Father Parenting Style and Adverse Emotional Development of Adolescents: The Mediating Effect of Technoference on Adolescents

Zhou Fei[1], Abdol Ali Khatibi[2], Jacquline Tham[3]
[1]Xinyang Normal University

Abstract	Article Info
This study investigates whether technoference mediates the emotional problems of adolescents under the influence of their fathers' educational models in family settings. In today's society, the rapid development of technological gadgets and the broadening access channels to the Internet pose significant challenges, including the persistent issue of Internet addiction. This study explores adolescents' emotional stability affected by Internet use. Using the Ecological Systems Theory, this study explains that adolescents in an environment of technological interference are prone to Internet addiction. The Online Disinhibition Effect further explains the negative consequences of adolescents' Internet addiction. A questionnaire study involving 416 secondary school students was conducted, and the findings revealed that the father's parenting style significantly impacts adolescent technoference. In turn, technoference significantly affects adolescents' emotions. The findings also demonstrate that technoference mediate substantially between the father's parenting style and the adolescents' emotions.	

Co-Author Affiliation
[2, 3]Xinyang Normal University

INTRODUCTION

Adolescents' emotions are crucial to their growth, and family life significantly influences their emotional well-being. A well-functioning family environment has a protective effect on adolescents' mental health, helping to reduce the occurrence of adverse emotions (Simpson, Vannucci & Ohannessian, 2018). As the most critical family members, parents have a significant impact on their children. Adopting a warm, democratic, and upbeat parenting style can better alleviate adolescents' mood instability, anxiety, depression, and other adverse emotions (Zhao et al., 2020). Conversely, negative parenting styles may cause adolescents to develop various anxiety symptoms, such as separation anxiety and social anxiety (Wang, 2020).

Therefore, negative parenting styles can significantly influence children's development. This study aimed to understand the anxiety levels among adolescents in a Chinese city and to explore further the developmental patterns between the family environment and children's growth.

LITERATURE REVIEW

Parenting Styles

Understanding parenting styles is crucial as they encompass the strategies parents employ in their children's development. These styles significantly influence a child's psychological growth, behavioural patterns, and interpersonal relationships. Psychological studies often categorise them based on the level of parental need, the child's coping abilities, and the promotion of independence.

Maccoby and Martin (1983) have classified parenting styles in terms which can be classified as responsive and demanding and as feedback to the child's behaviour. Different parenting styles produce different result orientations. Baumrind(1968), based on his studies on parenting, found three types of parenting styles: authoritarian, authoritative, and tolerant. Combining the two types of classification in terms of their operation, Baumrind(1991) proposed four parenting styles: authoritarian, authoritative, permissive, and neglectful. Different parenting styles may have different effects on children's development. Parenting styles that are democratic and caring may be more beneficial to children's development, while those that are more authoritative and neglectful may be detrimental to children's development (Liu et al., 2022). Recently, parenting styles have been categorised differently. Perris and Jacobsson (1980) developed a standardised version of the Parenting Styles Scale and categorised parenting styles into four dimensions: rejection, emotional warmth, over-protection and favouritism. Chinese psychologists such as Jiang (2010) and others revised the Chinese version of the Parenting Styles (PSI) based on previous studies by Ainindell (1999) and others, in which parenting style is divided into three dimensions: rejection, emotional warmth, and over-protection. Several studies have shown that this classification helps analyse the actual situation of local Chinese children.

This study will examine three types of parenting: paternal rejection, paternal emotional warmth, and paternal overprotection.

Technoference

Technoference is the disruption in daily life caused by interactions with digital and technological devices, negatively impacting human interactions. This phenomenon is common in close or team relationships, such as between parents and children, couples, and employees. Some scholars describe it as mobile phone cold shoulder behaviour, where individuals ignore others due to using electronic media like smartphones (Chotpitayasunondh & Douglas, 2016).

