The relationship between adolescents' sense of meaning in life and suicidal ideation: a meta-analysis based on a Chinese sample

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Abstract: This study systematically explored the relationship between sense of meaning in life and suicidal ideation among adolescents using meta-analysis. A total of 14 studies meeting the meta-analysis criteria were included, with a combined sample size of 22,096 participants. The meta-analysis results revealed a significant negative correlation between sense of meaning in life and suicidal ideation ($r = -h0.33$, $p < 0.001$), indicating that a higher sense of meaning in life is associated with lower suicidal ideation. Furthermore, in terms of gender, the negative correlation between sense of meaning in life and suicidal ideation strengthened as the proportion of females increased. Regarding age groups, the negative correlation was most pronounced among high school students. These findings further validate the significant role of sense of meaning in life as a psychological protective factor and provide theoretical foundations and practical guidance for mental health interventions targeting adolescents.

1. Introduction

In recent years, with the increasing societal pressures and the growing prominence of mental health issues, suicide has become a severe and globally recognized public health concern. According to the World Health Organization, over 700,000 people die by suicide each year worldwide, equating to one person taking their own life every 40 seconds [1]. Particularly among adolescents and middle-aged individuals, the prevalence of suicidal ideation and behaviors remains high due to pressures related to academics, work, and family life. The 2022 China Health Statistics Yearbook indicates that suicide is the second leading cause of death among Chinese adolescents, accounting for 19% of all deaths in this population [2]. Further research by Yu Guoliang in 2023 reveals that the detection rate of suicidal ideation among Chinese adolescents ranges from 17.0% to 31.3% [3]. These statistics underscore the severity of adolescent suicide and highlight the urgent need for timely prevention and intervention.

In the field of adolescent mental health research, the lack of a sense of meaning in life has been identified as a significant risk factor for suicidal ideation. Frankl posited that the absence of meaning in life can lead to severe psychological issues such as depression, suicidal tendencies, and behavioral dysregulation [4]. In recent years, the national emphasis on adolescent safety has further underscored the importance of fostering a sense of meaning in life within mental health education. The Healthy China Initiative (2019-2030) explicitly advocates for the promotion of positive life meaning concepts

through mental health education to enhance psychological resilience and reduce the incidence of mental health problems. This indicates that cultivating a sense of meaning in life has become a critical task in adolescent mental health interventions.

Suicidal ideation refers to the formation of thoughts or ideas about death in an individual's mind, without the actual implementation of life-threatening behaviors [5]. Research shows that suicidal ideation typically emerges in early adolescence (around 11 to 13 years old) and may develop into suicidal behaviors in late adolescence (15 to 16 years old) [6]. Suicidal ideation serves as the foundation of adolescent suicide issues and is a crucial precursor to suicidal behaviors [7]. Therefore, understanding the mechanisms underlying the formation of suicidal ideation and its influencing factors is essential for preventing adolescent suicide.

Sense of meaning in life is defined as an individual's perception and affirmation of the value and purpose of their life, encompassing two dimensions: the search for meaning and the realization of meaning [8]. The search for meaning refers to an individual's perception of life's value and the setting of life goals, while the realization of meaning represents the outcomes of efforts made toward achieving those goals. Numerous studies have confirmed that a sense of meaning in life plays a significant protective role against suicidal ideation. A high sense of meaning in life can buffer the impact of negative life events on individuals, effectively reducing their risk of suicide. For example, Zhang Shuyue, in a study of middle and high school students, found that a sense of meaning in life significantly negatively predicted suicidal ideation, indicating that a higher sense of meaning in life is associated with lower suicidal ideation [9]. Zeng Haikuan and colleagues found that among college students, both the experiential and search dimensions of meaning in life significantly negatively predicted suicidal ideation [10]. Additionally, Zhang Ping and colleagues noted that adolescents with a higher sense of meaning in life are more likely to experience positive emotions and maintain good mental health, thereby further reducing the likelihood of suicidal ideation [11].

