

Sex Ratio of Suicide Risk in Chinese Population: Related Theories, Risk Factors, Coping Strategies, and Postprint on Coping with Stress under Social Expectations

Authors: Wang Zhonghan, Wang Xiaotian

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Abstract

Globally, suicide consistently ranks among the top 20 leading causes of death. Suicide risk, defined as the probability of an individual engaging in suicidal behavior, has long been a focal concern for scholars worldwide. For many years, a phenomenon that is both universally observed yet culturally variable—and challenging to existing theories—has characterized suicide rates across nations: data from most countries demonstrate that male suicide rates are typically higher than female rates; however, Chinese data regarding this gender ratio of suicide diverges markedly from this pattern, occasionally even exhibiting a reversal. This distinctive phenomenon offers valuable insights for investigating the mechanisms underlying suicide risk formation. By systematically examining psychological theories and risk factors of suicidal behavior, along with the psychological mechanisms and associated risk factors underlying this gender ratio phenomenon, we can further investigate gender differences in life history and strategies for coping with psychological stress within Chinese populations, as well as divergent social expectations regarding stress coping for men and women. Such research facilitates the identification of gender-specific effective and maladaptive stress coping strategies, thereby contributing to the prevention and intervention of suicide risk in Chinese populations.

Full Text

Preamble

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The Sex Ratio of Suicide Risk in China: Relevant Theories, Risk Factors, Coping Strategies, and Social Expectancy for Stress Coping

WANG Zhonghan, WANG Xiaotian

(School of Humanities and Social Science, The Chinese University of Hong Kong (Shenzhen), Guangdong Shenzhen 518172, China)

Abstract

Globally, suicide consistently ranks among the top twenty leading causes of death. Suicide risk, defined as the probability of an individual engaging in suicidal behavior, has long been a focus of scholarly attention both domestically and internationally. For decades, a prevalent yet culturally variable phenomenon that challenges existing theories has been observed in suicide rates worldwide: data from most countries show that male suicide rates are generally higher than female rates. However, Chinese data on this gender ratio of suicide differ markedly from this pattern, sometimes even showing a reversal. This unique phenomenon offers valuable insights for research on the mechanisms underlying suicide risk. By reviewing psychological theories and risk factors of suicidal behavior, as well as the psychological mechanisms and related risk factors behind this gender ratio pattern, we can further explore gender differences in life history, strategies for coping with psychological stress, and divergent social expectations for stress coping between men and women in Chinese populations. Such research helps identify gender-specific effective and maladaptive stress coping strategies and contributes to the prevention and intervention of suicide risk in Chinese populations.

Keywords: suicide risk, suicide theory, sex ratio of suicide rates, life history, psychological stress coping strategies, social expectancy

1. Introduction

Suicide refers to any implicit or explicit intention, thought, or action to end one's life. The U.S. Centers for Disease Control and Prevention classifies suicide as a self-directed violent behavior with intent to die (Centers for Disease Control and Prevention, 2012). Suicide research encompasses suicide ideation, suicide intent, suicide plan, suicide attempt (or failed suicide attempt), and suicidal behavior (Chehil & Kutcher, 2012, p. 23). Suicide ideation involves having clear suicidal thoughts and preparing for a lethal, self-directed injurious act without a concrete plan. Suicide intent refers to considering or planning suicide, often with the intention of gaining attention through self-harm, not necessarily resulting in death. Suicide attempt includes unsuccessful implementation of a suicide plan, while suicidal behavior refers to carrying out self-directed injurious actions that result in death. However, definitions of suicide remain inconsistent (Du & Jiang,

2015). The suicide rate represents the proportion of deaths by suicide within the total population, and the male-to-female ratio of suicide rates—referred to as the sex ratio of suicide risk—is calculated as male suicide rate divided by female suicide rate (hereafter denoted as male/female).

This paper examines studies on suicide risk, encompassing the probability of suicide attempts, suicide attempts/failed attempts, and completed suicide. Suicide risk involves multiple factors including biological, psychological, clinical, social, and environmental dimensions (Turecki et al., 2019). Although the male/female suicide ratio is based on suicide outcome data, this paper also focuses on suicide risk for prevention purposes. Enhancing suicide prevention requires understanding the factors that promote and prevent suicidal motivation, thoughts, plans, and actions.