Parental technoference is particularly significant in affecting adolescents, drawing considerable scholarly attention. Studies indicate that the global prevalence of smartphone addiction among adolescents is 27.3% (Xiong et al., 2021), with parental technoference directly predicting adolescent smartphone addiction (Zhong et al., 2023). Additionally, Liu et al. (2021) found a similar relationship and noted that relative deprivation can mediate the effects of technoference on online interpersonal relationships (Liu, Hu, & Qi, 2021). Thus, technoference is a detrimental factor in adolescent development, and it is in the hands of family members to increase awareness and intervene effectively.

Negative Emotions

Emotions are internal feelings and reactions to personal experiences, representing psychological states. According to Saarni (1999), children's emotions can be categorized into eight types: self-awareness of emotions, recognition of others' emotions, use of emotional language, empathy and sympathy, differentiation between internal emotions and external expressions, coping with stressful emotions and situations, appropriate emotional communication, and emotional self-efficacy. In China, Yao et al. (2004) divide children's emotional abilities into understanding and regulation. Despite the classification, the significance of emotions in influencing behaviour remains paramount.

A survey among middle school students in five Chinese provinces found a significant correlation between depression and suicidal behaviour (Wang et al., 2023). Depression also affects non-suicidal self-injury (NSSI) behaviours in adolescents and is an independent risk factor for both NSSI and suicide attempts (Jiao et al., 2022). Recent research indicates that anxiety and depression moderate the frequency of NSSI, self-hitting as an NSSI method, and the relationship with suicide attempts (Zhang et al., 2024).

Due to increasing pressure and the accumulation of negative emotions without effective relief, there has been a slow growth in adolescents with depressive tendencies (Wang, 2021). The family environment must pay greater attention to adolescent emotions.

Parenting Styles and Adolescent Technoference

The influence of family environmental factors on children's development is significant. Poor parenting styles can lead to various issues in children's personality traits, interpersonal relationships, and self-perception, making them more susceptible to internet addiction (Bai, 2014). Parenting behaviours such as favouritism, rejection, denial, interference, and overprotection increase the likelihood of adolescents becoming addicted to mobile networks (Liu et al., 2017).

Parental attitudes towards internet use also impact their children differently. Parents inclined towards internet addiction often show less emotional warmth and understanding, and they tend to adopt harmful handling methods, which negatively affect their children's internet use (Wang et al., 2006). Excessive protection, interference, or indulgence from parents can contribute to adolescent internet addiction, and there is a bidirectional influence between parents and children regarding internet addiction, which is harmful to adolescent development. Studies have demonstrated that technological interference between parents and children predicts adolescent smartphone addiction (Zhong et al., 2023).

Parenting Styles and Adolescent Emotions

In discussing adolescent emotional issues, this study primarily focuses on the impact of negative emotions on adolescents. Emotions such as anxiety and sadness significantly affect adolescent development (Xiong et al., 2023). Anxious children often have poorer social adaptation skills and may exhibit problematic behaviours (Zhang et al., 2013). Generally, positive parenting styles benefit adolescents and can reduce the occurrence of negative emotions. Conversely, negative parenting styles, such as rejection, have an adverse effect and may increase the risk of negative emotions. Improving parenting methods can alleviate students' anxiety (Lin & Lin, 2024).

Our research emphasises the importance of positive parenting styles involving open communication, respect for children's thoughts, and effective responses to their psychological needs. These practices have been found to enhance children's self-efficacy, equipping them to handle problems and difficulties more effectively (Xie et al., 2019). On the other hand, negative parenting practices like rejection, denial, and authoritarian control can diminish adolescents' self-efficacy, leading to poorer outcomes, including declining academic performance (Sun, 2023).

Our study also sheds light on the gender differences in parenting styles. Research has shown that paternal indulgent and neglectful parenting styles score significantly higher than those of mothers (Lan, Liang, & Liu, 2023). This finding is consistent with the work of Yu (2019). The father's parenting style, particularly an authoritarian one, has a significant impact on adolescents, positively predicting conflictual parent-child relationships. This suggests that fathers should prioritise parent-child activities (Lan, Liang, & Liu, 2023). The higher scores in indulgence and neglect among fathers compared to mothers may be attributed to varying gender roles influenced by societal division of labor and differing role expectations. The concept of "men managing external affairs, women managing internal affairs" reflects Chinese social values and significantly

influences family dynamics (Yu, 2019). While both fathers' and mothers' parenting styles significantly impact adolescents' emotions, the effects differ in specific ways. Our study hones in on the influence of fathers' parenting styles on adolescents' emotional well-being.

