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Adolescent Problematic Gaming And Its Association With Parental Factors:

Sharpening The Focus From Distal To Proximal Mechanisms

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Abstract

For most adolescents, playing video games constitutes a pleasurable recreational activity that offers several benefits, including the possibility to explore different identities and to develop meaningful online social connections (Halbrook et al., 2019). Nevertheless, some young users can experience problematic gaming (PG), which is an emerging public health issue associated with significant psycho-social impairment (Nogueira-López et al., 2023). In response to the need of identifying the risk and protective factors of adolescent PG for delineating effective prevention programs (Kiràly et al., 2018), a growing amount of research has documented the key role of parental factors (Nielsen et al., 2020). While much evidence has been accumulated on parental mediation strategies (Lukavskà et al., 2022) and on traditional relational-emotional aspects (Bussone et al., 2020), there are still many gaps and limitations in the literature. In terms of study content, research has investigated parental factors only as proximal processes, without considering them from a broader, macro-level perspective; furthermore, the influence of parental dysfunctional use of digital technologies has been largely understudied, especially in Europe. In terms of study design, there is a dearth of longitudinal and of multi-informant studies, and a scarcity of evidence regarding gender differences.

Drawing from two well-established theoretical frameworks that conceptualise individual adjustment within an ecological perspective, the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) and the Ecological Techno-Subsystem Theory (Johnson & Puplampu, 2008), the current research project aimed to address the abovementioned gaps and to provide novel evidence on the associations between parental factors and adolescent PG by progressively sharpening the focus from distal to proximal and individual levels.

Study 1: this multi-level study examined the role of macro-level factors (i.e., family benefits and economic inequalities) and of proximal-level factors (i.e., perceived parental regulation and monitoring, perceived family support) in explaining the risk of PG in a representative sample of 15- to 16-year-old students ($n = 88\,998$; 49.2% males) living in 30 European countries. Data were drawn

from the 2019 European School Survey Project on Alcohol and Other Drugs (ESPAD) and from international public datasets, and were analysed using a multi-level logistic regression. At a macro-level, higher family benefits were associated with a reduced risk of adolescent PG, while economic inequalities were found to increase the risk. At a proximal level, the main results indicated that stronger parental regulation and higher family support were found to lower the risk of PG among adolescents.

Study 2: this dyadic study focused on the proximal level by investigating multiple informants' reports of adolescent PG and maternal behaviours (i.e., warmth and indifference) and by disentangling the associations between the behaviours that were shared by mothers and adolescents from those that were unique to each member by means of common fate model (CFM) analyses. Data were collected at school in Italy by using self-administered online questionnaires from $n = 137$ mother-adolescent dyads. The mean age of adolescents ($n = 92$ males, $n = 42$ females, $n = 3$ nonbinary) was 14.68 (± 1.25) years and that of mothers 47.48 (± 4.69) years. Within-reporter interclass correlations revealed positive associations between maternal indifference and adolescent PG for both informants. CFM results indicated that correlations between maternal behaviours and adolescent PG based on shared perceptions did not reach statistical significance, whereas correlations based on unique mothers' perceptions were statistically significant for all the observed relationships.

Study 3: this longitudinal study further deepened the knowledge at the proximal level by means of a two-wave research (with a six-month time interval) testing a model that evaluated the direct impact of maternal and paternal phubbing behaviours (i.e., snubbing via mobile phone) at Wave 1 (W1) on later adolescent PG at Wave 2 (W2) and their indirect impact via the mediating role of maternal and paternal indifference at W2, with a specific focus on gender differences. Data were collected at school in Italy via self-administered online surveys, and the final sample comprised $n = 557$ adolescent gamers ($M_{age} = 15.62 \pm 1.54$; 69% males). Path analyses and multi-group comparisons were performed. Parental phubbing at W1 increased parental indifference at W2 in both mothers and fathers. Maternal phubbing at W1 indirectly predicted adolescent PG at W2 via increased maternal

indifference at W2 in both males and females, whereas paternal phubbing at W1 directly and indirectly predicted adolescent PG at W2 via paternal indifference at W2 only in females.

Study 4: this cross-sectional study sharpened the focus on the associations between parental practices and adolescent PG by considering, at the individual level, the possible mediating roles of the satisfaction and frustration of basic psychological needs for autonomy, competence and relatedness. More precisely, this cross-sectional study separately examined, in mothers and fathers, the direct associations between supportive parenting practices (i.e., autonomy support, structure, warmth) and thwarting practices (i.e., coercion, chaos, rejection) and adolescent PG, their indirect associations via the satisfaction and the frustration of basic psychological needs, and potential gender differences. Data were collected at school in Italy via self-administered online questionnaires and the final sample comprised $n = 1193$ gamers ($M_{age} = 15.81 \pm 1.58$; 64.3% males). Path analyses and multi-group comparisons were conducted. Coercion by both parents was directly associated with higher PG among all adolescents, while chaos by both parents was directly associated with higher PG only in males. Furthermore, the three thwarting practices by both parents were indirectly associated with higher adolescent PG via increased need frustration, whereas autonomy support (supportive practice) only by fathers was indirectly related to lower adolescent PG via reduced need frustration, with no gender differences emerging in the indirect associations.

In conclusion, taken together, the findings of the four studies could be regarded as an original empirical contribution showing the relevance to consider the associations between parental factors and adolescent PG at multiple levels for a more accurate understanding of this condition.
The results reported in the present doctoral dissertation may have important implications for social welfare policies implemented by national governments, for prevention programs tackling adolescent PG delivered by healthcare professionals and for clinicians helping adolescents and their families to develop positive interpersonal relationships and a healthy use of digital technologies.

Abstract (Italian)

Per molti adolescenti, giocare ai videogiochi costituisce un'attività ricreativa piacevole che offre numerosi benefici, tra cui la possibilità di esplorare identità differenti e di sviluppare connessioni sociali online significative (Halbrook et al., 2019). Ciononostante, alcuni giovani utenti possono sperimentare i sintomi del gaming problematico (GP), che è un'emergente problema di salute pubblica associato ad un'importante compromissione psico-sociale (Nogueira-López et al., 2023). In risposta alla necessità di identificare i fattori di rischio e di protezione per il GP adolescenziale al fine di delineare programmi di prevenzione efficaci (Kiràly et al., 2018), una crescente mole di ricerche ha documentato il ruolo chiave dei fattori genitoriali (Nielsen et al., 2020). Mentre molte evidenze sono state accumulate circa le strategie di mediazione genitoriale (Lukavskà et al., 2022) e tradizionali aspetti relazionali-emotivi (Bussone et al., 2020), ci sono ancora diverse lacune e limitazioni nella letteratura scientifica. In termini di contenuti, la ricerca ha investigato i fattori genitoriali soltanto come processi prossimali, senza considerarli da una prospettiva più ampia e di macro-livello; inoltre, l'influenza dell'uso disfunzionale delle tecnologie digitali da parte dei genitori è stata poco studiata, soprattutto in Europa. In termini di design degli studi, c'è una carenza di studi longitudinali e multi-informant, ed una scarsità di evidenze riguardanti le differenze di genere.

Traendo spunto da due consolidate cornici teoriche che concettualizzano lo sviluppo individuale secondo una prospettiva ecologica, il Modello delle Determinanti della Salute (Dahlgren & Whitehead, 1991; 2021) e la Teoria Ecologica del Sottosistema Tecnologico (Johnson & Puplampu, 2008), il presente progetto di ricerca mirava a colmare le lacune soprammenzionate e a fornire nuove evidenze sulle associazioni tra i fattori genitoriali e il GP adolescenziale restringendo progressivamente il focus da un livello distale, a prossimale ed individuale.

Studio 1: questo studio multi-livello ha esaminato il ruolo di fattori di macro-livello (ovvero, benefici fiscali per le famiglie e disuguaglianze economiche) e di fattori di livello prossimale (ovvero, misure percepite di regolazione e monitoraggio genitoriali e di supporto familiare) nello spiegare il rischio di GP in un campione rappresentativo di studenti di età compresa tra i 15 e i 16 anni ($n = 88$

998; 49.2% maschi) che vivono in 30 Paesi Europei. I dati sono stati ottenuti dall'indagine epidemiologica condotta nel 2019 dall'European School Survey Project on Alcohol and Other Drugs (ESPAD) e da dataset pubblici internazionali, e sono stati analizzati mediante modelli di regressione logistica multi-livello. A livello macro, maggiori benefici fiscali per le famiglie sono risultati associati ad un minore rischio di GP adolescenziale, mentre le disuguaglianze economiche sono risultate aumentare il rischio di GP. A livello prossimale, i risultati principali hanno indicato che una maggiore regolazione genitoriale ed un più elevato supporto familiare sembrano ridurre il rischio di GP tra gli adolescenti.

Studio 2: questo studio diadico si è focalizzato sul livello prossimale analizzando i report di più informant sul GP adolescenziale e sui comportamenti materni (ovvero, calore e indifferenza) e distinguendo le associazioni tra i comportamenti che erano condivise da madri e adolescenti da quelle che erano percepite in modo unico da ciascun membro attraverso un modello di analisi statistica denominato common fate model (CFM). I dati sono stati raccolti in Italia per mezzo di questionari online autosomministrati a scuola, da $n = 137$ diadi composte da madri e adolescenti. L'età media degli adolescenti ($n = 92$ maschi, $n = 42$ femmine, $n = 3$ non binari) era di 14.68 (±1.25) anni e quella delle madri era di 47.48 (± 4.69). Le correlazioni interclasse tra i reporters hanno rivelato associazioni positive tra l'indifferenza materna e il GP adolescenziale per entrambi gli informant. I risultati del CFM hanno indicato che le correlazioni tra i comportamenti materni e il GP adolescenziale basate sulle percezioni condivise non hanno raggiunto la significatività statistica, mentre le correlazioni basate sulle percezioni uniche delle madri sono risultate statisticamente significative per tutte le relazioni analizzate.

Studio 3: questo studio longitudinale ha ulteriormente approfondito la conoscenza a livello prossimale attraverso l'implementazione di una ricerca a due tempi (con un intervallo di sei mesi) atta a testare un modello che valutasse l'impatto diretto dei comportamenti materni e paterni di phubbing (ovvero, snobbare attraverso lo smartphone) al Tempo 1 (T1) sul successivo GP adolescenziale al Tempo 2 (T2) e il loro impatto indiretto attraverso il ruolo mediatore

dell'indifferenza materna e paterna a T2, con un focus specifico sulle differenze di genere. I dati sono stati raccolti in Italia mediante questionari online somministrati a scuola, e il campione finale ha compreso $n = 557$ adolescenti che giocano ai videogiochi ($M_{età} = 15.62 \pm 1.54$; 69% maschi). Come analisi statistiche, sono stati condotti modelli di path analisi e confronti multi-gruppo. Il phubbing genitoriale a T1 è risultato aumentare l'indifferenza genitoriale a T2 sia nelle madri sia nei padri. Il phubbing materno a T1 è risultato predire in modo indiretto il GP adolescenziale a T2 attraverso una maggiore indifferenza materna a T2 sia nei maschi sia nelle femmine, mentre il phubbing paterno a T1 è risultato predire il GP adolescenziale a T2 in modo diretto, e in modo indiretto attraverso una maggiore indifferenza paterna a T2, solo nelle femmine.

Studio 4: questo studio trasversale ha ristretto il focus sulle associazioni tra le pratiche genitoriali e il GP adolescenziale prendendo in considerazione, a livello individuale, il possibile ruolo mediatore della soddisfazione e della frustrazione dei bisogni psicologici di base di autonomia, competenza e relazionalità. Nello specifico, questo studio trasversale ha esaminato, distinguendo tra madri e padri, le associazioni dirette tra pratiche genitoriali supportive (ovvero, supporto all'autonomia, struttura e calore) e pratiche ostacolanti (ovvero, coercizione, caos e rifiuto) e il GP adolescenziale, le loro associazioni indirette attraverso la soddisfazione e la frustrazione dei bisogni psicologici di base, e possibili differenze di genere. I dati sono stati raccolti in Italia mediante questionari online somministrati a scuola, e il campione finale ha compreso $n = 1193$ adolescenti che giocano ai videogiochi ($M_{età} = 15.81 \pm 1.58$; 64.3% maschi). Come analisi statistiche, sono stati condotti modelli di path analisi e confronti multi-gruppo. La coercizione da parte di entrambi i genitori è risultata associata in modo diretto ad un maggior GP in tutti gli adolescenti, mentre il caos da parte di entrambi i genitori è risultato associato in modo diretto ad un maggior GP solo nei maschi. Inoltre, le tre pratiche ostacolanti da parte di entrambi i genitori sono risultate indirettamente associate ad un maggior GP adolescenziale attraverso la frustrazione dei bisogni psicologici di base, mentre il supporto all'autonomia (pratica supportiva) solo da parte dei padri è risultato indirettamente associato

ad un minor GP adolescenziale attraverso la frustrazione dei bisogni psicologici di base, indistintamente per maschi e femmine.

In conclusione, nel loro insieme, i risultati dei quattro studi possono essere considerati come un contributo empirico originale che ha dimostrato la rilevanza del considerare le associazioni tra i fattori genitoriali e il GP adolescenziale a più livelli di analisi per una comprensione più accurata della condizione. I risultati riportati nel presente lavoro di tesi possono avere delle importanti implicazioni per le politiche di welfare sociale implementate dai governi nazionali, per i programmi di prevenzione del GP in adolescenza attuati dai professionisti della salute e per gli esperti clinici che aiutano gli adolescenti e i loro genitori a sviluppare relazioni interpersonali positive ed un uso sano delle tecnologie digitali.

Overview

Playing video games has become an increasingly popular pastime activity among adolescents worldwide. However, there is empirical evidence suggesting that gaming could become problematic (PG) for certain users (Gao et al., 2022; Männikkö et al., 2020). In the last decade, a growing number of studies has been conducted to identify the possible risk and protective factors underlying this condition, among which parental factors and behaviours emerged as significantly associated with adolescent PG (Nielsen et al., 2020). Despite much evidence has been accumulated on the influence of both parental mediation practices, aimed at regulating adolescent's video games use and, and on general parenting practices, mainly having an impact from a relational-emotional standpoint, there are still gaps and limitations that should be addressed.

By adopting an overarching and comprehensive approach that allows to progressively sharpen the focus from distal to proximal and individual factors, the present thesis aimed to expand current knowledge by examining how parental and family factors at multiple levels are involved in explaining PG among adolescents. The specific content of each chapter is reported below.

Chapter 1 will provide an overview presentation of the most accurate definitions of PG and its conceptualization in the main diagnostic manuals, with attention to the on-going nosological debate over its criteria, alongside with a detailed argumentation on the relevance of investigating this condition in adolescence and preventing maladaptive patterns of use.

Chapter 2 will underline the role of parents during the challenging period of adolescence and describe the available evidence on the associations between different parental behaviours and characteristics and adolescent PG. Furthermore, the chapter will introduce two well-established and influential theoretical frameworks that adopted a multi-level perspective to the study of adolescent health: the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) and the Ecological Techno-Subsystem Theory (Johnson & Puplampu, 2008). These two frameworks guided the design and implementation of the logical succession of four studies carried out in the context of

the present doctoral project to gain an in-depth understanding of the associations between parenting and adolescent PG based on specific aims and hypotheses that are presented.

Chapter 3 will illustrate a multi-level study which examined, at a macro-level, the role of family and socioeconomic indicators of the welfare state, and, at a proximal level, the contribution of parental and family behaviours in explaining cross-national variations in the risk of PG in a representative sample of 15- to 16-year-old students living in 30 European countries. Part of the results has been published in *Addiction* (Colasante, Pivetta et al., 2022).

Chapter 4 will present a dyadic study that focused on the proximal level by investigating multiple informants' reports of adolescent PG and maternal behaviours (i.e., warmth and indifference) and by disentangling the associations between the behaviours that are shared by mothers and adolescents from those that were unique to each member. Part of the findings has been published in *Addictive Behaviours* (Pivetta et al., 2023).

Chapter 5 will report a two-wave longitudinal study that deepened the knowledge at the proximal level by evaluating the impact of parental digital behaviours, specifically of parental phubbing (i.e., snubbing via mobile phone), in predicting adolescent PG, via the mediating role of increased parental indifference over time. Part of the results has been published in *Computers in Human Behaviors* (Pivetta et al., 2024).

Chapter 6 will present a cross-sectional study that further restricted the focus on the associations between three supportive parenting practices (i.e., autonomy support, structure, warmth) and three thwarting practices (i.e., coercion, chaos, rejection) and adolescent PG by considering, at the individual level, the mediating role of basic psychological need satisfaction and frustration. Part of the findings has been reported in a manuscript which is currently under review in a peer-reviewed journal.

Chapter 7 will summarize and further discuss the main findings from each study (Chapters 3-6), identify some limitations and directions for future research and discuss some practical implications for policymakers and healthcare professionals working to prevent PG in youth.

Chapter 1

General Introduction

1.1 Understanding Problematic Gaming (PG)

1.1.1 Definition of Gaming and its Benefits

In his seminal work "Homo Ludens", published in 1938, the cultural historian Huizinga defined play as "a free activity standing quite consciously outside 'ordinary' life as being 'not serious', but at the same time absorbing the player intensely and utterly" (Huizinga, 1938; p.13). Despite many decades have passed since the release of this book, the original definition proposed by Huizinga could still be applicable to describe the act of playing… video games, with some annotations. Indeed, while it is well-established that playing video games nowadays constitutes a highly engaging leisure activity for individuals around the world (Pontes et al., 2022), the adjectives 'free', 'outside ordinary' and 'not serious' could be questionable. In fact, as reported by Statista (2023), the global gaming market continues to register an upward trend, with the overall number of gamers expected to be around 3.1 billion in 2027 and the revenues of digital gaming worldwide estimated to reach nearly 300 billion of U.S. dollars. These figures show how gaming has become an increasingly 'popular' and 'ordinary' activity, penetrating daily life and gaining formal consideration, both for the economic gains that it provides, and, most importantly, for the emerging professional opportunities that it offers, involving teams of individuals working as game developers, advertisers and professional players (Bihari & Pattanaik, 2023). Furthermore, not even to mention, the use (and possible misuse) of video games has become an object of international academic research since the early 1990s (Griffiths et al., 2012).

Starting from its definition, one may wonder what a video game is. According to the essentialistic definitional approach by Bergonse (2017, p.253), a video game can synthetically be described as "a mode of interaction between a player, a machine with an electronic visual display,

and possibly other players, that is mediated by a meaningful fictional context, and sustained by an emotional attachment between the player and the outcomes of his/her actions within this fictional context." Based on this, the first video game that used digital computing hardware and was commercialized to a large audience can be considered *Spacewar!,* developed in 1962 by Russell, Graetz and Witanen, three young researchers working at the Massachusetts Institute of Technology in Boston, USA (Ivory, 2015). After the first video games prototypes, several coin-operated arcade games (e.g. *Pac-Man*) were released, which, however, contributed to a remarkable video games industry crisis in 1983. Nevertheless, only few years later, thanks to the rise of personal computers and home consoles, the video games industry not only recovered, but also registered a considerable increase in the sales of innovative products, such as the iconic *Super Mario Brothers* games produced by the Japanese company Nintendo (Ivory, 2015). With the rapid pace of innovation, characterized by technological advancements such as increased graphical realism, rapid data processing, improved user interfaces, handheld devices (e.g., Game Boy, PlayStation), and, crucially, connections to the Internet available 24 hours a day, the video games industry dramatically expanded at the beginning of the 21st century, leading to the establishment of many game companies (e.g., Sony, Microsoft) and to the production of a variety of video games.

To distinguish the different typologies, there are many classifications available. One of the most accredited system of categorization is considered the Entertainment Software Rating Board (ESRB), established in 1994 by the Entertainment Software Association. According to the ESRB, video games can be distinguished into six age-based levels (e.g., everyone, teen, adults only 18+) that are intended to inform individuals (especially parents) about the suitability of a product, alongside with a table of content descriptors (e.g., substances, blood, violence, language, nudity) and interactive elements (e.g., in-game purchases, online interactivity) (ESRB, 2023).

Furthermore, a comprehensive classification of video games genres has been provided by Elliott and colleagues (2012) in a study which identified the following categories by analysing multiple online databases and game archives and by surveying *n* = 2 885 gamers: (i) *Action-Adventure*: video games

requiring action and exploration, mostly in third person perspective; (ii) *Massive Multiplayer Online Role-Playing Games (MMORPGs)*: video games allowing to develop a personalized character and interact collaboratively and/or competitively with other players in a shared online environment; (iii) *First-Person Shooters (FPS)*: video games where players have to kill or be killed in fast, violent actions, typically set in a military or science-fiction world; (iv) *Real-Time Strategy (RTS)*: video games in which players strategically fight from an aerial perspective with no wait between moves; in the specific case that two teams compete against each other in a battlefield, these video games are defined as Multiplayer Online Battle Arena (MOBA); (v) *Card Games*: simulations of classic games without gambling elements; *Sports*: video games characterized by realistic simulations, mainly of team sports; (vi) *Puzzle*: video games requiring matching, deductive reasoning, and other puzzles; (vii) *Rhythm/Party*: dance and music themed video games often implying the use of a controller; (viii) *Driving*: primarily racing video games, involving cars or motorcycles; (ix) *Platformer*: video games in two or three dimensions in which gamers are in competition with others (serving as enemies) in a world requiring precision of actions to achieve objectives; (x) *Other genres*: this category may include other types, such as simulation video games and sandbox, stimulating creativity in different environments.

Thanks to this wide variety of genres, which offers gamers the possibility to interact with a potentially unlimited number of stimuli and individuals in different ways, the use of video games has been associated with several benefits in the cognitive, emotional, social and physical domains (Granic et al., 2014; Markey et al., 2020). From a cognitive standpoint, gaming has been found to improve visuo-spatial abilities, including attention allocation, speed of processing and mental rotation abilities, as well as problem-solving and decision-making skills (Choi et al., 2020). Furthermore, some scholars have documented that action video games, characterized by the presentation of multiple, peripheral, and spatio-temporally unpredictable stimuli, can contribute to improve reading abilities, specifically phonological decoding and visual-to-auditory attentional shifting, in young individuals diagnosed with developmental dyslexia (Franceschini et al., 2017).

From an emotional perspective, gaming can elicit many positive states, for instance, by allowing players to achieve a sense of mastery and control over the challenges arising in the virtual environment, which could be rewarding and boost self-esteem (Tichon & Tornqvist, 2016). Furthermore, by being highly focused on the game, individuals can experience a state of 'flow', that has been defined as a state of complete absorption in a task in which the level of skills well aligns with the level of challenge posed by the task itself (Csíkszentmihályi, 1990); this typically generates a sense of gratification and immersion that may lead the person to lose time perception and even self-consciousness while gaming (Nuyens et al., 2020). This experience of positive affect may be particularly pursued by individuals who have the tendency to use video games to escape from daily stressors and to avoid negative affect (Larche et al., 2021).

In addition, through the customization of personal avatars, video games allow individuals not only to explore but also to express different identities and preferences in a safe and anonymized environment, which, for instance, may be particularly helpful for gender minorities (McKenna et al., 2022). The use of avatars also facilitates gamers to interact with other users without necessarily disclosing information about their real identity, thus providing a unique opportunity for practicing communication and socialization skills in a protected way, especially for individuals having difficulties in dealing with interpersonal situations, such as those high in social anxiety (Gioia et al., 2022; Sioni et al., 2017) and gifted students (Wood & Szymanski, 2020). In fact, from a social perspective, the act of playing video games offers the possibility to connect with others, both in the physical world and, more often, in the virtual world, and it promotes cooperative and prosocial behaviours, as well as social support (Granic et al., 2014).