Despite the existing research revealing the close relationship between sense of meaning in life and suicidal ideation, there are still gaps in the current understanding of this relationship. On one hand, there is a lack of systematic integration and quantitative analysis of the relationship between sense of meaning in life and suicidal ideation. On the other hand, the moderating effects of different age groups and genders on this relationship remain unclear. To address these research gaps, this study employs a meta-analytic approach to systematically explore the overall association between sense of meaning in life and suicidal ideation, while also examining the moderating roles of age and gender. The aim of this study is to integrate existing research findings, uncover the protective mechanisms of sense of meaning in life against suicidal ideation, and provide scientific evidence and practical guidance for adolescent mental health interventions.

2. Information and methodology

2.1 Literature Search

In this study, we systematically collected relevant studies on the meaning of life and suicidal ideation since the establishment of the database until November 2024 by searching the China Knowledge Network (CKN), Wipu Journal Network (WJN) and Wanfang Database. The search terms for meaning of life included "meaning of life", "meaning of personal life", "purpose of life", "attitude toward life", etc.; suicidal ideation was also identified. "The search terms for suicidal ideation include "suicide", "suicidal ideation", "suicide attempt", etc. The search results were organized and analyzed. The search results were organized and analyzed to provide data support for subsequent research.

2.2 Inclusion criteria

Inclusion criteria: (1) it must be an empirical study, excluding review and qualitative studies; (2) the content of the articles mainly explored the relationship between the meaning of life and suicidal ideation; (3) the information and data in the literature were complete, and the effective correlation coefficient r or the F value that can be converted to r, t value, etc. were clearly reported; and (4) the sample size in the literature must be clear. After reading the titles, abstracts, and contents of the literature, those that did not meet the above criteria were excluded, and a total of 14 articles that met the criteria were included.

2.3 Coding

In this study, we coded the characteristics of the literature that met the inclusion criteria, and the coding included the author and year of publication, the measurement tools of sense of meaning of life and suicidal ideation, the type of subject group, the sample size, the gender ratio, and the source of publication (see Table 1). The extraction of effect sizes was based on the following principles: (1) the measurement tools for sense of meaning of life covered classic scales at home and abroad (e.g., MLQ, PIL), and in order to ensure the unity and comparability of the study, the overall scores were analyzed uniformly with reference to Steger et al.'s definition of sense of meaning of life; (2) the gender ratio prioritized the use of data reported directly in the literature, or, if it was not explicitly stated, by the number of female samples versus the total sample size calculation; (3) Measurement tools for suicidal ideation included the BSI-CV, PANSI, and DSI-SS, and all results were transformed into standardized effect sizes for Meta-analysis.

Table 1 Basic information about the primary literature included in the meta-analysis

Name	Year	Sense of meaning in life	Suicidal ideation	Participant Group	Sample Size	Correlation Coefficient	Gender Ratio	Source
Wu Wenli	2015	PIL	BSI-CV	University	1688	-0.355	767/921	Core
Zhang Shuyue	2019	MLQ	BSI-CV	University	1148	-0.29	—	Core
Zhang Ping	2022	MLQ	PANSI	University	671	-0.215	457/214	Core
Zhang Ping	2024	MLQ	PANSI	University	1137	-0.365	740/397	Core
Evan M	2013	MLQ	BSI-CV	University	209	-0.39	33/176	Core
Zhang Ye	2022	MLQ	PANSI	High School	1074	-0.15	469/605	Core
Zhang Ye	2021	MLQ	PANSI	High School	633	-0.3	255/378	Core
Cui Ailin	2024	MLQ	SIOSS	High School	444	-0.415	230/214	General
Li Jieru	2020	MLQ	PANSI	High School	500	-0.644	238/262	Thesis
Zhang Yu	2023	MLQ	SIOSS	High School	749	-0.696	383/366	Thesis
Yuan Bo	2019	MLQ	PANSI	High School	641	-0.304	257/384	Thesis
Liu Shuangjin	2024	MLQ	DSISS	High School	6884	-0.33	3342/3542	Core
Shi Qian	2018	MLQ	PANSI	Middle School	410	-0.34	228/182	Thesis
Hu Yiqiu	2023	MLQ	DSI-SS	Middle School	930	-0.12	501/429	Core
Liu Shuangjin	2024	MLQ	DSISS	Middle School	4978	-0.4	2394/2584	Core