Adolescent Technology Interference and Emotions

Adolescent technological interference may worsen internet addiction. Online gaming significantly influences adolescents' lives, and technological interference can predict the severity of their internet addiction (Ding & Liu, 2022). As technological interference within the family increases, adolescents may develop a stronger preference for online gaming, potentially leading to gaming addiction symptoms (Fard et al., 2015). Cheng (2023) supports this conclusion, finding that depression and anxiety positively impact internet addiction. The higher the level of these negative emotions, the more strongly individuals are affected by internet addiction.

In 2001, Davis proposed the cognitive-behavioural model of internet use, suggesting that underlying psychological health issues make individuals more prone to unhealthy internet use. These psychological issues indirectly lead to harmful cognitive patterns, resulting in excessive or problematic internet use. Davis also stated that negative emotions such as depression and anxiety act as distal causes for internet use, representing the individual's psychopathological characteristics where these individuals may develop negative cognitions about themselves, using escapist internet activities to regulate their emotions.

Ecological Microsystem Theory

The Ecological Systems Theory, developed by Bronfenbrenner (2006), describes the social environment influencing human development and survival as a nested, interaction-focused dynamic system. It emphasizes interactions between individuals and various societal systems. The family system, as the primary environment for child growth, has the most significant impact on adolescents. Factors such as the number of electronic devices in the family, their frequency of use, and permissions are crucial in influencing adolescents' media usage behaviours (Lee & Chae, 2007). The microsystem is fundamental as it directly affects individuals through direct interactions.

Internet addiction impacts adolescents' social levels, emotions, academic performance, and physical and mental health (Derevensky et al., 2019; Kokka et al., 2021). Adolescents' regulation of online information reception is essential; appropriate control helps reduce exposure to harmful content and enhances the positive benefits of online media (Lee & Chae, 2007). Effective parental management or the adoption of better educational methods can significantly mitigate symptoms of internet addiction in adolescents (Zhan et al., 2023).

This theory effectively explains the various impacts of internet technology on adolescents

This theory effectively explains the various impacts of internet technology on adolescents observed in this study. Ecosystem theory posits that the family is the most direct and dominant ecological subsystem influencing adolescent development (Bronfenbrenner, 1979). Based on this theory, this study analyses and explores various related factors within the family, such as parenting style, adolescent technoference, and adolescent emotions, as research variables

The Online Disinhibition

John (2004) proposed the Online Disinhibition Effect, a theory describing the differences in people's roles when communicating on the Internet. This theory explains that individuals feel more accessible online than in real life, leading to blurred boundaries of self-restraint. Consequently, people express themselves more openly and are more emotionally sensitive, sometimes appearing kinder and more generous or, conversely, more aggressive due to negative emotions.

Different individuals have varied ways and perspectives of releasing their inner emotions, resulting in different emotional thresholds on the Internet. Yang et al. (2021) found that adolescents with higher levels of deviant peer relationships are more likely to engage in cyberbullying. Adolescents, whether they become victims of online hate or not, are likely to be bystanders or perpetrators of such hate (Wachs & Wright, 2018). Furthermore, increasing the degree of Internet disinhibition predicts adolescents' false self-cognition, leading individuals with narcissistic and psychopathic tendencies to exhibit online aggressive behaviours due to false self-cognition and Internet disinhibition (Kurek et al., 2019).

This theory effectively reflects the emergence mechanism of undesirable behaviours on the Internet and is well-suited to explain the behaviours of individuals with Internet addiction (Dong, 2021). By addressing the mechanisms underlying negative online behaviours, the Online Disinhibition Effect provides a robust framework for understanding and explaining the behaviour of people with Internet addiction (Dong, 2021).

