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Original Paper

Relationship between Family Function and Adolescent Self-Injury: The Mediating Role of Regulatory Emotional Self-efficacy and Rumination

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Abstract

Based on the developmental assets framework and the emotional cascade model, this study explores the relationship between family function and adolescent self-harm, as well as the mediating role of regulatory emotional self-efficacy and rumination. 682 adolescents were recruited to participate in this study with Family Assessment Device, Regulatory Emotional Self-Efficacy Scale, Rumination Response Scale-Chinese Version, Adolescents Self-Harm Scale. The results showed that: (1) family function had a significant negative impact on adolescent self-injury; (2) family function predicted adolescent self-injury through the mediating effect of rumination; (3) family function predicted adolescent self-injury through the chain mediating effect of emotional regulation self-efficacy and rumination. These findings contribute to a comprehensive understanding of the mechanisms of self-injury. They have implications for the prevention and intervention of self-injury.

Keywords

family function, regulatory emotional self-efficacy, rumination, adolescents self-injury

1. Introduction

Non-suicidal Self-injury (NSSI) refers to the individual's deliberate act of damaging or altering their own body tissues without a clear intention of suicide, such as cutting, burning, needle-sticking, or preventing wound healing, which are typically low-lethality or non-lethal behaviors and are not socially acceptable (Gratz, 2003). Survey data show that the rate of self-injury among adolescents in Minnesota has reached 15.5% (Taliaferro et al., 2020). In China, researchers conducted a meta-analysis of articles on the prevalence of adolescent self-injury from 2010 to 2020 and found that the prevalence rate was

22% among middle school students and 22.8% among high school students (Yu et al., 2022; Zhang Yali et al., 2022). Self-injury not only causes physical trauma to the body tissues, but also has negative psychological effects on individuals. Compared to individuals who do not engage in self-injury, self-injurers have an increased risk of experiencing depression and anxiety disorders by 1.61 times and 1.92 times, respectively (Borschmann et al., 2017). Among the risk factors for suicide, self-injury is the strongest predictor, with self-injurers having a suicide risk of 0.7% in the first year, which is 66 times that of the general population. The risk increases to 1.7% in the fifth year, 2.4% in the tenth year, and 3% in the fifteenth year (Klonsky et al., 2003), indicating the profound negative impact of self-injury on individuals. Based on this, it is particularly important to explore the mechanisms underlying self-injury and to provide theoretical and research support for the prevention and intervention.

In recent years, the role of the family in the healthy development of adolescents has attracted increased attention. From the perspective of the developmental assets framework for the prevention and intervention of this behavior (Benson et al., 2011), developmental resources determine developmental outcomes, and the more and higher quality resources adolescents obtain during their growth process, the healthier their developmental outcomes will be, and correspondingly, the fewer externalizing problem behaviors they will exhibit (Benson et al., 2012; Theokas & Lerner, 2006). The family is one of the most important external resources for adolescents' development. The basic function of the family is to create conditions and environments that are conducive to the healthy development of all family members (Li & Guo, 2008). Previous research have shown that when family function is well performed, adolescents are less likely to engage in smoking, drinking, drug use, and other illegal behavior (Kopak et al., 2012; Yun et al., 2016). On the contrary, when family function is poorly performed, adolescents are more likely to participate in truancy, drunk driving, unsafe sexual behavior and other negative risk-taking behaviors (Wang et al., 2018). Obviously, family function has an important influence on the occurrence of adolescent problem behaviors (Mack et al., 2015). Therefore, hypothesis 1 is proposed: family function has a negative predictive effect on adolescent self-injury.

Regulatory emotional self-efficacy refers to an individual's confidence level and perceived ability to regulate their own emotions (Caprara et al., 1999). Bandura proposed that self-efficacy is derived from early family experiences (Bandura, 2012). Children who grow up in families with good function (such as high intimacy and adaptability) are more likely to develop healthy emotional function, one of which is having good regulatory emotional self-efficacy (Lafreniere, 1982). In addition, high regulatory emotional self-efficacy is believed to play an important role in shaping adolescents' selection and implementation of adaptive regulatory emotional behaviors (Bigman et al., 2016). That is to say, adolescents with low regulatory emotional self-efficacy are more likely to adopt maladaptive regulatory emotional behaviors. According to the emotional management theory of self-injury, self-injury is primarily motivated by the desire to alleviate negative emotions, representing a typical example of maladaptive regulatory emotional behavior (Chapman et al., 2006; Gratz, 2003). Liu et al. (2020) found

that regulatory emotional self-efficacy is an important protective factor against self-injury in adolescents. When individuals lack confidence in regulating their own emotions, they are more likely to engage in self-injurious behaviors. Therefore, hypothesis 2 is proposed: regulatory emotional self-efficacy is mediating variable between family function and adolescent self-injury.