Note: MLQ stands for Meaning of Life Questionnaire developed by Steger et al. The scale has two subscales i.e., Meaning Possession Scale and Meaning Seeking Scale, PIL = Purpose in Life Test, BSI-CV = Beck Suicidal Ideation Inventory Chinese Version, PANSI = Poisonous Adolescent Suicidal Ideation Scale, SIOSS = Suicidal Ideation Self-assessment Scale, DSISS = Depressed Symptoms Inventory-Suicidal Ideation Subscales

2.4 Literature Screening Process and Results

An initial review of 492 articles of related literature was conducted. After a step-by-step screening process, 14 studies with a total sample size of 22,096 were finally included. The literature screening process and results are shown in Figure 1.
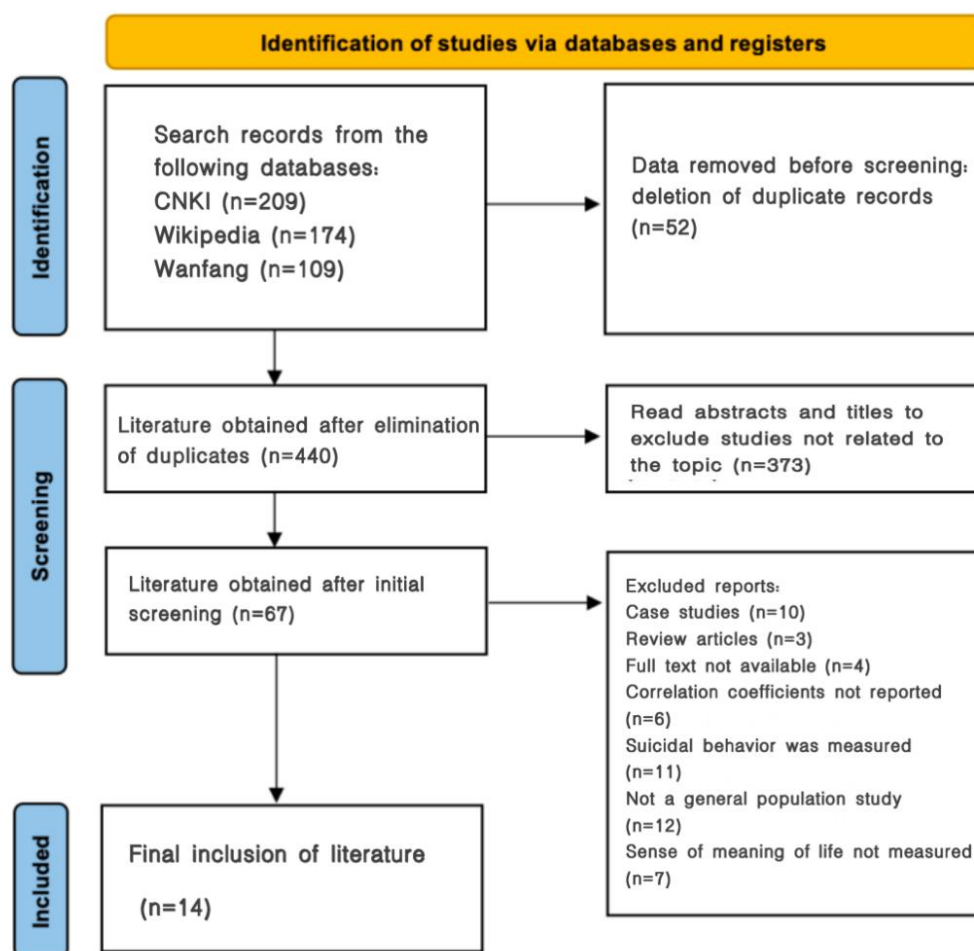