Finally, several studies have documented that video games can be beneficial for physical health, especially *exergames*, a portmanteau for 'exercise' and 'video games', that are games requiring bodily movements to function, designed to improve or maintain physical fitness with a planned and structured format both in patients and the general population (Benzing & Schmidt, 2018).

1.1.2 When Gaming Becomes Problematic

Despite most individuals play video games in a functional and life-enriching way, taking advantage of the several benefits that have been previously described, a minority of vulnerable players can experience detrimental consequences in diverse life domains due to their excessive and uncontrolled gaming behaviour (Bender et al., 2020).

Firstly, as suggested by Billieux et al. (2019), it is crucial to acknowledge the difference between a high involvement in video games use and a pathological involvement. While it is possible that a person plays video games for a significant amount of time (for instance, more than 20 hours a week) without experiencing loss of control over this activity and tangible negative consequences, other players may become incapable of limiting their gameplay to the detriment of relevant aspects of their life (e.g., occupational activities, social and family relationships, daily duties).

To further understand this qualitative difference, the Dualistic Model of Passion (Vallerand et al., 2015) could be useful: when a passion, entailing a strong inclination towards an activity (e.g., gaming) that is highly valued and self-defining, is 'harmonious', it may become part of the self in an integrated and positive way, being fulfilled by the individual on a voluntary basis and without interfering with other life domains; instead, when a passion is 'obsessive', so that one's own identity and self-esteem strictly depend upon the possibility of carrying out that specific activity, it may become maladaptive and transform into a rigid and compulsive behaviour that is difficult to control, causing functional impairment. This is the case when gaming becomes problematic.

To directly cite the words of Griffiths (2005, p.195), it can be stated that "the difference between an excessive healthy enthusiasm and an addiction is that healthy enthusiasms add to life, whereas addictions take away from it." Following this line, over the past two decades, a growing body of research has documented the negative consequences of unregulated gaming behaviours.

A recent review and meta-analysis by Männikkö et al. (2020) synthetized the main adverse health-related outcomes associated with problematic gaming (PG), including psychological, social and physical outcomes. Among the psychological outcomes, individuals with PG reported poorer

mental health, especially symptoms of depression and anxiety, alongside with lower levels of quality of life and of life satisfaction. Furthermore, excessive gaming has been associated with greater levels of impulsivity and poorer self-control, concentration problems and irritability (Sugaya et al., 2019). In addition, PG may also exacerbate aggressive tendencies and interfere with anger management, possibly resulting in a vicious cycle of problematic behaviours (Jeong et al., 2020).

Consistent with this, among the social outcomes, Männikkö and colleagues (2020) evidenced the development of problems in interpersonal relationships, especially conflict with family members and peers, increased levels of loneliness and lower levels of social support. Indeed, in the most severe cases, individuals may progressively avoid social interactions and confine themselves into an isolated place of their house, disengaging from their occupational and educational duties and being totally absorbed by their gaming activities (Stavropoulos et al., 2019). Consequently, it is also possible that young individuals playing video games in a dysfunctional way may experience academic difficulties, including skipping school classes and school homework, to the point that they drop-out from school (Bender et al., 2020). This may progressively lead them to lose contact with the real world and to miss important formative developmental tasks, such as becoming emotionally mature, independent, and employed (Stavropoulos et al., 2019). While this condition of prolonged self-isolation, referred to as 'Hikikomori syndrome', was initially predominant in Eastern countries, especially in Japan, nowadays it has become a widespread phenomenon receiving increasing attention in many countries of the developed world, including Italy (Cerniglia et al., 2017; Ferrante & D'Elia, 2022). Furthermore, among adults, individuals may fail to get significant career opportunities or even decide to quit their jobs due to their intensive and dysregulated participation in gaming (Männikkö et al., 2020).

Finally, among the physical health-related outcomes, excessive gaming has been associated with lower levels of physical activity and greater physical symptoms, including hand and wrist pain associated with a repetitive strain injury, headaches and impairments of the visual system (Männikkö et al., 2020). Furthermore, individuals with PG have reported circadian rhythm sleep disorders, deficient dietary habits and reduced self-hygiene practices (Ellithorpe et al., 2023).

1.1.3 PG in the Diagnostic Manuals and Current Debate

In the last decade, international workgroups of research and clinical experts have provided mounting empirical evidence (e.g., epidemiological, psychometric, clinical, neurological), documenting the potential detrimental effects of excessive gaming (Petry et al., 2013; Saunders et al., 2017). Based on this evidence, the major health institutions have recognized PG as a public health issue and started to include this condition in the main diagnostic manuals for mental health disorders to stimulate further research and increase attention (Montag et al., 2019; Reed et al., 2022).

Specifically, in 2013, the American Psychiatric Association (APA) included Internet Gaming Disorder (IGD) in the Section III "Conditions for Further Studies" of the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). According to the DSM-5 (APA, 2013, p.796), IGD can be defined as the "persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress".

To be diagnosed with IGD, individuals must have experienced at least five out of nine of the following criteria over the past 12 months (DSM-5; APA, 2013):

1. Preoccupation with gaming: a cognitive symptom entailing, for instance, the tendency to think about the previous gaming session or to anticipate the next session;

2. Withdrawal symptoms when gaming is taken away or not possible: this may include the experience of negative emotions, such as sadness, anxiety and irritability;

3. Tolerance: the need to increase time spent playing video games to satisfy the urge;

4. Unsuccessful attempts to reduce or stop gaming: implies the inability to quit a gaming session;

5. Loss of interest in other activities because of gaming: entails the tendency to give up previously enjoyed hobbies, pastimes and activities to exclusively focus on the use of video games;

6. Continuing to game despite problems: it refers to the continuation or even escalation in the use of video games despite the awareness of the occurrence of psychosocial problems;

7. Deceiving family members or others about the amount of time spent on gaming;

8. Gaming to escape or to relieve negative moods: this may include individual attempts to alleviate stress, hopelessness, guilt or boredom;

9. Having risked, jeopardised or lost a relationship, job, or educational or career opportunity because of gaming.

As evidenced in the DSM-5 (APA, 2013), this proposed condition is limited to gaming on the Internet and does not include problems with general use of the Internet, online gambling, or the use of social media or smartphones. Notably, the definition and criteria for IGD originally proposed by the APA in 2013 have remained unchanged in the latest *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR)* released in March 2022 (APA, 2022).

Following the initial inclusion of IGD in the DSM-5 (APA, 2013), which contributed to boost the number of studies regarding this condition, in 2019, the World Health Organization (WHO) officially recognized Gaming Disorder (GD) as a full-fledged diagnostic entity in the section "Disorders due to Addictive Behaviors" of the eleventh revision of the *International Classification of Diseases* (ICD-11; WHO, 2019). Differently from the APA (2013; 2022), which adopted a polythetic approach by allowing the possibility to use a subset of sufficient and necessary criteria to identify the condition of disordered gaming (i.e., at least five), the WHO (2019) applied a more concise and monothetic approach by describing GD as a "pattern of gaming behaviours ("digital-gaming" or "video-gaming"), which may be predominantly online (i.e., over the internet or similar electronic networks) or offline," characterized by all of the following three criteria that need to be endorsed in the last 12 months:

1. Impaired control over gaming: this implies failed attempts to interrupt or diminish gaming involvement; gaming performed in a more extensive way than initially planned;

2. An increasing priority given to gaming to the extent that it takes precedence over other life interests and daily activities;

3. Continuation or escalation of gaming despite the occurrence of negative consequences for the individual and his/her acquaintances.

To meet the diagnosis of GD, the maladaptive pattern of gaming activities has to be either continuous or episodic and recurrent, but it needs to be manifested over a prolonged period over time, that is at least one year as specified above (ICD-11; WHO, 2019). Furthermore, the gaming behaviour has not to be better accounted for by another mental disorder (e.g., Manic Episode) and has not to be due to the effects of a substance or medication. Importantly, the pattern of gaming behaviour has to cause psychological distress or significant impairment in personal, family, social, professional, and/or other important areas of functioning (WHO, 2019).

As pinpointed by Billieux and colleagues (2021), this last point placing the emphasis on functional impairment is crucial for differentiating between individuals with GD and the large number of players engaged in intensive or persistent patterns of gaming (e.g., 20-30 hours per week) without experiencing loss of control and associated harmful consequences. Of note, the WHO (2019) considered both online and offline gaming as potentially associated with functional impairment. Furthermore, one major advantage offered by the WHO guidelines is that they include only a few essential requirements, thus resulting more practical and easily usable by different healthcare practitioners in multiple settings around the world (Billieux et al., 2022).

Notably, the possibility to formally diagnose GD not only paves the way for the effective identification of individuals seeking treatment for this condition, who were previously diagnosed with alternative conditions (e.g., pathological gambling, impulse disorders, mood disorders), but also, it allows for the implementation of precise evidence-based treatments, including large-scale randomized controlled trials with follow-up, and for the development of effective and comprehensive policies and systems of monitoring implemented by national governments (Reed et al., 2022).

Nevertheless, despite there is increasing agreement among researchers and practitioners in the disciplines of psychiatry, clinical psychology and public health, that a dysfunctional use of video games constitutes a public health issue, some scholars have raised their concerns towards the criteria proposed for the diagnosis of IGD/GD, arguing that they may encourage over-pathologization of

gaming behaviours, leading, on one hand, to moral panic, on the other, to inappropriate policies and medical treatments targeting false-positive cases (Aarseth et al., 2017).

In the attempt to achieve a more systematic agreement in the context of the debate, Castro-Calvo and colleagues (2021) carried out a structured and iterative Delphi study by involving a representative and international panels of experts who were invited to critically evaluate, based on the available empirical evidence and on their clinical experience, all the criteria proposed in the DSM-5 (APA, 2013) and in the ICD-11 (WHO, 2019), in terms of diagnostic validity, clinical utility and prognostic value. The results indicated that, among the nine DSM-5 (APA, 2013) criteria, only four of them, namely impaired control, continued use, jeopardizing relationship and/or career opportunity and diminished interests (experts' agreement only for diagnostic validity) were rated as 'very important' or 'extremely important' by at least the 80% of experts. Instead, the criteria of tolerance, deception (family members, therapists or others) and mood regulation were considered as incapable of distinguishing between problematic and non-problematic gaming, while preoccupation and withdrawal symptoms did not reach experts' agreement (Castro-Calvo et al., 2021). In addition, all the criteria proposed in the ICD-11 diagnostic guidelines (WHO, 2019) achieved experts' agreement in terms of diagnostic validity, clinical utility and/or prognostic value, and were thus considered as adequate to diagnose GD and avoid over-pathologizing (Castro-Calvo et al., 2021). However, besides this study was the first to adopt a transparent approach to assess the clinical relevance of the DSM-5 and ICD-11 diagnostic criteria, it only involved 29 experts, mainly operating in Europe and Asia, therefore these results should be considered as preliminary and limited, in that they reflect the view of only a proportion of professionals in the field.

Currently, the debate over the diagnostic criteria is still on-going, with scholars evidencing similar percentages of experts' agreement on the reliability and validity of both the DSM-5 and the ICD-11 criteria (Ferguson & Colwell, 2020) and others specifically analysing the disputed DSM-5 criteria (e.g. tolerance) to provide more robust evidence (Razhum et al., 2023). Alternatively, as proposed by Billieux et al. (2019), diagnostic criteria may be distinguished into core criteria, that are

indicative of pathological behaviours (e.g., loss of control, continuation), and peripheral criteria, that are not necessarily indicative of pathological behaviours (e.g., deception, mood management). Indeed, by considering all criteria to have equal importance, it is possible that, in some cases, especially when functional impairment is not fulfilled, a pathologization of highly involved (but healthy) players may occur, leading to a potential overestimation of cases (Billieux et al., 2019).

At this point, it is also worth mentioning the theoretical contribution by Wegmann et al. (2022), who proposed to combine quantitative (i.e., number of criteria fulfilled), qualitative factors of criteria fulfilled and underlying psychological dimensions to conceptualize Internet use disorders, including gaming, along a continuum. Specifically, four different approaches were identified to define Internet use disorders: (i) based on the number of DSM-5 criteria met, (ii) based on the severity of functional impairment, (iii) based on specific psychological factors and processes (e.g., maladaptive cognitions, dysfunctional coping, impaired inhibitory control), and (iv) based on time spent online. According to Wegmann et al. (2022), the joint combination of these four spectrums allows for properly detect the different subtypes of disordered involvement in online activities. For instance, it is possible that "that for a person fulfilling five out nine DSM-5 criteria (e.g., tolerance, deception, mood modification, preoccupation, loss of interest), the functional impairment is low, the expression or impairment of a mechanism such as inhibitory control is present, and the person spends lots of time online. In contrast, a different individual may fulfil five (partially different) DSM-5 criteria (e.g., preoccupation, loss of control, jeopardizing, continuation, loss of interest), report severe functional impairment, experience high craving, but not spend very much time online (it may be higher than typical use, but lower than in another individual also fulfilling five criteria)" (Wegmann et al., 2022; p.291). This example shows how the condition of IGD can be multifaceted in real scenarios and conveys the message that high preciseness and attention should be paid by researchers and healthcare professionals working with individuals presenting this disorder.

Moving beyond the nosological debate, yet acknowledging the detrimental consequences of excessive gaming, in the present doctoral dissertation, I will refer to the term "Problematic Gaming",

which has been evaluated as less restrictive and medicalized but sufficiently descriptive of the pathological condition by several scholars (Larrieu et al., 2022; Nogueira-López et al., 2023).

1.1.4 Prevalence Rates

In the light of the current debate and considering the relatively recent formal recognition of the condition, it is not surprising that a variety of screening and assessment tools have been developed in the last decade to estimate the prevalence of maladaptive gaming behaviours. According to King and colleagues (2020), 2.5 tools, on average, have been published annually since 2013, either resulting from the adaptation of previous instruments (e.g., word edits or substitutions, new response categories) or being newly developed based on DSM-5 (APA, 2013) or ICD-11 (WHO, 2019) criteria. The main consequence of this heterogeneity of instruments is a reduced accuracy in the prevalence estimates of PG due to the impossibility to directly compare results from studies using different methodological procedures. Furthermore, as reported in a comprehensive systematic review that identified 32 eligible instruments to assess PG (King et al., 2020), there were inconsistencies across tools in symptom coverage, factor analytic approaches, test validity, relationship to impairment and clinical use of the tools, aspects that may have hindered the reliability of the estimates. According to Stevens and colleagues (2021), the choice of the screening tool accounted for 77% of the variance in the prevalence estimates; other confounding variables included sampling methods, sample types and sizes and the use of different cut-offs. In addition, Kim et al. (2022) suggested that geographical and cultural factors may also contribute to increase the variability, since in countries where gaming culture is intensive and pervasive, such as in South Korea, higher rates of disordered gaming may be registered (e.g., 15%-20%), possibly raising concerns about validity issues.

Nevertheless, it is interesting to note that the two most recently published reviews and meta-analyses on the worldwide pooled prevalence of IGD/GD mostly converged in their report of results, by computing a global prevalence of 3.05% (95% CI [2.38, 3.91]) (Stevens et al., 2021) and of 3.3% (95% CI [2.6–4.0]) (Kim et al., 2022), respectively. As noted by Stevens et al. (2021), this prevalence

appears to be comparable with that of some substance use disorders (2.6%) (Degenhardt et al., 2017) and that of problem gambling (around 1%) (Calado & Griffiths, 2016).

However, when examining only studies that applied more stringent criteria, such as stratified random sampling, Stevens et al. (2021) found a prevalence of 1.96% (95% CI [0.19, 17.12]); similarly, by retaining only representative sample studies, Kim et al. (2022) documented that the prevalence estimate was reduced to 2.4% (95% CI [1.7–3.2]), and the adjusted prevalence estimate using the trim-and-fill method was 1.4% (95% CI [0.9–1.9]). In addition, both studies, indicated that the Eastern countries of the world, especially China and South Korea, exhibited the highest prevalence rates of IGD/GD (Kim et al., 2022; Stevens et al., 2021).

Regarding gender differences, Stevens et al. (2021) observed that the rates for IGD/GD were approximately 2.5:1 in favour of males compared to females. However, as noted by some scholars (King et al., 2020; Lopez-Fernandez et al., 2019), this 'gender gap' in the prevalence of PG should be taken carefully, since it is also possible that female gamers may tend to underreport their problems with the use of video games, mainly due to cultural and social reasons supporting the predominance of a masculine gaming culture and its related stereotypes.

Notably, Kim et al. (2022) revealed that, among all age groups, children and adolescent groups (8–18 years) (6.7%) and the adolescent and young adult groups (12–40 years) (6.3%) showed the highest prevalence rates of IGD/GD, figures that are in line with the results by Stevens et al. (2021). Indeed, as reported in the latest available systematic review and meta-analysis on the prevalence of IGD/GD in youth conducted by Gao et al. (2022), the overall pooled prevalence among adolescents (aged 8-18) and young adults (aged 18-28) was 9.9% (95% CI [8.6%–11.3%], and it was specifically of 8.8% (95% CI [7.5%–10.0%]) among adolescents. The prevalence of IGD/GD in males (15.4%) more than doubled that of females (6.4%) (Gao et al., 2022).

With specific regards to Europe, before the first study reported in the present doctoral dissertation was carried out (Chapter 3), the most recent figures based on a cross-national representative sample of adolescents (n = 12 938; seven countries involved) were provided by Müller et al. (2015) in an

epidemiological study indicating that 1.6 % of the adolescents (mean age = 15.8 ± 0.7 years) met five or more criteria for IGD, while 5.1 % were at risk for IGD by fulfilling up to four criteria.

Altogether, these data clearly indicate that PG is a condition that starts to develop early in life, with the onset of dysfunctional gaming patterns that may become progressively habitual and deleterious, hindering the possibility for the youth to effectively achieve important goals (Fam et al., 2018; Sugaya et al., 2019). As stressed by Bender et al. (2020), it is thus important to gain an in-depth knowledge of the factors underlying the onset and maintenance of PG in adolescence, to discourage maladaptive developmental trajectories by developing tailored prevention programs.

1.2 Why Investigating PG in Adolescence

1.2.1 A Vulnerable Population: Characteristics and Risk Factors

As reminded by Steinberg (2017), the word 'adolescence' derives from the Latin verb 'adolescere', which means 'to grow into adulthood', thus implying a period of remarkable transitions and adjustments (e.g., biological, neurological, psychological, social) from the status of a child to that of an adult, from immaturity to maturity, approximately starting from the age of 10 (early adolescence) until the age of 21 (late adolescence). Among the various challenges characterizing the complex stage of adolescence, many developmental psychologists have emphasized the importance of identity formation, the establishment of an integrated, coherent and temporally continuous sense of self, that can only be achieved through exploration and commitment (Marcia, 1991). In this process of individuation, a progressive disengagement and emotional separation from parental figures is fundamental to attain a healthy sense of autonomy and the ability to establish mature and balanced relationships with others, especially with peers and romantic partners (Koepke & Denissen, 2012; Pace & Zappulla, 2012).

Furthermore, according to Siegel (2015), there are four vital features that mainly characterize the period of adolescence: (i) the emotional spark, which entails the experience of emotional states, both positive and negative, in an intensive and bustling way; (ii) the social engagement, which refers

to the tendency of looking for social relationships outside the family circle, mainly entailing friendships and support from peers and other groups (e.g., classmates, sports teams, musical groups, online communities); (iii) the novelty-seeking, which implies the search for exciting and rewarding experiences, in the extreme cases, for strong sensations and risky situations; (iv) the creative exploration, facilitated by the emerging abilities of abstract and critical thinking, which stimulate individuals to generate innovative ideas and to express themselves in a unique way.

However, as shown by research in adolescent brain development (Fuhrmann et al., 2015), the prefrontal cortex and the limbic system, which play critical roles in the regulation of behaviours, emotions and risk evaluation processes, are still under maturation in this stage of life. Consequently, adolescents may experience difficulties in their attempts to achieve the aforementioned developmental tasks and to regulate their own behaviours and emotions in an adaptive way, to the point that some of them may show a heightened vulnerability to various forms of psychopathology, including addictive behaviours associated with the use of technology (Cerniglia et al., 2017).

Specifically, in the last decade, following the introduction of IGD/GD in the main diagnostic manuals for mental health disorders, research on the possible risk factors that may increase maladaptive use of video games in youth has proliferated, as demonstrated by the publication of many systematic reviews (Bender et al., 2020; Gao et al., 2022; Mihara & Higuchi, 2017; Paulus et al., 2018; Rosendo-Rios et al., 2022; Schettler et al., 2022; Sugaya et al., 2019). By integrating the results of these systematic reviews with other relevant information reported in recent and comprehensive articles on the characteristics of PG (e.g., Kiràly et al., 2023), it is possible to group the risk factors currently identified for adolescent PG into three broad categories: individual factors, social factors and game-related factors.

Among the individual factors, neuropsychological vulnerabilities as well as psychopathological features and conditions should be included. Precisely, at a neural level, findings suggest that many cognitive-affective alterations, previously identified for other addictions, have been observed in adolescents with PG compared with healthy controls: in particular, deficits and

impairments have been detected in the prefrontal brain regions (fundamental for cognitive control and decision-making functions), temporo-parietal areas (important for attention processes), as well as fronto-limbic and subcortical regions (necessary for emotion regulation and implied in reward processing) (Schettler et al., 2022).

Consistent with this, many studies have indicated that minors with PG report higher attention problems and preferences for immediate rather that delayed feedback and rewards, to the point that, in some cases, they may have been diagnosed with attention-deficit hyperactivity disorder (Bender et al., 2020). Furthermore, higher levels of impulsivity in all its subcomponents (i.e., positive and negative urgency, lack of premeditation, lack of perseverance, sensation seeking) may act as risk factors in transitioning from healthy to PG (Raybould et al., 2022). As pinpointed by Sugaya et al. (2019), sensation seeking may encourage adolescents to continuously look for novel stimuli through the challenges and adventures of video games, ultimately determining a vicious cycle of stimulus-reward associations that may reinforce addictive patterns of use.

In addition, cognitive factors such as positive metacognitions, referring to the beliefs about the benefits of gaming as a cognitive and affective self-regulation strategy, have been found to play a central role in the pre-engagement phase of video game use, while negative metacognitions, entailing concerns about the uncontrollability and dangers of thoughts and actions related to gaming, appear to be specifically activated in the engagement and post-engagement phases (Akbari et al., 2021; Casale et al., 2021). Furthermore, strictly related to metacognitions, emotion dysregulation has been identified as a major risk factor for adolescent PG, since adolescents lacking emotional clarity, having difficulties in accepting negative emotions and having limited knowledge of adaptive emotion regulation strategies, may display heightened tendencies to use gaming as a coping strategy to escape from stressful life events (Bender et al., 2020; Gioia et al., 2021). Maladaptive emotion regulation strategies such as self-blame, rumination and catastrophizing have also been reported by adolescents with PG (Kökönyei et al., 2019). Relatedly, among the main psychopathological conditions, depression and depressive symptoms as well as anxiety and anxiety symptoms have been consistently

associated with adolescent PG in several cross-sectional studies (Gao et al., 2022), and in emerging longitudinal studies (Teng et al., 2021). The risk, however, is that adolescents intensively playing video games to distract themselves from negative emotions (instead of trying to manage them in functional ways) may further exacerbate their comorbid psychopathological conditions and experience a progressive impairment in their psychosocial functioning (Kiràly et al., 2023).

