Deviant peer affiliation as a mediating variable in the relationship between family cohesion and adaptability and internet addiction among adolescents

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Abstract

The aim of this study was to investigate the mediating role of deviant peer affiliation in the relationship between family functioning, specifically family cohesion and family adaptability, and internet addiction among Saudi adolescents. A sample of 946 Saudi Arabian adolescents with a mean age of 18.5 years (SD = 3.06) was obtained using snowball sampling. Path analysis using structural equation modeling was conducted. The results indicated significant negative relationships between family cohesion and internet addiction and between deviant peer affiliation and family cohesion, and a significant positive relationship between family adaptability and internet addiction. In accordance with prior research, we found a significant positive relationship between deviant peer affiliation and internet addiction, but in terms of mediation, deviant peer affiliation mediated only the relationship between family cohesion and internet addiction. In conclusion, it is important for the effectiveness of interventions and preventive programs that aim to address deviant peer affiliation and internet addiction in adolescents to enhance the well-being of their family systems.

Keywords Internet addiction · Deviant peer affiliation · Family cohesion · Family adaptability · Saudi Arabia

The prevalent use of computers and the internet has significantly and globally changed the way people work and live. It is estimated that the number of internet users worldwide is around 4.66 billion (Statista, 2021a) and in Saudi Arabia, this number is forecast to reach 36.22 million in 2025 (Statista, 2021b). On the negative side of this phenomenon, some people are prone to self-damaging behavior known as internet addiction (IA) (Wu et al., 2016b; Young & Case, 2004). IA can be defined as a compulsive need to spend an excessive amount of time on the internet to the extent that other aspects of life (e.g., relationships, health, or work) are allowed to suffer (Shapira, et al., 2000). Li et al. (2015) cited as symptoms of IA a preoccupation with and psychological dependency on internet activities

and use of the internet to cope with negative emotions and reduce stress. Beard and Wolf (2001) indicated as symptoms increasing amounts of time online necessary to reach satiation and unsuccessful attempts to decrease usage, and asserted that symptoms of IA overlap with DSM-IV criteria for diagnosing other addictions such as pathological gambling, a view shared by others (e.g., Young, 2009).

Research has shown that adolescents are at the forefront of internet addiction risk (Chung et al., 2019). Adolescents use the internet for many legitimate, positive, and beneficial reasons, such as information-searching, schoolwork, music and video entertainment, and appropriate use of social media. The internet is appealing to adolescents because it offers a social milieu in which to interact with others (Subrahmanyam & Lin, 2007) and build relationships (Bargh & McKenna, 2004). However, some adolescents, particularly stressed individuals, cross the line from positive internet use to overuse and addiction (Feng et al., 2019). And there is abundant literature detailing the deleterious effects of internet addiction on adolescents in particular. For example, Yavuz (2019) found that internet addiction negatively affects adolescents' levels of happiness. Cerutti et al. (2017) found that higher levels of internet use by

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adolescents were associated with depression and other emotional and behavioral problems. Kumar et al. (2019) also found that negative impacts of IA among 11th and 12th grade students include emotional and behavioral difficulties as well as hyperactivity. Tsitsika et al. (2011) determined that IA in adolescents led to poor academic performance as well as engagement in risky behaviors. Lam et al. (2009) found that internet addiction increases the risk of self-harm among adolescents. In sum, internet addiction is a serious public health problem among adolescents and it is important to investigate factors associated with it.

