

Parental influences on excessive Internet use among adolescents

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Abstract

Purpose – Using longitudinal data, this study aims to provide a greater understanding as to how parenting factors, including the employment of various disciplinary techniques, during a young person's early adolescence may contribute to excessive Internet use (EIU) in later adolescence.

Design/methodology/approach – Employing “Problem Behaviour” theory (PBT) as a guiding framework, this study uses data from the Growing Up in Ireland '98 Cohort to investigate the effect of proximal and distal parental influences, measured when children were 13 years old, on symptoms of EIU in young adults at 17 or 18 years. Multiple regression models control for other child and family factors, and separate models for males and females examine sex differentials.

Findings – Estimation did not find a statistically significant association between internet-specific mediation practices in early adolescence and EIU in later adolescence. However, regularly playing games or sports together is a protective factor. Parent-adolescent conflict and spending time home alone are estimated as risk factors. How parents deal with misbehaviour is a strong predictor of EIU, with the direction of association dependent upon the type and frequency of discipline employed.

Practical implications – The findings are of practical significance in informing parents of modifiable aspects of their behaviour that can lead to EIU.

Originality/value – The study applies a longitudinal modelling framework and considers the effect on EIU of various parental disciplinary techniques, representing a novel contribution.

Keywords Excessive Internet use, Adolescents, Digital engagement, Parental influences, Ireland

Paper type Research paper

1. Introduction

Internet use can greatly improve people's lives, facilitating communication, education and leisure (Van Deursen and Helsper, 2018). However, the growing ubiquity of the Internet as a tool in daily life has spawned some concern related to potential negative consequences for people's wellbeing arising from “excessive Internet use” (EIU) (World Health Organization, 2015; Kwak *et al.*, 2022). Adolescence is an especially important life stage in the context of EIU, as the interaction between Internet use and the developmental vulnerability of this age is particularly acute. The Internet may be especially attractive to adolescents because of the opportunities it provides to satisfy crucial developmental psychological needs. For example, adolescents may experiment with different identities and personas on the Internet as they



seek to develop their identity (Beard, 2011). Adolescents may also be motivated to use the Internet in ways which allow them to practice autonomy from their parents (Borca *et al.*, 2015). However, Internet addiction has been found to significantly predict academic performance decrement (Jiang, 2014); and social media use has been found to be associated with sleep disorder (Kaur *et al.*, 2021; Nguyen *et al.*, 2022) and post-traumatic stress (McHugh *et al.*, 2018). Furthermore, EIU behaviours developed in adolescence may continue in later-life (Dahl and Bergmark, 2020), with the OECD (2018) emphasising the importance of early intervention in Internet use behaviours that threaten young people's mental wellbeing.

The development of Internet dependency (or Internet addiction) has been recognised as an issue by parents (UNICEF, 2017), and there is an increasing body of evidence that demonstrates that the behaviours of parents themselves and the nature of the parent-child relationship may influence adolescents' problematic use of the Internet (Ding *et al.*, 2017; Faltýnková *et al.*, 2020; Özasan *et al.*, 2022). The research of this paper, in the study setting of Ireland, is motivated to examine EIU among a national sample of over 5,000 adolescents, and to study several unexplored parental influences on this, using a longitudinal approach. A focus on the influence of parenting factors during the period of early adolescence is of import since parental influence on child development is estimated to peak in early adolescence (Worthman *et al.*, 2017), and parents are also well-placed to play a role in preventing and resolving severe cases of EIU (Beard, 2011; Kuss and Lopez-Fernandez, 2016). While parent-child conflict has consistently been shown to be a risk factor for EIU of adolescents, little is known as to whether specific parental discipline techniques affect adolescents' EIU. Moreover, the bulk of extant studies of EIU among adolescents rely on cross-sectional designs.

Specifically, the research question of this work sets out to explore which exposure factors in early adolescence, specifically at 13 years of age, may influence symptoms of EIU at 17 years? The research of this paper adopts Jessor's (1991) Problem Behaviour Theory (PBT) as an underpinning framework for modelling parental influences on EIU. Factors considered include the use of internet-specific parenting interventions, parent-child time together and apart, disciplinary techniques employed by parents, indicators of the parent-child relationship, parenting style, parental knowledge of the child's activities, as well as household and parent characteristics. Bowlby's (1969) Attachment Theory is also employed to provide a theoretical linkage between EIU and distal parental influences, such as the quality of the parent-child relationship. Of the factors considered, to the author's knowledge, there is no extant research on the effects of specific disciplinary techniques on EIU, which represents a novel contribution and focus of this paper.

Recent research by Kuss and Lopez-Fernandez (2019), devised to support future policies relating to harmful Internet use in the European Union, has focused on findings from European countries other than Ireland due to a paucity of research in this jurisdiction. As such, the present study contributes to addressing a void in an understanding of the extent of, and factors influencing, EIU among adolescents in Ireland. The dearth of research for Ireland is particularly glaring as Internet use has specifically been listed by the Irish Health Service Executive (HSE) as a behaviour to which one can become addicted (Health Service Executive, 2019). Though, it should be noted that internationally, Internet dependency has not yet been recognised as a mental disorder due to a lack of consensus over its clinical validity (World Health Organization, 2015). However, Internet Gaming Disorder has been added to the World Health Organization's International Classification of Diseases (World Health Organization, 2018) and the appendix of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (2013), and the demand for prevention and treatment of Internet addiction is mounting (Rowicka, 2016).

For the wider international research and policy making context, this work aims to contribute to the body of academic literature which brings to light potential risk and protective factors for EIU. Firstly, the research builds on prior studies that use PBT and

Attachment Theory to understand the influence of parents on adolescent's technology use, examining established factors such as the general nature of the child-parent relationship in terms of conflict, closeness, monitoring and time spent together (Faltýnková *et al.*, 2020). Secondly, to further advance the understanding of influencing factors on EIU, the work simultaneously explores hitherto unexamined dynamics, such as specific parenting practices including a variety of parental disciplinary techniques. Importantly, in the context of the prevailing evidence, the study benefits from the use of longitudinal data, assessing how parental influences in early adolescence influence EIU in later adolescence employing a lagged structure. As such the work contributes to filling a significant research gap, where Li *et al.* (2014b) have highlighted a dearth of high-quality studies that evaluate longitudinal or lagged associations between EIU and multiple aspects of parental influence. On the practical side, where the parental behaviours and practices are found to be associated with symptoms of EIU in this research, this can inform parents, carers, relevant stakeholders and policymakers of ways to address and resolve cases of EIU. The findings can highlight critical areas which could provide a focus for targeted intervention options to prevent or mediate EIU and potential negative consequences of this.

To summarise, there are several important research gaps that this study aims to shed light on, specifically: how parental discipline techniques may be theoretically placed in the context of EIU and how such disciplinary techniques influence EIU upon empirical examination; as well as how adolescents in Ireland fare in terms of EIU, and what factors influence this by fully exploiting longitudinal data. The rest of this paper is structured as follows. Section 2 describes the relevant extant literature, first outlining studies that define the concept of EIU, followed by an overview of how existing theories such as PBT and Attachment may be applied to EIU, then proceeding to provide an overview of the findings of studies which examine parental influences on EIU. The data and modelling strategy of investigation are outlined in section 3, with results presented in section 4. Findings are discussed in section 5, the strengths and limitations communicated, along with policy and practice implications.