According to the World Health Organization (WHO, 2019), suicide is the second leading cause of death among young people aged 15–29 worldwide, second only to traffic accidents. Globally, the suicide rate is approximately 10.5 per 100,000 population, varying across countries, genders, and age groups. While global suicide rates have risen slightly (WHO, 2019), the suicide rate in the United States has increased rapidly (Hedegaard et al., 2018). In contrast, China's suicide rate has declined significantly over the past few decades (Jiang et al., 2018), with recent statistics showing approximately 7.21 per 100,000, placing it among countries with relatively low suicide rates (Liu et al., 2020; Zhang et al., 2022) (see Figure 1 [Figure 1: see original paper] and Figure 2 [Figure 2: see original paper]).

As shown in Figure 2, a unique phenomenon in China's suicide rate is evident in the gender ratio between male and female populations. China was once one of the few countries worldwide where female suicide rates exceeded male rates (Phillips, Li, & et al., 2002). The male/female ratio of China's suicide rate differs significantly from most countries. One survey by Zhao et al. found urban and rural suicide rate ratios of 0.92 and 0.81, respectively (Zhao et al., 1994). Another study reported a male/female ratio of 0.88 (Phillips, Li, & et al., 2002). A more recent study reported a ratio of 1.56 (Zhang et al., 2022). Data from a 2019 urban Chinese sample we recently collected showed a male/female suicide risk ratio of 0.80, with female suicide rates still exceeding male rates. In stark contrast, Western populations typically show gender ratios between 3 and 4 (Ahn et al., 2012; WHO, 2019). Research suggests that one potential reason for higher female suicide ratios in some East Asian countries is lower female status (Chen et al., 2017; Phillips, Li, & et al., 2002; Zhang et al., 2006).

The recent decline in China's suicide rate has occurred primarily in rural populations, particularly among young rural women (Zhang et al., 2022). This decline benefits from effective preventive interventions, such as stricter control of agricultural pesticide availability in recent years. Over the past decades, China's economic development, improved living conditions, and modernized social values have provided rural women with more life opportunities, enabling them to escape poverty and traditional family constraints, thereby reducing psychologi-

cal stress. Studies also find that more women than men report suicide ideation, with education level, debt, daily life stress, loneliness, and psychological stress significantly correlated with suicide ideation. Negative life events and decreased life satisfaction correlate significantly with female suicide ideation but not with male suicide ideation (Lu et al., 2020). However, these studies lack urban female samples, and risk factors related to their suicide risk remain to be verified.

To date, China's male/female suicide ratio remains lower than most countries worldwide, including those with similar economic development levels. In other words, Chinese women's suicide proportion is higher than that of women in other countries. For example, WHO (2019) data show male/female suicide ratios of 3.31, 2.54, 2.21, 3.74, 5.28, and 1.80 for the United States, Japan, South Korea, Brazil, Russia, and China, respectively. To further understand the mechanisms behind China's unique male/female suicide ratio, we begin by reviewing suicide theories and related factors to identify relevant risk factors and propose new approaches for preventing and reducing suicide risk.

2. The Explanatory Power of Psychological Theories of Suicide for Gender Ratio Differences

This section reviews several suicide theories potentially related to gender differences in suicide rates. The goal is not to summarize and analyze suicide theories themselves but to evaluate their relevance for explaining the gender ratio of suicide rates.

2.1 Psychiatric (Diathesis-Stress) Theories of Suicide

Zubin and Spring (1977) proposed the diathesis-stress model, which posits that suicidal behavior stems from mental and physical illness, determined jointly by genetic predisposition (diathesis) and stressful events. After its proposal, scholars from different fields applied this model to various populations. Biological and behavioral data from schizophrenia (Walker & Diforio, 1997), potential insomnia (Drake et al., 2014), and depression (Colodro-Conde et al., 2018) groups all show that stressful events can intensify mental disorders and suicidal behavior.

de Catanzaro (1980) synthesized four models explaining suicidal behavior from biological and sociological perspectives: (1) suicide as a learned behavior related to abnormal development of human learning capacity rather than biological evolution; (2) suicide as a breakdown of adaptive mechanisms in extremely stressful new environments; (3) suicide as an evolved altruistic behavior sacrificing oneself for relatives' benefit to enhance shared gene transmission; and (4) evolution having some "tolerance" for suicide when it has no obvious impact on the gene pool. Evidence shows suicide is more common among individuals with low reproductive capacity. Integrating these models, Rubinstein (1986) proposed a

new diathesis-stress theory of suicide, incorporating situational stressors, vulnerable individuals in specific cultures, and susceptibility factors into a model of suicidal behavior. Subsequently, Mann and Arango (1992) further proposed a stress-disease model based on neurobiology and psychopathology.