The family environment plays an important role in the establishment of adolescents' social interactions and behavior (Grotevant, 1997). The benefits of assessing family functioning derive from the fact that the family is an extremely important element in the physical, social, and psychological development and maintenance of the well-being of its members. The circumplex model (Olson, 2000; Olson et al., 1989) describes family functioning to be a function of family cohesion and flexibility or adaptability. Family cohesion refers to the emotional connection or bonding that family members experience towards one another, while family adaptability is the capability of a family to adjust its authority or power structure, roles, and relationships in addressing the developmental and situational issues that can occur in families (Olson, 2000; Olson et al., 1989). "Balanced levels of cohesion and flexibility are most conducive to healthy family functioning. Conversely, unbalanced levels of cohesion and flexibility (very low or very high levels) are associated with problematic family functioning" (Olson, 2000, p. 65). Previous studies have reported that lower levels of family functioning (Ko et al., 2007; Yan et al., 2014), lower family cohesion (Chung et al., 2019; Park et al., 2008), and divorced parents and conflicted families (Wu et al., 2016a) are related to the emergence of internet addiction, whereas positive parenting and family functioning, such as high levels of communication (Park et al., 2008), can play preventative roles with respect to IA. A review of the literature concluded also that young people with internet addiction were more likely to come from dysfunctional families compared to those without internet addiction (Li et al., 2014).

A number of previous studies have shown that deviant peer affiliation influences internet addiction (e.g., Jia et al., 2017; Li et al., 2016) and is related to family functions (Fuligni et al., 2001). It has also been reported that children from families with poor family functioning were more likely to be members of deviant peer groups (Fuligni et al., 2001). Therefore, it is plausible that the relationship between family functioning and internet addiction may be impacted by deviant peer affiliation. Xin et al. (2018) argued that adolescents' peer relationships at school seem to be a crucial contributor to IA. Peers are major components of social interaction that influence many aspects of mental and intellectual development (Hartup, 1996; Hartup & Stevens, 1997). During adolescence, associating with inappropriate friends is one of the most important links to crime and substance use (Elliott et al., 1985; Patterson et al., 1992) and an increase in deviant behaviors in general (Dishion et al., 2002). It has been shown that adolescents' peer discussions of criminal or illegal activities is related to delinquency, violence, substance use, risky behaviors, and behavioral problems, as well as inappropriate use of the internet (Capaldi et al., 2001; Dishion et al., 1996, 1997). While previous studies have investigated the role of deviant peer affiliation in the formation of internet addiction, no such studies have been conducted in the context of Saudi Arabian adolescents. For example, in a sample of Chinese adolescents, Li et al. (2013) found that deviant peer affiliation mediated the relationship between school connectedness and internet addiction. Similarly, Jia et al. (2017) reported on the mediating role of deviant peer affiliation in the association between student–teacher relationship and internet addiction. In another study, the relationship between perceived school climate and internet addiction was mediated by deviant peer affiliation among adolescents (Li et al., 2016).

The identification of the mediating paths that operate between adolescents' family functions, deviant peer affiliation, and internet addiction is crucial in order to develop preventive strategies to inhibit IA among adolescents. However, such mediating factors are still unknown, as previous research has not highlighted these underlying mediating mechanisms. Moreover, no studies have investigated the associations between family functions, deviant peer affiliation, and internet addiction in Saudi Arabia. Therefore, this study aimed to examine the association between both family cohesion and adaptability and internet addiction and whether this association is mediated by deviant peer affiliation among adolescents. Figure 1 summarizes this conceptual framework.

Methods

Participants and Data Collection

Saudi adolescents were recruited to take part in this study. The sample was obtained using convenience and snowball sampling. The study was conducted during the Covid-19 pandemic, so it was conducted online. The adolescents were contacted through schools, and schools were chosen from the metropolitan areas of Saudi Arabia. The resultant sample of 946 adolescents had a mean age of 18.5 years (SD = 3.06). Participants were informed about the design and purpose of the study and provided consent. For participants under 18 years old, consent was also dependent on gaining appropriate permissions from school boards and