Rumination refers to the tendency for individuals to repeatedly focus their attention on negative affect and their possible consequences, without actively addressing or resolving problems, and is considered a maladaptive coping response (Nolen-Hoeksema, 1991). It contributes to an increase in psychological stress (Calvete et al., 2015) and is influenced by familial factors. Negative family function, characterized by parental over-control and passive compliance, hinders children's independence and renders them more susceptible to adopting maladaptive coping strategies, such as rumination (Hilt et al., 2012). According to the emotion cascade theory, rumination extends the duration of negative impact caused by adverse stimuli on individuals, amplifies the strength of the emotional cascade, and creates challenges in interrupting the cascade response. Conventional attention shifting behavior is often ineffective in interrupting the cascade, prompting individuals to resort to extreme measures, such as self-injury, to redirect their focus towards intense bodily sensations and disrupt the cascade process (Selby et al., 2008). Several studies, conducted in both China and other countries, have consistently shown that rumination positively predicts adolescent self-injury (Buelens et al., 2019; Wang et al., 2020). Findings from a meta-analysis revealed a significant positive correlation between rumination and self-injury in adolescents, consistently observed across different samples, cultural backgrounds, and measurement tools (Wang et al., 2022). Therefore, we propose hypothesis 3: rumination is a mediating variable between family function and adolescent self-injury.

Family function, as an important external resource for adolescent development, may have a single mediating effect on adolescent self-injury through either regulatory emotional self-efficacy or rumination. However, it remains unclear whether these two variables simultaneously mediate the relationship between family function and self-injury. This study will examine the two possible chain mediating paths. The first is: negative family function affects individual regulatory emotional self-efficacy, thereby increasing rumination and exacerbating adolescent self-injury. The second is: poor family function increases individual rumination, consequently diminishing regulatory emotional self-efficacy and worsening adolescent self-injury. Based on previous research, we believe that the first pathway is more reasonable. Adolescent thinking will be influenced by regulatory emotional self-efficacy. When individuals possess high self-efficacy in managing negative emotions, they are more inclined to adopt positive thinking patterns and effective coping strategies, subsequently decreasing the risk of self-injury. Conversely, when adolescents perceive their ability to effectively manage negative affect as inadequate, they may engage in negative thinking patterns such as rumination, which diminishes their motivation to confront and resolve problems, consequently elevating the risk of self-injury (Caprara et al., 2010; Muris, 2002). Therefore, we propose hypothesis 4:

regulatory emotional self-efficacy and rumination have a chain mediating effect between family function and adolescent self-injury.

In summary, this study aimed to explore the effects of family function, regulatory emotional self-efficacy, and rumination on self-injury. Based on the developmental assets framework and the emotional cascade model, four hypotheses are proposed: (1) Family function has a negative predictive effect on adolescent self-injury. (2) The relationship between family function and adolescent self-injury is mediated by regulatory emotional self-efficacy. (3) The relationship between family function and adolescent self-injury is mediated by rumination. (4) The relationship between family function and adolescent self-injury is mediated by the chain mediation of regulatory emotional self-efficacy and rumination. The hypothetical model is shown in Figure 1.

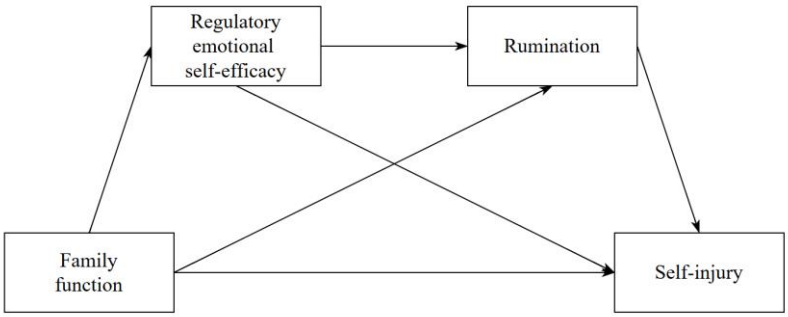

Figure 1. Hypothesis Model

2. Method

2.1 Participants

734 middle school students were invited to participate in a class-based questionnaire survey. We emphasized the anonymity of personal information and the authenticity of responses, and invited all participants to sign an informed consent form. A total of 734 questionnaires were collected, and after sorting, 682 (92.92%) questionnaires were deemed valid. The participants' ages ranged from 12 to 17 years old (13.79 ±1.97), with 11 individuals failing to provide their age information. Of the respondents, 295 (43.26%) were male, 340 (49.85%) were female, and 47 failed to indicate their gender. Prior to the testing, consent was obtained from the schools, parents, and the students themselves. The questionnaire adhered to the principles of voluntary participation, data confidentiality, and anonymous completion.