Among the environmental factors, family and school domains have received the greatest attention. As will be discussed in detail in Chapter 2, parental and family factors can play a central role in the development of PG, since most adolescents, despite being engaged in a process of separation and individuation from their parents, still live within their familial environment, which thus continues to exert an influential impact on adolescent (mal)adjustment (Pace & Zappulla, 2012). As reported by Nielsen et al. (2020), a variety of relational-emotional parental and family factors may enhance the risk for adolescent PG, including the psychological problems of the parents (e.g., internalizing disorders and substance use disorders), negative parenting practices (e.g., neglectful or authoritarian styles), family dysfunction (e.g., lack of cohesion, poor quality of communication) and family conflict. Each of these factors may contribute to create an unpleasant family climate, which may be so harsh for the adolescent to be tolerated that it may induce him/her to escape in the digital world and to use it as a safe place, to distance him/herself from the feelings of sadness, anger or frustration caused by poor family functioning (Gao et al., 2022).

Together with the family context, the school context and school-related factors also play an important role in potentially increasing adolescents' vulnerability to PG (Bender et al., 2020). Specifically, in terms of academic performance, research has repeatedly found that adolescents with PG report lower grades at school, which may either be due to their disinterest in learning before developing PG or may arise as a negative consequence of spending an excessive amount of time on gaming (Hawi et al., 2018). Importantly, poor academic achievement may lead to a range of dysfunctional behaviours, including skipping classes, school truancy and grade repetition, which may further exacerbate adolescents' psychological and social problems, ultimately fuelling PG (Mihara &

Higuchi, 2017). Moreover, research has indicated that both perpetrating actions of bullying, and, conversely, being bullied by schoolmates or by other adolescents, may increase the risk for adolescent PG (Bender et al., 2020; Gao et al., 2022). In addition, it has been shown that establishing affiliations with deviant peers may contribute to heighten the risk of PG, while cultivating a positive teacher-student relationship may be beneficial in buffering the negative effects of problematic interpersonal relationships (Wang et al., 2023).

Finally, the gaming-related factors entailing the structural characteristics of video games, purposely designed to be perceived as highly engaging and rewarding experiences by the profit-oriented industry, can be considered as critical risk factors for PG (Kiràly et al., 2023). For instance, the online modality of gaming, by allowing individuals to interact at any time within safe environments and satisfying one's social needs while remaining anonymous, could enhance the likelihood of problematic engagement, especially for adolescents preferring online social interactions (Heng et al., 2021). Furthermore, some games genres, such as MMORPGs (e.g. Dungeons & Dragons, World of Warcraft), through their ever-evolving immersive environments, which are permanent and keep transforming even when the player disconnect from them, may induce adolescents to play for an extensive period to maintain real-time connections and individual roles within the game (Bender et al., 2020). Furthermore, the presence of intermittent reinforcement in the administration of rewards and the possibility to achieve several in-game goals and to experience the satisfaction deriving from their attainment, may alter the dopamine system in the brain and keep the individual play to maintain a euphoric state (Kiràly et al., 2023). Finally, in recent years, the advancements of technology, by facilitating the use of video games on portable devices, such as smartphones and tablets, and by introducing monetization techniques, in-game transactions (e.g., through online purchases of loot boxes, consisting of consumable virtual items that are randomly assigned to the player buying them) and the personalization of offers, have further increase adolescents' willingness to play video games extensively (Kiràly et al., 2023).

1.2.2 Motives Driving Adolescent PG

Young individuals may turn to video games driven by different motives. As initially proposed by Demetrovics et al. (2011), these include the following nine categories: to avoid contact with reality and the problems of everyday life (escape), to deal with psychological distress (coping), to step out from one's identity and explore new identities in a fantasy world (fantasy), to improve one's own skills, such as coordination and concentration (skill development), to enjoy the benefits of a pastime activity (recreational), to challenge and defeat others to gain a sense of achievement (competition) and to get to know new people and play together with them online (social).

A recent work by Kiràly and colleagues (2022) involving a sample of 14 740 video gamers (mean age = 24.1 years; 89.3% male) confirmed the relevance of six specific motives, namely, escapism, competition and social, together with mastery, stimulation and habit/boredom. Among these motives, research has specifically documented that escapism, coping and social motives are the most frequently and positively associated with an increased risk of gaming problems in youth (Lòpez-Fernandez et al., 2021; Männikkö et al., 2017; Wang et al., 2021).

To further understand the role of escapism and coping motives, the Compensatory Internet Use Theory (CIUT; Kardefelt-Winther, 2014; Melodia et al., 2020) could be useful. According to the CIUT, users are mainly motivated to go online (e.g., to play video games) to avoid dealing with the psychological and contextual stressors that they encounter in the real world, to cope with the negative affect arising from these distressing situations, and to compensate for un-met individual needs. Indeed, by immersing themselves into the fictitious scenarios characterizing video games and by focusing on extra-ordinary tasks, adolescents can distract themselves from their psychological, interpersonal and scholastic problems and seek for alternative ways to compensate for what they feel they lack in real life, for instance social stimulation, attention or social support.

With specific regards to individual needs, many scholars have suggested to adopt the Self-Determination Theory (SDT; Ryan & Deci, 2000; 2017) as a theoretical framework to conceptualize the use of video games (Allen & Anderson, 2018; Mills et al., 2018; Przybylski & Weinstein, 2019).

Based on the SDT, individuals are intrinsically motivated and actively oriented towards the satisfaction of three basic psychological needs that include: (i) autonomy (acting volitionally and being independent when making decisions), (ii) competence (having adequate knowledge and being skilful in what they do), and (iii) relatedness (feeling a sense of belonging and of meaningful connection to others), that are essential to promote an optimal functioning, growth and integration (Ryan & Deci, 2017). Based on this perspective, video games are designed in such a way that they allow adolescents to intensively satisfy all these three needs, since they offer players the possibility to control their goals and actions (autonomy satisfaction), they are optimally challenging (competence satisfaction) and they promote and foster social relationships (relatedness satisfaction) (Allen & Anderson, 2018). Besides being predictive of high game enjoyment, the fact that video games allow for the possibility to fulfil psychological needs becomes even more evident when the frustration of these needs occurs in real life (Przybylski & Weinstein, 2019). If we think, for instance, of an adolescent perceiving external pressures, from parents or from teachers, that make him/her feel untalented or unknowledgeable (competence frustration), feeling forced to do something or behave in a certain way (autonomy frustration), or experiencing indifference and rejection from significant others (relatedness frustration), it may be easy to understand why video games can assume a central role in helping him/her counterbalance the negative effects of such daily obstructions to need satisfaction (Mills et al., 2018). However, as stressed by Bender et al. (2020), an excessive in-game satisfaction of basic psychological needs may constitute one of the most relevant risk factors for adolescent PG, since the perception of an adequate need fulfilment in the virtual world may compensate for the lack of fulfilment in real life to the point that adolescents may prefer to remain engaged in online gaming rather than exposing themselves to physical interactions, tasks and challenges.

Altogether, these theories on gaming motives highlight one crucial, yet controversial, aspect that is distinctive of adolescent gaming: the possibility to improve one's own well-being, which is as much attractive as risky. Indeed, in case that video games use becomes the preferential and mostly

adopted means to manage emotional distress or to satisfy basic psychological needs, adolescents may be entrapped in the online environment and put themselves at high risk of experiencing the most detrimental consequences associated with PG, such as social withdrawal, isolation and reduced self-care, thus generating a vicious cycle that may have severe repercussions on their adjustment.

1.2.3   The Relevance of Prevention

Since adolescent PG, due to its documented harmful consequences (Gao et al., 2022), has been increasingly recognized as a public health burden across the developed world (Kim et al., 2021) and considering that current statistics estimate an upward trend in the number of video game users (Statista, 2023), it becomes fundamental to implement efficient and evidence-based prevention programs to tackle this condition at its earliest stages in order to reduce its incidence, severity and persistence over time (Jeong et al., 2020; Lee et al., 2019; Lòpez-Fernandez et al., 2020).

As a result, government health departments and practitioners from Eastern to Western countries have begun to work on different typologies of prevention programs for PG, including universal, selective and indicated strategies (King et al., 2018). Among the currently identified universal strategies, targeting the general population, irrespectively of their risk level, there are legislative actions, in particular, indications and restrictions on video games genres (e.g., ESRB and PEGI) and mandated shutdowns of gaming services, especially in Asian countries, technological measures, such as time-limit settings and content filters, and educational campaigns to provide information on the condition and raise public awareness (King et al., 2018; Kiràly et al., 2018; Lee et al., 2019). Selective prevention strategies focusing on individuals at above-average risk for developing PG, such as adolescents, entail school-based psycho-educational programs and peer-education, regular screening, mostly at schools and universities, as well as parental and teachers' regulations. Finally, indicated prevention programs designed for individuals who already exhibit PG or detectable signs and symptoms foreshadowing it, include support groups, such as self-help communities, outpatient mental health services and psychosocial rehabilitation (King et al., 2018).

As outlined by Lopez-Fernandez and Kuss (2020), despite the available policy options and preventive actions for gaming-related and Internet-related problems have moved the field forward considerably, current international literature evidences the presence of some contradictions in that not all the strategies that have been implemented have obtained effective results in preventing PG. For instance, at the national level, the severe restrictions imposed by the Chinese government in 2019 to limit the amount of gametime, the bans and governments inspections on gaming companies have been considered 'draconian' and 'deeply misleading' by the scientific community (Colder-Carras et al., 2021). Indeed, this type of policies appear not to reflect current theories and knowledge about PG, not only because they solely focus on gaming hours, which have been demonstrated not to be necessarily indicative of PG (Billieux et al., 2019), but also because they fail to consider the role of gaming in the normative development and its associated benefits, possibly provoking reactance in the youth (Bender et al., 2020). As suggested by Colder-Carras and colleagues (2021), more successful policy measures should be implemented through systemic and collaborative approaches, among stakeholders, governments, practitioners and communities, that are culturally contextualized and sufficiently sensitive to help individuals reduce PG.

Furthermore, another important issue that may have hindered the effectiveness of selective prevention strategies is that much of the literature on the risk and protective factors for adolescent PG derives from cross-sectional studies, thus it may be limited in quality and accuracy. Further longitudinal studies examining causality between certain variables, studies using prospective cohort designs and epidemiological studies involving representative samples of adolescents may be useful to gain more robust evidence for the conceptualization and implementation of tailored prevention programs tackling the development of PG in adolescence (Bender et al., 2020; Kiràly et al., 2018).

In the next Chapter, a specific overview of the available evidence on parental and family risk and protective factors associated with adolescent PG will be provided, alongside with the major literature gaps and limitations that should be addressed by current research in the field of gaming.

Chapter 2

Adolescent PG and Parental Factors

2.1 Why Studying Parental and Family Factors

2.1.1 Role of the Parents in Adolescence

In the previous chapter, the relevance of studying PG in adolescence has been highlighted, with reference to its prevalence rates and possible detrimental consequences, as well as to several individual, social and game-related risk factors. Specifically, among the social factors, a growing amount of research has identified the critical role of parental factors in association with adolescent PG. Why investigating parental factors and behaviours in adolescence is so important?

"Despite the tremendous growth and psychological development that can take place as individuals leave childhood on the road toward adulthood, despite society's pressure on young people to grow up fast, despite all technological and social innovations that have transformed family life, and contrary to claims that parents don't make a difference (that by adolescence, parents' influence is overshadowed by the peer group or the mass media), adolescents continue to need the love, support, and guidance of adults who genuinely care about their development and well-being."

This is how, by means of only one, explicative sentence, Laurence Steinberg (2017, p.121), leading expert of adolescent development, synthesized the important role of the parents during adolescence. Indeed, even if the youngsters are expected to physically and emotionally distance themselves from their parents and take increasing responsibilities for themselves, in line with the process of separation and individuation (Blos, 1979; Soenens et al., 2007), the majority of them, during this stage of life, still live and interact with at least one of their caregivers on a daily basis, thus the quality of parenting and of parent-adolescent relationships inevitably continues to impact adolescent well-being (Lee et al., 2006).

In the last fifty years, many theoretical frameworks have been proposed by developmental psychologists across the globe to conceptualize the characteristics and dimensions of parenting, a construct that can be defined as the set of "parents' child-rearing strategies and behaviours that shape and influence their offspring's development" (Belsky & Jaffee, 2015; p.38).

One of the most accredited evidence-based theory of human socialization that considers the provision of love and support as the core dimension of parenting, consistent with the thought of Steinberg (2017), is the Parental Acceptance and Rejection Theory (PARTheory), initially proposed by Rohner (1986) and later elaborated by Rohner and Khaleque (2012). According to this theory, parenting can be conceived along a continuum that ranges from parental acceptance, entailing the unique dimension of parental warmth expressed through both physical (e.g., hugs, visual attention) and verbal behaviours (e.g., praises, compliments, saying nice things), to parental rejection, which, contrarily, consists into the absence or significant withdrawal of supportive and caring behaviours by parents, as reported in Fig.1.

Figure 1

Parental Acceptance and Rejection Theory.
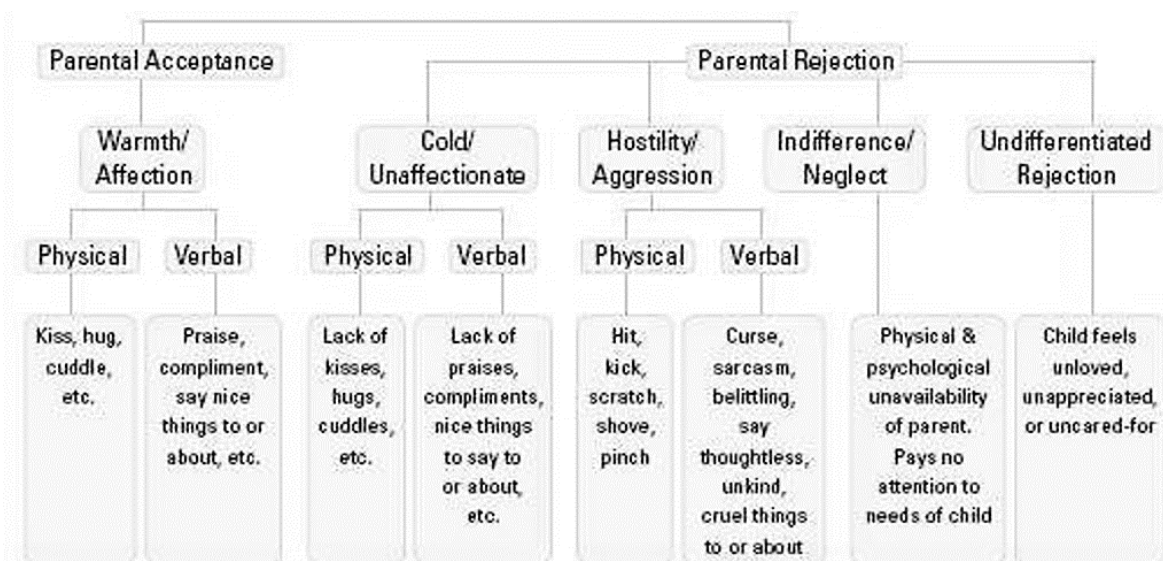
Source: Rohner & Khaleque (2012, p.3).

Specifically, parental rejection has been conceptualized as a broader dimension that can be manifested through four main parental expressions: (i) cold and unaffectionate, through the lack of hugs and praises, (ii) hostile and aggressive, through kicks, scratches, curse and sarcasm (iii) indifference and neglect, entailing parental physical and psychological unavailability and unresponsiveness, (iv) undifferentiated rejection, which makes the adolescent feel unloved and unappreciated (Rohner & Khaleque, 2012). While parental acceptance is fundamental to foster a positive adolescent adjustment, by allowing the youth to experience themselves as individuals worthy of care and attention, parental rejection can act as a major risk factor for adolescent maladjustment. For instance, a study by Ramírez-Uclés et al., (2018) has shown that the more adolescents perceived parental rejection, the greater their levels of hostility, emotional instability and independence were; furthermore, higher parental rejection was associated with lower levels of self-esteem and self-efficacy and a more negative worldview. Coherent with this, a multi-cultural and longitudinal study by Rothenberg et al. (2022) has indicated that increased maternal and paternal rejection positively predicted several externalizing (e.g., truancy, vandalism, bullying, drug and alcohol use) and internalizing problems (e.g., loneliness, nervousness, sadness, and anxiety) in young adolescents.

The centrality of the dimensions of parental warmth and rejection has also been recognized by Skinner and colleagues (2005) in their Motivational Model of Parenting, alongside with four other dimensions that constitute, according to the authors, the foundations of caregiving: structure and chaos, autonomy support and coercion. These six dimensions of parenting have been selected after considering decades of research in developmental psychology examining how parents relate with their offsprings and may thus be considered as reflecting the international consensus on the core features of parenting (Skinner et al., 2005). Moreover, according to the model, these dimensions are crucial to allow children and adolescents to experience themselves as belonging (related), effective (competent) and authentic (autonomous), thus satisfying the three basic psychological needs identified in the Self-Determination Theory (Ryan & Deci, 2000; 2017), which can serve an 'energetic function' in promoting well-being (Skinner et al., 2005; p.190).

Specifically, the dimension of structure consists into the provision of appropriate and consistent rules regarding adolescents' activities and family life, as well as of clear parental expectations for mature behaviours by the offsprings. This dimension of parental involvement in rule setting, especially when conveyed in a supportive way (e.g., by providing a meaningful rationale for requests, by offering choices about how expectations can be met), may be particularly important for adolescent development, since it entails the information and guidance about the pathways that should be pursued to avoid undesired and harmful outcomes (Van Petegem et al., 2017). Opposite to structure, there is the dimension of chaos, which refers to all the parenting behaviours that are incontingent, unpredictable and arbitrary, which contribute to create a laissez-faire climate that may put adolescents at higher risk for problematic behaviours (Skinner et al., 2005). The dimension of autonomy support, instead, refers to the promotion of adolescents' independent functioning, whereby parents, by communicating genuine respect, can encourage their offsprings to express their own personal opinions, to explore their interests, values and preferences and to enact upon them (Soenens et al., 2007). By supporting adolescents' autonomy, parents facilitate the process of separation and individuation which is critical for an adaptive functioning and thus they can help their offsprings make important decisions without influencing them. Lastly, the conceptual opposite of autonomy support is coercion, which is a parenting dimension characterized by punitive and controlling demand for strict obedience and intrusive autocratic style (Skinner et al., 2005). Parental coercion is also referred to as psychological control, a dimension that involves a series of manipulative behaviours and covert strategies, such as instilling anxiety or inducing guilt to push the offsprings to conform to parental requests, which can be highly deleterious, since they inhibit individuation, invalidate the adolescent's sense of self and promote dependency (Soenens & Vansteenkiste, 2010). Not surprisingly, this parenting dimension has been consistently associated with many adverse outcomes in youth, including internalizing and externalizing problems, as well as academic and social problems (Scharf & Goldner, 2018) and adolescent PG (Lin et al., 2020).

2.1.2 What we Know on the Parental and Family Factors Associated with Adolescent PG

Since parents remain one of the most determinant sources of environmental influence on adolescent adjustment (Rothenberg et al., 2022) and, importantly, since they are often the first ones to contact mental health services to seek help for their adolescents having problems with gaming and to understand how they can intervene (Bonnaire et al., 2019; Wartberg et al., 2019), in the last decade, an increasing amount of studies has been conducted to investigate the possible associations between parental factors and adolescent PG (e.g., Coşa et al., 2023; Fam et al., 2023; Lukavskà et al., 2022; Nielsen et al., 2019; 2020; Schneider et al., 2017).

As summarized by Lukasvkà et al. (2022), literature has distinguished two main categories:

(1) parental mediation practices: concerning parental attitudes, efforts and behaviours aimed at regulating adolescents' use of video games, in terms of time limits, gaming contents and modalities;

(2) general parenting practices: entailing a variety of well-established parental characteristics and behaviours that may have an impact from a relational-emotional standpoint.

Specifically, regarding parental mediation practices targeting adolescent gaming, a literature review by Nielsen and colleagues conducted in 2019 identified five types of mediation, that are grounded in media consumption research (Nikken & Jansz, 2006; Valkenburg et al., 2013). These mediation parenting practices that are distinct, but not mutually exclusive, can be described as follows:

- *No mediation*: it consists into the parents taking no action on adolescents' gaming activities; this practice was found to be positively associated with PG, as it may reflect the overall laissez-faire climate and lack of clear regulations described by Skinner et al. (2005) with reference to the dimension of chaos, a critical risk factor for adolescent adjustment;

- *Co-use*: it refers to parent's and adolescent's simultaneous access to a video game and joint play, with both expressing interest and enjoyment for the activity; this practice was found to yield mixed results (Nielsen et al., 2020). Indeed, despite joint media engagement may improve parent-adolescent connectedness and the perceived quality of parent-adolescent relationship (Connell et al., 2015), possibly acting as a protective factor for PG, it is also possible that adolescents may

misinterpret parental co-use efforts as an encouragement for increased video games use (Fam et al., 2023). Consistent with this, a recent systematic review and meta-analysis (Fam et al., 2023) has found that co-using was positively associated with different problematic media uses in both children and adolescents. As argued by the authors, by observing and experiencing high parental engagement in video games use, adolescents may perceive intensive media use as an acceptable norm and thus feel authorized to further engage in this technology-related behaviours, which, however, can become excessive and dysregulated (Fam et al., 2023);

- *Parental monitoring*: it consists into parental knowledge of the adolescents' whereabouts (Stattin & Kerr, 2000), which, in the context of gaming, may concern the video games genres preferably played by the adolescents, the duration of each gaming session and the players with whom the offsprings interact in the online environment; results about this practice were inconsistent (Nielsen et al., 2020), with some research indicating a positive association with PG (Benrazavi et al., 2015) and other not observing significant effects (Smith et al., 2015). A recent meta-analysis by Coşa et al. (2023) has documented a small but negative association between parental monitoring and adolescent PG, suggesting that parents being proactive and carefully consistent in asking questions about gaming activities and online friendships may facilitate adolescents' willingness to disclose information and thus act in a protective way (Smetana, 2017);

- *Active mediation*: it reflects the extent to which parents openly discuss the limits and contents of video games use together with their sons and daughters, by assuming an open-minded attitude and without indulging in criticism (Valkenburg et al., 2013); despite being conceptualized as a possible protective factor, both the reviews by Nielsen et al. (2019) and by Fam et al. (2023) and the meta-analysis by Lukavskà et al. (2022) did not evidence significant associations with adolescent PG. As observed by Fam et al. (2023), while active mediation may be effective at reducing total screen time, it may be less effective at reducing the symptoms of problematic media use, since adolescents may continue thinking about video games or experience negative emotions when playing video games is not allowed;

- *Restrictive mediation:* it refers to parental regulations and limits to adolescents' use of video games that can be mild, severe or even punitive; the restrictions could take the form of verbal communications, of physical actions, such as locking away the equipment (e.g., consoles, controllers) and make it available only if some requisites are met, and they can also technical, with parents using specific software and control systems to block the access to Internet or to certain video games types. While Nielsen et al. (2019) evidenced mixed results for this practice, Fam and colleagues (2023) found that restrictive mediation was associated with reduced PG in children, but not in adolescents, implying that the strictness of this practice may still be significantly influential for young individuals, but may progressively lose its strength when adolescents grow up and become more independent. Notably, the meta-analysis by Lukavskà et al. (2022) revealed that restrictive mediation was associated with higher PG among older adolescents, possibly suggesting that parents imposing rules in a firm and unquestionable way may act in a counterproductive way during late adolescence (Lukavskà et al., 2022; Valkenburg et al., 2013).

