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# Parental dysfunction and adolescent mental health: AI-aided content analysis of suicide notes on social media

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## Abstract

Adolescent suicide represents a critical global health issue. While research has identified numerous risk factors, the specific impact of parental dysfunction on adolescent suicide remains understudied, especially in Chinese contexts. This study explores how parental dysfunction manifests in suicide notes and affects adolescent mental health. We collected data from Chinese social media platforms using web crawlers, yielding 30 valid suicide notes for analysis. Using the AI-aided content analysis platform DiVoMiner®, we conducted high-frequency word and semantic network analyses. Our findings reveal that parents are a central concern for suicidal youth. We identified three primary patterns of parental dysfunction: excessive emphasis on instrumental goals, neglect of basic emotional needs, and inadequate protection from life traumas. These dysfunctions contribute to severe psychological distress, identity loss, and negative coping behaviors among youth. The research highlights two significant phenomena in contemporary Chinese family dynamics: the "short-sightedness" of prioritizing short-term instrumental goals over long-term social-emotional development, and the remarkably high prevalence of "lack of autonomy" in parenting approaches. Our study extends the literature by exploring mechanisms through which parental dysfunctions contribute to suicidal behaviors in young people. These findings emphasize the need for collaborative efforts among parents, educators, policymakers, and mental health professionals to foster nurturing environments characterized by emotional support, autonomy encouragement, and balanced academic expectations—all crucial for adolescent well-being.

**Keywords** Parental dysfunctions, Adolescent mental health, AI-aided content analysis, Suicide notes, Adolescent suicide

## Introduction

Suicide is a critical public health issue, with over 720,000 deaths annually, making it the third leading cause of death among individuals aged 15 to 29 years [1]. Among adolescents (defined as individuals aged 10 to 24 years [2]), non-suicidal self-injury, suicidal ideation, and

deliberate self-harm are the three most common suicidal and self-harm behaviors [3]. Suicide notes, which are left behind by 10–45% of adolescent suicide victims [4, 5], provide valuable insights into their psychological distress, social struggles, and family conflicts. A Norwegian study found that 14% of suicide victims under 15 and 39% of those aged 15 to 19 left a note [6]. Similarly, an Australian study of 1051 suicides showed that 33% left suicide notes, with these individuals more frequently involved in interpersonal conflicts [7]. Additionally, an in-depth interview study of 22 adolescents suggested that a hostile family environment and lack of perceived family support may contribute to suicidal behavior [8]. While suicide note

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research has been extensive in Western contexts [4–7, 9–11], little is known about their significance in Chinese culture, where parental expectations and social pressures may influence both their content and prevalence.

Numerous studies have identified risk factors for suicidal behavior, including individual factors such as depression, low self-esteem, and substance use [12–14], as well as school and social factors such as bullying victimization [15]. While biological markers such as the mean platelet volume and the platelet-to-lymphocyte ratio have been examined [16], psychological and social factors, particularly family-related issues, remain critical. Parental dysfunction—including rejection, neglect, and overcontrol—has been identified as a major contributor to adolescent suicide risk [17, 18]. However, few studies have systematically analyzed how these dysfunctions are expressed in suicide notes, particularly within the Chinese sociocultural context where family dynamics are shaped by both traditional values and rapid social change.

Parental dysfunction, characterized by problematic parenting behaviors, adversely affects children's emotional and psychological well-being [19–21]. Several theories explain its impact on distress and suicidal behavior. Family systems theory (Bowen) views the family as an interconnected unit, where dysfunction in one member affects the whole [22]. Attachment theory (Bowlby) highlights the role of early caregiver relationships in emotional development [23]. In addition to these perspectives, self-determination theory (SDT) offers further insight into how parental dysfunction—particularly autonomy deprivation—contributes to youth mental health [24]. SDT posits that autonomy, competence, and relatedness are fundamental psychological needs for well-being [25]. Autonomy is crucial for adolescent psychological development. Research has shown that the fulfillment of the intrinsic need for autonomy enhances self-motivation and mental well-being, whereas its obstruction results in diminished motivation and overall welfare [25, 26]. Family dynamics evolve amid traditional values and social change. In China, collectivist values and a mix of authoritative and authoritarian parenting often emphasize discipline and academic achievement, sometimes at the cost of emotional connection [27], which is a phenomenon of "short-sightedness" in children's development goals. A meta-analysis of 686,672 adolescents found that Asia has the highest prevalence of suicide plans and self-harm, with academic pressure being a key factor [3]. Compared to Western individualistic, autonomy-supportive parenting [27], excessive parental control in China may undermine autonomy development, increasing adolescent distress. Given these complexities, understanding how parental dysfunction appears in suicide notes can provide critical insights into the psychological

links between family relationships and suicidal behavior, addressing a key gap in current research.