2.2 Measurements

2.2.1 Family Assessment Device (FAD)

The General Functioning sub-dimension of the Family Assessment Device was used to evaluate family function (Wang & Li, 2016). It has 12 items, such as "In times of crisis we can turn to each other for support", and "We cannot talk to each other about the sadness we feel". Participants chose the option

(1=Strongly disagree, 2=Disagree, 3=Agree, 4=Strongly agree) that is close to their actual situation. The higher the score, the better the family function. In the current study, Cronbach's α= 0.751.

2.2.2 Regulatory Emotional Self-Efficacy Scale (RES)

The Regulatory Emotional Self-Efficacy Scale was used to evaluate participants' self-efficacy to manage their emotional life (Caprara et al., 2008). It contains 12 items that assess three aspects: expressing positive affect (such as "Express joy when good things happen to you?"), managing despondency/distress (such as "Keep from getting dejected when you are lonely?"), and managing anger/ irritation (such as "Manage negative feelings when reprimanded by your parents or significant others?"). Participants responded based on their first intuition (from 1 = "not consistent at all" to 5 = "very consistent"). The higher the total score, the stronger the individual's regulatory emotional self-efficacy. In the current study, Cronbach's α=0.864.

2.2.3 Rumination Response Scale-Chinese Version (RRS-CV)

The Rumination Response Scale compiled by Nolen-Hoeksema (1991) and revised by Han and Yang (2009) was used. The scale includes 22 items, with a 4-point Likert scale (1 = "almost never" to 4 = "almost always"). Such as "Go someplace alone to think about your feelings", and "Think about how angry you are with yourself". A higher total score indicates more severe rumination in the participant. In the current study, Cronbach's α= 0.942.

2.2.4 Adolescents Self-Harm Scale (ASHS)

The Adolescents Self-Harm Scale was used to measure self-injury (Feng, 2008; Zhang et al., 2012). It contains 18 items indicating the manner of self-harm behavior, such as "Deliberately rubbing the skin with bleeding", and "Deliberately beating yourself so that bruises appear". Participants were asked to respond in two dimensions: the first is how many times these behaviors have occurred in the past six months (0 is for "didn't happen"; 1 is for "happened one time"; 2 is for "happened two to four times"; 3 is for "happened more than five times"), and the second is how seriously these behaviors have caused physical harm (0 is for "no harm"; 1 is for "mild harm"; 2 is for "moderate harm"; 3 is for "severe harm"; 4 is for "extremely severe harm"). The final score for each item is the product of frequency and degree. The higher the total score, the more serious the self-injury. In the current study, Cronbach's α= 0.879.

2.3 Statistical Analyses

SPSS 23.0 was used for descriptive statistics and correlation analysis of the data, and Mplus 8.0 was used to test the mediating effect of regulatory emotional self-efficacy and rumination between family function and self-injury. In order to test the possible common method bias, the Harman single factor test method was employed to examine the control effect (Podsakoff et al., 2003). The results showed that there were 13 factors with characteristic roots greater than 1, and the variance explained by the first factor was 20.066%, less than 40%. There was no serious common method bias in this study.

3. Result

3.1 Descriptive Statistics and Bivariate Correlations

Descriptive statistics and correlation analysis results are shown in Table 1. Family function was significantly positively correlated with regulatory emotional self-efficacy and significantly negatively correlated with rumination. Regulatory emotional self-efficacy was significantly negatively correlated with rumination. Self-injury was significantly negatively correlated with family function and regulatory emotional self-efficacy, and significantly positively correlated with rumination. Additionally, among the demographic variables, only age was significantly correlated with family function (r=-0.088, p<0.05), so age was included as a control variable in subsequent analysis.

Table 1. Descriptive Statistics and Bivariate Correlations

	M±*SD*	Family function	Regulatory emotional self-efficacy	Rumination Self-injury
Family function	3.020±0.477			
Regulatory emotional self-efficacy	39.847±9.038			
Rumination	53.027±15.803	-0.315***	-0.171***	
Self-injury	2.936±8.660	-0.303***	-0.226***	

Note: ***p<0.001, **p<0.01, *p<0.05, same below.