Fig. 1 Conceptual framework
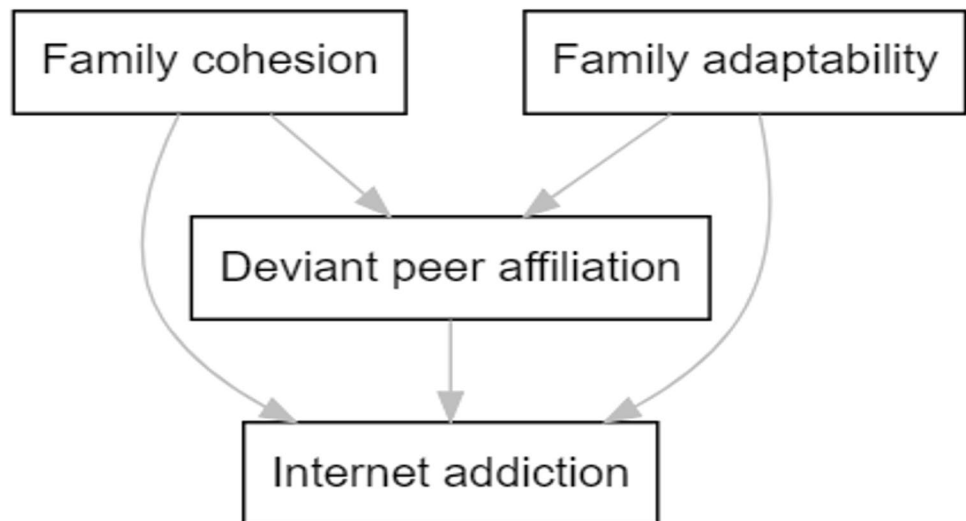
parents. Participants completed questionnaires during regular classroom hours. Participation was voluntary and participants were allowed to withdraw from the study at any time.

Ethical approval for this study was provided by King Abdulaziz University in Saudi Arabia.

Measures

Participant questionnaires included socio-demographic characteristics questions, the Internet Addiction Test (Young, 1998), the Deviant Peer Addiction instrument (Zhu et al., 2015), and the Family Adaptability and Cohesion Scale, third version (Olson, 1991).

The Internet Addiction Test (Young, 1998)

This measure consists of 20 items designed to measure the presence and intensity of IA in respondents. Items are scored on a five-point Likert scale ranging from 1 (not applicable) to 5 (always). Thus, the total score for the Internet Addiction Test ranges from 20 to 100. This instrument had a sufficient internal consistency reliability (Cronbach's alpha = 0.71).

The Deviant Peer Affiliation Instrument (Zhu et al., 2015)

This measure contains 12 items using a five-point Likert scale for each item ranging between 1 (never) and 5 (6 or more). Respondents are asked how many of their close friends engaged in conduct such as stealing, smoking, cheating, and other deviant behaviors. The minimum total score is 12 and the maximum is 60. The scale had an adequate internal consistency reliability (Cronbach's alpha = 0.86).

The Family Adaptability and Cohesion Scale, Third Version (Olson, 1991)

This measure consists of 20 items of which 10 odd-numbered items measure family cohesion and 10 even-numbered items measure family adaptability. It also uses a five-point Likert scale for each item, ranging between 1 (almost never) and 5 (almost always). In this study, the scale had a sufficient internal consistency (Cronbach's alpha = 0.82 for family cohesion and 0.73 for family adaptability). Following Olson (1991), linear scores were computed and used for family cohesion and family adaptability, respectively, and the scores range from 1 to 8 for both constructs.

Data Analysis

The R-Studio software package (Fox & Leanage, 2016) was used for data management and analysis. Descriptive statistics were analyzed first. Differences in internet addiction were estimated using Kruskal–Wallis tests, since the data were not normally distributed. Correlation analyses were also calculated on the whole sample, but separately for females and males. Then, a set of structural equation models was estimated to test the potential mediation roles of deviant peer affiliation in the relationship between both family cohesion and family adaptability and internet addiction. Since the data were not multivariate normal, we used the WLSMV (weighted least squares mean and variance adjusted) estimator, which does not assume normality when the sample size is large (Liang & Yang, 2014). Several fit indices were used to compare models, including chi-square, root mean square error of approximation (RMSEA), standardized root mean squared residual (SRMR), comparative fit index (CFI), and Tucker–Lewis index (TLI) (Hu & Bentler, 1999).