Alongside with this preliminary but promising evidence on parental mediation practices, research on parental factors and adolescent PG has also examined several traditional parental characteristics and behaviours, such as attachment and parenting styles (Bussone et al., 2020).

Following the first systematic review on parental factors involved in adolescent PG by Schneider et al. (2017), which included in the qualitative synthesis a limited number of available studies (n = 14), in July 2020, three months before the beginning of my doctoral pathway, Nielsen and colleagues published a more comprehensive systematic literature review that identified six main categories of parental (and family) factors associated with PG in youth, as follows:

- *Parental psychological problems*: acting as possible risk factors for PG, they include both parental internalizing symptoms, mainly depression and anxiety (Wartberg et al., 2019), and parental addictive behaviours, such as substance use disorders and problematic Internet use (Lam et al., 2015). Despite research on these aspects is still limited, a recent longitudinal study by Piao et al.

(2022) provided further evidence that parental depression in particular was significantly associated to adolescent PG and indicated the roles of increased adolescent aggression and decreased adolescent self-control as possible mediators. Indeed, it has been repeatedly demonstrated that depressive parents tend to transmit their negative affect (e.g., sadness, anger) to their children (Goodman, 2020) and to act in an inconsistent and unpredictable way, increasing adolescents' susceptibility to dysregulated behaviours;

- *Parental maltreatment and abuse of the offsprings*: this could be considered as an early-life relational risk factor entailing sexual, emotional or physical abuse, or alternatively, emotional and physical neglect, that can lead to dramatic negative consequences in youth (Cicchetti & Carlson, 1989); the feelings of shame and guilt, and the experience of victimization determined by childhood maltreatment have been found to play a pivotal role in the onset and maintenance of addictive disorders, including the development of PG as a way to functionally compensate for unmet social needs and to cope with overwhelming emotional states and psychological suffering (Benarous et al., 2019; Bussone et al., 2020);

- *Co-parental teamwork*: this factor could be either protective, in case of the parents being collaborative and respectively supportive, as well as coherent and consistent in their choices and behaviours, or risky, when parents are discordant in their parenting decisions and conflictive, lowering the quality of family environment and putting adolescents at higher risk to use video games as a coping strategy (Rehbein & Beier, 2013; Schneider et al., 2017);

- *Parenting styles and practices*: with regards to the four well-known and influential typologies identified by Baumrind (1971), resulting from the combination of low/high levels of parental responsiveness and demandingness, in line with the developmental psychology literature (e.g., Smetana, 2017), only the authoritative parenting style, whereby parents are highly sensitive to their offsprings' needs but also define reasonable limits and expect mature behaviours, was negatively associated with adolescent PG, while authoritarian, permissive, and rejecting parenting styles were found to increase the risk of PG in youth (Nielsen et al., 2020).

In addition, many different parenting practices have been studied in association with adolescent PG, with those labelled as 'emotionally warm', 'supportive' and 'caring' serving as protective factors (Lukavskà et al., 2022), while the practices labelled as 'controlling', 'harsh', 'punitive', 'indifferent' and 'inconsistent' acting as major risk factors (Nielsen et al., 2020). More recently, a metanalysis by Coşa et al. (2023) has evidenced that autonomy-supportive parenting was associated with lower adolescent PG, while parental aversiveness (i.e., lack of parental acceptance) and parental overinvolvement (i.e., parents interfering with adolescent's age-normative autonomy and emotional independence) were linked to higher adolescent PG;

- *Attachment:* despite research examining the contribution of attachment to adolescent PG is still in its infancy (Estèvez et al., 2019), evidence suggests that gamers who report insecure attachment styles (i.e., anxious and avoidant) exhibit more problematic gaming behaviours than those characterized by a secure attachment style (Bussone et al., 2020; Teng et al., 2020). As explained by Bussone and colleagues (2020, p.4), anxiously attached individuals may be driven by the potential of video games to satisfy their "exaggerated needs for interpersonal closeness and support due to their perceived inability to handle stress autonomously"; on the contrary, avoidant individuals may be attracted by video games to suppress and deactivate their needs for interpersonal intimacy, to prevent the frustration and social rejection they already experience in everyday life. In this vein, Scalone et al. (2023) recently showed that individuals with avoidant attachment displayed higher alexithymic features (i.e., concerning the difficulty in identifying and discerning emotions) and externally oriented thinking, which might facilitate the engagement in problematic gaming behaviours as a coping mechanism to regulate negative affect and alleviate the distress arising from close interpersonal interactions.

- *Family functioning*: similarly to parenting styles, this factor could be protective, in case of adaptive family functioning, characterized by family cohesion and family expressiveness of feelings and emotions (Bonnaire & Phan, 2017), a good quality of family communication, high family support and shared social activities that promote family connectedness and constitute an alternative for

adolescents to playing video games (Schneider et al., 2017); however, it may also constitute a relevant risk factor, when there is conflict and discord between family members, worsening family relationships and the overall perception of the family environment; furthermore, low family cohesion and low family adaptability, reflecting familiar difficulties in responding to situational changes and developmental needs, have been reported by adolescent problematic gamers (Bussone et al., 2020). Importantly, as demonstrated by a recent random intercept cross-lagged panel model study (Zhou et al., 2023), there is a risk for a vicious cycle between family dysfunctioning and adolescent PG to be established, whereby higher levels of PG may disrupt family functioning, which, in turn, may exacerbate maladaptive patterns of gaming in youth.

Altogether, the abovementioned studies constitute the first preliminary evidence supporting the associations between different parental and family factors and adolescent PG. Despite this evidence could be useful to start to understand the underpinnings of this condition in youth and to delineate tentative prevention and intervention programs (e.g., Bonnaire et al., 2019; Hülquist et al., 2022; Li et al., 2019), as concluded by Nielsen et al. (2020), it is still limited to disentangle the complexity of this problematic behaviour. Indeed, studies in some areas yielded mixed results (e.g., regarding parental mediation practices), most of them used cross-sectional designs without testing causal relationships between variables, they involved unrepresentative samples of participants, and, furthermore, only certain parental behaviours and characteristics have been examined so far, with several possible related factors that remain unexplored. Therefore, additional research is needed to gain a more robust and comprehensive knowledge of the associations between parental behaviours and adolescent PG, with the aim to provide solid findings that can be used to reduce the incidence and maintenance of this public health issue (Kiràly et al., 2019).

2.1.3 What still Needs to be Learnt

As anticipated, the available literature on the associations between adolescent PG and parental factors presents several gaps and limitations that should be evidenced, and possibly, addressed.

Firstly, in terms of study contents, research investigating parental factors from a macro-level perspective and research focusing on parental digital behaviours is currently missing.

In fact, parental factors have only been studied as proximal processes occurring at the level of the micro-system, which is conceptualized as "a pattern of activities, social roles, and interpersonal relations experienced by the developing person in a given face-to-face setting" in the well-known Ecological Model of Human Development (Bronfenbrenner, 1994; p.1645). However, as stressed by this model and by other ecological system theories (e.g., Dahlgren & White, 1991; 2021), as well as by the World Health Organization (WHO, 2008; Viner et al., 2012), the study of the influence of environmental factors on individual adjustment, should adopt a broader, multi-level approach. More precisely, adolescent development should be considered as embedded within an overarching set of nested and intertwined systems, ranging from a proximal, micro-level system, consisting, for instance, of daily parent-adolescent interactions, to a more distal, macro-level system, entailing the structural determinants of a nation, such as economic and social welfare systems (Bronfenbrenner & Morris, 2006; Dahlgren & White, 1991; 2021). Indeed, as documented by previous research, these macro-level factors may exert substantial influences on parents, and, indirectly, on their offsprings, by fostering or hindering positive parenting based on the number of resources made available and on the levels of stress mitigated, ultimately impacting adolescents' adjustment (Masarik & Conger, 2017; Viner et al., 2012; Yeung et al., 2002). In this regard, studies investigating the contribution of parental- and family-related factors on adolescent PG from a macro-level standpoint – and their possible interactions with parental practices – are completely missing in the gaming literature. In addition, as pinpointed by Rosendo-Rios et al. (2022), there is a need for comparative studies examining differences and similarities in adolescent PG across countries by means of cross-national research.

Furthermore, while parental behaviours, in terms of parental mediation practices of adolescents' gaming activities and of general parenting practices, have been largely investigated worldwide (Lukavksà et al., 2022), parental digital behaviours, referring to parents' own use of

technological devices, have been rarely examined in association with adolescent PG, especially in Europe. This is quite surprising, considering that information and communication technology constitute nowadays an integral part of individual and family life to the point that its positive and negative impacts on the quality of family relationships are more and more documented by international literature (Tammisalo & Rotkirch, 2022). Consistent with this, current updated ecological systems theories (e.g., Navarro & Tudge, 2022; Stavropoulos et al., 2022) encourage researchers to investigate the direct influences of digital technology use on individual functioning and on the quality of his/her interpersonal relationships, as reflected in the concept of the "techno-subsystem" introduced by Johnson and Puplampu in 2008 (*see* Paragraph 2.2).

Additionally, in terms of study design, there are at least three major limitations to highlight in the context of gaming literature and parenting: (i) the scarcity of longitudinal studies, (ii) the dearth of multi-informant studies and (iii) unexplored gender differences, both between parents and between male and female adolescents.

With specific regard to the first point, as noted in the most recent systematic reviews and meta-analyses (e.g., Fam et al., 2023; Lukavskà et al., 2022), the studies investigating causal links between parental behaviours and adolescent PG are still scarce. This aspect, however, should be considered as a principal research target, since it is fundamental to understand whether parental behaviours, beyond being associated with adolescent PG at a given point in time, may also exert a significant and long-lasting impact on the maintenance of this problematic condition, thus proving to be critical risk and protective factors. In fact, only by adopting the use of repeated measurement of the same variables over time (i.e., by assessing them at two different time points or at multiple time points, possibly with a six-month time interval), it is possible to effectively test the direction and magnitude of hypothesized causal relationships and to observe the stability (or instability) of certain effects over time, thus providing more robust empirical evidence than that offered by cross-sectional studies (Menard, 2002). For instance, concerning the relationship between attachment to parents (measured in terms of trust, communication and alienation) and adolescent PG, while a two-year longitudinal

study by Jeong et al. (2020) documented changes in PG severity in youth, whereby lower levels of PG were positively predicted by higher adolescent attachment, a study by Teng et al. (2020), despite finding stable and significant negative correlations between attachment and adolescent PG at all the three time points considered, did not find longitudinal evidence supporting the predictive (and protective) roles of mother and father attachment in relation to adolescent PG. This example of inconsistent results over time evidences that there is an urgent need for longitudinal studies to provide an in-depth exploration of the associations between parental behaviours and adolescent PG.

In addition to this, another relevant limitation of the current gaming literature is that relatively little evidence has been collected from parents themselves. Indeed, most of the available studies have considered only adolescent samples of participants, without considering parental reports (Lukavskà et al., 2022; Paschke et al., 2021). As explained by De Los Reyes and Ohannessian (2016), to gain an incrementally valuable and comprehensive assessment of adolescent mental health and problematic behaviours, as well as of the quality of parenting and of family relationships, it is recommended to collect information from multiple informants, for instance, from dyads or triads composed of adolescents and their parents. In fact, considering that the nature of the parent-adolescent relationship is interactive, each family member can be considered as a distinct but equally knowledgeable observer providing a unique and valid perspective, thus gathering information exclusively from the youth may be reductive to effectively capture all the facets of a behaviour or a situation (Achenbach, 1987; Hughes & Gullone, 2010). Nevertheless, despite one might expect high levels of convergence between adolescents' and parents' reports, the literature has repeatedly showed that informant discrepancies (i.e., individual differences in the perception of the same phenomenon) frequently emerge (De Los Reyes et al., 2019). Since the analysis of these discrepancies between reports might disclose important and meaningful information about key dynamics underlying adolescent well-being and parent-adolescent relationship, multi-informant studies represent an invaluable method of assessment and are highly encouraged (Hughes & Gullone, 2010).

Last, but not least, research on parental factors and adolescent PG has predominantly measured and examined the contribution of parents as a unique construct, using composite rather than distinct scores, thus without distinguishing between maternal and paternal behaviours (Nielsen et al., 2020). Yet, the lack of analysis of the unique role of each parent may have overlooked potential gender-specific effects (Inguglia et al., 2018). In fact, according to a systematic review on the differences between mothers and fathers in parenting styles and practices, maternal contribution is mainly perceived in terms of emotional availability and responsiveness, while paternal contribution is mainly experienced in terms of restrictive and authoritarian practices (Yaffe, 2020). As pointed out in the paper, this difference may stem from the traditional socialization practices regarding femininity and masculinity, which encourage individuals to adopt specific gender-based social and behavioural characteristics, that can ultimately shape parenthood (Kachel et al., 2016). Nevertheless, it should also be noted that, despite childcare is still disproportionately provided by women, the involvement of fathers in family life has increased in the last years, to the point that a "new masculinity ideology" reflecting values of authenticity, emotional expressivity and self-awareness has begun to emerge (Kaplan et al., 2017). This stresses the importance to equally consider and separately explore the contribution of maternal and paternal behaviours on adolescent adjustment in the studies conducted at the present time.

Along this line, there is also relatively little evidence of studies assessing the associations between parental behaviours and PG that considered possible gender differences among adolescent participants (Bussone et al., 2020). However, it may important to further investigate this aspect for several reasons: first, because the majority of studies in gaming literature involved male-only samples of gamers or samples predominantly composed of males (Männikkö et al., 2020), possibly increasing biases and reducing accuracy in the interpretation of results deriving from total samples of adolescents; second, because some studies have shown that adolescent males and females may differentially perceived parental behaviours, with girls being more sensitive to the adverse effects of negative parenting than boys (Nishikawa et al., 2010; Ramírez-Uclés et al., 2018), thus suggesting

the relevance of implementing multi-group analyses in the study of the direct and indirect associations between parental behaviours and adolescent PG.

2.2 Comprehensive Theoretical Frameworks

Public health perspectives on individual (mal)adjustment have long suggested to conceptualize human development as influenced by a complex set of "conditions or circumstances shaped by families and communities, and by the distribution of money, power, and resources at worldwide, national, and local levels, and affected by policy choices at each of these levels" (Viner et al., 2012; p.1641). These conditions have been defined by the WHO (2008) as the Social Determinants of Health (SDH) and they stress the relevance to adopt comprehensive theoretical approaches encompassing both distal and proximal factors when studying socioenvironmental influences on individual well-being and the development of problematic behaviours (Bronfenbrenner & Morris, 2006), including technology-related behaviours (Navarro & Tudge, 2022). Thus, the study of adolescent PG and its association with parental factors may be viewed as a complex, multi-faceted challenge that is not likely to be fully achieved using a single theory.

Therefore, to gain an in-depth understanding of the role of parental factors to the process of adolescent PG from an overarching, multi-level perspective, the present doctoral project has been guided by two well-established and influential frameworks: the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) and the Ecological Techno-Subsystem Theory (Johnson & Puplampu, 2008). The integration of these two theories, chosen based on their ecological conceptualizations and their clear visual representations, may constitute a good strategy for theory generation to broaden available literature in the field. Indeed, as if we were using a magnifying glass, the combination of these theories may allow us to progressively sharpen the focus on parental factors and adolescent PG from a broader, macro level to a more proximal, intermediate level, and finally, to the individual level, by examining possible psychological factors mediating the associations. Such a holistic approach may be particularly advantageous, since it contributes to provide evidence-based

knowledge on adolescent PG that can be used by a wide range of experts operating at multiple levels, from policymakers to healthcare and education professionals, to researchers (Kiràly et al., 2019; Rosendo-Rios et al., 2022).

Specifically, the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) places individuals at the centre of concentric, surrounding and interconnected layers of socio-environmental influences, to convey the message that it is fundamental to consider the SDH from different perspectives to obtain a complete picture of a condition and to implement effective prevention strategies and policy interventions to promote individuals' health (*see* Fig.2).

According to this model, the most distal layer is composed of macro-level factors, entailing the structural determinants of a nation, that can be considered as the fundamental structures which determine social stratification (Dahlgren & Whitehead, 1991; 2021).

Figure 2

The Rainbow Model of Health Determinants.
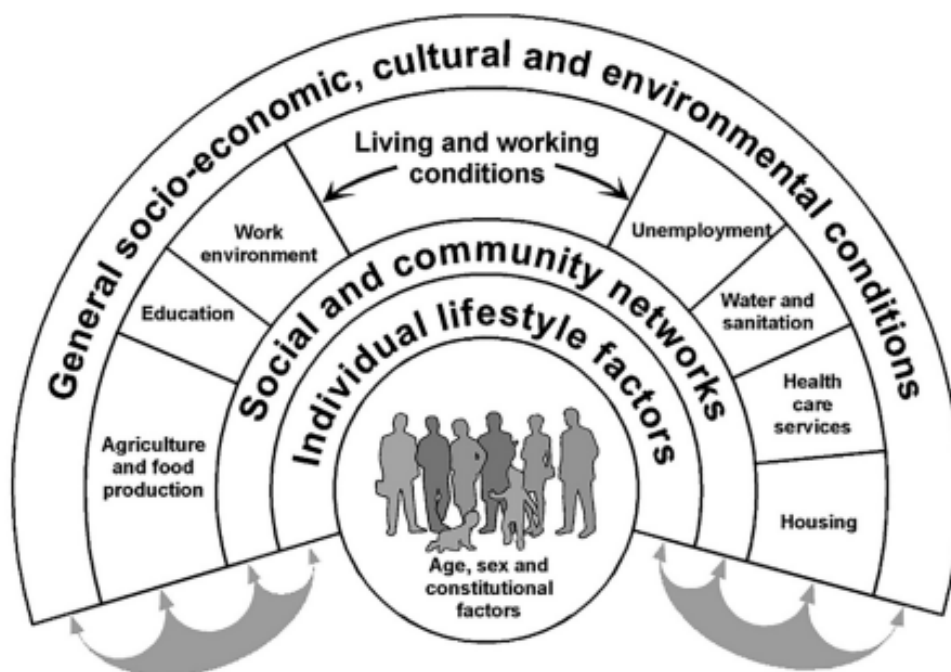
Source: Dahlgren & Whitehead (2021, p.22).

Among the macro-level factors, there are political and social welfare systems, national wealth and economic inequalities, as well as cultural and religious values, which have all been found to significantly influence children and adolescents' vulnerability to psychological and behavioural problems (Viner et al., 2012; Newland et al., 2019). Furthermore, strictly related to this broader layer, the model contemplates the material and social conditions in which individuals live, including, in the case of adolescents, the school environment, healthcare services and housing.

Sharpening the focus, the intermediate layer encloses adolescents' daily interactions with social entities, such as parents and family members, teachers and peers. These social and community networks exert a direct and immediate influence on adolescent well-being daily and they can either constitute a source of support, social recognition and connectedness, or a source of rejection and disapproval that can be particularly harmful (Dahlgren & Whitehead, 1991; 2021).

Finally, the inner layer of the model puts the focus of the attention on the individual him/herself, characterized by certain constitutional factors, psychological needs and attitudes, which not only can shape his/her lifestyle, but also can concur to the interpretation of the broader socioenvironmental influences (Dahlgren & Whitehead, 1991; 2021).

As recently observed by Dyar et al. (2022), the enduring relevance of the Rainbow Model of Health Determinants across years and contexts could be due to the fact that it captures several key aspects of the concept of health (WHO, 1948), such as the importance of paying attention not exclusively to the risk, but also to the protective factors, the transversal nature of the SDH considered, which are in many cases the same for the most common diseases and the relevance to adopt a multi-level perspective to inform professionals working in different health-promoting organizations.

Of note, the widely-used Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) could be considered as a comprehensive, general model to explain adolescent dysfunctional behaviours, of which PG could represent an emerging instance. An important aspect that has not been addressed by this model is the ubiquitous and ever-increasing influence of Information and Communication Technologies (ICTs), entailing both hardware (e.g., computers,

smartphones) and software components (e.g., video games, social media), on children and adolescents' development. Indeed, the last two decades have been defined as the beginning of the 'fourth industrial revolution', also labelled as the 'digital era', due to a fast-growing expansion of the Internet and to the rapid advancements in the production of digital devices (Coldwell, 2019). The use of ICTs has become so much embedded into the daily lives of young individuals living in the industrialized countries, also known as 'digital natives' (Prensky, 2001), that some scholars, Johnson and Puplampu among the firsts (2008), proposed to integrate the available ecological systems models with a new Ecological *Techno*-Subsystem; this subsystem has been conceptually situated in the interim space between the individual and his/her microsystem to evidence the immediate influences of digital technology on youth's adjustment, as reported in Fig. 3.

According to the authors, the Techno-Subsystem includes children and adolescents' "interaction with both living and non-living elements of communication, information, and recreation technologies in immediate or direct environments" (Johnson & Puplampu, 2008; p.4).

Figure 3

The Ecological Techno-Subsystem Theory.
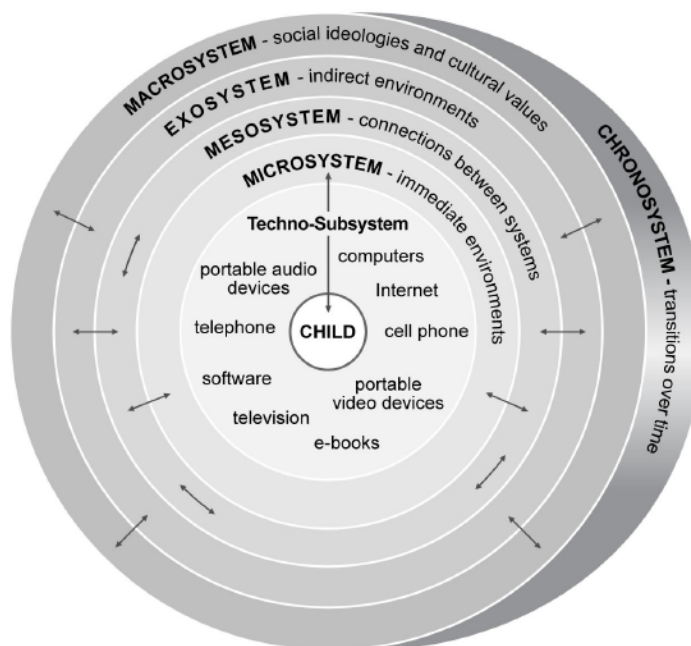
Source: Johnson & Puplampu (2008, p.5).

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Based on this definition, this theoretical framework appears particularly suitable to guide the implementation of the studies reported in the present doctoral dissertation, since not only it confirms the relevance of applying an ecological approach to the study of environmental factors on adolescent adjustment, but also it specifically encourages researchers to examine the use of ICTs in youth (such as that of video games) and in their immediate social environment, by emphasizing the pervasive influence of digital technology in daily interactions with parents and peers.