Figure 1 Literature Screening Process

2.5 Statistical analysis

Meta-analysis was conducted in this study using Stata 17.0 software, and correlation coefficients (Pearson's r values) and their 95% confidence intervals (CIs) were used as effect size indicators to quantify the correlation between adolescents' sense of meaning in life and suicidal ideation. The standardized effect sizes were also converted by FisherZ transformation and then back-transformed into the form of correlation coefficients. Based on Cohen's criterion [12] , effect size $r \leq 0.10$ is considered as low correlation, $0.10 \leq r \leq 0.40$ is considered as moderate correlation and $r \geq 0.40$ is considered as high correlation. Inter-study heterogeneity was assessed by Cochran's Q test ($\alpha=0.1$)

and I²metrics, with a fixed-effects model for I²≤50% and a random-effects model for I²≥50%. The moderating effects of gender and age group were explored, where gender was analyzed by regression through sex ratio, and age group was analyzed using subgroup analysis to estimate effect sizes. Publication bias tests were performed using funnel plots, Egger's regression, and Begg's correlation tests, with P<0.05 as the criterion for statistical significance for all analyses.

3. Meta-analysis results

3.1 Correlation between adolescents' sense of meaning in life and suicidal ideation

The results of the random effects model showed an effect value of -0.38 (95% CI: -0.46 to -0.31, p<0.001) between sense of meaning of life and suicidal ideation, which is moderate and in the negative direction according to Cohen's criterion for the interpretation of effect values. This suggests that individuals with a higher sense of meaning in life have lower levels of suicidal ideation. The absence of zero in the 95% confidence interval indicates that the effect value is less likely to be generated by chance and the relationship between sense of meaning of life and suicidal ideation is more stable. The results of the heterogeneity test showed a significant Q (p<0.001) and I²=96.6%, indicating a high degree of heterogeneity among the effect values. Therefore, it is reasonable to use the random effects model for the combined analysis of effect values in this study. At the same time, this heterogeneity also suggests that the relationship between sense of meaning of life and suicidal ideation may be influenced by other moderating variables (e.g., gender, age group, etc.). The specific data analyzed are shown in Figure 2.
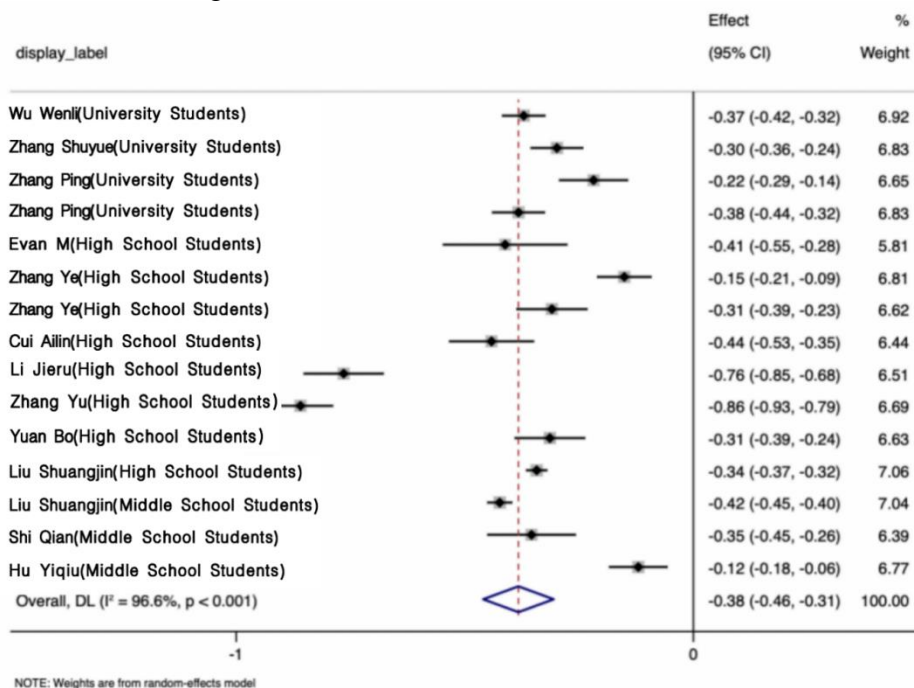