Results

The socio-demographic characteristics and the results of the Kruskal–Wallis tests are summarized in Table 1. Around 63% of the sample were females, 19% were middle school students, 42% were high school students, and 39% were university students. Twenty-nine percent had fathers with less than high school education, 24% had fathers with high school education, 36% had fathers with a university degree, and 11% had fathers with master's or doctoral degrees. 34.2% of the participants had mothers with less than high school education, 24.7% had mothers with high school education, 32.65% had mothers with a university degree, and 8.5% had mothers with a master's or doctoral degree. In terms of monthly income, 39.1% were from families with less than SR 5000, 24.1% were from families with monthly incomes from SR 5000 to SR 9999, 16.3% were from families with monthly incomes from SR 10,000 to SR 14,999, and 20.5% were from families with monthly income greater than SR 15,000.

As indicated by the Kruskal–Wallis tests, significant differences were found in internet addiction based on gender, where males had increased IA scores; based on father's education, where those whose father's education was less than high school had higher scores; on mother's education, where those whose mother had a university degree reported increased scores; and on income, where those from families earning less than SR 5000 per month had increased scores of internet addiction.

The descriptive statistics, Pearson correlations, and Cronbach's alphas are summarized in Table 2. The mean score for family cohesion was 3.33 (SD = 1.92) of a possible maximum score of 8, the average score of family adaptability was 6.37 (SD = 1.44) also with a maximum of 8, the mean score for deviant peer affiliation was 19.6 (SD = 7.01) with a possible range between 12 and 60, and the mean score for internet addiction was 58.3 (SD = 9.7), where scores could range from 20 to 100. Internet addiction was correlated with family cohesion (r = -0.24, $p < 0.001$), family adaptability (r = 0.07, $p < 0.05$), and deviant peer affiliation (r = 0.30, $p < 0.001$) in the whole sample. The correlation coefficients for females and males separately are displayed in Table 3. In males, internet addiction had a negative correlation with family cohesion (r = -0.12, $p < 0.001$) and a positive correlation with family adaptability (r = 0.32, $p < 0.001$) and with deviant peer affiliation (r = 0.26, $p < 0.001$). In females, internet addiction was negatively correlated with family cohesion (r = -0.12, $p < 0.001$) and positively correlated with deviant peer affiliation (r = 0.26, $p < 0.001$). The correlation of internet addiction with family adaptability was negative but not significant in females.

To test the mediation role of deviant peer affiliation in the relationship between both family cohesion and family adaptability and internet addiction, a set of paths

Table 1 Socio-demographic characteristics of the sample, scales scores, and Kruskal–Wallis tests

Variable	%	Mean (SD) IA
Gender		$p < 0.001$
Male	36.8	62.3 (7.2)
Female	63.2	56.01 (10.3)
Academic level		$p = 0.603$
Middle school	19	58.4 (10.3)
High school	42	58.3 (9.8)
University	39	58.2 (9.4)
Father's education		$p < 0.001$
Less than High school	29	59.7 (9.5)
High school	24	59.1 (9.4)
University degree	36	57 (9.5)
Master's/Doctoral	11	57.09 (10)
Mother's education		$p < 0.01$
Less than high school	34.2	59.5 (9.4)
High school	24.7	57.3 (10)
University degree	32.6	60.1 (9)
Master's/Doctoral	8.5	57.3 (9.9)
Family monthly income in SR		$p < 0.001$
< 5000	39.1	59.9 (8.8)
5000 to < 10000	24.1	57.6 (9.9)
10,000 to < 15000	16.3	56.5 (10.1)
≥ 15000	20.5	57.5 (10.6)

IA internet addiction

Table 2 Mean scores and standard deviations, pearson correlations, and Cronbach's alphas

	Mean (SD)	1	2	3	4	Cronbach's alpha
1. Family Cohesion	3.33 (1.92)	1				0.82
2. Family Adaptability	6.37 (1.44)	0.20***	1			0.73
3. Deviant Peer Affiliation	19.6 (7.01)	-0.17***	0.00	1		0.86
4. Internet Addiction	58.3 (9.7)	-0.24***	0.07*	0.30***	1	0.71