However, the diathesis-stress model of suicidal behavior lacks adequate explanation for why not all susceptible individuals develop suicidal tendencies (Ludwig et al., 2017). The psychiatric illness theory offers some feasibility for interpreting the male/female suicide ratio but faces multiple challenges. From a mental illness perspective, one could first examine gender differences in disease etiology and genetic mechanisms. However, studying suicide solely from a mental illness perspective is incomplete. Although most people who die by suicide have some degree of mental illness, only a small portion of those with these disorders actually die by suicide. Research on the sex ratio of suicide needs to explore more sociocultural and psychological mechanisms.

2.2 Social Anomie Theory

Early sociological theories of suicide explained suicide mechanisms from the perspective of social integration and regulation (Durkheim, 2005), arguing that deficits in social integration could lead people to suicide. Social integration refers to individuals' connections with social groups and their degree of acceptance. The psychological feeling of social integration is the bond between individuals and society—a state of mutual connection based on shared emotions, morals, beliefs, and values. People with high social integration feel loved and accepted, making suicide unlikely; conversely, those feeling rejected and excluded have increased suicide risk. Research finds that gender differences in social connectedness show the strongest correlation with suicide across multiple demographic variables (Vaux, 1985).

Previous studies show gender differences in the correlation between suicidal behavior and social integration (Aliverdinia & Pridemore, 2009; Stack, 1979; Zhang, 2010). Although social anomie theory does not directly address gender differences in suicide, gender differences do exist in social integration and social support. Generally, men have more freedom and independence, establish fewer important relationships than women, and thus have more difficulty obtaining social support and comfort during stressful events, leading to a sense of detachment from their groups. Women have more friends, more diverse social networks, and perceive more social support than men (Caetano et al., 2013; Shye et al., 1995). Women also have more significant others to care for and be cared for by (Antonucci & Akiyama, 1987). These gender differences may result in men lacking social support when encountering major life changes, thereby increasing male suicide risk. However, for the unique male/female suicide ratio in Chinese populations, we need to find answers from Chinese data.

2.3 Suicide Strain Theory

Recognizing these issues, scholars have begun exploring reasons behind China's unique male/female suicide ratio and proposed the Strain Theory of Suicide (Zhang, 2019). This theory expands sociological and psychological research on suicide and provides new perspectives for interpreting China's unique suicide gender ratio. The strain theory posits that suicide ideation can be triggered by life events that create conflict, frustration, psychological distress, hopelessness, or despair—collectively termed psychological stressors. The model identifies four sources of strain that may lead to suicide: (1) value strain from conflicting social values; (2) aspiration strain from large gaps between life aspirations and reality; (3) deprivation strain from distressed living conditions including poverty that creates feelings of deprivation; and (4) coping strain from inadequate coping skills when facing crises and stressful events. The model suggests that when individuals experience psychological stress they cannot resolve, they feel tormented and angry. External release of anger becomes violence toward others, while internal release may lead to depression, anxiety, self-harm, or suicidal thoughts. The release of anger or stress relates not only to coping strategies learned early in life but also to strategies used in workplace settings.

Zhang & Li et al. (2011) found in rural China that, except for religious belief conflicts, the other three types of conflict (relative deprivation, unfulfilled aspirations, and lack of coping skills) showed significant positive correlations with suicide. Strain theory also provides direction for understanding the suicide gender ratio issue, as gender differences may exist in stress sources, formation mechanisms, and coping methods. Research applying suicide strain theory has focused primarily on rural China (Lew et al., 2019; Zhang, Wiczeorek, & et al., 2011), with studies on urban Chinese populations still lacking.

2.4 Interpersonal Theory of Suicide

Joiner (2005) proposed the Interpersonal Theory of Suicide, later expanded by van Orden et al. (2010). This theory suggests that the most dangerous suicide ideation results from two simultaneous interpersonal problems: thwarted belongingness and perceived burdensomeness. Only when both suicide ideation and suicide capability are present does near-fatal or fatal suicidal behavior occur. Thwarted belongingness refers to feelings of alienation from social groups and deteriorated relationships, including loneliness, lack of care, few friends, living alone, incomplete families, social withdrawal, and family conflict. Perceived burdensomeness involves viewing oneself as a burden to others, including perceived responsibility and self-hatred. Since suicide is a result of multiple factors, this theory also explains why most people with suicide ideation do not attempt suicide, thus analyzing suicide risk within an “ideation-to-action” framework.