The conceptualization of the Techno-Subsystem Theory by Johnson and Puplampu (2008) could be considered as a seminal and ground-breaking introduction in the field of Cyberpsychology, facilitating the exploration of several technology-related behaviours, which are not limited to PG, but also include, for instance, Problematic Internet Use, Problematic Smartphone Use and Problematic Social Media Use. In this vein, the Techno-Subsystem Theory has served, across this last decade, as the theoretical foundation for the development of many articulated theories concerning human-computer interaction, such as the most recent Neo-Ecological Theory by Navarro and Tudge (2022) and the Cyber-Developmental Framework by Stavropoulos and colleagues (2022). These theories, however, predominantly shift their attention on individual experiences of their own online presence (e.g., flow, digital resilience) and of the virtual microsystem, which are concepts that fall outside the topics investigated in the present dissertation.

Taken together, the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) and the Ecological Techno-Subsystem Theory (Johnson & Puplampu, 2008) clearly evidence how complex can be the study of environmental factors (e.g., parental factors) on adolescent PG and suggest the adoption of a comprehensive perspective for an in-depth investigation of this condition in youth. These two theories thus constitute the general theoretical background that guided the logical succession of the four studies implemented in the present doctoral project, each of which had specific aims that have been reported in detail in the following paragraph.

2.3 Aims and Hypotheses of the Present Dissertation

As reported in Paragraph 2.1.3, despite the last decade has registered a growing amount of international research investigating the possible associations between parental factors and adolescent PG, there are still several gaps and limitations that should be considered. Therefore, drawing from the two theoretical frameworks previously described (Dahlgren & Whitehead, 1991; 2021; Johnson & Puplampu, 2008), the general aim of the present dissertation was to expand current knowledge in the field by adopting a more comprehensive and multi-level approach to capture the complexity of PG in youth and its relationship with parental factors and to examine understudied mechanisms. This approach may allow to gain novel and valid evidence at different levels that can be used for the implementation of more effective and tailored prevention programs targeting adolescents and their parents (Kiràly et al., 2019; Rosendo-Rios et al., 2022).

More specifically, by progressively sharpening the focus from distal to proximal and individual levels, the present thesis is aimed to fill the abovementioned research gaps by means of four sequential studies with the following specific aims and hypotheses:

Aim 1. To examine the role of macro-level factors (i.e., family and socio-economic indicators of the welfare state) and proximal-level factors (i.e., parental and family behaviours) in explaining cross-national variations in the risk of PG during adolescence.

Hypothesis 1. At a macro-level, greater national expenditures on benefits in kind for families and children (hereafter referred to as family benefits) would reduce the risk of adolescent PG.

Hypothesis 2. At a macro-level, higher economic inequalities would be associated with an increased risk of adolescent PG.

Hypothesis 3. At a proximal level, adolescents perceiving more parental regulation, parental monitoring and family support would be at lower risk of PG.

Hypothesis 4. Cross-level interactions between family benefits and parental behaviours were also hypothesized, whereby a higher availability of social and economic resources would further improve

the quality of parental regulation and parental monitoring which, in turn, would reduce the risk of adolescent PG.

Aim 2. At a proximal level, to examine multiple informants' reports of adolescent PG and maternal behaviours (i.e., warmth and indifference) and to disentangle the associations between the behaviours that are shared by mothers and adolescents from those that are unique to each member of the dyad. Indeed, despite the original aim was to equally explore the contribution of mothers and fathers, thus involving triads of participants, only data related to maternal behaviours were finally analysed, due to the low participation rates of fathers, which still constitute a major challenge in parenting research (Yaremych & Persky, 2022). Consequently, the following hypotheses were formulated:

Hypothesis 1. With regards to mothers' and adolescents' ratings of adolescent PG, a definite hypothesis was not advanced, since available evidence is mixed.

Hypothesis 2. With regards to maternal behaviours, mothers would provide higher estimates of warmth and lower estimates of indifference than adolescents.

Hypothesis 3. A negative association between maternal warmth and adolescent PG and a positive association between maternal indifference and adolescent PG were expected to emerge from the reports of both informants, with low to moderate levels of agreement.

Aim 3. At a proximal level, to test a two-wave mediation model investigating the direct (and distinct) impact of maternal and paternal phubbing (i.e., snubbing via mobile phone), on later adolescent PG, the mediating role of increased maternal and paternal indifference over time, the crossover effect between parental behaviours, and, at an exploratory level, possible gender differences among adolescents.

Hypothesis 1a. Maternal phubbing at Wave 1 (W1) would positively predict adolescent PG at Wave 2 (W2).

Hypothesis 1b. Paternal phubbing at W1 would positively predict adolescent PG at W2.

Hypothesis 2a. Maternal phubbing at W1 would positively predict maternal indifference at W2.

Hypothesis 2b. Paternal phubbing at W1 would positively predict paternal indifference at W2.

Hypothesis 3a. Maternal indifference at W2 would be positively associated with adolescent PG at W2.

Hypothesis 3b. Paternal indifference at W2 would be positively associated with adolescent PG at W2.

Hypothesis 4a. Maternal indifference at W2 would mediate the relationship between maternal phubbing at W1 and adolescent PG at W2.

Hypothesis 4b. Paternal indifference at W2 would mediate the relationship between paternal phubbing at W1 and adolescent PG at W2.

Hypothesis 5a. Maternal phubbing at W1 would positively predict paternal indifference at W2.

Hypothesis 5b. Paternal phubbing at W1 would positively predict maternal indifference at W2.

Hypothesis 6a. Maternal indifference at W2 would mediate the relationship between paternal phubbing at W1 and adolescent PG at W2.

Hypothesis 6b. Paternal indifference at W2 would mediate the relationship between maternal phubbing at W1 and adolescent PG at W2.

Aim 4. From a proximal to an individual level, to test a mediation model examining the direct associations between three supportive parenting practices (i.e., autonomy support, structure, warmth) and three thwarting practices (i.e., coercion, chaos and rejection) and adolescent PG, the mediating role of basic psychological need satisfaction and need frustration, and, at an exploratory level, possible gender differences among adolescents.

Hypothesis 1. The supportive parenting practices would be negatively associated with adolescent PG.

Hypothesis 2. The thwarting practices would be positively associated with adolescent PG.

Hypothesis 3. The supportive parenting practices would be positively associated with need satisfaction and negatively associated with need frustration.

Hypothesis 4. The thwarting parenting practices would be negatively associated with need satisfaction and positively associated with need frustration.

Hypothesis 5. Need satisfaction would be negatively associated with adolescent PG.

Hypothesis 6. Need frustration would be positively associated with adolescent PG.

Hypothesis 7. Need satisfaction would primarily mediate the relationship between the positive parenting practices and adolescent PG and also, between the thwarting parenting practices and adolescent PG.

Hypothesis 8. Need frustration would primarily mediate the relationship between the thwarting parenting practices and adolescent PG, and also, between the thwarting parenting practices and adolescent PG.

2.4 Overview of the Studies

The following chapters will illustrate the details of the corresponding four studies carried out to fill in the main research gaps in the associations between parental behaviours and adolescent PG.

Chapter 3 will introduce the first study that investigated, at a macro-level, the role of family and socioeconomic indicators of the welfare state, and, at a proximal level, the contribution of parental and family behaviours in explaining cross-national variations in the risk of PG during adolescence. A multi-level model was implemented to evaluate the impact of family benefits and economic inequalities, as well as of perceived parental regulation, parental monitoring and family support, on adolescent PG in a representative sample of students living in 30 European countries. Data were drawn from the 2019 European School Survey Project on Alcohol and Other Drugs (ESPAD) Study, which involved a cohort of $n = 88\ 998$ students aged 15- to 16-year-old (49.2% males).

Chapter 4 will illustrate the second study that focused on the proximal level by investigating the relational-emotional correlates of parental behaviours and adolescent PG using a multi-informant

approach. Specifically, this dyadic study aimed to examine multiple informants' reports of adolescent PG and maternal behaviours (i.e., warmth and indifference) and, by means of a common fate model, to disentangle the associations between the behaviours that are shared by mothers and adolescents from those that are unique to each member. Data were collected at school by using self-administered online questionnaires from $n = 137$ Italian mother-adolescent dyads, with the mean age of adolescent gamers ($n = 92$ males, $n = 42$ females, $n = 3$ nonbinary) being 14.68 (± 1.25) years and that of mothers 47.48 (± 4.69) years.

Chapter 5 will present the third study that deepened the knowledge at the proximal level by evaluating the impact of parental digital behaviours, specifically of parental phubbing (i.e., snubbing via mobile phone), in predicting adolescent PG, via the mediating role of increased parental indifference over time. Precisely, a two-wave longitudinal study was implemented to test a path analytic model examining the direct and indirect impact of parental phubbing on later adolescent PG by distinguishing between maternal and paternal behaviours, testing their crossover effects, and exploring possible gender differences among adolescents in the pattern of associations. Data were collected in Italy via online surveys administered at different high schools, and the final sample comprised $n = 557$ adolescent gamers ($M_{age} = 15.62 \pm 1.54$; 69% males).

Chapter 6 will report the fourth study that further restricted the focus on the associations between parental behaviours and adolescent PG by considering, at the individual level, the mediating role of basic psychological need satisfaction and frustration. The purpose of this study was to examine a path analytic model linking three supportive parenting practices (i.e., autonomy support, structure, warmth) and three thwarting practices (i.e., coercion, chaos, rejection) with adolescent PG, testing their indirect associations via need satisfaction and need frustration, and exploring possible gender differences among adolescents. Data were collected by means of online self-report questionnaires at different Italian public high schools and the final sample comprised $n = 1193$ Italian gamers ($M_{age} = 15.81 \pm 1.58$; 64.3% males).

Chapter 3

Study 1: The Risk of PG among European Adolescents:

A Cross-National Evaluation of Macro-level

and Proximal-level Parental Factors

This chapter was adapted from:

Colasante, E., Pivetta, E., Canale, N., Vieno, A., Marino, C., Lenzi, M., Benedetti, E., King, D., & Molinaro, S. (2022). Problematic gaming risk among European adolescents: a cross-national evaluation of individual and socio-economic factors. *Addiction, 117*, 2273–2282. https://doi.org/10.1111/add.15843

3.1 Rationale of the Study

As reported in Chapter 1, most of the available studies in the literature that have examined the risk and protective factors of adolescent PG has predominantly investigated the independent contribution of individual correlates, such as impulsivity, emotion dysregulation and internalized and externalized psychopathology (Bender et al., 2020; Sugaya et al., 2019), as well as of the social environment, including parents and peers (Teng et al., 2020).

Crucially, consistent with the theoretical framework of the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) that guides the present doctoral dissertation, research and prevention programs targeting the associations between adolescent PG and parental factors only at proximal levels might be limited, and a more comprehensive approach is needed to capture the complexity of this condition (Kiràly et al., 2018; Lopez-Fernandez & Kuss, 2020). Following this line, Lee and colleagues (2019) conceptualized an epidemiological model for the prevention of Internet Use Disorders (IUDs) that stressed the importance of considering both the contribution of individual and proximal level factors, and also of broader contextual factors (e.g.,

national welfare policies, economic indicators, accessibility to video games) on the onset and maintenance of IUDs, including PG. With specific regards to macro-level factors, previous research in public health has mainly documented the impact of socio-economic indicators on adolescent well-being, by showing, for instance, that lower national wealth and higher economic inequalities were associated with a variety of psychological and physical symptoms in youth (Dierckens et al., 2020; Elgar et al., 2015; Newland et al., 2019).

In the context of gaming literature, to the best of the knowledge, only one study (Strizek et al., 2020) has considered a macro-level economic factor (i.e., national wealth) in explaining cross-national variations in perceived problems with gaming, reporting an increased risk of PG among adolescents using substances and living in poorer countries. As argued by the authors, this could be due to the lack of competing alternative activities that may be available to adolescents living in less prosperous nations (Strizek et al., 2020). Furthermore, drawing from previous evidence on other problematic behaviours (Dierckens et al., 2020; Lenzi et al., 2022), it is plausible to hypothesize that the levels of adolescent PG might be higher in countries where socioeconomic inequality is more pronounced, in that excessive gaming may develop as an additional negative consequence of status anxiety and weakened social capital deriving from such inequality. Moreover, another study that has conducted a multi-national comparison using macro-level indicators (Cheng et al., 2018), focused more on psychological and cultural factors, by showing stronger positive correlations between PG and psychological problems in young adults living in countries lower in national life satisfaction and higher in cultural masculinity (conceived as the extent to which residents consider achievement and work-oriented outcomes as core values and denigrate pastime activities since they may hinder performance). Finally, two other recent studies have conducted cross-national comparisons to examine possible variations in the severity of PG and its associations with mental health outcomes based on country-level prevalence of societal Internet use and daily computer activities (Vashishtha et al., 2022) and country's prevalence rates of PG behaviours (van der Neut et al., 2023), without, however, obtaining statistically significant results.

Therefore, to date, not only there is a paucity of research on macro-level factors and PG (Cheng et al., 2018; Strizek et al., 2020; van der Neut et al., 2023; Vashishtha et al., 2022), but also evidence on parental and family-related macro-level factors is completely missing. In this regard, a multi-level analysis of national child and adolescent health policies across Europe (Hendriks et al., 2020) identified the important role of benefits in kind for families and children, such as child payments and allowances, parental leave payments and childcare support (hereafter referred to as family benefits), in reducing adolescent psychosocial problems associated with poorer economic conditions. In fact, government investments aimed at helping the most vulnerable families may have important implications at the interpersonal and individual levels, for instance, by alleviating the economic and psychological stress of the parents, which, in turn, may improve the quality of family relationships (Viner et al., 2012). However, while previous research on other behavioural and substance use disorders, such adolescent problematic gambling (Molinaro et al., 2014) and alcohol use (Vieno et al., 2018), investigated the role of family benefits in their cross-national comparisons, no studies are currently available on PG, thus the possible protective role of these macro-level variables remains unexplored.

In addition, with specific regard to the proximal level, as reported in Chapter 2, many researchers have focused on the relevance of parental mediation practices, which entail parental attitudes and behaviours aimed at regulating adolescents' gaming, in influencing the patterns of video games use among adolescents (Jang & Ryu, 2016; Koning et al., 2018). However, despite growing evidence has been collected in the last years, a systematic review by Nielsen et al. (2019) has concluded that results on the impact of these practices have been inconsistent, stressing the need for further research to explore these dimensions. For instance, a study by Su et al. (2018) demonstrated that higher parental monitoring, defined as parental practices and knowledge concerning their children's activities and whereabouts (Stattin & Kerr, 2000), was associated with lower levels of PG; on the contrary, a study by Benrazavi et al. (2015) showed that parental monitoring was positively related to adolescent PG, whereas Smith et al. (2015) did not evidence significant protective effects

of this specific parenting practice on the use of video games in youth. Similar mixed findings have also been obtained in studies investigating parental regulation (Nielsen et al., 2019), highlighting the importance to gain further evidence to understand whether parental mediation practices limiting adolescents' gaming activities use may be effective in reducing problematic patterns of use. With regards to the socio-emotional domain, instead, a large body of evidence (*see* Nielsen et al., 2020 for a review) has repeatedly documented the protective role of positive family influences, in terms of family support, cohesion among family members and open communication.

Of note, in this first study, I will refer to the *risk* of PG in youth, due to the non-clinical nature of the screening tool employed to assess the perceptions of problems with gaming activities in large samples of adolescents, which only consisted of three items that were not specifically conceived on the basis of the DSM-5 (APA, 2013) or ICD-11 (WHO, 2019) criteria, as reported in Paragraph 3.3.3.

3.2 Specific Hypotheses

To expand current gaming literature by adopting a more comprehensive approach, this first study tested a multi-level model to simultaneously estimate the contribution of (i) proximal-level factors (i.e., parental and family behaviours) and of (ii) macro-level factors (i.e., family benefits and economic inequalities) in explaining cross-national variations in the risk of PG during adolescence; in addition, based on previous literature (e.g., Bender et al., 2020; Sugaya et al., 2019), socio-demographic factors and self-reported measures of gaming time were included as control variables. Specifically, this first study tested the following hypotheses:

Hypothesis 1. At a proximal-level, adolescents perceiving more parental regulation, parental monitoring and family support would be at lower risk of PG.

Hypothesis 2. At a macro-level, greater national expenditures on benefits for families would reduce the risk of adolescent PG.

Hypothesis 3. At a macro-level, higher economic inequalities would be associated with an increased risk of adolescent PG.

Hypothesis 4. Considering that an adequate availability of social and economic resources might improve the quality of family environment (Conger et al., 2010), cross-level interactions between family benefits and parental behaviours were also hypothesized, whereby a higher availability of social and economic resources would further improve the quality of parental regulation and parental monitoring which, in turn, would reduce the risk of adolescent PG.

3.3 Materials and Method

3.3.1   Procedure

Data for the present research were drawn from the 2019 European School Survey Project on Alcohol and Other Drugs (ESPAD), a cross-sectional survey carried out in 35 European countries since 1995, designed to collect comparable data on substance use and behavioural disorders in a target population of adolescents attending secondary high schools (ESPAD Group, 2020a; 2020b). To allow students to participate, parental informed consent was preliminarily requested. Subsequently, students were invited to fill in an anonymous self-report questionnaire during regular school hours. A shared standard methodology was employed, which involved national samples of randomly selected classes/schools in which the cohort of students aged 15- to 16-years completed the standardized ESPAD questionnaire. In most countries, a stratified random sampling was applied, with the class being the final sampling unit. In small countries, like Iceland, Malta and Montenegro, a total population sample was employed. All samples included in the analysis are nationally representative, apart from Cyprus (only government-controlled areas) and Germany (only federal state of Bavaria). On average, 82% of the sampled schools (range 21-100) and 84% of the sampled classes (range 21-100) took part in the survey. Additional details about geographical coverage, sampling procedure in each country, representativeness and characteristics of the samples, as well as participation rates can be retrieved in Tables 3 and 6–8 of the ESPAD 2019 Methodology Report (ESPAD Group, 2020b).

3.3.2 Participants and Datasets

Of the total sample of adolescent respondents ($n = 90\,299$) from the original ESPAD database, $n = 1301$ cases (1.4%) were excluded from the present statistical analyses due to missing values in the outcome variable (risk of PG). Therefore, the final sample included $n = 88\,998$ participants, that was evenly distributed between males ($n = 43\,749$ males, 49.2%) and females ($n = 45\,249$ females, 50.8%) living in 30 European countries.

Macro-level data for family benefits were primarily obtained from the last available data in Eurostat (2017) and from national thematic reports on social protection policies made available by the European Social Policy Network (Kaluđerović & Golubović, 2019; Mustafa & Haxhikadrija, 2019). Data for Gini coefficient measuring economic inequality were also retrieved from Eurostat (2019) and were complemented with information from World Bank (2017). Of the initial ESPAD dataset comprising 35 countries, five countries were excluded due to the unavailability of data either for gaming (France) or for any of the macro-level variables (Faroes, Georgia, Monaco and Ukraine).

3.3.3 Measures

Problematic Gaming Risk

To examine adolescents' risk of PG, the Perceived Problem Scale (PPS) was used (Holstein et al., 2014). This is a non-clinical and self-report screening tool consisting of three items evaluating participants' perceptions of problems in relation to the amount of time spent gaming (i.e., 'I think I spend way too much time playing computer games'), negative feelings because of restricted access to video games (i.e., 'I get in a bad mood when I cannot spend time on computer games'), and parents' opinion over the time spent gaming (i.e., 'My parents tell me I spend way too much time on computer gaming'). Both online and offline activities were considered, as items refer to gaming on different electronic devices, including computers, smartphones and tablets. Students were asked to rate their level of agreement with these statements on a five-point scale as follows: (1) 'Strongly agree', (2) 'Partly agree', (3) 'Neither agree nor disagree', (4) 'Partly disagree' and (5) 'Strongly disagree'. In

this study, the Cronbach's alpha was .75 (95% CI [.72, .79]). Consistent with previous research (Holstein et al., 2014; Spilkovà et al., 2017; Strizek et al., 2020), each item was dichotomized into 'Strongly agree'/ 'Partly agree' (coded 1) versus the remaining categories (coded 0). As a result, the final index ranged from 0 to 3: following the threshold identified by Holstein and colleagues (2014), a score of 0-1 points was considered indicative of low risk of PG, and a score of 2-3 points was considered to represent high risk of PG.

Proximal-level Variables

At a proximal level, two distinct parental behaviours (i.e., perceived parental regulation and parental monitoring) and the levels of perceived family support were inspected.

Specifically, in the ESPAD questionnaire (ESPAD Group, 2020a), parental regulation was assessed by means of two items (i.e., 'My parents set definite rules about what I can do at home'; 'My parents set definite rules about what I can do outside the home') that were rated on a five-point scale ranging from (1) 'Almost always', (2) 'Often', (3) 'Sometimes', to (4) 'Seldom' and (5) 'Almost never'. Based on $\alpha = .77$ (95% CI [.74, .77]), responses were averaged to obtain a synthetic measure, in line with previous literature (Molinaro et al., 2014).

Similarly, parental monitoring (Stattin & Kerr, 2000) was investigated using two items (i.e., 'My parents know who I am with in the evenings'; 'My parents know where I am in the evenings'), that were rated on the same five-point system of parental regulation, thus ranging from (1) 'Almost always' to (5) 'Almost never'. Based on $\alpha = .84$ (95% CI [.81, .86]), responses were averaged to obtain a synthetic measure (Bacikova-Sleskova et al., 2021).

Adolescents' perception of family support was assessed by means of the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988). This scale is composed of four items investigating the extent to which family members are caring and supportive towards adolescents. Examples of these items include: 'I get the emotional help and support I need from my family' and 'I can talk about my problems with my family'. Participants are invited to rate their level of agreement with each item of

a six-point scale ranging from (1) 'Very strongly disagree' to (6) 'Very strongly agree'. Based on α = .92 (95% CI [.87, .93]) responses were averaged to obtain a synthetic measure, consistent with previous research (Canale et al., 2017).

In addition, four control variables were included in the analyses: among the socio-demographics, (i) participants' gender (coded 0 for males and 1 for females), (ii) family structure (coded 0 for 'Living with both parents' and 1 for 'Not living with both parents'), the perception of family socio-economic status, measured by means of the question 'How well off is your family compared to other families in your country?', rated on a seven-point scale ranging from (1) 'Very much better off' to (7) 'Very much less well off' (coded 0 for 'Very much better off/Much better off/Better off/About the same' and 1 for 'Less well-off/Much less well-off/Very much less well off', in line with previous research (Gerra et al., 2020); finally, regarding gaming activities, (iv) the average amount of time spent gaming on electronic devices, measured as the number of hours in the last 30 days, on a school-day and on a non-school day separately, was included. However, based on the high Pearson's correlation between the two items ($r = 0.82$, p < .01), only the number of hours on a school-day was considered in the final analyses to avoid collinearity issues.

Macro-level Variables

The contribution of family benefits, consisting of national government expenditures on targeted social protection policies for children, adolescents and their parents, was analysed as the main macro-level factors. Specifically, family benefits, which can take the form of cash payments and allowances, parental leave benefits or other in kind contributions in relation to the cost of childcare and support for the vulnerable members of the family, were reported as a percentage of national Gross Domestic Product (GDP), and were retrieved from Eurostat (2017) and from national thematic reports (Kaluđerović & Golubović, 2019; Kosovo (Mustafa & Haxhikadrija, 2019).

Furthermore, economic inequalities were measured by Gini coefficient of equivalized disposable income, which represents deviation from perfect equality with a theoretical 1-point range

(or 100-point range if expressed using percentages) where 0 (or 0%) indicates perfect equality (with everyone having equal income) and 1 (or 100%) indicates perfect inequality (one person has all the income), and were retrieved from Eurostat (2019) and (WorldBank, 2017).