The numbers with asterisks indicate Pearson correlations; ***$p < 0.001$; *$p < 0.05$; column heading numbers correspond to the numbers in the row headings and represent the corresponding variables

Table 3 Pearson correlations in males and females separately

	Males				Females			
	1	2	3	4	1	2	3	4
1. Family Cohesion	1				1			
2. Family Adaptation	-0.01	1			0.55***	1		
3. Deviant Peer Affiliation	-0.09	0.04	1		-0.11***	-0.05	1	
4. Internet Addiction	0.12*	0.32***	0.26***	1	-0.21***	-0.01	0.26***	1

The numbers with asterisks indicate Pearson correlations; ***$p < 0.001$; *$p < 0.05$; column heading numbers correspond to the numbers in the row headings and represent the corresponding variables

Table 4 Fit indices

Model	Chi-square	RMSEA	SRMR	CFI	TLI
Model 1	157.66	0.09	0.10	0.81	0.79
Model 2	112.97	0.03	0.01	0.99	0.96

was estimated using structural equation modelling (SEM). The first model (Model 1) included all paths but exhibited poor fit indices (see Table 4) ($\square^2 = 157.66$, $p < 0.001$; RMSEA = 0.09; SRMR = 0.10; CFI = 0.81; TLI = 0.79). In this model, deviant peer affiliation mediated the relationship between family cohesion and internet addiction, but not the relationship between family adaptability and internet addiction since the path from family adaptability to deviant peer affiliation was not significant. In Model 2, this non-significant path was deleted and the fit indices were improved considerably. In this model, deviant peer affiliation mediated the relationship between family cohesion and internet

addiction, and family adaptability was allowed to have a direct relationship with internet addiction ($\square^2 = 112.97$, $p < 0.001$; RMSEA = 0.03; SRMR = 0.01; CFI = 0.99; TLI = 0.96). Model 2 was then taken as the final model and is portrayed in Fig. 2, which shows the standardized regression coefficients for the direct paths among the constructs. Table 5 presents the indirect effects using bootstrapping methods.

As shown in Fig. 2, the path from deviant peer affiliation to internet addiction was significant ($\beta = 0.38$, $p < 0.001$). The path from family cohesion to deviant peer affiliation was also significant ($\beta = -0.14$, $p < 0.001$). The path from family cohesion to internet addiction was significant as well ($\beta = -0.24$, $p < 0.001$). Finally, the path from family adaptability to internet addiction was positive and significant ($\beta = 0.22$, $p < 0.001$). As Table 5 portrays, the indirect effect of family cohesion on internet addiction through deviant peer affiliation was significant, indicating that deviant peer affiliation mediated this relationship ($\beta_{ind.} = 0.05$, $p < 0.001$).

Fig. 2 SEM model predicting internet addiction with the standardized regression coefficients on each path. Notes: *** $p < 0.001$, the numbers on the arrows indicate standardized regression coefficients
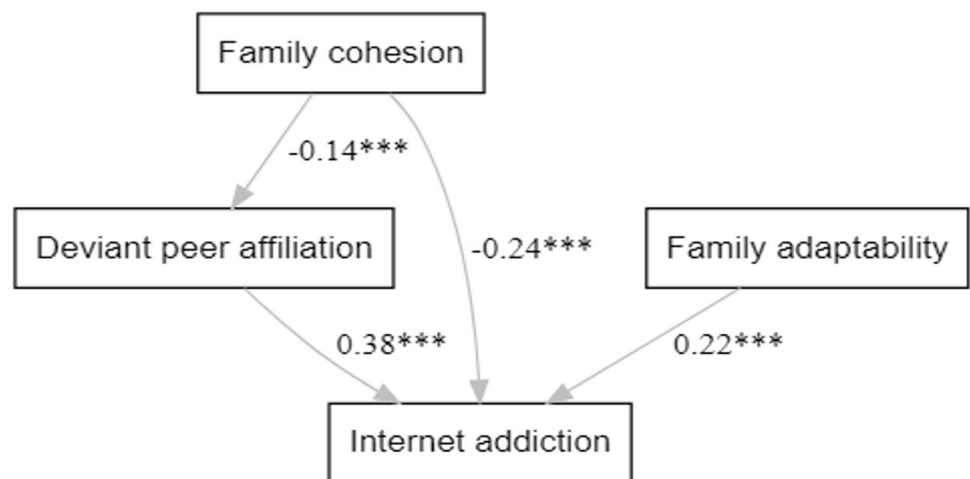
Table 5 Indirect effects estimate and 95% confidence intervals