Thus, this study employs AI-aided content analysis to examine suicide notes from Chinese social media platforms. Since accessing official suicide notes is difficult in Macau and mainland China, social media provide a rich dataset for mental health research [28]. Unlike traditional content analysis methods [29–32], AI-based techniques enhance objectivity and efficiency, allowing for deeper insights into text classification and semantic patterns, as demonstrated by the software program DiVoMiner® in other studies [33–35]. By analyzing the contents of suicide notes, this study aims to (1) describe the frequency and context of references to parents, (2) identify patterns of parental dysfunction, and (3) explore their impact on adolescent mental health. This study employs an inductive, exploratory approach rather than testing predetermined hypotheses. This qualitative methodology is particularly appropriate for investigating complex psychosocial phenomena where the goal is to understand lived experiences rather than confirming existing theoretical frameworks. The findings contribute to both theoretical frameworks of family dysfunction and practical suicide prevention strategies.

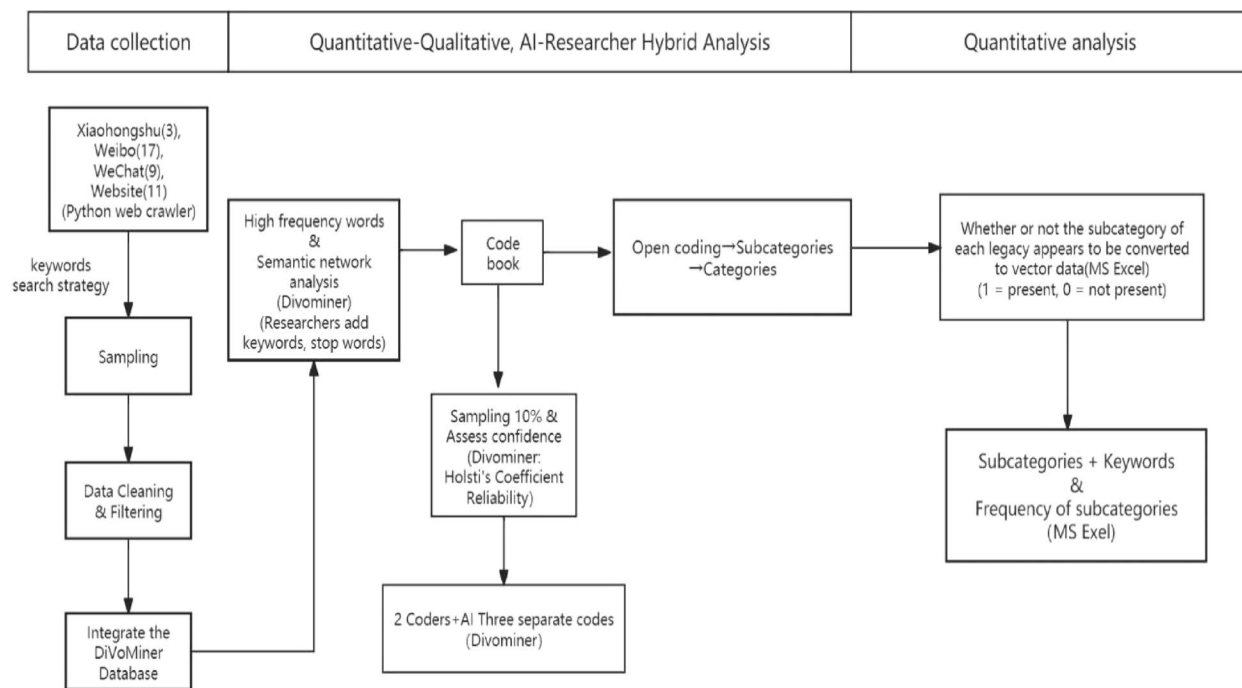
## Methods

Suicide notes were collected from mainstream, publicly accessible Chinese social media platforms, including WeChat public accounts (with over 1.26 billion monthly active users, including approximately 97% of Chinese internet users aged 16–24 years), Weibo (with 582 million monthly active users, of which 37.8% are under 25), and Xiaohongshu (with over 200 million registered users, with approximately 70% being under 30 years of age) [36, 37]. These platforms collectively reach the vast majority of online Chinese youth and allow access to publicly shared content, making them valuable sources for studying expressions of mental health in the Chinese context [38].

Data processing and analysis were conducted on the DiVoMiner® AI-aided content analysis (ACA) platform [39]. Figure 1 illustrates the data collection and AI–researcher hybrid analysis process.