3.3.4 Data Analytic Strategy

To evaluate the influence of individual/proximal-level variables and macro-level variables on adolescents' risk of PG, the data were analysed by implementing a multi-level logistic regression analysis through the software HLM7 (Raudenbush & Bryk, 2002; Raudenbush et al., 2011), with students at level 1 and countries at level 2. Design weights were applied into multi-level models. Starting from Model I (empty model), which did not include any explanatory variable, two increasingly complex models were elaborated. Specifically, Model II (within-country model) estimated the links between the individual/ proximal-level variables and the high risk of PG for individual I in country J. Model III (between-country model) added the estimation of the influence of macro-level variables on participants' high risk of PG.

As a result, the final model was computed using the following formula:

$$\text{Adolescent PG Risk} = \beta_{0j} + \beta_{1j}*(\text{gender}) + \beta_{2j}*(\text{gaming hours}) + \beta_{3j}*(\text{parental regulation}) + \beta_{4j}*(\text{parental monitoring}) + + \beta_{5j}*(\text{family support}) + \beta_{6j}*(\text{family economic status}) + \beta_{7j}*(\text{family structure}),\ \beta_{0j} = \gamma_{00} + \gamma_{01}*(\text{GINI}) + \gamma_{02}*(\text{family benefits}) + u_{0j.}$$

Furthermore, to investigate the factors associated with high risk of PG, Odds Ratios (ORs) and 95% Confidence Intervals (CIs) through two-level logistic regression models were computed. The random-effect factor (country) was included in all models to allow for possible heterogeneity. Considering the aim of the present study, only adolescents with complete data in the variables of interest ($n = 88\ 118$) were included in the final analyses.

3.4 Results

3.4.1 Preliminary Analyses

Of the total sample, 20.0% of the participants was found to meet the criteria for high risk of PG, thus suggesting that one every five adolescents may be at risk of developing problematic patterns of video games use. With regards to the prevalence by gender, the percentage of males reporting high PG risk (30.8%) tripled that observed in females (9.4%).

As can be observed in the choropleth map (Fig.1), implemented using the packages ggplot2 and choroplethr of the statistical software R (R Development Core Team, 2020) to visually represent the prevalence of PG risk across European countries based on a gradient of colours ranging from white (absence of PG risk) to black (high PG risk), Danish youth reported the lowest rate of PG risk (12.0%), whereas Romanian adolescents showed the highest (30.2%).

Figure 1

Choropleth Map Showing the Prevalence of High Adolescent PG Risk in European Countries.
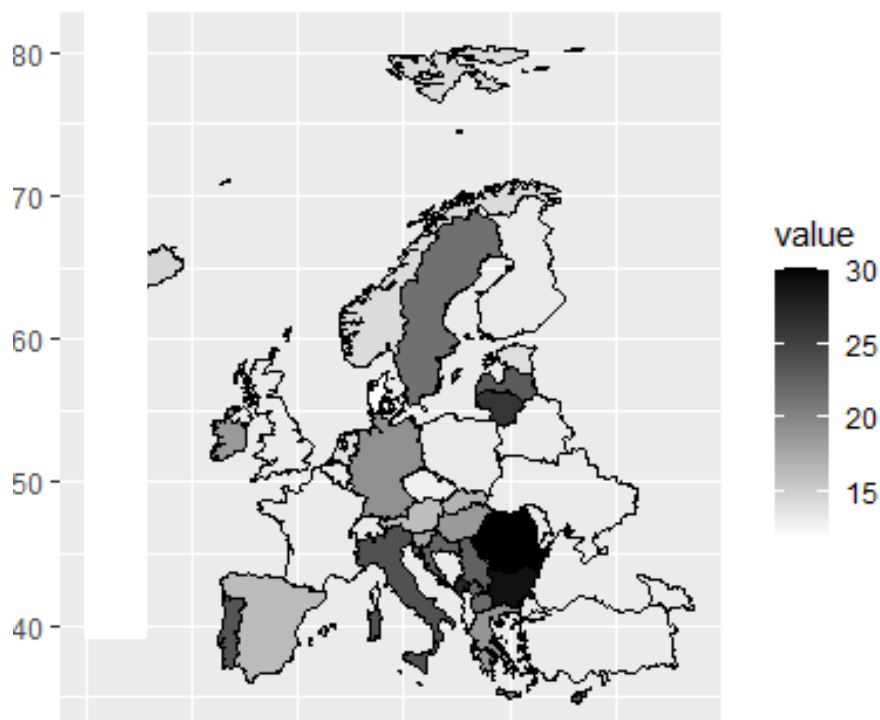
Table 1 shows further details of the prevalence of low and high adolescent PG risk in each European country and by gender. Furthermore, Table 2 reports the descriptive statistics for all the individual/proximal-level and macro-level variables by risk of PG in each of the 30 countries.

Table 1

Prevalence of Low (0-1) and High (2-3) Risk of PG, Stratified by Country and Gender.

Country	n	Low risk of PG (0-1)			High risk of PG (2-3)		
		Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
Austria	4313	72.2	95.7	83.8	27.8	4.3	16.2
Bulgaria	2826	62.9	78.2	70.7	37.1	21.8	29.3
Croatia	2744	66.7	89.5	77.6	33.3	10.5	22.4
Cyprus	1168	68.4	849	77.7	31.6	15.1	22.3
Czechia	2724	78.3	96.2	87.0	21.7	3.8	13.0
Denmark	2457	77.4	97.5	88.0	22.6	2.5	12.0
Estonia	2513	74.8	96.2	85.9	25.2	3.8	14.1
Finland	4501	77.0	96.3	86.7	23.0	3.7	13.3
Germany	1448	66.5	94.3	80.7	33.5	5.7	19.3
Greece	5964	69.7	91.7	81.1	30.3	8.3	18.9
Hungary	2332	71.3	91.8	81.4	28.7	8.2	18.6
Iceland	2473	76.9	93.3	85.4	23.1	6.7	14.6
Ireland	1913	69.1	92.9	81.4	30.9	7.1	18.6
Italy	2505	66.0	87.2	76.1	34.0	12.8	23.9
Kosovo	1695	69.5	85.1	77.9	30.5	14.9	22.1
Latvia	2728	63.6	90.4	76.8	36.4	9.6	23.2
Lithuania	2384	64.2	83.3	73.8	35.8	16.7	26.2
Malta	3009	64.1	87.9	75.8	35.9	12.1	24.2
Montenegro	5594	61.6	84.1	72.9	38.4	15.9	27.1
Netherlands	1287	77.2	94.9	86.1	22.8	5.1	13.9
Macedonia	2866	68.6	87.0	78.0	31.4	13.0	22.0
Norway	4113	77.2	94.2	85.7	22.8	5.8	14.3
Poland	2334	79.1	93.4	86.7	20.9	6.6	13.3
Portugal	4322	57.1	92.7	76.4	42.9	7.3	23.6
Romania	3734	61.8	77.9	69.8	38.2	22.1	30.2
Serbia	3447	65.7	88.2	77.2	34.3	11.8	22.8
Slovakia	2227	70.9	94.8	83.1	29.1	5.2	16.9
Slovenia	3392	70.9	93.1	82.3	29.1	6.9	17.7
Spain	3523	71.3	95.0	83.6	28.7	5.0	16.4
Sweden	2462	67.9	88.9	78.4	32.1	11.1	21.6
Total	88 998	69.2	90.6	80.0	30.8	9.4	20.0

Table 2

Descriptive Statistics for the Individual/Proximal-Level and Macro-Level Variables by Risk of PG (Lpg: Low Risk of PG = 71242; Hpg: High Risk of PG = 17756). Values are Percentage Frequency (%) or Mean and Standard Deviation (M, SD).

	Level 1 Individual/Proximal												Level 2 Macro	
	Gaming hours on a school day M (SD)		Living with both parents (%)		Parental regulation M (SD)		Parental monitoring M (SD)		Family support M (SD)		Perception of high family ses (%)		GINI coeff. (%)	Family Benefits (% GDP)
Country	Lpg	Hpg	Lpg	Hpg	Lpg	Hpg	Lpg	Hpg	Lpg	Hpg	Lpg	Hpg		
Austria	2.08 (1.48)	3.54 (1.76)	71.9	62.7	3.48 (1.16)	3.23 (1.27)	1.58 (0.97)	1.78 (1.07)	5.81 (1.61)	5.41 (1.87)	92.0	92.0	27.5	2.7
Bulgaria	2.68 (1.59)	2.92 (1.75)	71.1	62.4	3.02 (1.26)	2.61 (1.32)	1.68 (1.07)	1.84 (1.15)	5.22 (2.12)	4.72 (2.30)	94.9	93.4	40.8	1.8
Croatia	2.25 (1.37)	3.38 (1.67)	80.4	79.7	2.92 (1.14)	2.75 (1.15)	1.65 (0.99)	1.92 (1.12)	5.80 (1.69)	5.61 (1.99)	93.0	91.9	29.2	1.8
Cyprus	2.06 (1.36)	2.65 (1.58)	81.5	73.2	3.16 (1.16)	2.78 (1.17)	1.41 (0.79)	1.63 (1.00)	5.96 (1.49)	5.57 (1.98)	90.0	88.1	31.1	1.2
Czechia	2.31 (1.40)	3.98 (1.35)	60.8	56.5	3.22 (1.01)	3.08 (0.98)	1.92 (1.09)	2.04 (1.08)	5.46 (1.79)	5.23 (1.97)	93.5	93.1	24.0	1.6
Denmark	2.63 (1.46)	4.14 (1.26)	73.4	77.5	3.64 (0.94)	3.46 (1.00)	1.52 (0.79)	1.54 (0.81)	5.89 (1.47)	5.63 (1.68)	93.4	93.1	27.5	3.4
Estonia	2.72 (1.56)	4.21 (1.33)	61.7	65.3	3.66 (1.12)	3.39 (1.13)	1.86 (1.06)	1.93 (1.07)	5.66 (1.51)	5.70 (1.50)	91.7	91.2	30.5	2.1
Finland	2.72 (1.44)	4.19 (1.35)	70.6	74.4	2.63 (1.10)	2.52 (1.08)	1.65 (0.89)	1.71 (0.87)	5.69 (1.59)	5.57 (1.83)	90.7	89.7	26.2	2.9
Germany	2.23 (1.37)	3.91 (1.35)	77.4	74.3	3.58 (1.01)	3.68 (1.00)	1.46 (0.84)	1.68 (1.01)	5.69 (1.50)	5.68 (1.46)	94.5	87.9	29.7	3.3
Greece	1.88 (1.28)	3.18 (1.69)	83.7	80.3	3.14 (1.18)	3.05 (1.22)	1.47 (0.86)	1.71 (0.99)	6.05 (1.32)	5.96 (1.39)	92.2	92.4	31.0	1.4
Hungary	2.22 (1.38)	3.50 (1.50)	65.8	65.9	3.52 (1.07)	3.25 (1.16)	1.44 (0.85)	1.58 (0.97)	5.63 (1.65)	5.52 (1.71)	95.7	94.2	28.0	2.2
Iceland	2.55 (1.73)	3.71 (1.86)	71.7	66.9	2.58 (1.13)	2.46 (1.16)	1.56 (0.85)	1.62 (0.90)	5.92 (1.62)	5.52 (1.99)	90.3	93.8	23.2	2.4
Ireland	1.87 (1.33)	3.03 (1.65)	78.3	73.6	2.64 (1.20)	2.57 (1.14)	1.72 (1.03)	1.81 (1.07)	5.38 (1.72)	5.26 (1.78)	90.8	90.8	28.3	1.2
Italy	2.15 (1.28)	3.07 (1.54)	71.4	69.2	2.87 (1.18)	2.59 (1.24)	1.63 (0.95)	1.67 (0.99)	5.67 (1.58)	5.52 (1.75)	87.6	87.8	32.8	1.8
Kosovo	1.76 (1.23)	2.31 (1.62)	88.6	79.3	2.07 (1.12)	1.91 (1.15)	1.43 (0.96)	1.54 (1.04)	5.89 (1.79)	5.16 (2.27)	98.9	99.2	29.0	0.1

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Latvia	2.25 (1.54)	3.54 (1.71)	55.5	55.2	3.38 (1.16)	3.21 (1.14)	1.81 (1.04)	2.06 (1.12)	5.55 (1.68)	5.51 (1.74)	91.8	90.2	35.2	1.6
Lithuania	2.51 (1.47)	3.38 (1.66)	64.6	63.6	3.08 (1.17)	2.86 (1.20)	1.67 (0.94)	1.82 (1.00)	5.97 (1.54)	5.89 (1.68)	95.1	94.5	35.4	1.2
Malta	2.31 (1.40)	3.39 (1.65)	70.5	68.0	2.79 (1.11)	2.62 (1.10)	1.51 (0.88)	1.64 (0.91)	5.64 (1.62)	5.71 (1.61)	88.5	88.3	28.0	0.9
Montenegro	2.18 (1.41)	3.09 (1.72)	86.0	82.0	2.40 (1.20)	2.14 (1.19)	1.38 (0.82)	1.50 (0.91)	6.31 (1.34)	6.02 (1.78)	87.9	87.1	34.1	1.9
Netherlands	2.23 (1.38)	3.26 (1.62)	72.2	67.4	2.42 (1.12)	2.18 (1.07)	1.64 (0.87)	1.69 (0.86)	6.01 (1.33)	5.50 (1.60)	85.3	79.7	26.8	1.2
North Macedonia	2.01 (1.25)	2.87 (1.68)	83.4	74.0	2.70 (1.23)	2.39 (1.29)	1.57 (1.02)	1.59 (0.99)	5.77 (1.90)	5.32 (2.27)	91.2	92.7	30.7	0.9
Norway	2.46 (1.55)	3.78 (1.63)	75.8	72.6	2.35 (1.08)	2.39 (1.15)	1.60 (0.82)	1.72 (0.95)	5.75 (1.57)	5.49 (1.85)	93.3	91.6	25.4	3.2
Poland	2.67 (1.56)	3.75 (1.66)	74.0	72.8	3.43 (1.13)	3.19 (1.16)	1.85 (1.08)	2.09 (1.19)	5.15 (1.83)	4.79 (2.01)	91.8	91.7	28.5	2.6
Portugal	2.03 (1.31)	3.50 (1.57)	69.8	71.2	2.80 (1.17)	2.66 (1.14)	1.65 (0.94)	1.74 (0.97)	5.72 (1.54)	5.83 (1.46)	94.5	93.2	31.9	1.2
Romania	2.24 (1.48)	2.88 (1.68)	60.6	59.2	3.55 (1.22)	3.30 (1.33)	1.67 (1.09)	1.81 (1.17)	6.19 (1.39)	6.11 (1.54)	94.2	94.0	34.8	1.1
Serbia	2.07 (1.24)	3.07 (1.63)	78.7	78.8	3.21 (1.20)	2.95 (1.28)	1.48 (0.95)	1.70 (1.12)	6.22 (1.38)	6.05 (1.61)	85.3	84.8	33.3	1.2
Slovakia	1.93 (1.36)	3.18 (1.76)	71.1	67.2	3.26 (1.08)	3.02 (1.07)	1.83 (1.08)	2.00 (1.18)	5.15 (1.74)	5.04 (1.75)	94.3	94.0	22.8	1.6
Slovenia	1.95 (1.17)	3.30 (1.46)	80.8	77.2	3.21 (1.13)	2.96 (1.12)	1.56 (0.93)	1.80 (1.10)	5.74 (1.41)	5.59 (1.52)	85.4	87.3	23.9	1.8
Spain	1.98 (1.20)	3.18 (1.52)	74.0	71.4	2.62 (1.17)	2.53 (1.15)	1.67 (0.97)	1.81 (1.06)	5.75 (1.51)	5.45 (1.71)	92.2	91.3	33.0	1.2
Sweden	2.60 (1.43)	3.35 (1.60)	77.1	74.1	3.07 (1.14)	2.83 (1.21)	1.62 (0.88)	1.81 (1.00)	5.68 (1.54)	5.52 (1.80)	95.4	95.5	27.6	2.9
n	70909	17659	70532	17491	70496	17476	70386	17419	70389	17440	69812	17317	30	30
Total	2.25 (1.43)	3.32 (1.67)	73.7	71.2	2.99 (1.21)	2.79 (1.25)	1.61 (0.95)	1.75 (1.04)	5.77 (1.61)	5.61 (1.80)	91.7	91.2	29.67 (4.13)	1.81 (0.81)

3.4.2 Multi-Level Logistic Regression Analyses

The estimates of the three HLM models are reported in Table 3. The analyses started by fitting an unconditional model (model I) and comparing the empty model at one level with the empty model at two levels. This comparison revealed a significant main effect of the countries and suggested the need to conduct further analyses to observe possible differences.

The within-country model (model II) examined the contribution of the proximal-level variables of perceived parental regulation, parental monitoring and family support, controlling for three socio-demographic variables (i.e., gender, family economic status, living with both parents) and the average amount of time spent on gaming on a school day.

Among proximal-level variables, results indicated that adolescents who experienced stronger parental regulation and higher family support reported lower risk of PG, whereas parental monitoring showed no significant association with the risk of PG. With regards to socio-demographic variables, findings showed that female adolescents were less likely to be at high risk of PG compared to males and evidenced that living within a non-traditional family structure may constitute a potential risk factor for PG. Students' perception of their family socio-economic status was not significantly associated with high risk of PG in youth. In addition, the daily number of hours spent playing video games was positively associated with high PG risk.

The between-country model (model III) inspected the role of macro-level variables ($n = 30$ European countries). Results indicated that family benefits (% of GDP) were negatively associated with high risk of PG. Furthermore, the Gini coefficient for economic inequality was found to be positively associated with the risk of PG.

Finally, to account for between-country variability, the cross-level interactions between the main proximal-level variables (i.e., perceived parental regulation, monitoring and family support) and family benefits were computed, but no significant interaction was observed.

Table 3

Correlates of the Risk of Problematic Gaming (0 = Low Risk of PG, 1 = High Risk of PG).

Variables	Model I (unconditional model)			Model II			Model III		
	Coeff. (SE)	P-value	OR (95% C.I.)	Coeff. (SE)	P-value	OR (95% C.I.)	Coeff. (SE)	P-value	OR (95% C.I.)
Fixed Effect									
Intercept	-1.39 (0.06)	<0.001		-0.90 (0.09)	<0.001		-0.93 (0.07)	<0.001	
Individual-Proximal Level									
Gender (0=male, 1= female)				-1.06 (0.07)	<0.001	0.34 (0.30-0.39)	-1.08 (0.07)	<0.001	0.34 (0.29-0.39)
Gaming hours on a school day				0.34 (0.02)	<0.001	1.41 (1.35-1.48)	0.35 (0.02)	<0.001	1.42 (1.36-1.49)
Parental regulation				-0.20 (0.01)	<0.001	0.81 (0.80-0.83)	-0.21 (0.01)	<0.001	0.81 (0.79-0.83)
Parental monitoring				0.03 (0.01)	0.088	1.03 (0.99-1.06)	0.03 (0.01)	0.088	1.03 (0.99-1.06)
Family support				-0.07 (0.01)	<0.001	0.93 (0.91-0.95)	-0.07 (0.01)	<0.001	0.93 (0.91-0.95)
Perception of high family economic status				0.03 (0.04)	0.490	1.03 (0.95-1.10)	0.02 (0.03)	0.495	1.03 (0.95-1.10)
Living with both parents (0= yes, 1= no)				0.08 (0.03)	0.003	1.09 (1.03-1.15)	0.09 (0.03)	0.003	1.09 (1.03-1.15)
Macro-level (N=30)									
Benefits for families (% of GDP)							-0.24 (0.06)	<0.001	0.78 (0.70-0.89)
Gini coefficient							0.05 (0.01)	<0.001	1.05 (1.03-1.07)
Random Effect									
Variance components	0.10 (0.31)	$\chi^2_{(29)}$ = 1549.62, P<.001		0.16 (0.40)	$\chi^2_{(29)}$ = 2002.85, P<.001		0.05 (0.24)	$\chi^2_{(27)}$ = 625.65, P <.001	

Notes. SE = standard error; OR = odds ratio; CI = confidence interval. Individual random effects tests examine hypotheses about whether the variance for each random intercept or slope (and their covariances) are significantly different from zero (Raundenbush & Bryk, 2002).

3.5 Discussion

The purpose of this first study was to adopt a comprehensive approach to examine the contribution of proximal-level variables, with a specific focus on to parental and family behaviours, and of macro-level indicators, namely family benefits and economic inequalities, in explaining the risk of PG in a representative sample of adolescents living in 30 European countries.

At a macro-level, this is the first study that revealed that family benefits may play a significant protective role in relation to adolescent risk of PG. As explained by some scholars (Yeung et al., 2002; Lebihan & Takongmo, 2018), national investments providing financial assistance to families may foster adolescent well-being in different ways, both directly, by increasing the availability of resources, in terms of goods, services and opportunities, and indirectly, by improving family well-being and the quality of family environment. Indeed, as conceptualized in the Family Stress Model by Masarik & Conger (2017), family functioning could be worsened by economic stress, which, in turn, can deplete the psychological and relational resources of caregivers, ultimately leading to increased maladjustment in youth. Given that PG has been previously associated with lower quality of family functioning (Nielsen et al., 2020), these results are particularly relevant since they demonstrate that government expenditures on social protection policies, such as cash transfers, to support families in childcare, may indeed reduce PG risk.

Contrary to the hypotheses, however, no cross-level interaction was found between proximal-level variables of parental regulation, monitoring and family support and macro-level family benefits in the 30 European countries examined. This nonsignificant result may be due to the fact that the effect has been previously tested for all countries in aggregate (Lebihan & Takongmo, 2018). Consequently, it may be hypothesized that more substantial effects would emerge if countries were grouped using welfare state typologies (Esping-Andersen, 1999; Eikemo et al., 2008), such as Social democratic, Conservative, Liberal, Southern and Eastern (Rathmann et al., 2015), for which different returns from additional incomes on parental variables could be observed. Future multi-level research should investigate variations in PG also by considering the use of these welfare state typologies.

Another possible argumentation could be that family benefits may have a more direct impact on other parental mechanisms and characteristics associated to PG, which are not included in the present study. For instance, considering that economic hardship has been found to increase parental psychological distress and parental conflict (Conger et al., 2010), it may be appropriate to explore the influence of additional incomes deriving from social protection policies on these two variables, which were also previously identified as risk factors for adolescent PG (Nielsen et al., 2020).

Further evidence of this first study is that macro-level economic inequalities were positively associated with adolescent PG risk. This results well aligns with extensive literature on the detrimental effects of living in an unequal country on multiple components of well-being (Elgar et al., 2015; Strizek et al., 2020). It is plausible that PG might be related to the preoccupation about the status deriving from a highly salient social hierarchy (Wilkinson & Pickett, 2019). In other words, students who live in such societies might be motivated to spend more time in the virtual environment offered by commercial video games, because competition rules are different from the ones applying to real-world dynamics. However, since the effect observed in this study was modest in magnitude, the proposed interpretation should be taken with caution. Future studies should investigate the potential effect of the social hierarchy characterizing proximal environments, for instance, by examining the role of relative deprivation at the school level (Kim et al., 2021).