METHODOLOGY

This study focuses on the influence of fathers' parenting styles on adolescents' developmental processes, emphasizing fathers' significant role in the family. To measure parenting styles, the study adopted the short-form Parenting Style Questionnaire (s-EMBU), revised from the Evaluation of Parenting Styles Scale (EMBU). This streamlined version, tested by Jiang (2010), demonstrates good reliability and validity.

To measure technoference among adolescents, the study utilized the Technology Device Interference Scale (TDIS), adapted by Song (2020). Originally developed by McDaniel (2014) to measure technology interference between partners, Song adapted it for adolescents. The children's section of the questionnaire was used in this study.

Emotions were measured using the Strengths and Difficulties Questionnaire, developed by Goodman in 1998. This tool assesses adolescents' behaviours across five dimensions, with the Emotional Symptoms Scale specifically used to measure emotional problems. Questions included "I am often unhappy" and "I panic easily." An on-site questionnaire was meticulously administered in the classroom after the students were dismissed, with class counsellors maintaining order. The questionnaires were collected immediately after completion. A teacher from the Counseling Centre, who had undergone uniform training, served as the main examiner. This teacher read the guidelines and assured the students of the utmost confidentiality of their responses, instilling a sense of trust and professionalism in the process. The questionnaire assessment took approximately 30 minutes, ensuring a thorough data collection.

In this study, SPSS 26 and AMOS 24 were used for data statistics and analysis. After excluding invalid questionnaires, the data were analyzed and processed using SPSS 26.0 and AMOS 24.0 software. The analyses included a common method bias test, descriptive statistics, and correlation analyses. Additionally, AMOS was used to test mediation effects.

Analysis and Findings

Five hundred questionnaires were distributed to middle school students in Xinyang City, Henan Province, China, of which 416 valid questionnaires were used for data analysis. The demographic results of this data are shown in Table 1.

The number of male and female genders in this study is approximate, of which 211 (50.7%) are male students and 205 (49.3%) are female students.

Table 1 Demography

Age	Numbers	Percentage
11	141	33.9%
12	182	43.8
13	77	18.5%
14	16	3.8%

In this study, multiple questionnaires were used to be answered by the same subjects, and in order to prevent common method bias, Harman's one-factor method was used to conduct a common method bias test, and an exploratory factor analysis was conducted on all the measurement questions in the study, and it was found that a total of 31 factors were analysed with an eigen value of more than 1, and the first factor explains 33 % of the variance, which is less than the critical value of 40% (Zhou & Long, 2004). Therefore, it indicates that there is no significant common methodological bias in this study.

Correlation analyses showed that father rejection and father overprotection positively affected adolescent science and technoference, as well as positively affecting adolescent mood, while father emotional warmth had the opposite result, as shown in Table 2. Specifically, father rejection was positively correlated with children's

technoference (r=.282, p<.000) and positively correlated with children's emotions (r=.306, p<.000); father emotional warmth was negatively correlated with technoference (r=-.383, p<.000) and negatively correlated with children's emotions (r=-.348, p<.000); father overprotection was positively correlated with children's technoference (r=.440, p<.000) and positively correlated with child mood (.484, p<.000); and child technology interference was positively correlated with child mood (r=.583, p<.000).

Table 2 Correlation Analysis

Variable	Rejection	Emotional warmth	Overprotection	Technoference	Emotion
Rejection	1				
Emotional warmth	-.293**	1			
	.000				
Overprotection	-.213**	-.295**	1		
	.000	.000			
Technoference	.282**	-.383**	.440**	1	
	.000	.000	.000		
Emotion	.306**	-.348**	.484**	.583**	1
	.000	.000	.000	.000	

The results of the AMOS modelling analysis, **Figure 1**, show that the model fit well with cmin/df = 1.619, less than 5; CFI = .970, greater than .70; and RMSEA = .039, less than .08.