3.2 The Chain Mediating Effects Analyses

A structural equation model was used to examine the mediating effects of regulatory emotional self-efficacy and rumination on the relationship between family function and self-injury (Fang et al., 2014). The results showed that the fit indices of the model: $\chi 2/df$ =5.16, RMSEA = 0.078, SRMR =0.045, CFI =0.948, TLI =0.922, were within an acceptable range (Wen et al., 2004). The model fit well, and the path coefficients are shown in Figure 2. Family function had three pathways of influence on self-injury: a direct path (path 1): family function → self-injury, and two indirect paths (path 2): family function → rumination → self-injury, and (path 3): family function → regulatory emotional self-efficacy → rumination → self-injury. The maximum likelihood estimation method was used to test the mediating effects. The results are shown in Table 2, which indicates a total indirect effect of -0.107, with two significant indirect pathways with effect sizes of 0.212 and 0.038, respectively.

Table 2. Mediation Effect Test Results

	Effect	Ratio of indirect to total effect	Ratio of indirect to total indirect effect	*p*
Family function →Regulatory emotional self-efficacy→Self-injury	-0.028	(-0.028) / (-0.316) = 0.089	(-0.028) / (-0.107) = 0.262	0.090
Family function→Rumination →Self-injury	-0.067	(-0.067) / -0.316) = 0.212	(-0.067) / (-0.107) = 0.626	<0.001
Family function→ Regulatory emotional self-efficacy→ Rumination→Self-injury	-0.012	(-0.012) / (-0.316) = 0.038	(-0.012) / (-0.107) = 0.112	0.047
Total indirect effect	-0.107	(-0.107) / -0.316) = 0.339		<0.001
Direct effect	-0.209			<0.001
Total effect	-0.316			<0.001

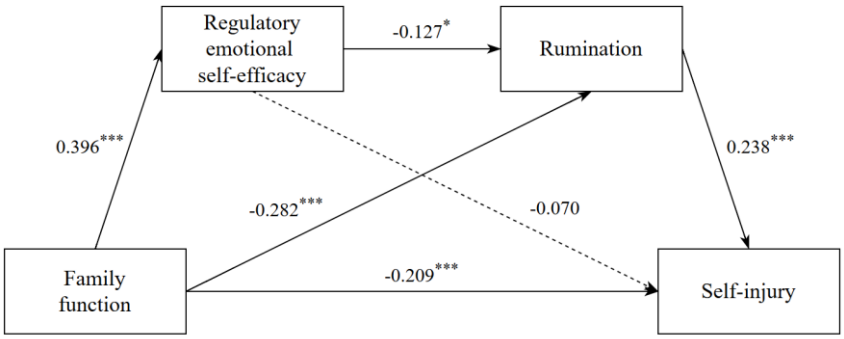

Figure 2. The Chain Mediating Role of Regulatory Emotional Self-efficacy and Rumination

4. Discussion

This study further confirms the important role of family function in adolescent self-injury. The results demonstrated that family function significantly predicted adolescent self-injury in a negative direction, which is consistent with previous findings. Generally, good family function, such as high cohesion, good communication, and positive parent-child relationships, promotes positive psychological development in adolescents (Hakvoort et al., 2010; Schermerhorn et al., 2011; Vandeleur et al., 2009). Conversely, issues within family function significantly elevate the risk of maladaptive outcomes among adolescents. For example, the development of externalizing problems is associated with maternal emotional support and harsh parenting (Ugarte et al., 2021). This study suggests that family members should pay more attention to building a positive family structure, establishing good communication,

emotional response mechanisms, and actively solving problems during the process of adolescent growth, by fully harnessing the potential of family function to help adolescents grow up in a healthy way.

The research findings did not reveal a mediating role of regulatory emotional self-efficacy in the relationship between family function and adolescent self-injury. Specifically, although family function significantly predicted regulatory emotional self-efficacy, regulatory emotional self-efficacy did not directly predict self-injury. According to ecological systems theory, individuals exist within four environmental systems: the microsystem, mesosystem, exosystem, and macrosystem. The microsystem, which encompasses the immediate environment individuals interact with, exerts a profound influence on individual development. For adolescents, the family represents a crucial component of the microsystem. Family function plays a vital role in shaping and fostering an individual's self-efficacy, including intimacy, emotional expression, and parental warmth and understanding, all of which are significantly positively correlated with the self-efficacy of middle school students (Guo et al., 2009). Good family function is essential for enhancing an individual's level of regulatory emotional self-efficacy. There are two mechanisms through which regulatory emotional self-efficacy affects an individual's psychological health and behavior. One is through indirect effects by other variables, such as cognition and motivation, while the other is through direct effects, but generally, the direct impact is relatively small (Tang et al., 2010). Regarding the indirect effect mechanism, Caprara and Steca (2005a) have found that regulatory emotional self-efficacy could increase prosocial behavior by enhancing interpersonal and empathy self-efficacy. In the impact of regulatory emotional self-efficacy on subjective well-being, variables such as positive expectations and positive self-concept also play a role (Caprara et al., 2005; Caprara & Steca, 2006). In this study, the impact of regulatory emotional self-efficacy on self-injury may also need to occur indirectly through other variables.