2. Literature

2.1 Defining EIU

Spending significant amounts of time online does not necessarily mean that adolescents will have problems related to their Internet use (Smahel *et al.*, 2012). High engagement with the Internet can be productive, and users of the Internet with high usage who do not experience negative consequences should not be conflated with those who do (Charlton and Danforth, 2007). Therefore, rather than being defined by the amount of time one spends on the Internet, EIU is generally characterised by “poorly controlled preoccupations, urges or behaviours regarding Internet use that lead to impairment or distress” (Weinstein and Lejoyeux, 2010, p. 277). Studies on EIU often narrow down these maladaptive preoccupations, urges and behaviours to six criteria, labelled as the components of Internet addiction by Griffiths (2000) which include *salience* of the Internet in a person's thinking; *mood modification* resulting from Internet engagement; the development of a *tolerance* to the mood modifying effects of certain quantities of Internet use; *withdrawal symptoms* following reduced or discontinued Internet use; *interpersonal or intrapsychic conflicts* related to Internet use; and the tendency to *relapse* into patterns of EIU. These symptoms are thought to be common to all forms of addictive behaviour (Griffiths, 2005), and for this reason, EIU is sometimes synonymously referred to as Internet addiction. However, the “Internet addiction” terminology may be better reserved for use in clinical settings where there is a psychological diagnosis (Smahel *et al.*, 2020). Furthermore, while the presentation of some combination of these symptoms may be emblematic of EIU, Griffiths (2000) contended that all six should be present for a person to be classified as

“Internet addicted”. Therefore, EIU can be viewed as a continuum of Internet misuse, with users at risk of developing addictive behaviour at the extreme end of it.

Blinka *et al.* (2015) suggested that EIU may not always necessarily be a condition *per se*, but sometimes a symptom of broader behavioural difficulties, estimating a prevalence of EIU of 3.8% among European adolescents. However, prevalence rates of EIU vary widely across studies, partly due to different diagnostic criteria as well as divergent cut-off scores across the same measurement instruments (Kuss and Lopez-Fernandez, 2019). For example, a review found a range of prevalence rates across studies of 0.9–38% (Bisen and Deshpande, 2018). EIU behaviours appear to have a slight male preponderance, but again there is disparity across studies (Anderson *et al.*, 2017).

2.2 Theoretical background

Ko *et al.* (2008) proposed that Internet addiction may be considered a problematic behaviour within Jessor’s (1991) framework of PBT. PBT consists of three major systems of explanatory variables for the development of a problematic behaviour: the perceived-environment system, the personality system and the behaviour system. Within each, and across the three systems, the balance of risk and protective factors determine an adolescent’s overall tendency for problem behaviour (Jessor and Jessor, 1977; Jessor *et al.*, 1995). For the purposes of this study, EIU is deemed a problematic behaviour within the PBT construct, where parental influences lie in the perceived-environment system of PBT, which encompasses social controls, models and support. Perceived-environment variables may be distinguished by “proximal” variables that directly relate to behaviour (e.g. peer alcohol consumption); and “distal” variables which are more remote in the causal connection requiring theoretical linkage to behaviour (e.g. parental support) (Jessor and Jessor, 1977; Jessor *et al.*, 1995). For this study, structured on PBT, we also draw on Bowlby’s (1969) Attachment Theory to provide a theoretical linkage between distal parental influences (e.g. closeness of parent-child relationship) and EIU (Gorjinpour and Tavana, 2022). Attachment Theory is concerned with the quality of the emotional connection or bond between a child and their primary caregiver (PCG). The degree of secureness of child-parent attachment may influence EIU, where a comforting home environment with warm communication fosters a secure attachment and instils a sense of ease and confidence among adolescents in the real world, making them less likely to seek comfort in virtual environments (Asyriati, 2020).

Focussing on the perceived-environment channel of PBT, the research of the current study investigates:

Proximal parental influences on EIU, specifically: internet-specific parental practices - supervising Internet use, whether the parent implemented an Internet filter system; parent-child time spent together and apart, whether the parent and child play cards, games, or sport together, do household activities together, or go on outings together, and whether the adolescent is left home alone. Internet-specific parental mediation is posited to directly implicate Internet use, as is time spent with parents doing non-internet related activities.

Distal parental influences on EIU, specifically: parental discipline approaches, the nature of the parent-child relationship in terms of conflict and closeness (as a proxy for attachment), parenting styles and parental knowledge. Attachment Theory provides the basis for the connection between distal variables and EIU.

Other controls including household characteristics (log of household income, social class of the family, whether the household is a single-parent household, educational attainment of the PCG, employment status of PCG, age of PCG and depression status of PCG) are incorporated as control variables in the models of EIU, informed by studies in this area (Lam, 2015; Venkatesh *et al.*, 2019; Lukavska *et al.*, 2020). Additionally, other elements from PBT adjusted for those related to the personality system, including measures of the adolescent’s openness, conscientiousness,

extraversion, agreeableness, emotional stability and those related to emotional and behavioural difficulties, including emotional difficulties, conduct problems, hyperactivity or inattention, peer relationship problems and prosocial behaviour (Fumero *et al.*, 2018).

The overarching proposition of this research posits that both proximal and distal parental influences in the perceived-environment system of PBT influence adolescents' EIU. The research model investigated in this paper is illustrated graphically in Figure 1. The extant international evidence on parental influences in EIU is considered in the next section.

2.3 Extant evidence on parenting influences on EIU

2.3.1 Proximal influences. To contain children's Internet use parents may apply mediation strategies, which may include *active mediation*, involving for example, discussion of social media use with children and guiding them on appropriate use, or *restrictive mediation* which may involve setting rules and limits on access to screens or social media (Ho *et al.*, 2020). Such restrictions can be verbal, or technical, e.g. where parents employ software to limit access and, or, time spent on the Internet (Benrazavi *et al.*, 2015; Nielsen *et al.*, 2019). In a systematic review assessing the effects of restrictive Internet parenting practices on problematic Internet use, Nielsen *et al.* (2019) commented that the majority of studies are cross-sectional, originating from Western Europe, Asia and the US. Of 12 studies which examine the impacts of restrictive interventions on Internet use, half found a reduction in interest use, though a quarter found no correlation and the remainder reported higher Internet use where controls are implemented (see Nielsen *et al.* (2019) for details). A near-zero association between media-specific parenting approaches, considering both active and restrictive mediation tactics, on problematic Internet use of adolescents was also reported in a recent meta-analysis (Lukavská *et al.*, 2022).

Spending more time with parents doing real life pursuits together may displace time spent using the Internet (Subrahmanyam *et al.*, 2000) and thereby reduce excessive Internet use. However, in a cross-sectional study using national data from Slovakia, Faltýnková *et al.* (2020) found that greater time spent at home in the family environment was positively associated with problematic Internet use among adolescents, which may be attributable to decreased time spent with peers. Relatedly, the COVID-19 lockdown periods, which forced greater amounts of time spent in the family home, was found to be strongly associated with greater media use among adolescents (Werling *et al.*, 2021).