Model pathways	Estimate effect	Lower 95% CI	Upper 95% CI
FC = > DPA = > Internet addiction	0.054***	0.029	0.073

FC family cohesion, *DPA* deviant peer affiliation, *CI* confidence interval, ***$p < 0.001$

Discussion

This study investigated the relationship between the family functions of family cohesion and family adaptability and internet addiction among adolescents, and the mediating role of deviant peer affiliation in this relationship. Several conclusions concerning this relationship can be asserted. Initially, one notable finding was that family cohesion was negatively associated with internet addiction, and deviant peer affiliation was positively correlated with adolescents' internet addiction. This is in accordance with previous studies cited earlier in this paper's introduction (Jia et al., 2017; Li et al., 2014; Li et al., 2016; Park et al., 2008). These findings are also in line with the studies of Tian et al. (2019) and Zhu et al. (2015) who confirmed the relationship between deviant peer affiliation and adolescents' internet gaming addiction. Also confirmed were the results from Chung et al. (2019) that low family cohesion was related to internet addiction. In addition, deviant peer affiliation mediated the relationship between family cohesion and internet addiction.

The current study found that family cohesion was negatively correlated with internet addiction, but contrary to our expectations, there was a positive correlation between family adaptability and internet addiction. Based on the Olson (2000) circumplex model, family therapists interpret family functioning in terms of family cohesion and adaptability (Rosenblatt & Budd, 1975; Stierlin, 1974; Wynne, 1958). The current study found a negative correlation between family cohesion and internet addiction. This supports the findings of Salimi and Hosseini (2016). Emphasizing the need to investigate family functions in adolescents' dependence on the internet, Pashaeii et al. (2009) asserted that an adolescent's addiction affects the child's family. This implies that when adolescents display internet addictive behaviors, this negatively affects family cohesion. This confirms the correlation found by Balkan and Adaher (2011) between social cohesion, including family relations, and the consequences caused by internet addiction. The explanation for this negative relationship might be the fact that excessive internet use interferes with family time and prevents adolescents from spending time with adults (Nie et al., 2002), and when adolescents are from disrupted families, they tend to seek attention externally, including through social media via the internet, as a means of emotional regulation (Park et al., 2008), which might lead to dependency on the internet.

Regarding family adaptability, which briefly is defined as the ability to adapt to family changes and stressors (Hosseini & Ashktorab, 2012), this study also found that it is positively correlated with internet addiction in the whole sample and in males, but no correlation was found in the sample of females. It seems that the relationship between family adaptability and internet addiction is different for males and females. Future research should investigate this in depth. The positive relationship found was surprising since Yan et al. (2014) reported that family adaptability was negatively correlated with adolescents' internet addiction. This suggests that high functioning families that have better parent–child involvement and adapt better in the face of difficult intra-family relationships are preventative of IA in the children. This negative correlation between the two factors was also found by Olson et al. (1979). The mechanisms underlying the positive relationship found in this study between family adaptability and internet addiction are to be addressed by future research.