The interpersonal theory helps understand relationships between suicide and related clinical symptoms (Gunn et al., 2012). When individuals experience unbearable perceived burdensomeness and thwarted belongingness, suicide ideation

emerges. If these interpersonal problems show gender differences, researchers can infer factors contributing to gender differences in suicide rates. As previously noted, men are more independent (Cross & Madson, 1997), while women have more social interactions with friends (Antonucci & Akiyama, 1987; Wong & Csikszentmihalyi, 2014). Therefore, in Western individualistic cultures, men's strong independence leads to stronger self-attribution frustration when encountering failure, combined with weaker social support, resulting in higher suicide risk.

Regarding why China's male/female suicide ratio differs significantly from most countries, we hypothesize that in the Chinese context, men may receive more protection from grandparents, parents, relatives, schools, and society. Zhang et al. (2011) found that belief in traditional Confucian values and being married served as protective factors against suicide for rural young men, while these variables were either risk factors or non-protective factors for rural young women. Zhang et al. argued that Confucian society has different expectations for men and women regarding life goals, moral constraints, family roles, and interpersonal relationships. Confucian society is patriarchal, where men's efforts and successes are more encouraged and valued, while traditional cultural expectations for women emphasize responsibilities of supporting husbands and raising children. Modern society's focus on gender equality creates conflicts with traditional consciousness, thereby increasing women's psychological feelings of contradiction and frustration. Accordingly, we further predict that women's subjective perception of unequal family status moderates how Confucian traditional beliefs affect suicide risk differently for men and women. Related research shows that perceived gender inequality positively correlates with suicide intent, a phenomenon particularly evident among Chinese women (Zhang et al., 2011).

3. Suicide Risk Factors and Their Relationship with the Male/Female Suicide Ratio

This section reviews suicide risk and protective factors. These factors exist at various developmental stages throughout life, including cultural background, age, gender, psychiatric symptoms, emotional states, and demographic variables related to suicide cases, with gender being just one factor (Foremann, 1990; Granello, 2010; Li et al., 2012; Simon, 2009). In reviewing suicide risk factors, we focus on those that may influence the male/female suicide risk ratio.

As shown in Table 1, numerous suicide risk factors can be broadly categorized into three groups: biological factors (e.g., genetics, hypothalamic-pituitary-adrenal axis dysfunction), mental disorders (e.g., alcohol and drug abuse, mood disorders), and psychosocial factors (e.g., negative life events, low quality of life, chronic interpersonal conflict).

3.1 Biological Factors

Twin and family studies indicate that genetics significantly influence suicidal behavior, accounting for approximately 30%–50% of suicide risk (Goldsmith et al., 2002; Pedersen & Fiske, 2010). van Heeringen and Mann (2014) found that biological factors related to suicidal behavior increase gene-environment interactions. The hypothalamic-pituitary-adrenal (HPA) axis, as the neural control center for stress adaptation, shows functional abnormalities that have predictive value for suicidal behavior (Pompili et al., 2010). Studies show that excessive cortisol secretion positively correlates with suicidal behavior; for example, Jokinen and Nordström (2009) found serum cortisol levels in individuals who died by suicide were significantly higher than in those without suicide attempts, indicating HPA axis hyperactivity relates to suicidal behavior.

Additionally, serotonin dysfunction is a biological factor closely linked to suicidal behavior (Antypa et al., 2013). Both suicide attempters and completers show reduced serotonin function, accompanied by changes in noradrenergic function (Goldsmith et al., 2002). Thus, combining the diathesis-stress model, serotonin dysfunction can be viewed as a stable biological marker of suicidal behavior (Pfeffer, 2001). However, depression and impulsive violent behavior groups also show serotonin system deficiencies (Mann, 2013), making this not unique to suicide. Furthermore, biological factor analyses of suicidal behavior focus on psychiatric populations (Mann et al., 1999), yet only about half of Chinese people who die by suicide are diagnosed with mental disorders (Phillips, Li et al., 2002; Phillips, Yang et al., 2002). Therefore, analyzing biological mechanisms in psychiatric patients alone cannot fully explain the psychological and behavioral characteristics of suicide in Chinese populations. Understanding the biological mechanisms related to the male/female suicide ratio requires further research on gender differences in these biological factors.