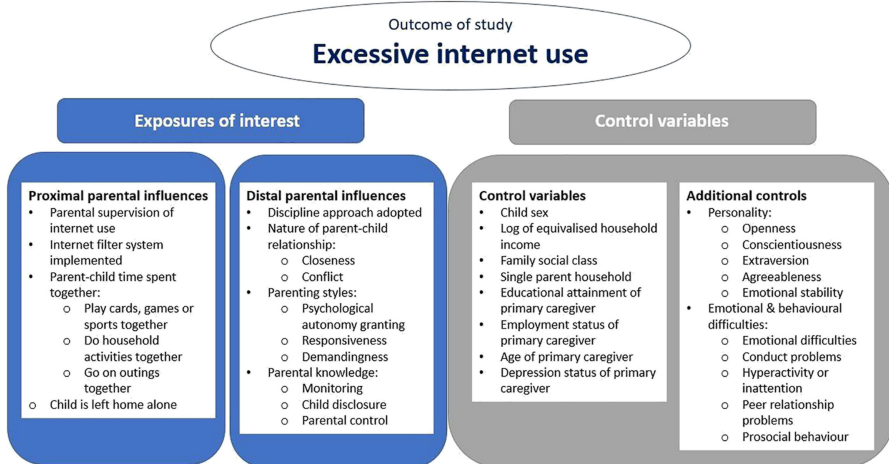


Figure 1.
Graphical depiction of model examined

Source(s): Author's own creation

2.3.2 Distal influences. A good parent-adolescent relationship with strong, secure attachment has been found to be associated with reduced EIU among adolescents by several studies (Asyriati, 2020). This may work through several mechanisms, such as higher adolescent self-concept (Huang *et al.*, 2021), better emotional regulation (Wang *et al.*, 2018) and relative preferences for online social interaction as opposed to offline (Mikuška *et al.*, 2020). On the other hand, higher conflict between parents and adolescents has been found to be associated with increased EIU (Sela *et al.*, 2020; Özasan *et al.*, 2022).

Parental knowledge about their child's life may also be important, because informed parents are better-placed to help identify and resolve specific issues such as EIU (Lam, 2017). Indeed, in China, high parental monitoring (Ding *et al.*, 2017), and in Israel, positive parent-adolescent communication (Alt and Boniel-Nissim, 2018), have been found to be negatively associated with EIU using cross-sectional data. Overprotective parenting (Shivam *et al.*, 2021) and overparenting (Love *et al.*, 2022) has been associated with higher EIU in India and the US respectively, while parental warmth is identified as a protective factor in a cross-sectional Chinese setting (Zhang *et al.*, 2019). In a cohort study from the Czech Republic, Lukavská *et al.* (2020) found a combination of parental warmth and control (i.e. via an authoritative parenting style) reduced the probability of problematic Internet use of adolescents. However, a meta-analysis by Lukavská *et al.* (2022) found considerable heterogeneity across studies as to the effects of parental warmth and control on problematic Internet use, concluding that there is a weak negative relationship from their synthesis of studies.

In a review of 42 studies concerned with family correlates of Internet addiction or pathological Internet use, Li *et al.* (2014b) found greater issues of Internet addiction where youth experience parent-child conflict and perceive their parents as less supportive, warm and involved, as well as those which are more disciplinarian. A meta-analysis of 28 case-control and cross-sectional studies examining personal and social factors involved in Internet addiction remarks that the majority of studies included originate from Asian countries (Fumero *et al.*, 2018). Positive family function, indicated by strong parent-child attachment (Chang *et al.*, 2014, 2015; Gorjinpour and Tavana, 2022), family communication and cohesion (Park *et al.*, 2008) is found to be a social protective factor against Internet addiction in a meta-analysis (Fumero *et al.*, *ibid.*).

In a mixed methods study set in Hong Kong, Venkatesh *et al.* (2019) also drew on Attachment Theory to understand whether the degree of the parent-child attachment (high versus low) affects whether children's Internet addiction is influenced by five different parenting behaviours - parental control, monitoring, unstructured time, dissuasion and rationalisation. Quantitative analysis of cross-sectional survey data from parent-child dyads finds that parenting behaviours are estimated to have a greater tempering effect on children's Internet addiction where the attachment between parent and child is high – with results supported by qualitative records.

In general, the literature finds that indicators of positive patterns of parenting are negatively associated with EIU, while negative indicators of parenting style have a positive association with EIU (Li *et al.*, 2018). However, there remains a number of key gaps in understanding. For example, little is known as to how differential disciplinary techniques affect EIU, except for indicators of disciplinary methods incorporated into broader measures of parental behaviour (Li *et al.*, 2014a). Power-assertive discipline, which can include corporal punishment, deprivation of privileges, psychological aggression and penalty tasks (e.g. chores), has been found to be associated with internalising problems in adolescents such as depression and anxiety as well as a less secure attachment (Bosmans *et al.*, 2011). Accordingly, the research of this paper posits that more power-assertive discipline may encourage EIU. On the other hand, inductive discipline, which may be regarded as non-power assertive discipline, which may consist of reasoning with children about socially appropriate conduct, reminding them of rules and regulations, and explaining the impact of their

behaviour on others, is associated with more positive mental health and attachment (Taillieu and Brownridge, 2013); we posit that non-power assertive discipline approaches (i.e. inductive discipline) could reduce EIU symptoms. As such, the research of this paper attempts to shed light on how various disciplinary tactics affect EIU, where discipline is placed as a distal influence on EIU within the framework of PBT.

More generally, we note that for the study setting of this paper, the topic of EIU has been unexplored in an Irish context despite indicators that the prevalence of EIU among Irish adolescents may be relatively high compared to other European nations. Research from the *EU Kids Online* project identified Ireland as ranking fourth highest for the proportion of children who had at least one symptom of EIU (Lobe *et al.*, 2011). The same study also expressed concern about the high levels of EIU symptoms in Irish children given the relatively low amount of time Irish children spent online. To the best of our knowledge, the research of this paper represents the first study of predictors of EIU in Ireland, where the findings are of relevance for the national context. Moreover, the findings add to, and extend upon, the international literature on this subject, particularly with regard to the use of longitudinal data. The use of information on past characteristics and behaviours to use as controls for current EIU as an outcome, improves upon previous cross-sectional dependent studies and is potentially valuable for identification of effects.

3. Material and methods

3.1 Data

This study is informed by data from Wave 2 and Wave 3 of the '98 Cohort (born in 1998) of the *Growing Up in Ireland (GUI)* survey, collected between August 2011 and March 2012 when the children under study were 13 years old and when they were 17 or 18 years old between April 2015 and August 2016. *GUI* is a nationally representative, large-scale, longitudinal study of children in Ireland based on a fixed panel design (see Murphy *et al.* (2019) for further details). In both the second and third waves, interviews with the study child's PCG were carried out using Computer-Assisted Personal Interview (CAPI), while more sensitive questions were administered using Computer-Assisted Self Interview (CASI). Separate CASI interviews were also conducted with the study children themselves. A total of 8,568 children and their families were interviewed in the first wave of the study in 2008, when the children were 9 years old. Of these, 7,525 responded to the second wave, when the children were aged 13 (a response rate of 88% among eligible participants). At the third wave, 72.5% of those in the original sample of 9-year-olds were retained, with 6,216 families interviewed.

Adolescents' EIU symptoms were recorded at 17 or 18 years old, in the third wave. To inform this study we also use child and parent indicators recorded in the second wave, when the adolescents were 13 years old. The analytical sample size is 5,084 for which there is complete information on all variables of interest, the derivation of which is outlined in 2. Table 1 documents the characteristics of the analytical sample, and a correlation table of the variables studied is included in Table A-I of the online Supplementary File. Table A-I of the Supplementary File also documents changes to household situations between Wave 2 and Wave 3 of GUI '98 Cohort, as indicated by the employment status, and lone parent status of the PCG, as well as the family social class. For most young people, their background situation does not change (for those whose PCG was employed, 83% remained so, for those from a lone parent household, 95% experienced no change, and there was no change in family social class for 80%).