## Data collection and authenticity identification

The purpose of this study is to analyze suicide notes publicly posted on mainstream Chinese social media platforms from January 2013 to December 2023 by Chinese young people. We collected relevant new media reports and posts on mainstream platforms, including WeChat, Weibo and Xiaohongshu. Our web crawler was developed using Python 3.9 with BeautifulSoup and Selenium libraries for HTML parsing and dynamic content



**Fig. 1** Data collection and analysis process

rendering. The crawler employed a breadth-first search algorithm with configurable depth parameters (set to 3 for this study) to systematically explore content across the targeted platforms. To comply with ethical scraping practices and platform terms of service, we implemented rate limiting (maximum 1 request per 3 s), respectful robots.txt adherence, and user-agent declaration. Data collection occurred between September and December 2023, with duplicate detection mechanisms to prevent content redundancy. The search strategy combined subject words and free words, and the selected keywords included "青少年或青年或学生" (adolescent or youth or student), "自杀或自尽" (suicide or attempted suicide or committed suicide), and "遗书或遗信" (suicide note or suicide letter or last words).

The data were then cleaned and filtered on the basis of specific inclusion and exclusion criteria. The inclusion criteria included individuals aged 12 to 24 years, who attempted suicide or completed suicide, with complete suicide notes, including images, with descriptions of life experiences. The exclusion criteria included the absence of a full suicide note, the use of fewer than 100 words, or a lack of verification in media reports.

Multiple verification measures were applied to confirm the authenticity of the online suicide notes. (1) The first was content analysis: we assessed the authenticity of suicide notes by scrutinizing the choice of language, expression of emotion, and coherence of themes. Typically, an

authentic suicide note reflects the individual's emotional experience and despair for the future in greater depth [40, 41]. (2) The second was logical analysis: we considered whether the content of the suicide note matched the author's life background, which included possible school experiences and interpersonal relationships that made sense. (3) The third involved media reports: this study cross-checked the information with reference to relevant media reports. A list of five suicide notes is provided in Supplementary Appendix Panel 6.

### Data analysis

Data analysis was conducted on the DiVoMiner® AI-aided Content Analysis platform. Content analysis is a methodological process of coding and categorizing textual data to investigate trends, patterns, frequencies, relationships, and structures of communication, as outlined by Vaismoradi et al. [32]. Our analysis followed three main phases:

First, we performed quantitative text analysis. High-frequency words were obtained, and semantic network analysis (SNA) was performed (source word frequency > 60, target word frequency > 10). Adjustments were manually made for keywords and stop words in DiVoMiner® (Supplementary Appendix Panels 1 and 2) via natural language processing (NLP) algorithms [42]. The deep structure and meaning of the text were revealed using SNA statistical indicators, including word frequency,

term frequency-inverse document frequency (TF-IDF), node degree, degree centrality, closeness centrality, and betweenness centrality (Supplementary Appendix Panels 3 and 4).

For analyzing subjective elements such as emotional tone and sentiment, the DiVoMiner<sup>®</sup> platform employed a hybrid approach. Initially, the platform used Natural Language Processing with a Chinese language sentiment lexicon containing over 15,000 emotionally-weighted terms calibrated specifically for adolescent expression patterns. Recognizing the limitations of computational sentiment analysis for nuanced emotional states, we implemented a two-stage validation process: (1) two independent researchers with backgrounds in adolescent psychology reviewed all AI-based classifications, and (2) cases with discrepant interpretations underwent consensus review involving a third researcher with expertise in Chinese youth mental health semantics.

Second, we developed a codebook on the platform using a hybrid approach that incorporated both deductive and inductive thematic analysis. Initially, we began with broad conceptual categories informed by literature on suicidal ideation and adolescent distress. As analysis progressed, we refined these categories based on patterns emerging from the suicide notes. The specific coding process is shown in Fig. 1. In the initial phase, relevant keywords were identified through "open coding." Subsequently, connections between different codes were analyzed to generate subcategories, which were then refined into final categories. Finally, frequencies and percentages of subcategories were calculated.

Third, we validated our analysis through reliability testing. Inter-coder reliability was assessed using Holsti's coefficient, resulting in a score of 0.95 on a randomly selected subset of 10% of the data. The validity of the constructs was reinforced by integrating qualitative insights with quantitative findings, obtaining a composite reliability range of 0.82–0.98 (Supplementary Appendix Panel 5).

### Ethical issues

The primary ethical principle guiding this study was the prevention of harm to the authors of suicide notes and their families. During data collection and analysis, we considered three critical questions: "Is a blog a public or private space?", "Will capturing a person's notes from a public space cause harm?", and "Even when anonymized, does the dataset contain sufficient personal information to identify individuals?" We implemented stringent anonymization processes, removing any potentially identifying information and minimizing direct quotations in reports and publications. Public online content, such as forums and newsgroups, is generally considered public data and can be used for research purposes, provided that

personal privacy is protected [43]. According to guidelines from institutions such as "Recommendations from the AoIR Ethics Working Committee" [44], content that is publicly posted online without explicit privacy restrictions typically does not require informed consent from the individuals involved. In addition, the 30 suicide notes that we included in the analysis had already been deidentified when they were obtained online; thus, there were no issues of informed consent or secondary harm. Nonetheless, our study received ethical review and approval from the ethics committee of the authors' affiliated institution, the Kiang Wu Nursing College of Macau (file ID: REC-2022.1103), prior to data collection.