At a proximal level, one of the most relevant findings of this study concerns the active role of mothers and fathers in reducing adolescents' risk of PG, in terms of provision of parental regulation. In fact, living in a family where limits on adolescents' activities (including video games use) are clearly defined could minimize the risk of PG (Wichstrøm et al., 2019), since adolescents' attention may be directed towards other recreational pastimes, for instance physical activity and music playing (Jago et al., 2013). As pinpointed by Hygen et al. (2022), this is in line with the displacement hypothesis (Neuman, 1988), whereby part of the total amount of time spent gaming during a regular day could be instead devoted to other beneficial activities. Consistent with this, recent research has revealed that adolescents' involvement in sports (e.g., gymnastics, athletics, swimming) can reduce

obesity and PG and help them to maintain an ideal weight and a healthy body (Gülü et al., 2023). Of note, especially during the critical period of adolescence, parental regulation and proposal of alternative activities should occur in a context where youths perceive autonomy-supporting parenting, rather than coercion, as empathic communication and negotiation on rules are fundamental to promote positive parent-adolescent relationships and family well-being (Van Petegem et al., 2017).

Along this line, a warm family environment offering the possibility to receive adequate emotional support and help with difficulties was found to reduce the risk of PG in the present study, in line with previous research (Schneider et al., 2017; Sugaya et al., 2019). Since adolescents may turn to gaming in the attempt to cope with everyday stressors and negative emotions (Kardefelt-Winther et al., 2014; Paulus et al., 2018), being supported by family members when facing the complex challenges of adolescence could be crucial.

Contrary to the expectations, findings from this first study did not evidence a significant association between parental monitoring and the risk of PG among European adolescents. It should be noted, however, that parental monitoring as measured by the ESPAD questionnaire (ESPAD Group, 2020) refers to general - and not-gaming specific - parental knowledge of adolescents' whereabouts: while such knowledge may play a central role in the onset and development of risky behaviours entailing illegal and anti-social activities such as gambling, substance use or delinquency (Molinaro et al., 2018), it may exert a less salient influence in reducing problems with gaming, since this is a socially accepted activity which mainly takes place at home. Therefore, rather than investigating generic adolescents' whereabouts, future studies on PG should further examine parental knowledge of targeted gaming-related aspects, such as their adolescents' motives driving gaming (e.g., escapism, coping) or preferred video games genres (e.g., massively multi-player online role-playing games, first person shooters), which were previously found to be positively associated with higher levels of PG in youth (Bender et al., 2020; Paulus et al., 2018; Wichstrøm et al., 2019).

Among the self-reported controlling variables, the findings confirmed that male gender was positively associated with the risk of PG (Bender et al., 2020). This could be possibly due to

neurobiological mechanisms, such as craving-related activations to gaming cues (Dong et al., 2018) and to the traditional masculine gaming culture and stereotypes which encourage male participation (Lopez-Fernandez et al., 2019). With regards to the other demographics variables related to the proximal domain of family, consistent with previous studies (Rehbein & Baier, 2013; Schneider et al., 2017), the results from this study indicated that adolescents living within a non-traditional family structure (e.g., single parents, stepfamilies) were at higher risk of PG, since these typologies of families may experience more difficulties in providing alternative resources or fulfilling individuals' needs (Rikkers et al., 2016). Furthermore, subjective assessment of family socio-economic status was not associated with high PG risk among adolescents, in accordance with a systematic review on family factors associated with adolescent PG by Schneider et al. (2017). Finally, the amount of time spent playing video games was found to be positively associated with PG risk, as repeatedly observed in previous studies (Paulus et al., 2018; Sugaya et al., 2019). However, as stressed by Billieux et al. (2019), a high involvement in gaming activities should not be considered as the fundamental aspect to identify problematic gamers, since it may also be characteristic of individuals who intensively play video games without necessarily develop a pathological use.

3.5.1 Limitations

Some limitations should be acknowledged. Although the ESPAD survey employed a shared and standardized methodology across participating countries (ESPAD Group, 2020b), there are some limitations that are typical of cross-sectional studies that could possibly weaken the validity of the estimates. Even if students' participation rate was generally high, class participation rates were relatively low in some countries (e.g., Denmark and the Netherlands). In addition, data were self-reported by students and therefore possibly subjected to well-known biases (e.g., social desirability, memory recall). Furthermore, the results may be considered representative only for 15- to 16-year-old students in regular schools, thus they may be not extendable to adolescents not involved in the education programs provided by school systems. This is an important limitation, since research has

documented that the most severe cases of PG in youth are predominant among self-isolated adolescents, who thus cannot be detected by school surveys (Ferrante & D'Elia, 2022).

In addition, as anticipated above, the risk of PG was assessed by means of a synthetic three-item tool, which, although resulting appropriate for non-clinical surveys (Holstein et al., 2014), may have limited accuracy in identifying problematic gamers (Spilková et al., 2017). As pointed out by King et al. (2020), the use of short screening tools in epidemiological studies could potentially inflate the prevalence of a condition due to the detection of false positive cases, thus hindering the comparability of findings. As proposed by Carras and Kardefelt-Winther (2018), considering the complex phenomenology of PG and the current lack of a unified measurement tool, multi-national studies should investigate both gaming-related problems and the levels of addiction-related symptoms, to define clearer boundaries for the condition.

From an epidemiological standpoint, it could also be useful that future research distinguishes between the absence and low presence of PG risk, as done in previous studies in the gambling field (Canale et al., 2016). In addition, the findings concerning parental practices (regulation and monitoring) should be interpreted with caution, as the formulation of the items used for the assessment in the ESPAD questionnaire (ESPAD Group, 2020a) did not explicitly refer to the use of video games, but rather to general activities carried out by adolescents. Specifically, the construct of parental regulation may be further explored in its distinct facets, including restrictive mediation and active mediation (Nielsen et al., 2019; Valkenburg et al., 2013).

Another limitation of the present study is that family benefits, being computed and treated as a macro-level variable (i.e., % of GDP), solely allowed to detect potential general differences between European countries, which may at least partially explain the lack of cross-level interaction between family benefits and self-reported parental variables obtained in the analyses. In other words, in the present research, it was not possible to ascertain whether only the families who effectively received additional income from national governments experienced more positive outcomes in parenting and family life. Therefore, it may be interesting for the future to specifically analyse whether the

percentage of families receiving monetary support would report significant improvements, possibly by also testing the interaction between the amount of state family benefits assigned and objective measures of the socioeconomic status of each family unit. This may allow to reduce the pragmatic and interpretative distance between country-level family benefits and individual risk of adolescent PG, by exploring a possible mechanism that can explain such association with greater accuracy.

Lastly, despite this first study applied a comprehensive perspective to investigate the associations between parental and family variables and adolescent PG, not only by considering the proximal level, but also by examining possible macro-level factors, the influence of other parental and family variables should be explored. For instance, at a macro-level, the percentage of families having access to the Internet and the average number of technological devices owned by families could be additional indicators to inspect in relation to the risk of adolescent PG. Furthermore, the level of parental digital literacy within a country may also be examined as a possible protective factor for PG in youth (Terras & Ramsay, 2016). Parents should not be outsmarted by their offsprings in the use of technology, otherwise they may lose credibility in the settings of their rules or they may be unable to effectively regulate adolescent gaming activities (Benrazavi et al., 2015).

3.5.2 Conclusion

This first multi-level study stressed the relevance of simultaneously considering parental and family variables both at a proximal and at a macro-level, to provide more robust evidence that can be used by national governments to take decisions on the allocation of resources for prevention. Together with guiding and supportive family environments, the findings revealed that larger government expenditures in family benefits and lower country economic inequalities can act as possible protective risk factors for adolescent PG. Future preventive efforts should target, on one hand, parents and families, to raise their awareness of the importance of parental practices and of a warm family context, on the other, national governments, to encourage the implementation of social protection policies fostering adolescent adjustment, which may lower the risk of adolescent PG.

Since in the present research, as in most available studies in the literature (e.g., Nogueira-Lòpez et al., 2023; Zhu et al., 2021), data concerning adolescent PG and parental practices have only been collected from adolescents, an important step for future research would be to directly involve parents themselves in the assessment of such constructs, to gain a more accurate picture of the condition and its possible correlates. An attempt to compare mothers' and adolescents' reports of PG and its associations with the emotional correlates of parenting is presented in the next study (Chapter 4).

Chapter 4

Study 2: The Association between Maternal Behaviours and Adolescent PG: A Dyadic Study Examining the Relational-emotional Correlates

This chapter was adapted from:

4.1 Rationale of the Study

At a proximal level, alongside with parental mediation practices towards adolescents' gaming activities, including parental regulation and parental monitoring analysed in the previous study (Chapter 3), increasing research has evidenced significant associations between several relational-emotional correlates of parenting and adolescent PG (Bussone et al., 2020; Nielsen et al., 2020), as reported in detail in Chapter 2. To date, however, most studies examining the link between the parent-adolescent relationship and PG have relied exclusively on adolescent reports, with only a few studies involving dyads, mainly carried out in the Eastern countries, such as China and Korea (Lam & Cheng, 2022; Li et al., 2018; Mun & Lee, 2021).

This second study presented in the doctoral dissertation adds novel findings by examining the associations between maternal behaviours and adolescent PG using a multi-informant approach within the European context, specifically in Italy. To conceptualize the associations, the Parental Acceptance and Rejection Theory (PARTheory; Rohner & Khaleque, 2005; Rohner et al., 2012) can

be useful. This theory is noteworthy, as it extensively draws on worldwide and cross-cultural empirical evidence, collected by means of multi-method strategies, which provided a solid ground for the study of parental (dys)functional behaviours in the field of Developmental Psychology (Ramìrez-Uclès et al., 2018; Rohner et al., 2010). According to the PARTheory, the quality of parenting is a key emotional-relational aspect that can foster or hinder adolescent adjustment. More precisely, while parental acceptance, expressed through parental warmth and through other physical and verbal behaviours that convey affection and support, is generally positively associated with an adaptive offspring development, parental rejection is a multi-faceted dimension that substantially increases vulnerability to psychopathology and is associated with different negative outcomes in youth, such as dependence, emotional unresponsiveness and negative worldview (Ramìrez-Uclès et al., 2018). Indeed, parental rejection can take a variety of forms, including parental hostility, aggression, and undifferentiated rejection, that can be highly harmful for adolescent well-being and lead to the establishment and maintenance of several forms of maladjustment (Rohner et al., 2012).

Among the different expressions of parental rejection, parental indifference was specifically selected for this study, in line with a cross-cultural meta-analysis that pinpointed it as a major risk factor for adolescent psychological problems, including emotional instability, aggressive behaviours and negative self-esteem (Khaleque, 2015). In fact, parental indifference is a critical aspect, because parents displaying a lack of interest, care and concern towards their sons and daughters, can fail to appropriately attend to their offsprings' physical, emotional and social needs, triggering a series of cascade effects which can increase the distance between family members, compromise the quality of parent-adolescent relationship, and, in turn, worsen adolescent mental health (Rohner et al., 2010).

In the field of adolescent gaming, two previous studies (Chen et al., 2020; Kim et al., 2015) provided initial evidence for the protective effect of parental warmth against PG, while other research revealed that the various expressions of parental rejection were positively associated with adolescent PG (Throuvala et al., 2019; Xie et al., 2021; Zhu & Chen, 2021). An important limitation of these studies, however, is that they collected information only from adolescents without considering

parental perceptions. However, given the interdependence of the parent-adolescent relationship, investigating the family domain by involving both adolescents and their parents as sources of information is recommended to increase the accuracy of assessment (Achenbach, 1987; Laursen et al., 2008). Since they are both actively involved in the same, close relationship and they act as independent observers of their respective behaviours, their simultaneous involvement in data collection can generate a greater and more detailed deal of information (Hughes & Gullone, 2010). In other words, each of them can provide a unique yet valid perspective on the overall picture (De Los Reyes et al., 2015). Furthermore, taking the parental perspective into account becomes even more important in the field of adolescent PG, since parents are often the ones who recognize gaming-related problems and seek the first contact with healthcare professionals, thus acting as proxy informants for their offsprings (Wartberg, Zieglmeier et al., 2019).

To the best of the knowledge, only few previous studies have investigated adolescent PG by means of a multi-informant approach, with some of them reporting high levels of accordance between parents' and adolescents' ratings (Vadlin et al., 2015; Wartberg, Zieglmeier et al., 2019b), some evidencing moderate levels (Paschke et al., 2021) and others showing low levels of accordance, with parents providing higher estimates of adolescent gaming frequency and PG compared to their offsprings (Lobel et al., 2014; Yazdi et al., 2021). None of these previous studies, however, specifically examined the possible associations between adolescent PG and parental behaviours form a dyadic perspective, which thus remains an unexplored area.

4.2 Specific Hypotheses

Capitalizing on a self-selected sample of mother-adolescent dyads, the aims of the present study were to examine multiple informants' reports of adolescent PG and maternal behaviours (i.e., warmth and indifference) and to disentangle the associations between these behaviours that are shared by mothers and adolescents from those that are unique to each member of the dyad. Specifically, this second study tested the following hypotheses:

Hypothesis 1. With regards to mothers' and adolescents' ratings of adolescent PG, a definite hypothesis was not advanced, as available evidence is mixed (e.g., Wartberg, Zieglmeier et al., 2019b; Yazdi et al., 2021).

Hypothesis 2. With regards to maternal behaviours, mothers would provide higher estimates of warmth and lower estimates of indifference than adolescents (Rohner et al., 2005).

Hypothesis 3. A negative association between maternal warmth and adolescent PG and a positive association between maternal indifference and adolescent PG were expected to emerge from the reports of both informants, with low to moderate levels of agreement (Ledermann & Kenny, 2012). In fact, as argued by De Los Reyes et al. (2019), despite one might theoretically expect high levels of accordance between parents' and adolescents' reports about the same family relationship and behaviours, in practice, discrepancies between informants are more likely to emerge.

4.3 Materials and Method

4.3.1 Procedure

Data for this second study were collected in Italy between October and November 2021. Adolescents were recruited at schools and parental informed consent and adolescent informed assent were required before proceeding with the study. Concurrently, both mothers and fathers of the participating students were invited to take part in the study and to provide their own consent. However, due to the low response rates by fathers ($n = 43$), only the data of mother-adolescent dyads were finally retained for statistical analyses.

Two different online surveys (one for adolescents and one for mothers) were delivered via the secure web-based platform Qualtrics®. Adolescents completed the questionnaire during school hours in the computer classroom of their institute, supervised by the researcher and by trained research assistants, whereas mothers were given the possibility to fill in the survey at their preferred time and location by clicking on a link sent to their e-mail address. All participants were asked to create a shared "identifying code" (within the same mother-adolescent dyad) by following detailed

instruction. The two resulting databases were merged and dyads were matched according to the code provided. Confidentiality was guaranteed. The research was conducted in accordance with the Declaration of Helsinki and was preliminarily approved by the Ethics Committee of the School of Psychology (Area 17) of the University of Padova, Italy (protocol number = 4331).

4.3.2 Participants

Of a total sample of $n = 158$ eligible mother-adolescent dyads, $n = 16$ were excluded due to missing values in one of the outcome variables, $n = 3$ were excluded because of missing values in family composition variable and $n = 2$ were excluded because adolescents and mothers did not live together. The final sample comprised $n = 137$ distinguishable and cohabiting dyads. All adolescents ($n = 92$ males, $n = 42$ females, $n = 3$ nonbinary) reported playing video games and were, on average, 14.68 ($SD = 1.25$, range: 13–18) years old. Table 1 shows in detail the sociodemographic characteristics of the adolescent sample and Table 2 illustrates adolescents' gaming habits and attributes.

Mothers were on average 47.48 years old (range 33-58; $SD = 4.69$); of them, approximately 20% ($n = 27$) completed middle school, 54.8% (n = 74) completed high school, the remainder obtained a bachelor/master's degree. Most of mothers (84.4%) were employed. With regards to the number of offsprings, 24.8% had one child, 54.9% had two, 20.4% had between three and five children.

4.3.3 Measures

Maternal Warmth and Indifference

Adolescents and their mothers evaluated maternal behaviours by using two respective versions of the Parental Acceptance and Rejection Questionnaire (Rohner & Khaleque, 2005; Italian validation: Rohner & Comunian, 2012). For this study, the scales of warmth (eight items) and indifference (six items) were retained. An example of item for the scale of warmth is, for adolescents: 'My mother lets me know she loves me'; for mothers: 'I let my daughter/son know that I love her/him'. An example of item for the scale of indifference is, for adolescents: 'My mother is too busy to answer to my questions'; for mothers: 'I am too busy to answer to the questions of my

son/daughter'. Dyads responded to items referring to the occurrence of these specific maternal behaviours by using a 4-point Likert scale from (1) 'almost never true' to (4) 'almost always true'. Following the indications of the authors (Rohner & Khaleque, 2005; Rohner & Comunian, 2012), scores for the warmth subscale were directly summed, with higher scores indicating higher levels of warmth, whereas reverse scoring was applied before summing items for the indifference subscale.

Adolescent Problematic Gaming

Adolescents completed the Internet Gaming Disorder Scale – Short Form (IGDS9-SF; Pontes & Griffiths, 2015; Italian validation: Monacis et al., 2016). This scale is composed of nine items based on the nine criteria identified in the fifth edition of the *DSM-5* (APA, 2013). An example of item is: 'Do you feel preoccupied with your gaming behaviour?'. Adolescents were invited to rate the frequency of each symptom experienced in the last 12 months by responding on a 5-point Likert scale: (1) 'never', (2) 'rarely', (3) 'sometimes', (4) 'often', (5) 'very often'. For the purpose of this study, responses were recoded by using a 3-point scale: (0) 'never', (1) 'rarely/sometimes', (2) 'often/very often'. Assuming a dimensional approach, adolescent PG was considered on a continuum of severity, in line with previous work that measured the same condition in youth (Ciccarelli et al., 2022; Zhang et al., 2022). Hence, the total IGDS9-SF score served as the observed variable, with higher scores corresponding to higher perception of PG by adolescents.

Mothers completed the Video Gaming Scale for Parents (VGS-P), developed and validated in Italian language by Donati and colleagues (2021). VGS-P is a hetero-evaluative instrument consisting, like the IGDS9-SF, of nine items corresponding to the nine criteria proposed in the *DSM-5* (APA, 2013) to assess adolescents' PG symptoms from a parental perspective. Mothers were asked to indicate the frequency of symptoms observed in their offsprings over the previous 12 months by using a 3-point Likert scale: (0) 'never', (1) 'sometimes', (2) 'often'. As for adolescent reports, the total VGS-P score served as the observed variable, with higher scores indicating higher adolescent PG as perceived by mothers.

Table 1

Sociodemographic Characteristics of the Sample of Adolescents (n = 137).

Variable	Categories	Frequencies (%)
Grade of High School	First	93 (67.9%)
	Second	17 (12.4%)
	Third	12 (8.8%)
	Fourth	7 (5.1%)
	Fifth	8 (5.8%)
Type of High School	Lyceum	44 (32.1%)
	Technical Institute	45 (32.8%)
	Professional Institute	48 (35.0%)
Country of Origin	Italy	134 (97.8%)
	Other (i.e., Greece, Russia, Ukraine)	3 (2.2%)
Geographic Area in Italy	North	131 (95.6%)
	Centre	3 (2.2%)
	South and Islands	3 (2.2%)
Socio-Economic Status	Much better off	4 (2.9%)
	Better off	30 (21.9%)
	About the same	93 (67.9%)
	Less well off	4 (2.9%)
	Much less well off	1 (0.7%)
	Not declared	5 (3.6%)
Maternal Education	Primary school	1 (0.7%)
	Middle school	16 (11.7%)
	High school	48 (35.0%)
	Bachelor's/ Master's	34 (24.8%)
	Postgraduate /Specialization	10 (7.3%)
	Unknown	28 (20.4%)
Paternal Education	Primary school	0 (0.0%)
	Middle school	27 (19.7%)
	High school	44 (32.1%)
	Bachelor's/ Master's	23 (16.8%)
	Postgraduate /Specialization	9 (6.6%)
	Unknown	34 (24.8%)
Family Structure	Living with two parents	115 (83.9%)
	Single-parent family	18 (13.1%)
	Stepfamily	4 (2.9%)

Table 2

Gaming Habits and Attributes of the Sample of Adolescents (n = 137).

Variable	Categories	Frequencies (%)
Gaming Modality	Online and offline	117 (85.4 %)
	Online	11 (8.0 %)
	Offline	9 (6.6 %)
Five Preferred Video Game Genres	Sport	22 (16.1%)
	Action/Adventure	19 (13.9%)
	Racing	16 (11.7%)
	Sandbox	15 (10.9%)
	FPS	15 (10.9%)
Gaming Partner(s) [a]	Alone	100 (73.0%)
	Real life friends	73 (53.3%)
	Online friends	53 (38.7%)
	Siblings	44 (32.1%)
	Parents	11 (8.0%)
	Other relatives	9 (6.6%)
Devices Used to Play Video games [a]	Smartphone	104 (75.9%)
	Console	98 (71.5%)
	Computer	55 (40.1%)
	TV	37 (27.7%)
	Tablet	26 (19.0%)
Places Where to Play Video games [a]	At home, anywhere	92 (67.7%)
	At home, only in my bedroom	73 (53.3%)
	In public places	41 (29.9%)
	At a friend's house	35 (25.5%)
	At school	14 (10.2%)
Gaming Time in Minutes (Weekdays)	$M = 276$; $SD = 106$	
Gaming Time in Minutes (Weekend)	$M = 263$; $SD = 102$	

Notes. FPS = First-Person Shooters. M = Mean; SD = Standard Deviation.

[a] More than one option could be selected.

4.3.4 Data Analytic Strategy

To examine mother and adolescent reports of the study variables, descriptive statistics, paired *t* tests, within-reporter (Pearson) interclass correlations, and between-reporter intraclass correlations (ICCs) were computed with SPSS V.28.0.1 software (IBM Corp., 2022). In addition, common fate model (CFM) analyses were conducted to disentangle variance shared between mother and adolescent reports and variance unique to each member of the dyad (Kenny & La Voie, 1985; Ledermann & Kenny, 2012). Consistently, the CFM model entails at least two latent variables, represented by elliptic shapes, which correspond to the common-fate factor, and their respective indicators, represented by rectangles, which correspond to the scores of Member A (e.g., adolescent) and Member B (e.g., mother) of the dyad. The design of this model allows for a decomposition of the associations between the two or more variables into a dyad-level relation (referring to the direct effect between variable X and variable Y) and two individual-level relations (referring to the error covariances between indicators) (Ledermann & Kenny, 2012).

The hypothesized model, with factor loadings for each latent variable set to 1, was tested by using the R package lavaan (Rosseel, 2013) of the open-source software R (R Development Core Team, 2021). To determine the power associated with each parameter of the model, post hoc Monte Carlo power analyses were run for a sample size of *n* = 137 dyads (Muthén & Muthén, 2002). A power of 51.9% was obtained for the association between adolescent PG and maternal acceptance, a power of 90.2% for the association between adolescent PG and maternal indifference and a power of 100% for the association between the two maternal behaviours.

To assess model fit, robust (R) indices were computed by using robust maximum likelihood (MLR) estimation. For an adequate fit, the χ^2 statistic should be not significant, the comparative fit index (CFI) and the Tucker-Lewis index (TLI) should be > .95, and the root-mean-square error of approximation (RMSEA) and standardized root-mean-square residual (SRMR) should be < .05 (Hu & Bentler, 1999). To estimate model parameters and confidence intervals (CIs), a bootstrapping

procedure with 5000 resamples was applied by using maximum likelihood (ML) estimation. Missing data were handled with full information maximum likelihood estimation (FIML).