3.2 Measures

3.2.1 *Outcome-EIU*. EIU is measured at age 17 or 18 using the *Internet addiction* measure (Cronbach's alpha = 0.72), adapted from the *EIU scale* used in the *Net Children Go Mobile* project (Mascheroni and Cuman, 2014) and the *EU Kids Online* survey (Smahel *et al.*, 2012). Six statements, shown below, are presented to the adolescents about different behaviours

Category	Variable	N	%	Internet use among adolescents
Analytical sample size		5,084	100.00	
<i>Categorical variables</i>				
Child and family controls	<i>Child sex</i>			
	Male	2,478	48.74	
	Female	2,606	51.26	
	<i>Family social class</i>			
	Managerial or professional	2,970	58.42	
	Other	2,114	41.58	
Parent characteristics	<i>Single parent</i>			
	Yes	577	11.35	
	No	4,507	88.65	
	<i>Employed</i>			
	Yes	3,323	65.36	
	No	1,761	34.64	
	<i>Depressed</i>			
	Yes	268	5.27	
	No	4,816	94.73	
	<i>Educational attainment</i>			
	Lower-secondary	482	9.48	
	Higher-secondary	1,552	30.53	
	Non-degree	1,332	26.20	
	College	1,718	33.79	
	<i>Age</i>			
	<40	856	16.84	
	40–50	3,495	68.75	
	>50	733	14.42	
<i>Proximal parenting factors</i>				
Internet-specific mediation	<i>Parental supervision of Internet use</i>			
	Never	475	9.34	
	Sometimes	2,231	43.88	
	Always	2,378	46.77	
	<i>Internet filter system</i>			
	Yes	2,213	43.53	
	No	2,871	56.47	
Time together or apart	<i>Play cards, games, or sports together</i>			
	Weekly	1,968	38.71	
	Less than weekly	3,116	61.29	
	<i>Doing household activities together</i>			
	Weekly	3,694	72.66	
	Less than weekly	1,390	27.34	
	<i>Going on outings together</i>			
	Weekly	3,135	61.66	
	Less than weekly	1,949	38.34	
	<i>Spending time home alone</i>			
	Yes	3,060	60.19	
	No	2,024	39.81	
<i>Distal parenting factors</i>				
Parent discipline approach	<i>Strongly power assertive</i>			
	Never	1,324	26.04	
	Sometimes	3,061	60.21	
	Always	699	13.75	
	<i>Mildly power assertive</i>			
	Never	2,194	43.15	
	Sometimes	2,486	48.90	

Table 1.
(continued) Sample characteristics

Category	Variable	N			%
	Always	404			7.95
	<i>Non-power assertive</i>				
	Never	422			8.30
	Sometimes	2,035			40.03
	Always	2,627			51.67

Continuous variables						
Category	Variable	Mean	Std. Dev	Skewness	Range	Cronbach's α
Distal parenting factors						
Parent-child relationship	Closeness	32.14	3.22	-1.70	11-35	0.72
	Conflict	14.87	6.21	1.03	8-40	0.83
Parenting style	Psychological autonomy granting	18.42	2.99	-0.49	5-25	0.75
	Responsiveness	20.74	3.27	-0.73	7-25	0.72
	Demandingness	18.63	2.70	-0.12	5-25	0.72
Parental knowledge	Monitoring	39.93	4.14	-1.25	8-45	0.86
	Child disclosure	19.47	4.65	-0.56	2-25	0.81
	Parental control	19.89	7.27	-0.88	0-30	0.82
Other control factors						
Family controls	Log of equivalised household income	1.08	0.54	-0.94	0-1.61	/
Child personality	Openness	4.72	1.83	-0.20	0.5-7	0.45
	Conscientiousness	4.30	2.07	-0.12	0.5-7	0.50
	Extraversion	4.00	1.98	0.15	0.5-7	0.68
	Agreeableness	5.00	1.96	-0.51	0.5-7	0.40
Child emotional and behavioural difficulties	Emotional stability	4.40	3.00	-0.10	0.5-7	0.73
	Emotional difficulties	1.72	1.88	1.33	0-10	0.73
	Conduct problems	1.04	1.31	1.64	0-10	0.53
	Hyperactivity or inattention	2.46	2.28	1.03	0-10	0.73
	Peer relationship problems	1.05	1.43	1.86	0-10	0.49
	Prosocial behaviour	8.84	1.47	-1.50	0-10	0.70

Table 1.

Source(s): Author's own work

associated with their Internet use, each of which they could answer "Never or almost never", "Not very often" or "Very or fairly often". The EIU variable counted the number of "Very or fairly often" statements of experience. Each statement is designed to capture a different component of addictive behaviour, as described by Griffiths (2005).

- (1) Felt bothered when I cannot be on the Internet
- (2) Caught myself surfing when I am not really interested
- (3) Spent less time than I should with family, friends or doing coursework because of the Internet
- (4) Tried unsuccessfully to spend less time on the Internet
- (5) I have been annoyed or reluctant when a parent or other adult has asked me to stop using the Internet or playing a digital game
- (6) Gone without eating or sleeping because of the Internet

3.2.2 Explanatory variables.

3.2.2.1 Proximal influences.

3.2.2.1.1 . *Internet-specific parental mediation. Parental supervision of Internet use* is measured by a single categorical variable formed by asking the child whether they are allowed to use the Internet without their parents or another adult checking what they are doing, to which they could respond “Never” (= 0), “Sometimes” (= 1), or “Always” (=2). A binary variable is also included referring to whether the child’s PCG reported using an *Internet filter system* (e.g. Net Nanny) to control the child’s access to the Internet (= 1 if “Yes”; = 0 if “No”).

3.2.2.1.2 . *Parent-child time together and apart.* Three binary variables indicate whether the PCG and child engaged in regular activities together, as reported by the PCG. These three variables, which separate parent-child interactions (dyads) into those who engage in the specified activities weekly (=1), or less than weekly (=0), include *play cards, games, or sports together, do household activities together (e.g. cooking) and go on outings together.* A further binary variable indicates whether the child spent any time *home alone* on an average school day (=1 if yes; = 0 if no), reported by the study child.

3.2.2.2 Distal influences.

3.2.2.2.1 . *Parent disciplinary techniques.* Parental discipline is assessed using child responses to the question: “When you misbehave, how often do your parents do the following?” Children answered this question in response to several different disciplinary techniques (e.g. “shout at you”, “ignore you”) on a three-point scale of “Never”, “Sometimes”, or “Always”. Using this information, disciplinary techniques are classified into three groups based on [Straus and Fauchier \(2007\)](#) and [Gu and Kwok \(2020\)](#). The former distinguishes between power assertive and non-power assertive discipline, while the latter distinguishes between strongly power assertive (physical and psychological aggression) and mildly power assertive discipline (deprivation of privileges and coercive penalties). Three categorical variables are therefore created, each with three levels (0 = “Never”, 1 = “Sometimes”, 2 = “Always”): *strongly power assertive discipline*, which includes shouting at the child, ignoring the child and slapping or hitting the child; *mildly power assertive discipline*, which includes stopping treats or pocket money and grounding the child; and *non-power assertive discipline*, which includes explaining to the child what they have done wrong and offering them treats for being well-behaved.