### Results

We initially collected 40 suicide notes from social media. Ten notes were excluded: 5 contained fewer than 100 words and 5 lacked media cross-verification. This left 30 valid notes for analysis. Among the authors, there was an equal gender distribution: 50% ( $n = 15$ ) male and 50% ( $n = 15$ ) female. Middle school students formed the largest group (33.3%,  $n = 10$ ), followed by college students (20%,  $n = 6$ ), primary school students (6.7%,  $n = 2$ ), and a combined group of graduate students, interns, unemployed individuals, and workers (40%,  $n = 12$ ).

### High-frequency words and semantic network analysis

DiVoMiner<sup>®</sup> identified 93 high-frequency terms in the suicide notes. The top three words were "dad" (155 occurrences), "mom" (118), and "hope" (89) (Table 1). Semantic network analysis (Fig. 2) further delineated central thematic nodes—"dad," "mom," "hope," "life," and "world"—interconnected with emotion-related terms ("happy," "pleasure," "pain," "despair") and life-domain descriptors ("study," "teacher," "friends"). Notably, the term "hope" predominantly appeared in negative contexts (e.g., "losing hope"), with 78% of its occurrences directly associating with unmet parental expectations. Educational terms ("teacher," "study," "grade") formed a distinct cluster co-occurring with emotional distress markers ("pain," "fear," "despair"), indicating academic pressure as a salient contributor to psychological distress. Critically, academic demands showed semantic proximity to parental references, suggesting adolescents perceived these pressures as extensions of familial obligations rather than isolated stressors. Emotional terminology exhibited contextual polarity: positive terms ("happy," "pleasure") primarily appeared in hypothetical narratives (e.g., imagining alternative realities), whereas negative terms ("sad," "pain") described immediate affective states. The centrality of "life" and "world" within the network, bridging parental relationships and emotional states, underscores how familial dynamics fundamentally shaped

**Table 1** High-frequency words

Keywords	Frequencies	Word types	Keywords	Frequencies	Word types
Dad	155	Noun	Inward	20	Noun
Mom	118	Noun	Grandmother	20	Noun
Hope	89	Noun	Alive	19	Verb
World	46	Noun	elder brother	18	Noun
Life	38	Noun	Cheer	18	Verb
Sorry	36	Verb	Future	18	Noun
Pleasure	36	Adjective	Grade	16	Noun
Teacher	30	Noun	Leave	16	Verb
one person	29	Noun	Home	16	Noun
Friend	27	Noun	Dead	15	Verb
Strive	25	Verb	love you	15	Verb
Fear	24	Verb	Despair	15	Noun
Affair	23	Noun	Suicide	15	Verb
School	23	Noun	Apology	15	Adjective
Pain	22	Noun	Children	15	Noun
Study	22	Verb	Aunt	14	Noun
Sad	22	Adjective	Existence	14	Noun
Younger brother	21	Noun	thank you	14	Verb
Time	21	Noun	Evening	14	Noun
Gratitude	21	Verb	Like	13	Verb

adolescents' existential perspectives, intertwining personal distress with broader perceptions of purpose and belonging.

#### Lived experiences of parental dysfunctions and mental distress

Following the coding steps outlined in the Methods section, two category systems regarding perceptions of parental dysfunctions and experiences of mental distress emerged. The experiences of parental dysfunctions were identified (Table 2): (1) excessive emphasis on instrumental goals (example statement: "They have high expectations of me, and I hate that I can't live up to my responsibilities to them, but I really can't do it, and I really want to be free"; (2) neglect of social-emotional needs (example statement: "I feel very sad. I think he wants to do good for me, but his love is too suffocating. His love is without consent, which makes me feel that I have no future."); and (3) inadequate protection from life trauma (example statement: "No one will support me, no one will stand by me and help me without hesitation. My family will only say that I deserve it and that they should beat me to death. Maybe I really don't deserve to live."). Over half (57%) indicated that parents focused excessively on academic performance and rigid evaluations. With respect to social needs, 67% lacked basic social-emotional skills and struggled with interpersonal relationships because of inadequate family education.

In terms of emotional needs, 83% felt neglected by their parents, experiencing a lack of communication and understanding. Additionally, 80% craved more emotional support and affirmation but were often disappointed. Nearly all cases (97%) reflected a desire for greater autonomy in life choices; however, parental control deprived them of this right. Almost one-third (33%) involved children from dysfunctional families, such as those experiencing domestic violence or punishment, significantly impacting these children's mental health.