Family cohesion was also found to negatively correlate with deviant peer affiliation in the whole sample, in males and females, that is, poor family functioning can lead to the family's children forming deviant peer affiliations. This is in line with many studies that confirmed such findings. For example, Fergusson & Horwood (1999) reported that children from dysfunctional families were more likely to form deviant peer affiliations. Dishion et al. (2012) found that weak family ties (e.g., high levels of family conflict, poor family relationships) can lead young people to engage in risky behaviors with peers. Conversely, Gao et al. (2013) reported that positive family functioning moderated the risk of deviant peer affiliation. Others have suggested that unity among family members and the family power structure are unique contributions to positive peer affiliation choices of their adolescent children (Gao et al., 2013; Liu et al., 2020; Salimi & Hosseini, 2016). Hirschi (1969) asserted that adolescents from healthy functioning families with effective communication and positive family relationships seem not to affiliate with deviant peers. These factors (effective communication and positive family relationships) indicate cohesion within a family, and Huey et al. (2000) found that better family functioning was associated with decreased delinquent peer affiliation and behavior.

In terms of mediation analysis, this study found that deviant peer affiliation mediated the relationship between family cohesion and internet addiction while the relationship between family adaptability and internet addiction was not mediated by deviant peer affiliation. This finding corroborates those of prior studies that reported the mediational role of deviant peer affiliation (Jia et al., 2017; Li et al., 2013, 2016). It is possible that when adolescents do not have sufficient family support or their basic psychological needs are not being met by the family, they seek out and obtain a sense of belonging with peers (bad or good) which may in turn lead them to poor peer affiliation choices and then deviant behaviors, including internet addiction (Hummel et al., 2013).

With regard to the prevalence of internet addiction in the sample, the results indicated that the internet addiction scores were higher in adolescent males than females, in those whose fathers had less than high school education, in those whose mothers had a university degree, and in children of families earning less than SR 5000 per month, as compared to their counterparts. The findings are in line with prior research that reported a higher prevalence of internet addiction in boys than in girls (Ha & Hwang, 2014). The results of this study also corroborate those of previous studies that found that family income, father's education, and mother's education were related to internet addiction among adolescents (Ahmadi & Saghafi, 2013; Ozturk & Ayaz-Alkaya, 2021; Sarıalioğlu et al., 2022; Wu et al., 2016b).

There are limitations of this work that should be mentioned. First, the study used a cross-sectional design and no causal effect statements can be made. Longitudinal designs should be used by future research in order to assume causality. Second, the data were collected with self-reported measures. Future research should use other methods of data collection, including interviews, peer reports, and behavior observation. Third, the study used convenience sampling methods which are not ideal for generalizability of the findings. Future research should use random sampling.

Conclusions

The present study aimed to examine whether family functions are related to adolescents' internet addiction and whether deviant peer affiliation can mediate the association of these two variables. It has been noted that deviant peer affiliation mediated the relationship between family functions and adolescents' internet addiction. In other words, deviant peer affiliation is a strong predictor of such addictive behaviors in young people. Families that do not satisfactorily meet the basic needs of their members seem to lead their adolescent children to attempt to achieve needs satisfaction from peers. On the other hand, families in which members are emotionally and socially satisfied do not have adolescent children with deviant peer affiliations. Families with low levels of cohesion result in children relying too heavily on finding friends outside the family and if they make poor choices may result in juvenile delinquency and internet addiction.

Based on the study results, suggestions for prevention include the following. As healthy family functioning negatively affects abusive behaviors such as internet addiction, there should be an emphasis on the family and enhancing family well-being in interventional programs. Programs should be developed to foster harmonious families by enhancing family cohesion and adaptability and incorporate instruction regarding parenting skills to avoid deviant behaviors in the children. However, as Olson (2000) notes, there is a need for balanced cohesion and adaptability, as opposed to extreme highs or lows. Moreover, since deviant peer affiliation is strongly associated with delinquency and addiction, deviant peer affiliation must be a main target of interventions. In addition, interventions and training programs should be school-based since adolescents spend much of their time at school.

Authors' Contributions All authors made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Data Availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics Approval Ethical approval to conduct this research study was provided by King Abdulaziz University in Saudi Arabia. All procedures performed in this study were in accordance with the ethical standards of King Abdulaziz University and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Consent to Participate Informed consent was obtained from all individual participants included in the study, and participation was completely voluntary.

Conflicts of Interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

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