Since this paper is the first to examine the effect of specific disciplinary techniques on EIU, the following hypotheses, informed by studies on the impacts of disciplinary techniques on children’s outcomes and attachment ([Bosmans et al., 2011](#); [Taillieu and Brownridge, 2013](#)), are examined:

- H1. More frequently employing strongly power assertive disciplinary techniques is associated with greater EIU symptoms.
- H2. More frequently employing mildly power assertive disciplinary techniques is associated with greater EIU symptoms.
- H3. More frequently employing non-power assertive disciplinary techniques is associated with fewer EIU symptoms.

3.2.2.2.2 . *Parent-child relationship.* The level of closeness and conflict between the PCG and the study child at age 13 is assessed using two subscales of the *Short-Form Pianta Child-Parent Relationship Scale* ([Pianta, 1992](#)), completed by the PCG. The *closeness* subscale consists of 7 items measuring the PCG’s perception of how well they get on with the child and their feelings of effectiveness as a parent. The *conflicts* subscale comprises 8 items, measuring the PCG’s perceptions of difficulties in the relationship.

3.2.2.2.3 . *Parenting style.* The degree to which mother’s grant *autonomy* to their child, respond to their child and command their child is examined using three corresponding

subscales from the *Parenting Style Inventory II* (Darling and Toyokawa, 1997). Higher scores on each of these subscales of *psychological autonomy granting*, *responsiveness* and *demandingness* infer more positive parenting. The three subscales are constructed using the child's own report and are designed to be independent of specific parenting practices.

3.2.2.2.4 . *Parental knowledge*. Parental knowledge of the child's daily activities at 13 is assessed using three subscales devised by Kerr and Stattin (2000). The *parental monitoring* subscale is constructed using the PCG's self-report and measured knowledge of the child's whereabouts, activities and associations. Similarly, the *child disclosure* subscale uses the PCG's self-report and measures the child's spontaneity and willingness to disclose information to the parent. Finally, the *parental control* subscale uses information from the child's self-report which includes questions about the extent of permissions the child required from parents before partaking in certain activities.

3.2.2.3 Additional household controls. Control variables related to the child and family included including the child's *sex* (= 0 if female; = 1 if male), the socioeconomic status of the family as indicated by the *log of equivalised household income*, and *family social class* which refers to the highest social class status of both partners (if applicable) in the household (= 1 if managerial or professional; = 0 otherwise). The following parental variables are assessed using data from the period when the study child was 13 years old: Single-parenthood (= 0 if two-parent family; = 1 if one-parent), the employment status of the child's PCG (= 0 if not in employment; = 1 if employed), the highest level of education received by the child's PCG (0 = "lower secondary or less", 1 = "higher secondary", 2 = "non-degree level qualification", 3 = "college degree or higher"), and the age of the child's PCG (0 = "younger than 40 years old", 1 = "40–50 years old", 2 = "older than 50 years old") and the depression status of the child's PCG (= 0 if not depressed; = 1 if depressed).

3.3 Modelling strategy

The dependent variable is the count of EIU symptoms at 17 or 18 years (depicted in Figure 2). As a discrete, non-negative, overdispersed variable with a variance (2.65) greater than the mean (1.5), a negative binomial regression is the most appropriate choice of model. This may be expressed as:

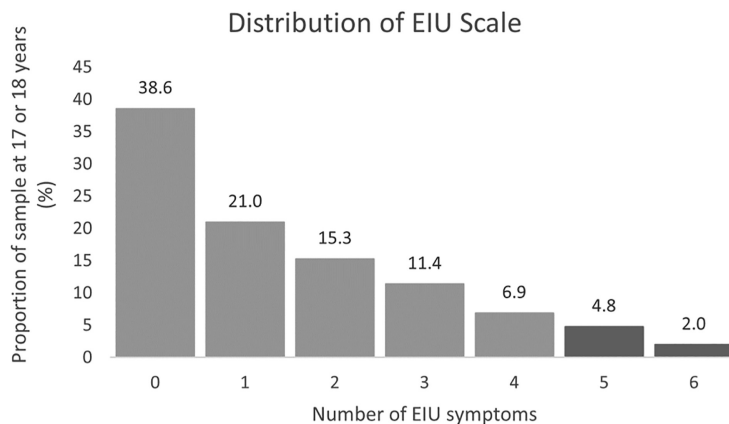


Figure 2.
Distribution of EIU
symptoms

Source(s): Author's own creation

$$\Pr(y_i = y_i^*) = \frac{\Gamma(y_i^* + v)}{\Gamma(y_i^* + 1)\Gamma(v)} \left(\frac{v}{v + u_i}\right)^v \times \left(\frac{u_i}{v + u_i}\right)^{y_i^*}$$

$y_i^* = 0, 1, 2, \dots, 6$

where y_i is the number of EIU symptoms at age 17 or 18, Γ is the gamma distribution function, with

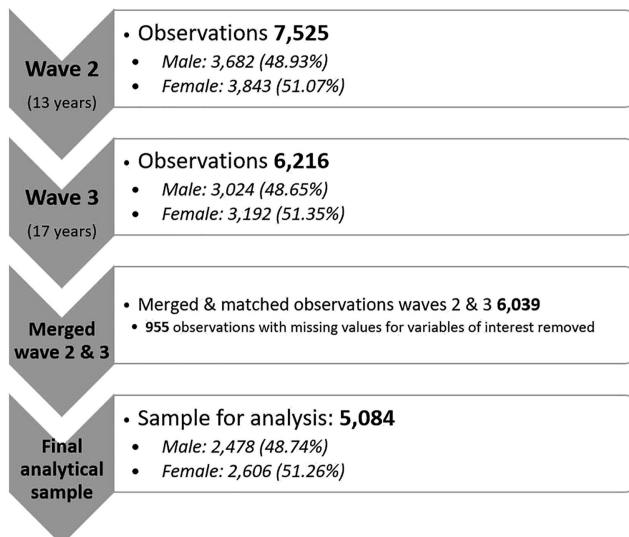
$$u_i = \exp(x_i\beta), v = \alpha^{-1} \exp(x_i\beta)$$

x_i is the vector of explanatory variables at age 13, and β are parameters to be estimated.

The main analysis, denoted Model 1, includes the independent variables outlined previously, where the exposures of interest include proximal measures of internet-specific parenting interventions and time spent with child doing activities, as well as distal influences including indicators of disciplinary techniques, the parent-child relationship, parenting style, parental knowledge of the child’s activities. Background household factors are included as controls.

A pooled analytical sample size consists of 5,084 observations, the derivation for which is provided in Figure 3, and separate models are estimated for the 2,478 males and 2,606 females, to examine sex differentials. All analysis was performed using STATA 16. The threshold for statistical significance is a p -value of $p < 0.05$.

A second model, Model 2, is designed as a robustness check of the stability of associations between parental influences and EIU, where Model 1 is further adjusted to include other influences from PBT, including indicators of the child’s personality traits and emotional and behavioural difficulties at 13. The child’s personality is measured using five subscales derived from the *Ten Item Personality Inventory* completed by the child’s PCG (Gosling et al., 2003): *openness, conscientiousness, extraversion, agreeableness* and *emotional stability*. The child’s socio-emotional and behavioural difficulties are measured by five subscales derived from the *Strengths and Difficulties Questionnaire*, completed by the PCG (Goodman, 1997): *emotional difficulties, conduct problems, hyperactivity or inattention, peer relationship*



Source(s): Author’s own creation

Figure 3.
Derivation of analytical
sample

problems and *prosocial behaviour*. Higher scores on each of the first four subscales relate to greater difficulties, while the fifth subscale is an indicator of positive behaviour.