3.2 Mental Disorders

Psychological autopsy studies identify mental disorders as important influencing factors for suicide. Psychological autopsy refers to exploring factors influencing an individual's death by collecting information about suicide decedents (e.g., suicide notes, family interviews) (Wu et al., 2018). In Europe and the United States, research shows approximately 90% of suicide decedents have at least one mental disorder (Cavanagh et al., 2003; Hjelmeland et al., 2012; Pridmore, 2015). This proportion is called mental disorder comorbidity when an individual has two or more mental disorders, a common phenomenon in suicide cases (Cavanagh et al., 2003; Schneider et al., 2008; Yoshimasu et al., 2008; Tong et al., 2016). Moreover, men have higher prevalence rates of mental disorders than women. The mental disorder most related to suicide is depression (Brådvik, 2018). Besides depression, patients with schizophrenia, panic disorder, substance abuse, and borderline personality disorder also have higher suicide risk (Blasco-Fontecilla et al., 2009; Harris & Barralough, 1997; Palmer et al., 2005; Pompili et al., 2005). Chinese studies also find that 63% of suicide decedents

have mental disorders (Phillips, Li, et al., 2002). Research on rural Chinese individuals aged 15–34 shows the most common mental disorders among suicide decedents are mood disorders, schizophrenia, and addictive substance abuse (Zhang, 2010).

When individuals have two or more mental disorders simultaneously, this is called mental disorder comorbidity. The combination of substance abuse and depression has received substantial attention as one of the most common comorbid forms in clinical practice (Cheng, 1995; Yoshimasu et al., 2008). Additionally, having multiple personality disorders simultaneously also increases suicide risk (Schneider et al., 2008). Patients with multiple coexisting disorders have higher suicide risk than those with single disorders (Schneider et al., 2008).

In Europe and the United States, most suicide decedents have mental illness (Cavanagh et al., 2003; Hjelmeland et al., 2012). However, in China, the prevalence of mental disorders among suicide decedents is significantly lower than in Western countries (Phillips, Li, & et al., 2002; Zhang et al., 2010; Zhang, Li, & et al., 2011). Approximately 35% of suicide decedents and 60% of suicide attempters had not been diagnosed with any mental disorder before their suicidal behavior (Wang et al., 2008). Chinese research on suicide risk also shows that long-term and acute psychosocial stress and conflict, impulsive personality, and maladaptive coping strategies have greater impact on suicide risk than mental disorders (Li et al., 2003). Therefore, understanding the uniqueness of China's suicide gender ratio also requires examining relevant psychosocial factors.

3.3 Psychosocial Factors

Psychological characteristics (e.g., impulsivity), maladaptive coping strategies (e.g., denial, venting), environmental factors, and psychiatric symptoms all relate to suicide risk. Li et al. (2012) found through meta-analysis that being in special families (single-parent or remarried parents), poor academic performance, and high academic pressure all increase suicide risk among adolescents and college students. Negative life events are also common triggers for suicide intent or behavior. Suicide decedents often have stronger religious beliefs than control groups; additionally, psychological stress from relative deprivation, unfulfilled aspirations, and lack of coping skills also shows clear associations with suicide (Zhang, Li, & et al., 2011). Phillips, Yang, et al. (2002) psychological autopsy study revealed eight important psychosocial predictors of suicidal behavior (see Table 1). Research also finds that social support, self-esteem, and clear life goals can serve as protective factors against suicide risk (Lew et al., 2021).

Effective stress coping methods have preventive effects on suicide risk. Effective coping can buffer psychological stress through positive emotional strength, ultimately preventing individuals from using suicide as a solution to life's problems. Using inappropriate strategies to handle stressful events may trigger suicidal behavior (D'Zurilla et al., 1998; Gandy et al., 2013; Kalichman et al., 2000; Kaslow

et al., 2004; Li & Zhang, 2012; Marty et al., 2010). Maladaptive strategies such as avoidant coping, lack of emotional regulation, or inability to respond in a problem-centered manner strengthen suicidal behavior (D’Zurilla et al., 1998; Li & Zhang, 2012; Pietrzak et al., 2011; Sugawara et al., 2012; Tang & Qin, 2015). In general populations, using avoidant rather than adaptive coping strategies correlates with subsequent suicide risk (Svensson et al., 2014) and suicide ideation (Woodhead et al., 2014).

Existing literature shows inconsistent definitions and classifications of different coping styles (Compas et al., 2001; Skinner et al., 2003). Carver et al. (1989; Carver, 1997) defined 14 coping strategies people use when facing stress: self-distraction, active coping, denial, substance use, emotional support, instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. This 14-item coping strategy scale is called Brief COPE. According to this scale, the 14 coping strategies can be divided into three major types: avoidant, emotion-focused, and problem-focused.