The results of the path analysis are shown in the table3
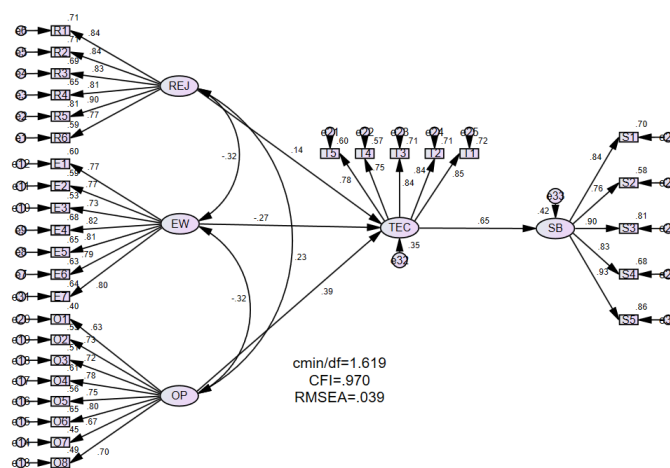
Figure 1: Structural Equation Modelling (SEM)

cmin/df=1.619
CFI=.970
RMSEA=.039

Table3: Significance test results for path coefficients of structural equation models

Construct	Path	Construct	Estimate	S.E.	C.R.	P
REJ	→	TEC	.138	.053	2.862	.004
EW	→	TEC	-.269	.057	-5.215	.000
OP	→	TEC	.386	.066	7.097	.000
TEC	→	SB	.650	.053	12.176	.000

Figure 2 FREJ mediating effect
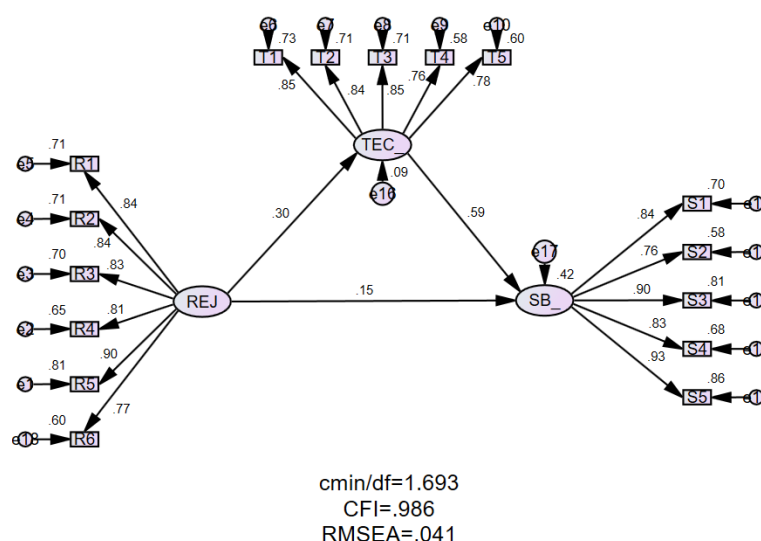
cmin/df=1.693
CFI=.986
RMSEA=.041

Table 4 Significance test results for FREJ mediating effect (Partial mediation)

FREJ	Point estimate	Product of coefficients		Bootstrap 5000time 95%CI					
				Bias corrected		P	percentile		P
		SE	Z	Lower	Upper		Lower	Upper	
Indirect Effect	.150	.031	4.871	.094	.216	.000	.092	.214	.000
Direct Effect	.132	.042	3.143	.052	.217	.002	.052	.217	.002
Total Effect	.282	.051	5.529	.183	.384	.000	.183	.384	.000