This study also found that rumination played a significant mediating role between family function and adolescent self-injury. As early as over 30 years ago, Nolen-Hoeksema and Morrow (1991) proposed that an individual's rumination is formed through learning, conditioned reflex, and socialization processes within the family, and parents play a very important role. A family that consistently experiences negative affect (such as sadness, guilt, embarrassment, etc.) has an adverse effect on an individual's ability to regulate their own emotions, which contributes to the development of rumination (Eisenberg et al., 2001; Halberstadt & Eaton, 2002). Previous research has found that controlling and negative parenting styles, as well as mothers' difficulty in empathy, are important predictors of adolescent rumination (Hilt et al., 2012; Goodvin et al., 2006; Santona et al., 2015). Rumination is closely related to self-injury (Hatzopoulos et al., 2021), and it increases an individual's susceptibility to self-injury (Armey & Crowther, 2008) and can predict baseline self-injury levels as well as self-injury within two months (Bjärehed & Lundh, 2008). Consistent with the emotion cascade theory, this study further revealed a substantial predictive effect of adolescent rumination on self-injury levels, thereby

providing new research support. These findings underscore the importance of prioritizing the mental well-being of adolescents exhibiting elevated levels of rumination and the need for increased vigilance regarding their propensity for self-injurious behaviors.

This study further revealed a significant pathway from "family function → regulatory emotional self-efficacy → rumination → self-injury" among the variables, indicating that regulatory emotional self-efficacy and rumination have a chain-mediated effect between family function and adolescent self-injury behavior. This suggests a close relationship between regulatory emotional self-efficacy and rumination, as well as indicating that the role of regulatory emotional self-efficacy in self-injury behavior is indeed an indirect effect, with rumination mediating the relationship between the two. It is worth noting that previous research has consistently demonstrated the mediating role of rumination between regulatory emotional self-efficacy and problem behavior. When individuals possess a strong belief in their ability to regulate negative emotions effectively, they are more likely to adopt positive coping strategies such as cognitive reappraisal, as opposed to becoming immersed in negative affect (Liu et al., 2020). Furthermore, individuals who have confidence in their ability to express positive affect tend to experience higher levels of self-worth, self-acceptance, and engage in positive thinking (Caprara & Steca, 2005b). Compared with rumination, positive thinking fosters positive expectations for the future and reduces the likelihood of problem behavior (O'Connor et al., 2015). These findings underscore the importance of focusing on the development of regulatory emotional self-efficacy and rumination in adolescents from dysfunctional families. Especially by helping them master regulatory emotional skills, boost confidence in coping with negative affect and expressing positive affect, thereby reducing the impact of poor family function on self-injury behavior and promoting healthy adolescent development.

At present, there is a lack of consistently effective intervention measures for reducing self-injurious behaviors. Therefore, it is crucial to gain a better understanding of the mechanisms underlying early prevention of self-injury. The findings of this study enrich the existing theoretical research on the interaction between family function and adolescent self-injury. Moreover, from a practical standpoint, the study offers new insights for early prevention and intervention strategies targeting adolescent self-injury.

This study has several limitations that should be acknowledged. Firstly, data collection relied on self-report measures, and despite assuring participants of confidentiality, social desirability bias may still have influenced responses. Secondly, the use of a cross-sectional design precludes establishing causal relationships. Thus, future research could benefit from refining the study design to address these limitations.

5. Conclusion

Adolescent self-injury is an internalizing problem behavior that has attracted much attention. In addition to the direct role of family function, this study also reveals the mediating role of rumination, as well as the chain mediating role of regulatory emotional self-efficacy and rumination. Adolescents from dysfunctional families are more likely to develop low regulatory emotional self-efficacy and high levels of rumination, increasing their vulnerability to engage in self-injury. Therefore, when carrying out self-injury prevention and intervention, it is necessary to focus on regulatory emotional self-efficacy and rumination of adolescents from dysfunctional families.

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