Four categories regarding the experiences of mental distress in suicidal children were also identified: psychological distress, loss of identity and belonging, loss of meaning, and negative coping behaviors (Table 3). Psychological distress was the most prevalent, affecting the majority of children. Notably, this category included feelings of hopelessness (87%), helplessness (77%), and a lack of meaning in their present lives (77%). Loss of identity and belonging was significant, with many children expressing a lack of self-worth (90%) and a strong desire for social belonging (70%). Many reported that their lives felt meaningless (77%) and that their futures held no promise (60%). In terms of negative behaviors, a significant proportion reported avoidance (90%) and suicidal thoughts (90%).

As shown in Fig. 3, our conceptual summary of key findings illustrates the relationship between patterns of parental dysfunction and experiences of mental distress,





education, where academic success is prioritized over emotional well-being.

The analysis of suicide notes revealed that parents are a central concern among suicidal youth. The high frequency of words such as "dad" and "mom" indicates that parental relationships significantly impact the emotional and psychological well-being of these individuals. This finding aligns with the literature underscoring the impact of family dynamics on youth mental health. A study in Norway revealed that most suicide notes have a formal opening that assures the recipient of the writer's love, affection, or friendship, with mothers and fathers being the most common recipients [4]. Another study in India found suicide notes in 22 of the 232 cases studied, with thirteen addressed to parents [45]. A suicide note is an act of communication, conveying the concerns that are important enough to be included [4]. The prominence of parental references suggests that issues related to parents are often foremost in the minds of suicidal youth. This finding highlights the crucial role that parents play, as a source of either support or stress, in their children's lives. Further semantic network analysis shows that the words

Our study highlights the central role of parents in the psychological distress of suicidal adolescents in China. Through AI-assisted content analysis of suicide notes, we identified three primary patterns of parental dysfunction: excessive focus on instrumental goals, emotional neglect, and inadequate protection from life traumas. The patterns revealed in our conceptual framework highlight the prominence of autonomy deprivation (97%) and its relationship to psychological distress outcomes, particularly lack of self-worth (90%) and avoidance behaviors (90%). This suggests that restriction of adolescent agency may be a critical factor in understanding suicidal ideation in Chinese adolescents. We also identified a cultural phenomenon of "short-sightedness" in Chinese family

**Table 2** Content analysis of perceptions of parental dysfunctions in suicidal children

Categories	Subcategories	Keywords	Number of cases	Percentage (%)
Excessive instrumental goals	Academic performance	Comparison with others, academic criticism, breaking tradition, fakeness, rules, regulations	17	57
	Achievement and comparison	Excessively high expectations, pressure to succeed	9	30
	Financial issues	Poverty, financial difficulties, borrowing money, loans	7	23
Neglect of social-emotional needs	Weak social-emotional skills	Emotions, lack of life skills, how to live, temper	20	67
	Interpersonal relationship difficulties	Relationships, broken parent–child relationship, not close relationship, isolation, loneliness	12	40
	Lack of communication and understanding	Neglect, indifference, forgotten	25	83
	Lack of emotional support	Lack of security and love, insincerity	24	80
	Lack of autonomy	Wish, homework, last wishes, becoming after death, soul, individualism, freedom, fear of rebellion	29	97
Inadequate protective function	Victimization experiences	Physical abuse, emotional abuse, sexual abuse, corporal punishment, physical torture, beating, verbal abuse, domestic violence, bullying, harassment	10	33
	Stressful life events	Parental separation, divorce, family conflict, discord, abandonment by biological parents, death/passing/loss of parents or close relatives or friends	16	53

"father," "mother," "hope," "life," and "world" are central in the network, indicating that parents are closely related to life, the world, and hope. Important words such as "hope," "life," and "world" reveal young people's profound pursuit of the meaning of life. Family systems theory [22] and attachment theory [23] demonstrate parents'valuable impact on shaping children's mental health. Research has shown that disconnection from the world or hope and a lack of meaning in life lead to deeper existential emptiness and psychological distress, such as hopelessness [46, 47]. Our research further emphasizes the central position of parents in children's lives and the importance of a good parent–child relationship in fostering "hope," "life," and "world".

Our study sheds light on the pattern of parental dysfunctions that are most prevalent in the suicide notes of young people in China, including an excessive emphasis on instrumental goals, neglect of basic emotional needs, and inadequate protection from life traumas. In many Chinese families, parents often prioritize academic success over their children's overall well-being—a trend driven by societal pressures to achieve. At the same time, emotional needs are frequently overlooked, partly because cultural values emphasize family responsibilities more than personal happiness. Additionally, parents sometimes fail to shield children from stressful

experiences like family conflicts. These dysfunctions align with established risk factors for suicidal behaviors but reveal culturally specific manifestations. Existing literature corroborates these patterns. Systematic reviews link family conflict and low parental support to heightened suicide risks [48], while longitudinal data confirm enduring impacts of parental dysfunction on adult mental health [17]. Prior studies have identified discrete risk factors—parental rejection, emotional neglect, and abuse [48–50]—yet our analysis advances this knowledge by delineating how these dysfunctions coalesce and manifest within China's sociocultural framework. For instance, while Western research emphasizes parental warmth deficits [21], our findings highlight culturally embedded neglect tied to instrumental hyper-focus. Similarly, autonomy restriction amplifies trauma impacts in collectivist settings [48], underscoring the need for culturally sensitive interventions. By contextualizing universal risk mechanisms within China's unique sociocultural landscape, this work bridges a critical gap in suicide prevention research, offering actionable insights for culturally tailored family support strategies.