display_label	Effect (95% CI)	% Weight
Wu Wenli(University Students)	-0.37 (-0.42, -0.32)	6.92
Zhang Shuyue(University Students)	-0.30 (-0.36, -0.24)	6.83
Zhang Ping(University Students)	-0.22 (-0.29, -0.14)	6.65
Zhang Ping(University Students)	-0.38 (-0.44, -0.32)	6.83
Evan M(High School Students)	-0.41 (-0.55, -0.28)	5.81
Zhang Ye(High School Students)	-0.15 (-0.21, -0.09)	6.81
Zhang Ye(High School Students)	-0.31 (-0.39, -0.23)	6.62
Cui Ailin(High School Students)	-0.44 (-0.53, -0.35)	6.44
Li Jieru(High School Students)	-0.76 (-0.85, -0.68)	6.51
Zhang Yu(High School Students)	-0.86 (-0.93, -0.79)	6.69
Yuan Bo(High School Students)	-0.31 (-0.39, -0.24)	6.63
Liu Shuangjin(High School Students)	-0.34 (-0.37, -0.32)	7.06
Liu Shuangjin(Middle School Students)	-0.42 (-0.45, -0.40)	7.04
Shi Qian(Middle School Students)	-0.35 (-0.45, -0.26)	6.39
Hu Yiqiu(Middle School Students)	-0.12 (-0.18, -0.06)	6.77
Overall, DL (I² = 96.6%, p < 0.001)	-0.38 (-0.46, -0.31)	100.00

NOTE: Weights are from random-effects model

Figure 2 Random effects modeling to analyze the correlation between adolescents' sense of meaning in life and suicidal ideation

3.2 Moderating effects of subject groups

As shown in Table 2, this study investigated the correlation between sense of meaning in life and suicidal ideation across different age groups, as well as the level of heterogeneity, through subgroup

analysis. The strongest negative correlation between sense of meaning in life and suicidal ideation was observed among high school students, with a correlation coefficient of r = -0.45 (95% CI: -0.62, -0.29) and the highest level of heterogeneity (I^2 = 98.1%, p < 0.001). Overall, the negative correlation between sense of meaning in life and suicidal ideation was most pronounced in the high school group, relatively weaker in the middle school group, and moderate in the college group. However, varying degrees of heterogeneity were present across all groups, which may be attributed to differences in research methodologies, sample characteristics, or other factors.

Table 2 Subgroup analysis for different age groups

Subgroup	Number	Sample	r(95%CI)	I^2(%)	P-Value
Middle School Group	3	6318	-0.30(-0.50,-0.10)	97.20%	p<0.001
High School Group	7	10925	-0.45(-0.62,-0.29)	98.10%	p<0.001
University Group	5	4853	-0.33(-0.39,-0.27)	75.90%	p=0.002

3.3 The moderating role of gender

As shown in Table 3, this study examined the moderating effect of gender ratio (proportion of females) on the effect size between sense of meaning in life and suicidal ideation through meta-regression analysis. The results revealed that the moderating effect of gender ratio was significant (regression coefficient = -0.3896, 95% CI = [-0.5075, -0.2717], p < 0.001), indicating that a higher proportion of females in the study samples was associated with a stronger negative correlation between sense of meaning in life and suicidal ideation. Specifically, the negative regression coefficient suggests that in samples with a higher proportion of females, the inhibitory effect of sense of meaning in life on suicidal ideation was more pronounced. This may reflect potential gender-specific mechanisms underlying the relationship between these two variables. These findings provide statistical support for further exploration of the role of gender in the correlation between psychological variables.

Table 3 Regression analysis for gender

	Regression Coefficien(β)	95%CI	I^2(%)	P-Value
Gender Ratio (Proportion of Females)	-0.3896	(-0.51,-0.27)	96.81%	P<0.001