4. Results

The results of the regression analysis on symptoms of EIU are displayed in [Table 2](#), where estimations are reported as marginal effects; model estimates are presented for the total pooled sample, as well as the male and female sex-separated samples. Model 1 includes all potential parental influences and child and household controls as explanatory variables. Model 2 additionally includes measures of the child's personality, emotional and behavioural difficulties as explanatory variables.

The results from both models demonstrate that sex is a significant predictor of EIU symptoms, where females are estimated to report significantly more EIU symptoms than males. Turning first to proximal parental influences on EIU, internet-specific mediation by parents is not shown to have a statistically significant estimated effect on EIU symptoms. On the other hand, children who play cards, games, or sports with their PCG weekly are estimated to have a lower number of EIU symptoms compared with those having lower frequency of playing cards, games, or sports together with their PCG. However, examining the estimation results separated by sex, shows that this association is only significant for the female-only group. For all groups, no statistically significant association is reported for doing household activities together or going on outings together. The estimates report that children who spent time home alone on an average weekday are estimated to have a higher number of EIU symptoms, and in the sex-separated samples this effect is only significant for the female sample.

Turning to distal parental influences, the estimates in [Table 2](#) report that the use of strongly power assertive discipline by parents is associated with more EIU symptoms. The estimated effect size for "Always" using strongly power assertive discipline is twice as large as that for "Sometimes" using strongly power assertive discipline. "Always" using mildly power assertive discipline is similarly associated with more EIU symptoms among males, but not females. "Sometimes" using non-power assertive discipline is associated with a lower number of EIU symptoms among males but not females.

With regard to parent-child relationships, higher parent-child conflict is associated with more EIU symptoms, with the association driven by females rather than males, as presented in the sex distinction models. Parent-child closeness is not estimated to have a statistically significant influence on EIU. Psychological autonomy granting parenting is the only dimension of parenting style reported to have a statistically significant association with EIU: a higher level of psychological autonomy at age 13 is associated with a reduced number of EIU symptoms at 17. None of the three measures of parental knowledge (PCG monitoring, child disclosure to PCG, parental control) of their child's activities are estimated to be associated with later EIU symptoms.

Finally, the estimated results on the household controls report that the log of equivalised household income is a significant predictor of EIU symptoms, though in the sex breakdown this is only significant for the male-only sample. Children of college-educated PCGs are estimated as more likely to have a greater number of EIU symptoms compared to those whose PCGs have lower-secondary education. Males at 13-year-old for whom their PCG is over the age of 50 are more likely to have an increased count of EIU symptoms, although no similar effect is uncovered for females.

The results depicted for Model 2, which represents a robustness check, demonstrate that the associations on the proximal and distal exposures of interest remain stable upon adjustment for personality traits and emotional and behavioural difficulties of the child at 13 years old.

Dependent variable	All	Model 1 Male	Female	All	Model 2 Male	Female
Symptoms of excessive Internet use						
Child sex: female (reference category (ref): male)	0.522*** (0.047)			0.512*** (0.048)		
<i>Proximal parental influences</i>						
Parental supervision of Internet use: Sometimes (ref: never)	-0.046 (0.085)	-0.070 (0.119)	-0.009 (0.120)	-0.059 (0.086)	-0.095 (0.119)	-0.014 (0.120)
Parental supervision of Internet use: Always (ref: never)	0.019 (0.086)	0.015 (0.118)	0.053 (0.122)	-0.001 (0.087)	-0.015 (0.118)	0.037 (0.122)
Internet filter system implemented (ref: no Internet filter system)	0.065 (0.046)	0.113* (0.061)	0.015 (0.068)	0.063 (0.047)	0.118* (0.061)	0.011 (0.069)
Play cards, games, or sports together: weekly (ref: less than weekly)	-0.155*** (0.049)	-0.103 (0.067)	-0.199*** (0.073)	-0.154*** (0.049)	-0.108 (0.067)	-0.193*** (0.073)
Do household activities together: weekly (ref: less than weekly)	-0.069 (0.053)	-0.086 (0.066)	-0.053 (0.080)	-0.055 (0.054)	-0.085 (0.066)	-0.021 (0.081)
Go on outings together: weekly (ref: less than weekly)	0.062 (0.049)	0.081 (0.064)	0.038 (0.073)	0.062 (0.049)	0.073 (0.064)	0.039 (0.073)
Home alone sometimes or always (ref: never)	0.131*** (0.047)	0.052 (0.065)	0.216*** (0.070)	0.129*** (0.047)	0.047 (0.065)	0.217*** (0.070)
<i>Distal parental influences</i>						
<i>Discipline approach adopted</i>						
Strongly power assertive: Sometimes (ref: never)	0.237*** (0.053)	0.193** (0.078)	0.324*** (0.088)	0.238*** (0.053)	0.193** (0.078)	0.329*** (0.088)
Strongly power assertive: Always (ref: never)	0.544*** (0.085)	0.453*** (0.104)	0.636*** (0.120)	0.531*** (0.085)	0.459*** (0.104)	0.616*** (0.121)
Mildly power assertive: Sometimes (ref: never)	0.059 (0.050)	0.044 (0.068)	0.101 (0.073)	0.059 (0.050)	0.045 (0.068)	0.103 (0.074)
Mildly power assertive: Always (ref: never)	0.169* (0.099)	0.243*** (0.112)	0.026 (0.148)	0.185* (0.100)	0.244*** (0.113)	0.052 (0.148)
Non power assertive: Sometimes (ref: never)	-0.106 (0.088)	-0.239*** (0.113)	0.024 (0.127)	-0.116 (0.089)	-0.243*** (0.114)	0.005 (0.128)
Non power assertive: Always (ref: never)	-0.012 (0.090)	-0.092 (0.114)	0.072 (0.130)	-0.024 (0.091)	-0.110 (0.114)	0.065 (0.131)
Closeness	0.005 (0.008)	-0.002 (0.010)	0.016 (0.012)	0.008 (0.008)	-0.001 (0.011)	0.022* (0.013)

(continued)