One of the significant contributions of our study is the identification of the "short-sightedness" phenomenon in contemporary Chinese family education. This phenomenon is characterized by an excessive focus on short-term,

**Table 3** Content analysis of experiences of mental distress in suicidal children

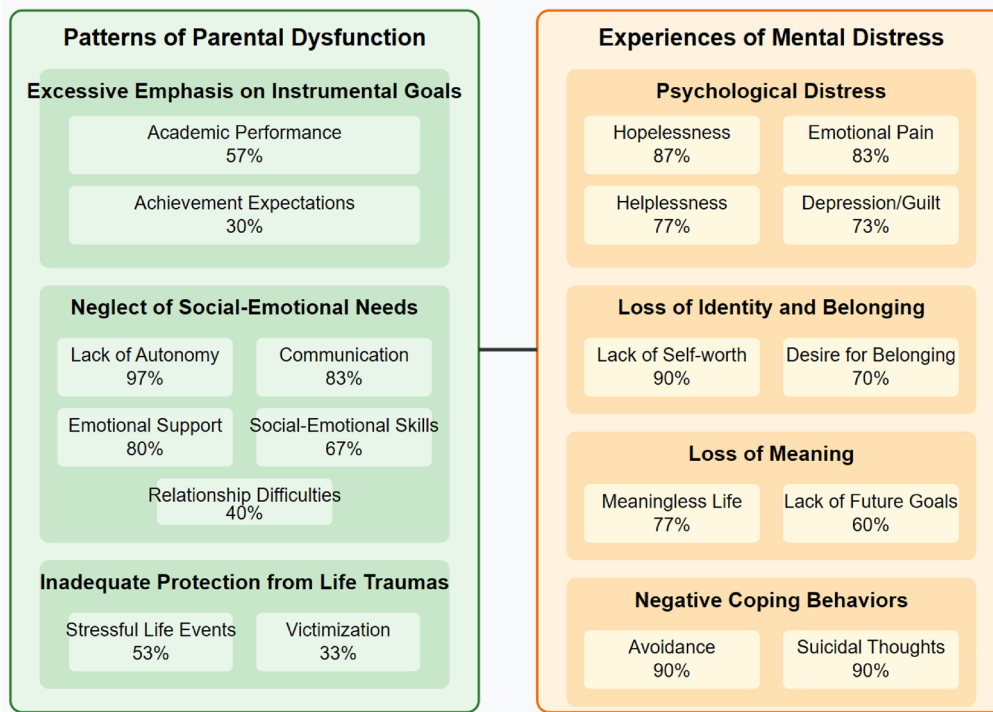
Categories	Subcategories	Keywords	Number of cases	Percentage (%)
Psychological distress	Depression	Depression, melancholy, loss of interest, anhedonia	22	73
	Anxiety	Anxiety, worry, tension, panic	5	17
	Fear	Fear, dread, terror	14	47
	Disappointment	Disappointment, loss, giving up	19	63
	Helplessness	Helplessness, feeling of being trapped, desperation	23	77
	Hopelessness	Hopelessness, no hope for the future	26	87
	Loneliness	Loneliness, isolation, feeling alone	17	57
	Low self-esteem	Self-deprecation, feeling worthless	7	23
	Emotional pain	Pain, torment, suffering, distress	25	83
	Guilt	Guilt, self-blame, seeking forgiveness, apology, feeling selfish	22	73
Lack of identity and belonging	Lack of interests/hobbies	Hobbies, interests	5	17
	Desire for identity	Feeling different, disliking oneself, seeking validation	25	83
	Lack of self-worth	Feeling incapable, useless, worthless	27	90
	Desire for belonging	Lack of belonging, desire for inclusion	21	70
	Lack of personal values	Collapse of values, questioning life/worldview	12	40
Lack of meaning	Meaningless present life	Lack of meaning, feeling empty, purposelessness	23	77
	Lack of future goals	Confusion, hopelessness about the future	18	60
	Dissatisfaction with life	Dissatisfied with life, unhappy with current situation, resentment	26	87
Negative coping behaviors	Pretending around others	Masking true feelings, putting on a facade	16	53
	Avoidance	Unable to cope with setbacks, avoidance, difficulty seeking help	27	90
	Suicidal thoughts	Suicide, wanting to die	27	90
	Self-harm or Suicide attempts	Suicidal behaviors, Self-harm, self-injury, self-abuse, attempting to take one's life	2	7