In **Table 4,** bootstrapping results for the 5000 samples showed 95% confidence intervals of .094 to .216 for the indirect effect, a point estimate of .150 for the direct effect, an indirect effect value of .132, and an SE of .031. The model fit indices showed appropriate results with CMIN/DF = 1.693, CFI = .986, and RMSEA = .041, supporting the mediation model's stability of the model. Therefore, from the perspective of father rejection, technoference is a mediator between father rejection and children's emotions which is significant, with a partial mediating effect. This findings agrees with the findings by Bolin (2014).
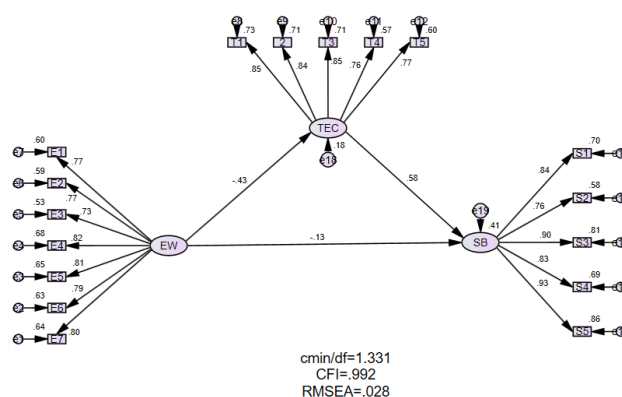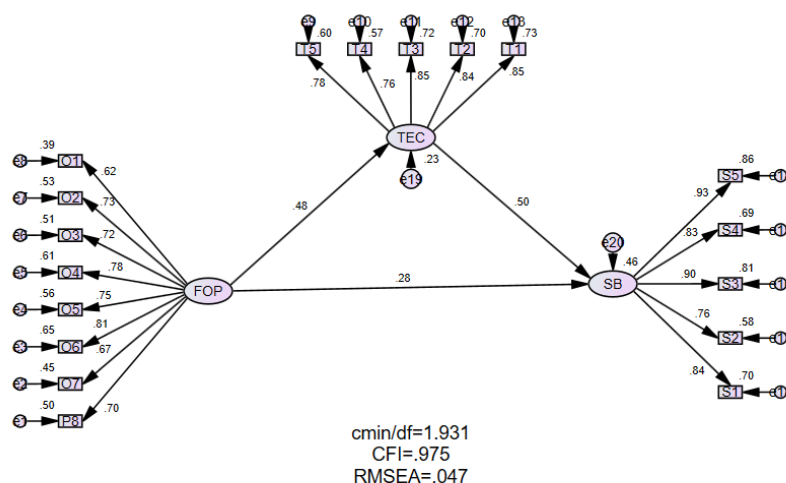
Figure 3 FEW mediating effect

cmin/df=1.331
CFI=.992
RMSEA=.028

Table 5 Significance test results for FEW mediating effect (Partial mediation)

FEW	Point estimate	Product of coefficients		Bootstrap 5000time 95%CI					
				Bias corrected			percentile		
		SE	Z	Lower	Upper	P	Lower	Upper	P
Indirect Effect	-.270	.047	-5.745	-.373	-.187	.000	-.369	-.182	.000
Direct Effect	-.140	.064	-2.188	-.264	-.017	.025	-.267	-.019	.026
Total Effect	-.409	.067	-6.104	-.546	-.283	.000	-.549	-.284	.000

In **Table 5**, bootstrap results for the 5000 samples showed a 95% confidence interval of -.373 to -.187 for the indirect effect, a point estimate of -.140 for the direct effect, a value of -.270 for the indirect effect, an SE of -.270, and a Z-value of -5.745. the total effect was -.409. The model fit indices showed appropriate results, with a CMIN/DF = 1.331, CFI = .992, and RMSEA=.028, supporting the stability of the mediation model. Thus, from a father's emotional warmth perspective, technoference as a mediator between father rejection and children's emotions was significant with partial mediating effect.

Figure 4 FOP mediating effect

Table 6 Significance test results for FEW mediating effect (Partial mediation)

FOP	Point estimate	Product of coefficients		Bootstrap 5000time 95%CI					
				Bias corrected			percentile		
		SE	Z	Lower	Upper	P	Lower	Upper	P
Indirect Effect	.352	.059	5.966	.247	.484	.000	.242	.476	.000
Direct Effect	.405	.080	5.063	.252	.566	.000	.249	.561	.000
Total Effect	.757	.070	10.814	.626	.901	.000	619	.895	.000

In **Table 6**, from the perspective of overprotective fathers, the mediating effect of technoference as a mediator between father rejection Jun and children's emotions was significant as a partial mediating effect. Bootstrap results for the 5000 samples showed 95% confidence intervals of .247 to .484 for the indirect effect, a point estimate of .405 for the direct effect, an indirect effect value of .352, and an SE of .059. The model fit indices showed

appropriate results with CMIN/DF = 1.931, CFI = .975, and RMSEA = .047, which supported the mediation model's stability of the model.