3.4 Publication bias test

A funnel plot was used to detect publication bias in the study of the relationship between adolescents' sense of meaning in life and suicidal ideation. The funnel plot showed that the distribution of points was slightly asymmetric, with the right side being sparser, suggesting that there might be some publication bias. It needs to be combined with Egger's or Begg's test to further verify whether the bias is significant. (See Figure 3).
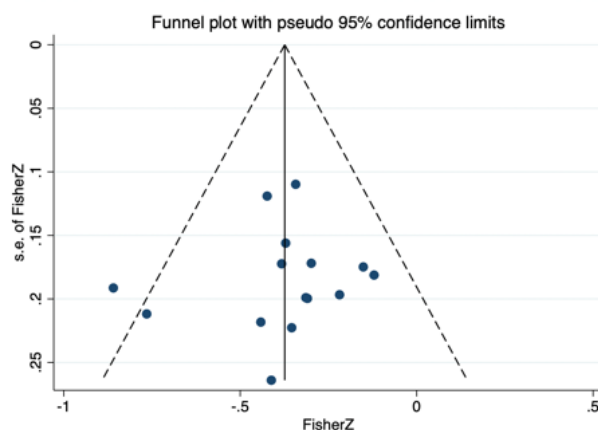
Figure 3 Publication bias funnel plot

As shown in Table 4, the results of Egger's regression test and Begg's test are displayed for assessing the existence of publication bias. The results of Egger's test show an intercept of -0.788, a standard error of 3.066, and a t-value of -0.26, $p=0.801$ (>0.05), which did not reach statistical significance, indicating that no significant publication bias was detected. The results of the Begg's test showed a z-value of -0.2107, $p=0.451$ (>0.05), which also did not reach statistical significance, further supporting the conclusion that publication bias did not exist. Taken together, no significant publication bias was found in either test, indicating that the results of this Meta-analysis are robust and highly reliable.

Table 4 Publication bias test

	Egger's Regression Coefficient Test			Begg's Rank Correlation Test	
Intercept	SE Value	T-Value	P-Value	Z-Value	P-Value
-0.788	3.066	-0.26	0.801	-21.07%	0.451

4. Discussion

The present study explored the relationship between adolescents' sense of meaning in life and suicidal ideation through Meta-analysis, and the results showed a significant negative correlation, which is consistent with the findings of previous studies[9][10][11]. Specifically, sense of meaning of life, as an important psychoprotective factor, has a significant buffering role in the formation of suicidal ideation in adolescents. Adolescents with a low sense of meaning in life often lack clear life goals and sense of value, and they are more likely to experience negative emotions such as loneliness and despair in the face of stress or frustration, and fall into a vicious cycle of self-denial, thus significantly increasing the risk of suicidal ideation. On the contrary, adolescents with a higher sense of meaning in life tended to actively search for meaning and hope in life in the face of adversity, demonstrated greater psychological resilience and optimism, and were able to derive strength from interpersonal relationships, personal growth, and anticipation of the future, thus effectively reducing the sense of psychological distress and decreasing the risk of suicidal ideation. The results of this study further validate the protective factor theory that a sense of meaning in life can effectively buffer adolescents from the negative effects that may arise in the face of psychological stress. A sense of meaning of life not only provides adolescents with a positive cognitive framework, but also helps them to reshape their beliefs and hopes about life in difficult situations. By enhancing adolescents' sense of meaning of life, it can provide important theoretical support for interventions to prevent

suicidal behaviors, and at the same time point out the practical direction for adolescent mental health education.

Subgroup analyses in this study showed that the negative correlation between sense of meaning of life and suicidal ideation varied significantly among adolescents of different ages, with the strongest negative correlation in the high school cohort. The high school stage is a critical period for adolescents' psychological and socialization development, and the academic pressure, competition for higher education, and uncertainty about the future at this stage make the sense of meaning of life more prominent for psychological support. In addition, high school students' self-knowledge gradually deepens, but their ability to cope with stress is not yet fully mature, making a sense of meaning of life particularly important in helping them resist negative emotions and suicidal ideation. In contrast, junior high school students' sense of meaning of life is relatively weak in protecting them from suicidal ideation due to their younger age, incomplete cognition of the meaning of life, and relative lack of psychological development and emotional regulation. Meanwhile, junior high school students were more likely to be influenced by external environments such as family and peer relationships, which may have weakened the direct relationship between sense of meaning of life and suicidal ideation. In contrast, the negative correlation for the college student group, although significant, was less intense than that for high school students, which may be related to the fact that college students are more mature in their psychological development and more capable of coping with stress. In addition, college students live in a relatively free environment with a more diverse social support system, which may have somewhat attenuated the direct protective effect of sense of meaning of life on suicidal ideation. Overall, the differences in the correlation between sense of meaning of life and suicidal ideation at different ages reflect the diversity of adolescents under the influence of psychological developmental characteristics and external environment.