measurable goals at the expense of long-term emotional and social well-being and may arise from external societal pressures and internal values. Externally, the concept of “neijuan” (involution) has garnered significant attention in China [51]. It reflects unreasonable or excessive competition, particularly in education and the workplace. In this competitive environment, parents and children face immense pressure to achieve outstanding academic results, leading to anxiety [52]. Consequently, parents often prioritize academic performance over fostering psychological well-being and social skills. Internally, parents' behaviors are influenced by their values and parenting knowledge. Some parents believe that academic or career success is the sole measure of achievement, leading them to emphasize instrumental goals [53]. Additionally, both “neijuan” in China and the Western “burnout generation” reflect youth under extreme pressure, but they stem from different cultural dynamics. In collectivist China, parental expectations often tie a child's success to family honor, enforcing autonomy restrictions through obligation and hierarchy. In contrast, Western individualism fosters burnout through internalized perfectionism and competition, where self-worth hinges on personal

achievement. While both limit autonomy, Chinese youth face direct external pressures, whereas Western youth grapple with internalized expectations. Recognizing these cultural nuances is key to developing targeted interventions for adolescent well-being.

Another striking finding of our study is the remarkably high prevalence of “lack of autonomy” (97%) within the “neglect of emotional needs” category. This finding suggests that suicidal youth in China experience a profound lack of agency and control over their lives that goes beyond typical teenage rebellion. Previous studies have demonstrated a significant correlation between suicidal ideation and authoritarian parenting, low levels of parental warmth, and excessive control [21]. This finding challenges the idea that strict parental control is the primary issue, instead suggesting that a lack of emotional connection, where children feel heard and respected in their individuality, is a significant driver of distress. Our findings show that strict parental control often combines with other harmful parenting behaviors. For example, when parents focus too much on academic success, their control can turn into micromanaging schoolwork—leaving teens feeling





**Fig. 3** Conceptual summary of the key findings

trapped between strict rules and high pressure to succeed. At the same time, if parents ignore their child's emotional needs while tightly controlling their achievements, teens may feel watched in their school life but lonely in their personal life. This mix of control and neglect seems especially damaging, as teens in these situations often described feeling hopeless. Autonomy is the basis for self-esteem [26]. One previous study examined sequential mediating pathways involving self-esteem and psychological inflexibility in the association between parenting style and adolescent mental health [54]. The findings of the study corroborated the notion that parental dysfunctions play a significant role in influencing the mental well-being of young individuals, with autonomy emerging as a pivotal factor. Additionally, the cultural specificity of this study primarily focuses on Chinese family dynamics and the concept of "involution" [51, 52]. While cultural differences exist between China and Western countries, the phenomenon of "burnout culture" in the West, as highlighted in popular literature [55], shares notable similarities with "involution" in China. Both reflect the intense pressure and excessive competition that young people face in their pursuit of academic or professional success, often leading to mental health challenges and a sense of disillusionment. Therefore, the findings of this study have broader implications beyond the Chinese context

and may provide valuable insights for understanding similar issues in Western societies.

The most prevalent category of mental distress identified in our study is psychological distress, with all subcategories affecting a majority of suicidal youth. This finding is consistent with previous research highlighting the high prevalence of psychological distress among suicidal individuals [56, 57]. Our study extends the literature by exploring the potential mechanisms through which parental dysfunctions contribute to mental distress and suicidal behaviors in young people. Drawing upon Erikson's psychosocial developmental theory [58], we suggest that the nonfulfillment of normal psychosocial developmental needs, such as autonomy and emotional support, may be a crucial link between parental dysfunction and youth mental health problems. Scales et al. proposed a conceptual and measurement framework for successful young adult development, emphasizing the importance of positive relationships, self-regulation, and positive identity [59]. Our study highlights how parental dysfunction, such as neglect of emotional needs and lack of autonomy, can hinder the development of these crucial factors, potentially leading to mental distress and suicidal behaviors in adolescents.

The results of this study emphasize the crucial role of parental influence in adolescent suicidal behavior, providing key implications for adolescent suicide prevention

