-child intimacy, and school mental health service moderated the relationship among parents' mental health literacy, parent-child intimacy, and adolescents' mental health literacy. This finding may lead future research to investigate the role of parents in the family, and the influence of home-school cooperation on adolescents' mental health literacy.

## Data Sharing Statement

The application employed in this manuscript are freely available. Please contact the corresponding authors for more details.

## Ethics Approval and Consent to Participate

This study were reviewed and approved by the Institutional Review Board of Henan Provincial Key Laboratory of Psychology and Behavior (numbered as 20221010003). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study did not use clinical/personal patient data. Administrative permissions and/or licenses for accessing clinical/personal patient data were not acquired. Informed consent was obtained from all individual participants included in the study.

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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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