When facing pressure and threat, coping strategies can be adaptive or maladaptive (Carver et al., 1989; Ben-Zur, 2009). A study using Brief COPE showed that behavioral disengagement and self-blame increase individual suicide risk (Horwitz et al., 2011). Another study on Chinese college students found that active coping and positive reframing negatively correlated with suicide risk, while self-distraction, substance abuse, behavioral disengagement, venting, and self-blame positively correlated with suicide risk (Liang et al., 2020).

Lazarus and Folkman (1984) view stress coping as efforts to manage personal and environmental demands. Stress coping serves multiple functions: problem-focused coping aims to manage or change the environment causing distress, while emotion-focused coping aims to regulate emotional responses to distress. Each coping style includes behavioral and cognitive strategies. Typically, individuals use single or combined strategies based on their assessment of the situation (Lazarus & Folkman, 1984).

These studies show clear relationships between the 14 coping strategies listed in Brief COPE and suicide risk. Therefore, some scholars combine stress coping strategies with different categories of stressful events and living environments to examine how coping strategies affect suicide risk in various populations after traumatic events, including adolescents (Stratta et al., 2014), military personnel (Pietrzak et al., 2011), college students (Yi et al., 2021), and depressed adolescents (Horwitz et al., 2011). Most of these studies assessing suicide risk in Chinese populations have not controlled for other suicide risk factors, focusing only on how different coping strategies influence individual suicide risk pathways. Therefore, existing results can provide suggestions for preventing and intervening in suicide risk in specific populations (e.g., depressed groups) but have not yet extracted models with more universal significance. Moreover, these studies have not examined whether gender differences in coping strategies affect the gender ratio of suicide rates. We argue that based on the characteristics of China’s male/female suicide ratio, better understanding the relationship

between different coping strategies (especially types and quantities chosen by different gender groups) and suicide risk in Chinese populations is necessary. We further explore this in the research prospects section.

4. Phenomenological Challenges to Suicide Theories—Research Progress on Gender Differences in Suicidal Behavior

As previously mentioned, China's male/female suicide ratio differs significantly from most countries (see Figure 2). Gender differences encompass both biological and social role differences, involving different social norms and expectations for both sexes. These norms and expectations further define behavioral characteristics of men and women, including how to cope with life stress. Gender norms can be replicated through early socialization in life history, subsequently affecting self-identity, self-evaluation, and self-regulation. Gender roles change over time, and inevitable conflicts arise between traditional and modern gender roles (Wood et al., 1997).

Regarding the male-dominated gender ratio of suicide in Western societies, scholars have proposed several possible explanations. First, research finds that men exhibit more aggressive behavior, value success more (Stillion & McDowell, 2015), and show more risk-taking and harm-causing behaviors (Langhinrichsen-Rohling et al., 1998). Therefore, men tend to choose more lethal suicide methods, which both increases the probability of completed suicide and reduces the possibility of being shamed by unsuccessful attempts (Wunderlich et al., 2001). Another hypothesis related to lethal method selection suggests that women's suicide attempts may be non-lethal resistance to their environment (de Catanzaro, 1995). These hypotheses provide indirect interpretations for the universally higher male suicide ratio but cannot reasonably explain the uniqueness of China's male/female suicide ratio.

Another research line examining the male-dominated gender difference in suicide rates focuses on cultural and social norm influences. Women tend to seek help and are generally willing to discuss emotional problems (Beautrais, 2002), but men often view such behaviors as weakness, inconsistent with expected masculinity (Rhodes et al., 2014). This sociocultural expectation of masculinity further leads men to be unwilling to seek help (Möller-Leimkühler, 2003; Oliffe et al., 2020). Additionally, men's tendency to use avoidant coping strategies may make it harder for them to confront emotional and behavioral problems (Miranda-Mendizabal et al., 2019). This hypothesis also cannot explain the uniqueness of China's male/female suicide ratio but provides a perspective on cultural differences behind it. That is, in the Chinese cultural context, gender differences in coping with life stress and social expectations for stress coping may lead to gender differences in coping strategy use, thereby resulting in gender differences in suicide risk.