Table 2.
Negative binomial
regression results

Dependent variable	Model 1		Model 2	
	All	Female	All	Female
Symptoms of excessive Internet use				
Conflict	0.012*** (0.004)	0.017*** (0.006)	0.014*** (0.005)	0.018** (0.008)
<i>Parenting styles</i>				
Psychological autonomy granting	-0.028*** (0.009)	-0.032** (0.013)	-0.029*** (0.009)	-0.033** (0.013)
Responsiveness	-0.002 (0.008)	-0.012 (0.012)	-0.001 (0.008)	-0.012 (0.012)
Demandingness	-0.012 (0.009)	-0.012 (0.014)	-0.011 (0.009)	-0.010 (0.014)
<i>Parental knowledge</i>				
Parental monitoring	-0.001 (0.007)	0.000 (0.010)	-0.001 (0.007)	0.000 (0.010)
Child disclosure	0.006 (0.006)	0.014 (0.009)	0.006 (0.006)	0.014 (0.009)
Parental control	0.005 (0.003)	0.006 (0.005)	0.005 (0.004)	0.006 (0.005)
<i>Household controls</i>				
Log of equivalised household income	0.106** (0.049)	0.029 (0.069)	0.095* (0.049)	0.014 (0.070)
Family social class: managerial or professional (ref: other)	0.087 (0.055)	0.055 (0.083)	0.081 (0.075)	0.058 (0.083)
Single parent household (ref: two parent)	0.034 (0.078)	-0.047 (0.108)	0.030 (0.077)	-0.056 (0.107)
PGC education attainment: higher-secondary (ref: lower-secondary)	0.116 (0.087)	0.176 (0.133)	0.102 (0.088)	0.166 (0.132)
PGC education attainment: non-degree (ref: lower-secondary)	0.145 (0.090)	0.237* (0.138)	0.125 (0.091)	0.213 (0.138)
PGC education attainment: college (ref: lower-secondary)	0.316*** (0.093)	0.327** (0.143)	0.294*** (0.094)	0.295** (0.143)
PGC: Employed (ref: unemployed)	0.017 (0.052)	0.059 (0.075)	0.020 (0.052)	0.064 (0.075)
PGC age: 40-50 (ref: younger than 40)	0.073 (0.063)	0.054 (0.094)	0.065 (0.063)	0.074 (0.094)

(continued)

Dependent variable	Model 1		Model 2	
	All	Female	All	Female
Symptoms of excessive Internet use				
PCG age: older than 50 (ref: younger than 40)	0.152* (0.084)	0.026 (0.122)	0.151* (0.085)	0.032 (0.123)
PCG: depressed (ref: not depressed)	-0.003 (0.105)	-0.141 (0.155)	0.008 (0.106)	-0.117 (0.155)
<i>Additional adjustment: personality, emotional and behavioural difficulties</i>				
Openness				
Conscientiousness				
Extraversion				
Agreeableness				
Emotional stability				
Strengths and Difficulties Questionnaire: Emotional difficulties				
Strengths and Difficulties Questionnaire: Conduct problems				
Strengths and Difficulties Questionnaire: Hyperactivity or inattention				
Strengths and Difficulties Questionnaire: Peer relationship problems				
Strengths and Difficulties Questionnaire: Prosocial behaviour				
<i>Log pseudolikelihood</i>	-8364.1	-4568.8	-8350.4	-4559.2
<i>Over-dispersion parameter (alpha)</i>	0.584	0.459	0.574	0.449
<i>Akaike Information Criterion</i>	3.310	3.544	3.309	3.544
<i>Bayesian Information Criterion</i>	-26231.2	-10974.6	-26173.3	-10915.1
<i>Observations</i>	5084	2606	5084	2606

Note(s): Estimates are average marginal effects * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors presented in parentheses
Source(s): Author's own work

Table 2.

5. Discussion and conclusion

5.1 Explaining the results

Underpinned by PBT, this paper examines proximal and distal parenting factors associated with adolescents' EIU. The empirical evidence presented reveals that distal parenting approaches are associated with EIU, as well as those more proximal. This research unveils that employment of various discipline techniques by parents in response to misbehaviour appears to be an important determinant of EIU symptoms, representing a novel contribution to understanding in this area. The use of power-assertive discipline (i.e. physical and psychological aggression) is a risk factor of EIU, with stronger and more frequent use of this disciplinary technique having larger effects. This result finds support for hypothesis *H1*. Power-assertive discipline has been found to be associated with internalising problems in adolescents such as depression and anxiety (Bosmans *et al.*, 2011), which may encourage EIU. It is also plausible that children subject to strongly power assertive discipline may seek refuge from aggravated interactions by using the Internet.

Mild power assertive discipline is only estimated to be positively associated with EIU in the case of the male-only sample, and as such, there is support for hypothesis *H2* only in the case of males. On the other hand, sometimes using non-power assertive disciplinary techniques (i.e. explaining to the child what they have done wrong and rewarding the child for good behaviour) is associated with reduced EIU symptoms among males. Hypothesis *H3* is supported in the case for males, and this may be regarded as an encouraging result because it suggests a potentially modifiable parenting behaviour that may lower the risk of adolescents developing EIU. It may be the case that children of parents who employ inductive disciplinary techniques (explaining to the child what they have done wrong following misbehaviour) gain a better understanding of the repercussions of their own behaviours, including the potential consequences of Internet use. We note however, that there appears to be a limit to the extent to which a non-power assertive approach to parenting can affect EIU, where "sometimes" using non-power assertiveness is estimated to reduce the symptoms of EIU for males more than "always" using this approach. The precise reasons for this are unclear from this study, which could be examined in greater detail using qualitative research approaches.

In terms of the estimated influence of other parental factors, firstly more proximal influences, our results fail to find support for the effectiveness of direct internet-specific interventions such as parental supervision of Internet use and the employment of an Internet filter system in preventing EIU. On the other hand, a key finding of our study is that EIU in adolescents is influenced by activities parents engage in with their children and crucially, the strength of this association differs according to type of activity. Regularly playing cards, games, or sports together is found to be strongly protective against the number of EIU symptoms compared to doing household activities together or going on outings together. This is especially evident among females, which aligns with findings that co-playing of video games between parents and girls can have beneficial behavioural effects for girls not observed for boys, thought to be due to improved connectedness, the creation of opportunities for quality time and conversation with daughters (Coyne *et al.*, 2011). A possible conclusion from this is that engaging children in recreational activities such as games and sports may have a stronger displacement effect on Internet use than doing household activities together or going on outings together. Furthermore, simply spending time with parents in a playful capacity is likely to foster better child development (Ginsburg *et al.*, 2007), and potentially suppresses the development of maladaptive cognitions associated with EIU.

Looking at the other distal influences, this study finds that greater parent-child conflict in early adolescence is associated with more EIU symptoms, concurring with other studies that also identify this as a risk factor (Wu *et al.*, 2016; Sela *et al.*, 2020). This effect is almost twice as large for females as for males. Parent-child conflict may be upsetting or distressing for youths and may translate into EIU through the damage inflicted on the adolescent's psychosocial wellbeing. In finding a similar result, Sela *et al.* (2020) concluded that problematic Internet behaviours among young people are developed in a broader context of stressful emotional

conditions, specifying family contexts which maintain environments of conflict as a source of significant stress. We also suggest that adolescents who experience higher levels of conflict with parents may experience poorer bonding and perceive lower levels of social support, which may directly result in spending excessive amounts of time on the Internet as suggested by the cognitive-behavioural model of [Davis \(2001\)](#).

Psychological autonomy granting parenting is by far the most important element of parental style in predicting EIU. While some parents may fear that granting greater amounts of independence to their children may lead to them engaging in problem behaviours such as EIU, our results are reassuring in that no evidence of this is found. Rather, we find that adolescents who receive greater freedoms to engage in independent decision-making have a reduced number of EIU symptoms. Children whose parents are more psychologically autonomy granting have been found to have higher self-esteem ([Zakeri and Karimpour, 2011](#)), which may temper psychological motivations to engage in EIU ([Arafa et al., 2019](#)).

Our results related to parenting patterns and behaviours are broadly in line with [Li et al. \(2018\)](#)'s conclusions that negative parenting patterns are associated with increased EIU and positive parenting patterns are associated with reduced EIU. Moreover, our results suggest that the influence of negative parenting patterns is stronger than the influence of positive parenting patterns. For example, parent-child relationships characterised by greater negativity (i.e. parent-child conflict) are identified as a risk factor of EIU, however we fail to find evidence of parent-child relationships characterised by positivity (i.e. parent-child closeness, as an indicator of attachment from Attachment Theory) as a protective factor. Similarly, the association between strongly power assertive discipline and higher EIU is much larger than the association between non-power assertive discipline and lower EIU.