Meta-regression analysis showed that an increase in the proportion of female students significantly enhanced the negative correlation between sense of meaning in life and suicidal ideation. This phenomenon may be due to a combination of factors. First, in terms of psychological mechanisms, female students usually have higher emotional sensitivity and tendency to express emotions, which makes it easier for them to perceive internal psychological pain and stress[13]. When women have a higher sense of meaning in life, this internal psychological resource can more effectively help them regulate their emotions and alleviate psychological pain, thus suppressing suicidal ideation more significantly. Second, sociocultural factors may also have a significant impact on this outcome. Girls usually face greater gender role expectations in their growing up process, and these expectations may prompt them to pay more attention to the realization of intrinsic values and the maintenance of interpersonal relationships. When these expectations are met, the role of a sense of meaning in life is further reinforced, leading to a more effective reduction in suicidal ideation. In addition, girls pay more attention to peer relationships and social evaluation in the process of socialization, and this sensitivity to relationships makes the role of the sense of meaning of life in alleviating psychological pain more significant[14]. Taken together, girls were influenced by multiple psychological, physiological, and sociocultural factors in the relationship between sense of meaning of life and suicidal ideation. This finding suggests that future research and psychological interventions should pay more attention to the specific needs of female students and explore more targeted intervention strategies to further enhance the protective efficacy of sense of meaning in life.

The present study reveals the significant protective effect of adolescents' sense of meaning in life on suicidal ideation, and further indicates the moderating role of different age groups and gender in this relationship. This finding not only provides new perspectives for understanding the formation mechanism of adolescent suicidal ideation, but also provides a theoretical basis for developing precise mental health interventions. In practice, for high school students, a high-risk group, educators and mental health professionals should pay more attention to reducing the occurrence of suicidal ideation

by cultivating a sense of meaning in life. Meanwhile, for female adolescents, the protective effect of a sense of meaning in life should be enhanced by combining the construction of social support systems with psychological interventions. Future research should further explore the influence of cultural background and sense of meaning of life on suicidal ideation, in order to provide more scientific theoretical support for adolescent mental health.

5. Research limitations and perspectives

This study has the following limitations: first, although this study screened and included literature that met the criteria through multiple ways, there may still be cases of omission of relevant literature, especially unpublished literature, which may have a certain impact on the results of the meta-analysis. Second, the included literature mainly focuses on student groups, especially high school and college students, while there are fewer studies on middle school students and other non-student groups, which limits the representativeness of the sample to some extent and may also bring bias to the comparison results between different groups. Third, this study focused on research in the Chinese cultural context and did not include foreign literature, thus failing to further examine the influence of cultural context on the relationship between sense of meaning in life and suicidal ideation, which may limit the cross-cultural generalizability of the findings.

Future research could be expanded in the following ways: first, to further explore the specific mechanisms of action of the sense of meaning in life on the impact of suicidal ideation, especially the pathways of action in different psychological regulation variables (e.g., social support, emotion regulation ability), and to deepen the theoretical and practical understanding. Second, future studies can expand the scope of research subjects and increase the study of non-student groups to enhance the diversity and representativeness of the samples. Third, cross-cultural comparative studies should be strengthened to explore the similarities and differences in the relationship between the sense of meaning of life and suicidal ideation in different cultural contexts (e.g., East and West), and to reveal the potential moderating effect of cultural factors on this relationship, so as to provide a more generalized basis for the development of targeted interventions.

In conclusion, the results of this study suggest that interventions for adolescent mental health problems should pay special attention to the importance of enhancing the sense of meaning in life, and that more precise psychological support and intervention programs should be developed in combination with the characteristics of different groups to help adolescents effectively cope with psychological crises such as suicidal ideation.

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