The change in gender ratio in China's suicide rates is not caused by increased suicides among Chinese men. In fact, over the past 30 years, Chinese men's suicide rates have also declined significantly (see Figure 3 [Figure 3: see original paper]). Western research has continuously investigated the causes of the gender ratio of suicide rates from different angles. In Western culture, suicide is considered a male behavior, leading women to be less likely to choose lethal suicide plans. However, in Chinese gender culture, suicide is viewed as an unmanly, weak behavior (Canetto, 2008); this cultural characteristic may have an inhibitory effect on male suicide.

Another possible explanation for significantly higher male suicide rates in Western countries is that men tend to choose more lethal suicide methods, which increases the probability of completed suicide (Bock et al., 2021; Granato et al., 2015). In China, where private gun ownership is strictly controlled, suicide by medication, particularly pesticide poisoning, accounts for a high proportion. The number of suicide deaths in rural areas is higher than in urban areas, and female suicide deaths exceed male deaths, with most suicides resulting from pesticide poisoning (Stevenson et al., 2008). Many impulsive suicides, especially among women, involve impulsively ingesting lethal pesticides to vent anger during intense conflicts. Due to lack of timely and effective treatment, this leads to death (Wang et al., 2008). The significant decline in female suicide rates in rural China in recent years is clearly related to enhanced pesticide control (Hvistendahl, 2013; Yip et al., 2012).

5. New Perspectives on Gender Differences in Suicide Risk Research

In the following sections, we discuss gender differences in suicide risk and research ideas from the perspectives of life history strategies, psychological stress coping, and gender expectations for coping.

5.1 Exploring Gender Differences in Suicide Risk from a Life History Strategy Perspective

Life History Theory (Ellis et al., 2009; Stearns, 1992) explains individuals' survival strategies for coping with their ecological environment. Species allocate time and material resources according to environmental conditions and their specific circumstances to better survive and develop (Schaffer, 1983). Life History Theory infers that environmental factors affecting life history strategies include harshness (age-related morbidity and mortality risk), unpredictability (variation in environmental and family life), and resource scarcity (difficulty obtaining energy resources). Individuals make adaptive choices in resource utilization strategies at different life history stages based on environmental characteristics. Life history strategies are mainly divided into fast and slow strategies. Fast strategy users tend toward early and rapid mate selection and reproduc-

tion, while slow strategies are more future-oriented, allocating more resources to physical development and skill development. When environmental harshness is high and unpredictable, or in environments with extreme resource scarcity and significant death threats, individuals tend toward fast strategies; when harshness is high but environmental change is predictable, or when resources are abundant, individuals tend toward slow strategies.

People's decision-making and risk-taking tendencies have domain-specific characteristics (natural risks, investment risks, interpersonal risks, etc.) (Cosmides & Tooby, 1996; Gigerenzer & Selten, 2001; Tooby et al., 1992; Wang, 1996, 2002). Individuals need to make trade-offs between different risk domains (different resources needed for reproduction and survival) at different stages of their life history (Wang et al., 2009). Suicidal behavior, as a risk decision, is also influenced by life history variables. Combining life history theory with risk decision-making, we infer: (1) suicide risk varies with the choice of fast versus slow life history strategies; (2) the degree of risk-taking varies across different life history stages; (3) through future event thinking, focusing on important nodes and risk events in one's life history can regulate decision strategies (Wang et al., 2019), and activating end-of-life thinking can regulate emotions and thereby enhance risk prevention (Wang et al., 2021; Wang et al., 2022), thus reducing suicide risk.

Gender is an important life history variable. Men's reproductive success variability is significantly higher than women's, men's lifespan is significantly lower than women's, men's reproductive capacity remains longer throughout life, and men and women have different tasks in raising offspring (Schaffer, 1983; Wang, 2002; Wang & Lu, 2016). We predict that this series of gender differences in life history variables will affect men's and women's use of risk strategies at different life history stages, leading to gender-specific suicide risks. For example, women's suicide rates remain low from adolescence to reproductive peak (King et al., 2017). In the next section, we explore gender differences in suicide risk and stress coping strategies.