strategies. First, school-based mental health initiatives are needed. Schools play a vital role in enhancing parents' awareness and education regarding their children's mental health. Suicide prevention programs should incorporate components that educate parents on the profound impact their behaviors and attitudes have on their children's psychological well-being [60]. The reason is that some parents may lack knowledge about holistic child development [61] or find parenting to be a stressful job [62], making it challenging to balance academic objectives with emotional and social needs. Schools can facilitate parenting workshops that promote a balance between academic expectations and the social-emotional needs of children. Additionally, structured parenting education programs should help parents shift from an instrumental approach to holistic child development. By incorporating value reshaping, emotional communication, autonomy support, trauma care, and home-school collaboration, these programs foster healthier parent-child relationships and enhance overall family well-being. Second, it is necessary to strengthen family support systems. Parental involvement in adolescent mental health is critical, although numerous studies have shown that medication can help [63]. Parents should be encouraged to actively monitor their children's well-being through open communication and early intervention, seeking professional assistance when necessary. Community organizations can assist by connecting families with mental health services and providing peer support networks [64]. Empirical evidence suggests that family-based interventions significantly reduce family dysfunction, decrease adolescent suicidal ideation, and alleviate depressive symptoms [65, 66]. Early intervention programs to identify and mitigate family problems before they lead to serious distress are also needed. Finally, policy and educational reforms are needed. The phenomenon of "involution"—the excessive academic competition in many East Asian societies—has been linked to heightened parental and student stress. Policy changes are necessary to create a child-friendly learning environment that prioritizes mental well-being alongside academic success. Educational curricula should integrate social-emotional learning (SEL) programs, which have demonstrated success in improving adolescent resilience and emotional regulation. For example, Hong Kong has successfully implemented mindfulness-based SEL programs within its regular school curriculum [67]. Such initiatives could serve as a model for broader adoption in mainland China, fostering a holistic approach to youth mental health.

## Limitations

This study has several limitations that should be acknowledged. First, suicide notes were collected via some mainstream social media platforms, which could still result in selection bias, as some youth may not express suicidal intentions on these specific platforms. Additionally, those who choose to share their final thoughts publicly may systematically differ from those who leave private notes or no notes at all. Furthermore, the use of secondary data with limited demographic information regarding socioeconomic background, geographic distribution, and family structure restricts our ability to explore how these factors might influence the experiences described in the suicide notes [68].

Second, the analysis relied heavily on the frequency and semantic network analysis of words. While this method provides a structured way to identify key themes and relationships, interviews with teenagers who have attempted suicide and their parents may yield a better understanding of the underlying issues [69]. Furthermore, there is a potential issue of conflict between child-perceived and actual parental care intentions for various reasons, such as generational cultural differences [70]. Future research should consider incorporating both child and parent perspectives to gain a more comprehensive understanding of parental dysfunction and its impact on youth mental health (e.g., integrating interviews or survey data).

Third, text feature-based analysis has limitations in detecting authenticity. Since it is not possible to directly verify the correspondence between textual content and reality and since authors may exaggerate or fabricate for a variety of reasons, relying solely on textual features to fully identify these biases is difficult. Another limitation is that the AI-assisted platform struggles to distinguish between subtle emotional categories, such as 'neglecting basic emotional needs' and 'craving emotional support,' requiring human intervention for precise coding. Future research could enhance the reliability of the results by integrating data from multiple sources and employing mixed research methods. However, with respect to the available data, we believe that textual analysis can still provide valuable insights for understanding the study participants.

Finally, while the conclusions of this study offer insights that may be relevant to other countries, caution should be exercised when extending these findings across different national and cultural contexts. Future research could further investigate the cross-cultural similarities and distinctions of these phenomena to inform more globally relevant mental health and suicide prevention strategies.

## Conclusions

This study highlighted the pattern of parental dysfunction and its impact on the mental health of suicidal youth in China. Using AI-assisted content analysis of suicide notes from various social media platforms, this study classified categories of the pattern of parental dysfunction into an excessive emphasis on instrumental goals, neglect of basic emotional needs, and inadequate protection from life traumas. These parental dysfunctions contribute to severe psychological distress, loss of identity, and negative coping behaviors among youth. Our research emphasizes the recognition of the "short-sightedness" phenomenon of prioritizing short-term instrumental goals over long-term social-emotional well-being and the high prevalence of "lack of autonomy" in contemporary Chinese family education. Our study extends the literature by exploring the potential mechanisms through which parental dysfunctions contribute to mental distress and suicidal behaviors in young people. Beyond China, these findings have broader implications for suicide prevention worldwide. Thus, the findings highlight the need for a comprehensive, multi-stakeholder approach involving parents, educators, policymakers, and mental health professionals. Specifically, fostering a nurturing environment—characterized by parental emotional support, encouragement of autonomy, and balanced academic expectations—is essential for promoting adolescent well-being.

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12991-025-00568-8>.

Additional file 1.

## Author contributions

J. Wu was a major contributor to the writing of the manuscript. X. Hu composed the proposal, supervised the whole study and revised the manuscript. T. Hung participated in the study design and manuscript revision. S. Liu and Y. Liu helped with the data collection and analysis. All authors have read and agreed to the published version of the manuscript.

## Funding

This study was funded by the Macao Foundation (reference number: 028/DGAF/2023-02).

## Data availability

No datasets were generated or analysed during the current study.

## Declarations

## Competing interests

The authors declare no competing interests.

Received: 26 June 2024 Accepted: 3 May 2025  
Published online: 23 May 2025

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