DISCUSSION

Effects of different parenting styles on Adolescents' technoference

The three parenting styles examined in this study had distinct effects on adolescents, particularly concerning technological interference. Father rejection and father overprotection were found to positively affect adolescent technological interference, whereas father emotional warmth had a negative effect. Specifically, father rejection was positively correlated with adolescent technological interference ($r = .138$, $p < .01$), father overprotection also showed a positive correlation ($r = .386$, $p < .01$), and father emotional warmth had a negative correlation ($r = -.269$, $p < .01$).

These findings are aligned with previous studies. For instance, Morris (2007) proposed a three-dimensional home environment model, including observation/imitation, parenting styles, and the family's emotional climate. This model suggests that the family environment moderates adolescents' emotions. Different parenting styles produce varying outcomes on adolescents' emotional regulation. Authoritarian, non-democratic parenting styles are linked to poorer emotion regulation in children. Additionally, permissive and neglectful parenting styles are significantly negatively associated with positive cognitive emotion regulation strategies and significantly positively associated with negative cognitive emotion regulation strategies (Liu, 2020).

The effect of technoference on adolescents' emotions

The data analysis results indicate that adolescent technology interference significantly affects adolescent mood ($r = .650$, $p < .01$). This finding aligns with existing research, which has shown that initial levels of negative emotions can positively predict the initial levels of Internet addiction scores among college students. Specifically, the development rate of negative emotions positively predicts the increase in Internet addiction. Negative emotions experienced during the sophomore year significantly predict Internet addiction in the junior year and vice versa, illustrating a reciprocal relationship between negative emotions and Internet addiction.

Further research supports these findings, indicating that individuals with Internet addiction often exhibit self-concept deficits in body image and social and emotional competence (Pop-Jordanova, 2021). This negative self-evaluation leads to self-doubt and escaping real-life dissatisfaction through the Internet. However, this escape also results in increased estrangement from real-life family and friends, with low social support being strongly associated with anxiety, depression, and other adverse emotions (Jia et al., 2024). These issues need to be addressed more seriously as adolescents grow up to mitigate the adverse effects of technology interference on their emotional well-being.

Mediating effects of technoference

The mediating effect of the three parenting styles on adolescents' emotions through technological interference was significant. The indirect mediating effect values were .150 ($p < .01$) for father's rejection, -.270 ($p < .01$) for father's emotional warmth, and .352 ($p < .01$) for father's overprotection. According to Bolin's (2014) explanation of different mediation effect models, the results indicate that the mediation effect is partial, regardless of the parenting style. Paternal parenting style is significantly associated with adolescent internet addiction, consistent with previous research (Wei et al., 2017). Parenting styles are related to the tendency of adolescent internet addiction (Sun et al., 2017), and internet addiction can predict negative emotions (Mo, 2022).

This implies that fathers' parenting styles significantly influence their children's emotions. Fathers should adopt more reasonable parenting styles to provide better emotional support to their children, facilitating healthier adolescent development. Fathers' different emotions and parenting styles can impact their children's emotional states differently. Thus, fathers should improve their behavioral, emotional, and decision-making abilities to manage better and support their children's emotional well-being.

CONCLUSION

In today's society, adolescent Internet addiction is a significant concern for both families and schools. Unlike the growth environment of their parents, teenagers now face numerous temptations and have easier access to

various negative information. However, the approaches to parenting differ across families, and in some cases, parents may be absent. When faced with difficulties, teenagers might turn to the Internet or reach out to others, including parents, for help.

In family education, parents should focus on the Internet's accessibility and appeal and the dependence teenagers might develop to handle their issues. Enhancing teenagers' ability to distinguish right from wrong and improving their problem-solving skills independently is crucial. Encouraging outdoor activities as alternatives to online entertainment can promote a healthier growth process.

It is important to note that the father's parenting style significantly influences the level of technoference in teenagers' lives, which, in turn, directly impacts their emotional well-being. Technoference acts as a mediator, connecting the father's parenting style to the emotional state of teenagers. Therefore, it is crucial to comprehend and address these dynamics to foster healthier adolescent development.

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