Females are found to be more at risk of EIU than males in our study. The literature on differences in prevalence of EIU across sex is mixed, although a small majority of studies find a slight male preponderance ([Bisen and Deshpande, 2018](#)). The higher prevalence of EIU in females in our sample may result from cultural differences between Irish 17 or 18-year-olds and their peers in other countries, or perhaps to differences in the emphasis placed on different Internet activities across EIU scales.

Young adolescents from higher income households, whose parents are aged 50 or over, and whose parents are college educated are associated with having more EIU symptoms in later adolescence. Some of these relationships between parent and family background and EIU may be easily interpreted: higher income households are more likely to have better Internet connections and better access to Internet devices ([Fuchs, 2009](#)); older parents may have less awareness of the facilities offered by the Internet and therefore may be less involved in their children's Internet use ([Álvarez et al., 2013](#)). An interesting result found in the analysis of this data is that the effect of having older aged parents on EIU differs by sex – where males of older parents are more likely to exhibit EIU symptoms, which is not estimated as statistically significant for females. This may point to some differences in how adolescent males and females relate to parents of more advanced ages than those of younger ages which is an area which could be studied given trends for shifting parenthood to more advanced reproductive ages ([Sobotka, 2009](#)). We also note the positive association uncovered here between parental education and EIU is somewhat surprising – this contrasts with [Heo et al. \(2014\)](#) who found an inverse relationship and hypothesise that more educated parents might be better-informed and better able to guide their children to more desirable forms of Internet use. A potential explanation may be that when controlling for potential confounders such as household income, family social class and parental employment status, a positive association is found because college-educated parents may have longer working hours than less-educated parents ([Trostel and Walker, 2006](#)), thus, they are less able to adequately supervise Internet use. Parental depression has been identified as a risk factor of EIU by other studies ([Lam, 2015](#)), although our results suggest that this is not the case when controlling for several other aspects of parents' characteristics and behaviours.

5.2 Strengths and limitations

GUI is a nationally representative, large-scale longitudinal study, where the large sample size affords reliability of estimates and permits investigating sex differentials by stratifying models while retaining a large number of observations. The wide-ranging questionnaire offers numerous relevant variables for the study of PBT and Attachment Theory where it is applied to EIU. This allowed us to mutually control for, and simultaneously evaluate, several domains of parental influence on EIU. The majority of extant studies in the literature investigate contemporaneous associations between aspects of parental influence and EIU, whereas the explanatory variables in the present study are measured at a four-year lag from the EIU variable. Longitudinal data affords an examination of temporal precedence of problematic behaviour, and this is a valuable contribution because it allows for greater insight into parenting behaviours that may be antecedents to EIU.

Several limitations in our investigation are also to be acknowledged. Firstly, we rely on parent and child self-reports, which may be subject to biases such as response and recall bias, leading to measurement error. Secondly, despite improvements on existing research which is typically purely cross-sectional, causality in associations cannot be confirmed in this observational setting. It is possible that other confounders of the relationship between parental influence and EIU exist, or that some children already had symptoms of EIU at 13 years old and that certain behaviours by parents demonstrate their reactions to this. Thirdly, although we simultaneously evaluated several domains of parental influence, there are other means through which parents may contribute to their children's EIU that we do not observe in our available dataset. For example, parents' own perceptions of the Internet and Internet uses could influence their child's EIU (see [Chemnad *et al.* \(2022\)](#) and [Matthes *et al.* \(2021\)](#)).

5.3 Implications for policy and future research directions

The array of parental influences identified as risk and protective factors of EIU in this study provide a basis for policy and practical responses designed to both prevent and resolve EIU. The most common policy approach to preventing severe forms of EIU in adolescents is through awareness-raising and educational campaigns ([Kwon, 2012](#)), which are typically aimed at students directly and are provided in school environments. The findings of our work motivate the extension of awareness-raising campaigns to parents, and an incorporation of information detailing how parents might modify their own parenting patterns to guard against the development of EIU in their children.

Parents may expect that directly supervising Internet use or installing an Internet filter system is sufficient in preventing the development of an unhealthy relationship with the Internet. However, our study does not uncover any evidence that such internet-specific forms of parental mediation are effective in preventing EIU. Rather, it is imperative that parents are aware of the influence that their *non-internet* parenting practices may have. For example, regularly playing cards, games, or sports together with their child and using or avoiding power assertive types of discipline may help parents prevent and manage EIU among their adolescents more effectively than implementing an Internet filter system. Granting psychological autonomy to adolescents may also help prevent EIU, which may seem counterintuitive, and so these findings may help inform concerned parents to make better decisions regarding EIU in the home. These messages could be promoted nationally through incorporation in Tusla's "Parenting24seven" campaign ([Tusla, 2021](#)), or internationally through UNICEF's "Parenting is also learned" campaign ([UNICEF, 2018](#)).

Our results also suggest that reducing parent-adolescent conflict and increasing psychological autonomy granting parenting should be of primary focus when treating EIU through family therapy. The former is a key component of approaches such as "multi-group family therapy" ([Kuss and Lopez-Fernandez, 2016](#)), although the latter perhaps deserves more attention than it currently receives.

Finally, the positive association between time spent home alone in early adolescence and later EIU symptoms raises the importance of parents having access to sufficient after-school facilities that are alternatives to being home alone. Certain demographics who may struggle in this regard and need additional supports are single-parent families and parents who have long or irregular working hours. Indeed, a positive association is observed between having a college-educated PCG and the count of EIU symptoms, which we assume is due to college-educated parents being more likely to work full-time (Trostel and Walker, 2006).

The findings of this study open several questions which future research may seek to answer. The linking of PBT and Attachment Theory in the context of compulsive Internet use for the first time in this investigation provides a preliminary basis on which scholars studying such behaviours can further develop, to greater ascertain and authenticate these connections. This may be more precisely examined using metrics which were not available to us for this study, e.g. measures of specific attachment styles (Lopez-Fernandez *et al.*, 2022). Greater development of theory and empirical testing is required concerning the mechanisms through which aspects of parental influence such as disciplinary tactics contribute to EIU. For example, perhaps these factors influence children's motivations for Internet use, or instead they create socio-emotional issues that leave children vulnerable to EIU. Qualitative research and further data collection on attitudes to the Internet may help draw out how children's motivations for Internet use vary across different aspects of parental influence and by sex. Future research could therefore potentially assess the stability of the associations between certain aspects of parental influence and EIU over time.

5.4 Conclusion

This study examined parental influences in early adolescence on the number of EIU symptoms in later adolescence developed on a PBT framework. The findings identified several parental risk and protective factors of EIU, among which the type and frequency of parental discipline, the degree to which the parent-child relationship is characterised by conflict, and psychological autonomy granting parenting styles, are most notable. Parents can be made conscious of the various channels through which their interactions with their children in early adolescence may lead to the development of EIU through awareness campaigns, parenting support groups etc. Most pertinently, our study suggests that general parenting patterns and behaviours are more predictive of EIU than directed internet-specific interventions. These findings are particularly instructive for strategies designed to prevent EIU but may also help inform the resolution of EIU cases.

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Supplementary File

The supplementary material for this article can be found online.

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