5.2 Exploring Gender Differences in Suicide Risk from Psychological Stress and Coping Strategy Perspectives

For a long time, gender differences in psychological stress have been a focus of sociological and psychological research. Women tend to experience more psychological problems than men, mainly for two reasons. First, physiological differences between women and men (such as hormones and cortisol levels) may be reflected in emotions and behaviors (Hankin & Abramson, 1999). For example, men and women show different responses when coping with stress because they have different sensitivities to stressful events (Afifi, 2007). Women are more susceptible to stress and distress than men, so they may experience more sadness and anxiety (Chaplin et al., 2008). Additionally, traditional masculine and feminine self-concepts affect people's attitudes and behaviors toward life. Masculine traits include individualism and self-confidence, while feminine

traits include affinity, compassion, and sensitivity to others' needs (Gibson et al., 2016). These traditional gender role expectations may affect men's and women's attitudes toward life stress and the coping strategies they adopt. Evidence shows that in stressful environments, women are more likely to develop internalizing disorders such as depression, anxiety, and mood fluctuations (Keng et al., 2019), while men show more externalizing disorders such as substance abuse (Rosenfield & Mouzon, 2013), alcohol abuse (Vu et al., 2019), and internet addiction (Ha & Hwang, 2014).

Research on gender differences in psychological stress among Chinese college students found that female students' anxiety levels were significantly higher than male students', while male students' depression levels were significantly higher than female students' (Gao et al., 2020). Partial reasons may be male students' negative attitudes toward emotional openness—they may be unwilling to utilize psychological services during college (Komiya et al., 2000; Rith-Najarian et al., 2019). Additionally, although men more commonly have substance abuse problems (e.g., tobacco and alcohol), women are more likely to develop emotional disorders from substance abuse (Cranford et al., 2009), thereby increasing women's suicide risk. In similar stressful event scenarios, men show higher stress levels, but women are more likely to develop internalizing disorders (e.g., anxiety) and tend to use avoidant coping strategies (Liu et al., 2004). Therefore, gender differences in psychological stress levels and coping strategies are important for interpreting gender differences in suicide risk among Chinese populations.

Future research examining how different coping strategies affect suicide risk should simultaneously consider socioeconomic and family life history variables with Chinese characteristics. Existing studies assessing suicide rates in Chinese populations have not deeply examined the relationship between the gender ratio of suicide rates and coping strategies. Future research should further understand the relationship between different coping strategies (especially types and quantities chosen by different gender groups) and suicide risk gender ratios in Chinese populations.

Prospects for research on China's male/female suicide ratio should focus on gender-differentiated psychological stress coping strategies and sociocultural expectations for coping. First, gender differences in coping strategies may exist in Chinese culture. The impact of coping strategies on suicide risk depends on the number and choice of coping methods. Additionally, others' expectations for different genders may influence men's and women's behaviors in coping with psychological stress (such as whether to hide emotions, take risks, or seek help). Therefore, people's cultural expectations and social norms for men's and women's stress coping strategies may lead to gender differences in stress coping, resulting in gender differences in suicide risk. This means four types of expectations can be compared: men's expectations of men, men's expectations of women, women's expectations of women, and women's expectations of men. These qualitative and quantitative psychological expectations for coping strategies may lead to gender differences in stress coping and subsequently to gender

differences in suicide risk.

Our recent exploratory study found that men's expectations of women's stress coping pathways and intensity are higher than women's own expectations; conversely, women's expectations of men's stress coping are lower than men's own expectations. Based on this, we infer that men's overestimation of women's coping abilities may lead to neglect of women's psychological stress, while women's underestimation of men's coping abilities may result in more attention to men's psychological stress. Therefore, these gender-differentiated social expectations may reduce men's suicide risk but increase women's suicide risk. Differences between men's expectations of women's stress coping and women's own expectations, and between women's expectations of men's stress coping and men's own expectations, may affect an individual's psychological journey. This process may go from expectation to hope, or from expectation to disappointment, and even from disappointment to despair.

Understanding the mechanisms forming the male/female suicide ratio can help identify gender-specific suicide risk factors, thereby contributing to more targeted psychological prevention and social intervention. Identifying gender-specific effective and maladaptive stress coping strategies helps develop new coping strategies and optimize cognitive behavioral therapy (Robinson et al., 2011), mindfulness meditation, and stress-reduction mindfulness training (Weinstein et al., 2009).

In summary, regarding the phenomenon that China's suicide rate male/female ratio differs significantly from most countries, we first examined relevant sociological and psychological mechanisms and related risk factors from suicide theories, then proposed future research directions from two perspectives: life history strategies and gender-differentiated social expectations for stress coping. The adaptive perspective on risk behavior in Life History Theory will help understand suicide risk. Meanwhile, different social expectations for how men and women cope with life stress may cause gender differences in coping strategy use. Through such research, we hope to further identify gender-specific effective and maladaptive stress coping strategies, thereby contributing to the prevention and intervention of suicide risk in Chinese populations.

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