4.4 Results

4.4.1 Preliminary Analyses

Before conducting the descriptive statistics and correlational analyses of the variables included in the present study, considering the relatively small number of mother-adolescent dyads (n = 137), the construct validity of each instrument was initially tested through a series of confirmatory factor analyses (CFAs). The CFAs using the diagonally weighted least squares (DWLS) estimator (Jöreskog & Sörbom, 1996) were performed by means of the lavaan package (Rosseel, 2012) of the open-source software R (R Development Core Team, 2021) and supported the structural validity of all the scales, as reported in the lines below.

Specifically, for the IGDS9-SF (Pontes et al., 2015; Monacis et al., 2016) examining adolescents' perceptions of problems with gaming, the CFA confirmed an adequate fit of the one-factor model and the data: $\chi^2(27) = 38.71$, $p = .067$; CFI = 0.97; RMSEA = 0.05; 90% confidence interval (CI) [0.00, 0.09]. All the standardized loadings were significant at the $p < .001$ level (range loading = 0.44–0.75), thus showing item convergent validity (Anderson & Gerbing, 1988). In this study, Cronbach's alpha for this measure was .76 (95% CI [.70, .81]).

For the VGS-P (Donati et al., 2021) examining maternal perceptions of their offsprings' problems with gaming, the CFA confirmed an adequate fit of the one-factor model and the data: $\chi^2(27) = 43.71$, $p < .05$; CFI = 0.99; RMSEA = 0.06; 90% CI [0.02, 0.10]. All the standardized loadings were significant at the $p < .001$ level (range loading = 0.72–0.87), thus showing item convergent validity. In this study, Cronbach's alpha for this measure was .90 (95% CI [.88, .92]).

For the warmth scale of the PARQ of the adolescent report (Rohner & Khaleque, 2005; Italian validation: Rohner & Comunian, 2012), the CFA confirmed an adequate fit of the one-factor model and the data: $\chi^2(20) = 47.21$, $p < .01$; CFI = 0.97; RMSEA = 0.08; 90% CI [0.03, 0.09]. All the

standardized loadings were significant at the $p < .001$ level (range loading = 0.62–0.87), thus showing item convergent validity. In this study, Cronbach's alpha for this measure rated by adolescents was .86 (95% CI [.82, .89]). For the warmth scale of the PARQ of the maternal report (Rohner & Khaleque, 2005; Italian validation: Rohner & Comunian, 2012), the CFA confirmed an adequate fit of the one-factor model and the data: $\chi^2(20) = 13.12$, $p = .172$; CFI = 0.98; RMSEA = 0.06; 90% CI [0.00, 0.07]. All the standardized loadings were significant at the $p < .001$ level (range loading = 0.50–0.85), thus showing item convergent validity (Anderson & Gerbing, 1988). In this study, Cronbach's alpha for this measure rated by mothers was .75 (95% CI [.68, .81]).

Finally, for the indifference scale of the PARQ of the adolescent report (Rohner & Khaleque, 2005; Italian validation: Rohner & Comunian, 2012), the CFA confirmed an adequate fit of the one-factor model and the data: $\chi^2(9) = 13.62$, $p = .136$ .01; CFI = 0.97; RMSEA = 0.06; 90% CI [0.00, 0.12]. All the standardized loadings were significant at the $p < .001$ level (range loading = 0.45–0.80), thus showing item convergent validity. In this study, Cronbach's alpha for this measure rated by adolescents was .70 (95% CI [.63, .78]).For the indifference scale of the PARQ of the maternal report (Rohner & Khaleque, 2005; Italian validation: Rohner & Comunian, 2012), the CFA confirmed an adequate fit of the one-factor model and the data: $\chi^2(9) = 12.97$, $p = .164$; CFI = 0.99; RMSEA = 0.05; 90% CI [0.00, 0.12]. All the standardized loadings were significant at the $p < .001$ level (range loading = 0.42–0.83), thus showing item convergent validity. In this study, Cronbach's alpha for this measure rated by mothers was .71 (95% CI [.63, .79]).

Furthermore, at the descriptive level, the means, standard deviation and range of the variables included in the study are reported in Table 3. Furthermore, as part of the preliminary analyses, paired t tests revealed statistically significant differences between mother and adolescent reports of maternal behaviours (Table 3). As can be observed, the scores of adolescent PG reported by mothers were higher than the scores reported by adolescents. Furthermore, mothers provided significantly higher estimates of maternal warmth and significantly lower estimates of maternal indifference, compared to their offsprings.

Table 3

Means, Standard Deviations, Range and Paired t-*Test of the Study Variables Measures.*

Variable	Mother Report			Adolescent Report			
	M	*SD*	Range	*M*	*SD*	Range	Paired *t* test
Adolescent PG	6.09	4.59	0-18	4.29	3.12	0-18	#
Maternal warmth	29.94	2.14	8-32	26.47	4.61	8-32	-8.57***
Maternal indifference	8.60	2.76	6-24	9.26	2.71	6-24	2.10*

Notes. *n* = 137 mother-adolescent dyads. PG = Problematic Gaming. *M* = Mean; *SD* = Standard Deviation. *p < .05. ***p < .001. # Paired *t* test between the reports of adolescent PG was not computed as two different scales were used for the assessment.

In addition, for mothers, Pearson correlations showed that adolescent PG was significantly and negatively associated with maternal warmth, *r* = -.32, 95% CI [-.46, -.15], *p* < .001, and significantly and positively associated with maternal indifference, *r* = .33, 95% CI [.17, .47], *p* < .001. For adolescents, a positive association between PG and maternal indifference, *r* = .20, 95% CI [.03, .35], *p* = .020, was observed, whereas the association between PG and maternal warmth did not reach statistical significance, *r* = -.05, 95% CI [-.21, .11], *p* = .541.

To establish dyadic similarity (interdependence), between-reporter ICCs were computed. Statistically significant correlations were found for adolescent PG (ICC = .50, 95% CI [.30, .64], *p* < .001) and for maternal warmth (ICC = .28, 95% CI [-.01, .49], *p* = .029). The ICC (= .21, 95% CI [-.11, .44]) between reports of maternal indifference did not reach conventional levels of statistical significance (*p* = .086). Nevertheless, the variable was retained because the association found can be considered a nonsignificant statistical trend, and previous research suggested a liberal test of non-independence (*p* < .25) to identify variables for inclusion in CFM analyses (Kenny & La Voie, 1985; Valdes et al., 2016).

4.4.2 Common Fate Model

Figure 1 shows the results of the CFM analyses. An adequate model fit was obtained, χ^2 (3) = 3.70, p = .296, R-CFI = .99, R-TLI = .96, RMSEA = .04 (95% CI [.00, .15]), SRMR = .03.

At the dyadic level, statistically significant associations emerged between maternal warmth and maternal indifference (r = -.72, p = .028). Dyadic correlations between maternal behaviours and adolescent PG, despite exhibiting the expected directions of associations and being moderate in magnitude, did not reach conventional levels of statistical significance (maternal warmth: r = -.26, p = .158; maternal indifference: r = .42, p = .147). At the individual level, correlations based on unique mother reports showed statistically significant associations both between PG and warmth (r = -.35, p = .033) and PG and indifference (r = .30, p = .024). Individual correlations based on unique adolescent reports were significant only for maternal warmth and indifference (r = -.31, p = .015). The 95% CIs for all associations are reported in Fig.1.

Figure 1

The Common Fate Model Displaying the Dyadic and Individual Correlations Between Adolescent

PG and Maternal Behaviours.
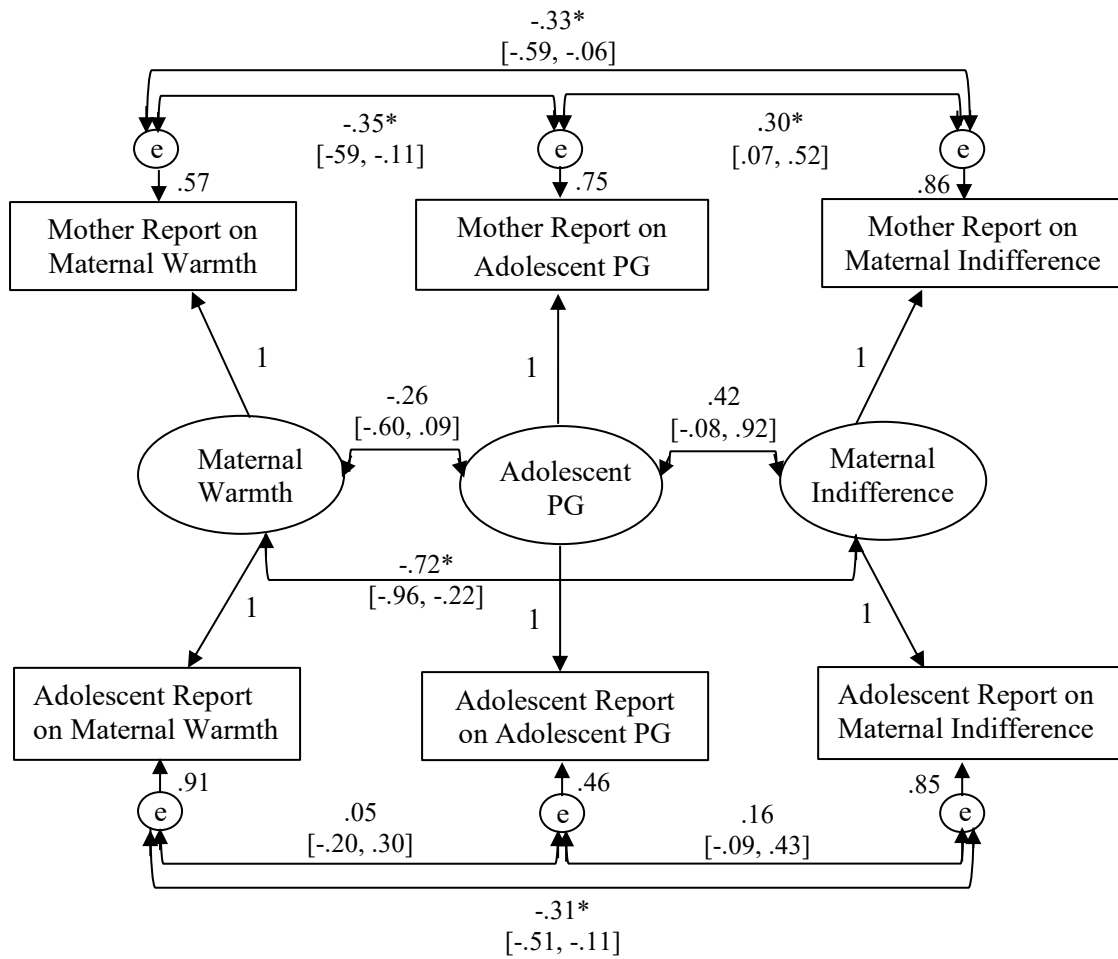
Notes. n = 137 mother-adolescent dyads. PG = problematic gaming. Standardized coefficients are reported. Square brackets indicate 95% confidence interval. *p* < .05.

4.5 Discussion

At a proximal level, this second study added to the literature by adopting a multi-informant approach to investigate the perceptions adolescent PG and maternal behaviours (i.e., warmth and indifference) both of Italian adolescents and of their mothers, and, by means of the CFM model, it decomposed the associations between these variables that were shared by mothers and adolescents from those that were unique to each member of the dyad.

Results indicated that mothers overall reported higher scores of PG than did their offspring. This finding aligns with previous research showing that parents tended to provide higher estimates of adolescents' PG in both community-based samples (Paschke et al., 2021) and in clinical samples (Nielsen et al., 2021; Yazdi et al., 2021). Although it could be hypothesized that awareness of problems among adolescents may be limited because of their low introspective abilities or, more importantly, because of their denial of the problems (Paschke et al., 2021), it is also plausible to assume that preoccupied or judgmental parents may overestimate adolescents' gaming problems (Yazdi et al., 2021). To provide novel insights on this issue, further studies are encouraged to examine potential moderating variables, such as parental attitudes towards adolescent gaming (Bonnaire et al., 2019) or adolescent metacognitive abilities (Aydin et al., 2020).

A major finding of this second study was that adolescents' perceptions of having a less physically and psychologically available mother (maternal indifference) positively correlated with their self-reported levels of PG. As proposed by Zhu & Chen (2021) and consistent with the Self-Determination Theory (Decy & Ryan, 2012), a plausible explanation could be that parental indifference may thwart the satisfaction of some basic psychological needs of the adolescent, who may develop PG in the attempt to alternatively fulfill them. Of note, however, the cross-sectional design of this study does not allow to infer causality; thus, it remains possible both that indifferent maternal behaviours may lead to more adolescent PG and that adolescent PG may induce a decrease in the quality of parenting (Nielsen et al., 2021), stressing the need for future research to explore these associations, for instance by means of longitudinal cross-lagged panel models. Indeed, as recently demonstrated by Zhou et al. (2023), it is also possible that a vicious cycle between adolescent PG and family dysfunction may be established, further fueling the maintenance of this problematic condition.

A central strength of this dyadic study was that the associations between maternal behaviours and adolescent PG were simultaneously partitioned into shared and unique components by using CFM analyses. Findings revealed that the correlations between maternal behaviours and adolescent PG based on shared perceptions did not reach conventional levels of statistical significance. This may

imply that within-reporter interclass correlations may reflect the unique view of each reporter, who may be accurately referring to distinct facets of the same behaviour (Valdes et al., 2016). In other words, this pattern of results suggests that mothers and adolescents tend to provide a discordant rather than a similar assessment of the same phenomenon, reflecting the concept of the "multiple subjective realities that exist in family relationships" proposed by Conway (2011; p. 41). This discrepancy between informants is consistent with previous literature showing low levels of convergence between parent and adolescent reports of parenting and deserves attention (Korelitz & Garber, 2016). Indeed, it might be that differences in the magnitude and direction of informant discrepancies in family dynamics are informative about key dynamics underlying adolescent development (De Los Reyes et al., 2019). More precisely, a pattern of diverging results - in which adolescents report more negative relationships than their parents do - may be indicative of increased parent-adolescent conflict, which has been found to be an important risk factor for adolescent maladjustment (De Los Reyes et al., 2019). From a clinical perspective, the more the family members disagree over the interpretations of the events, the more complicated the outcome of the treatment could be (Becker-Haimes et al., 2018).

Finally, CFM correlations based on unique mothers' perceptions were statistically significant between both maternal behaviours and adolescent PG, highlighting the risk of same-reporter variance bias in potentially inflating associations between variables (Burk et al., 2010). In line with the symbolic interaction theory (Stryker, 1972), positing that each family member may hold precise expectations about family roles and behaviours, it is possible that adolescents may be less willing to recognize associations between maternal behaviours and their actual behaviours (e.g., excessive gaming) because of progressive emotional detachment from their parents, whereas mothers may have a heightened motivation to perceive their parenting as crucial. Consistent with this, in the present study, the descriptive statistics showed that mothers reported higher ratings of maternal warmth and lower ratings of maternal indifference compared to their sons and daughters. This finding aligns with the results of a meta-analysis and qualitative review by Hou et al. (2020) showing that parents tend to perceive and rate their parenting behaviours in a more positive way than their offsprings.

Crucially, as argued by Augenstein et al. (2016), parents' inflated beliefs in the quality and quantity of their practices constitute a critical aspect, since those who are firmly convinced that they are parenting adequately may manifest limited compliance to question or possibly to modify their behaviours, thus posing a significant challenge for the work of clinicians and therapists.

4.5.1 Limitations

This study is not without limitations. First, parental data including only a relatively small, national sample of Italian mothers' reports reduced the generalizability of the findings. The low numerosity of mothers ($n = 137$) – and even more of fathers ($n = 43$) – obtained in the present data collection constituted an important issue, since higher parental participation was expected based on the total number of students responding to the questionnaire at school ($n = 1281$). One explanation could be traced in the challenging period in which the data collection occurred, that is the fourth wave of Covid-19 pandemic in Italy (Marcellusi et al., 2022). In fact, it is possible that the increased number of daily duties and responsibilities that has been found to negatively affect the well-being of Italian parents (Cusinato et al., 2021) may have hindered their willingness to participate in online surveys. In this regard, it should also be noted that, due to the constraints imposed by the pandemic, mothers and fathers only received a written invitation to fill in the questionnaire, which may have not been perceived as sufficiently motivating as formal events at school encouraging parental participation in presence. In the light of this, it may be useful to organize information sessions for parents, which can be more meaningful and stimulate higher participation of mothers and fathers in the surveys. Studies involving larger and cross-cultural samples of both mothers and fathers are needed, since both parents can exert an influence on adolescent adjustment (Miranda et al., 2016). However, it is worth mentioning that increasing fathers' participation still constitutes a major challenge in parenting research due to a number of practical barriers as well as theoretical and researcher-held biases (Yaremych & Persky, 2022). Second, the present research focused on a community-based sample of participants; larger effect sizes may be obtained in samples of highly engaged or problematic gamers.

Third, the use of two different measurement tools for PG, although previously validated in Italian samples of mothers and adolescents, has hampered direct comparisons between the reports of informants. Future studies should employ statistically validated measures for self- and parental ratings of PG, such as the Gaming Disorder Scale for Parents (GADIS-P), which was developed as an adaption of the Gaming Disorder Scale for Adolescents (GADIS-A) in Germany (Paschke et al., 2021). Lastly, the evaluations of PG symptoms based on the *DSM-5* criteria should be undertaken with caution, since it has recently been argued that some criteria cannot distinguish high involvement from pathological video game use (Castro-Calvo et al., 2021). Consistent with the ICD-11 (WHO, 2019), attention should be specifically placed on the loss of control over gaming behaviours and on the overall levels of functional impairment and negative consequences in daily life (Reed et al., 2022), which can be measured by means of semi-structural interviews (Wendt et al., 2021).

4.5.2 Conclusion

This second dyadic study documented the relevance of considering both adolescent and maternal perspectives when examining associations between adolescent PG and the relational-emotional correlates of maternal behaviours. The multi-informant approach not only provided a more accurate assessment of the condition and its potential underpinnings, but it may also be useful in designing prevention and intervention strategies. Specifically, the results underscore the need to explicitly examine and address discordant assessment of the same phenomenon between mothers and adolescents by encouraging open communication between them; this may help both parties gain better insight into their relationship and into their respective perceptions of what they consider problematic in gaming activities, eventually improving family functioning and well-being (Bonnaire et al., 2019).

Since maternal indifference emerged as a key risk factor for adolescent PG in the present research, the next study (Chapter 5) will further investigate the role of this relational-emotional aspect, as perceived by adolescents, by distinguishing it between mothers and fathers, in the relationship between parental phubbing behaviours and the development of adolescent PG over time.

Chapter 5

Study 3: The Impact of Maternal and Paternal Phubbing on Adolescent PG: A Two-Wave Longitudinal Model

This chapter was adapted from:

Pivetta, E., Marino, C., Bottesi, G., Pastore, M., Vieno, A., & Canale, N. (2024). The influence of maternal and paternal phubbing on adolescents' problematic gaming: A two-wave mediation model. *Computers in Human Behaviour*, *152*, 108058. https://doi.org/10.1016/j.chb.2023.108058

5.1 Rationale of the study

At the proximal level, results from the dyadic study reported in Chapter 4 suggested that maternal indifference may play a key role in potentially increasing adolescent PG. However, while much research has investigated the contribution of the traditional emotional-relational correlates of parenting in relation to adolescent PG (Nielsen et al., 2020), little attention has been drawn to their possible predictors, such as parental dysfunctional use of digital technology (Shen et al., 2022). Crucially, according to the Ecological Techno-Subsystem Theory (Johnson & Puplampu, 2008), illustrated in Chapter 2, the study of the environmental influences on adolescent adjustment should incorporate the non-negligible use and impact of digital technologies, as they constitute an integral part of individual and family daily life. In line with this, a phenomenon that has received increased attention in recent years is parental phubbing (Chotpitayasunondh & Douglas, 2016), which refers to parental behaviours characterized by an excessive engagement with smartphones during social interactions with the offsprings which may hinder adolescent functioning and socio-emotional adjustment (Niu et al., 2020; Zhang et al., 2023).

To the best of the knowledge, however, the available literature on parental phubbing and adolescent PG is limited, since it only includes few studies conducted in the Eastern countries which used cross-

sectional designs and investigated parental contributions as a unique construct (Shen et al., 2022; Xie al., 2021; Zhou et al., 2022). To expand previous literature, this third study aimed at providing novel evidence, contextualized in a different geographic area, by investigating the distinct contributions of maternal and paternal phubbing to adolescent PG and by exploring the psychological mechanisms involved in this relationship through a two-wave longitudinal study.

Parental Phubbing and Adolescent Problematic Gaming

The term "phubbing" is a portmanteau word of "phone" and "snubbing" and it refers to a widespread and observable phenomenon whereby individuals concentrate on their smartphones in social settings without paying sufficient attention to others (Chotpitayasunondh & Douglas, 2016). Specifically, parental phubbing occurs during everyday parent-adolescent interactions and may lead to negative interpersonal and psychological consequences, as well as to more internalizing and externalizing problems in youth (Liu et al., 2021; Zhang et al., 2023). Previous research has found that parental phubbing can increase the risk of depression in adolescents (Bai et al., 2020; Xiao et al., 2022) and the tendency of adolescents to perpetrate cyberbullying (Wang, Wang, Qiao, et al., 2022). Furthermore, a growing number of studies has examined the association between parental phubbing and problematic adolescent use of digital technology. Much of this research has focused on the link between parental phubbing and adolescent problematic smartphone use (e.g., Geng et al., 2021; Zhang et al., 2021), whereas only a few studies to date have considered the relationship between parental phubbing and adolescent PG (Shen et al., 2022; Xie al., 2021; Zhou et al., 2022). For example, a study by Zhou et al. (2022) provided initial evidence for the direct association between parental phubbing and Internet gaming addiction and further evidenced the mediating effect of increased parent-adolescent conflict.

Drawing from previous research, the association between parental phubbing and the development of problematic technology-related behaviours in youth, such as PG, can be conceptualized using Social Learning Theory (SLT) (Bandura, 1971). According to the SLT, the

primary means by which children and adolescents learn to behave is by observing others around them. Thus, living with a parent who is heavily engaged with digital devices daily may convey the idea that such technology-related behaviours are normative (Fam et al., 2023; Niu et al., 2020), which may reinforce adolescents' motivation to imitate them using technology (e.g., playing video games) and may progressively lead to the formation of maladaptive gaming habits (Shen et al., 2022). Notably, the fact that one's smartphone is the most used device for gaming worldwide (Statista, 2021) may further corroborate this hypothesis.

The Mediating Role of Parental Indifference

When the attentional resources of parents are reduced, as in the case of parental phubbing, adolescents may perceive a decrease in the quality of and satisfaction with the parent-adolescent relationship (Liu et al., 2020) and increased social disconnection from their parents (Pancani et al., 2020). As postulated by the Expectancy Violation Theory (Burgoon, 1993), individuals involved in face-to-face interactions often expect their partners to focus their full attention on them. When this expectation is violated, they may perceive indifference or exclusion from others, which can be harmful and trigger various negative emotions (Riva & Eck, 2016). In this regard, a cross-sectional study by Xie and Xie (2020) indicated that parental phubbing increased adolescent depression through higher parental rejection, which was associated with lower relatedness need satisfaction. However, the transversal nature of this study did not allow to infer causation, thus it remains unclear whether the specific behaviour of parental phubbing, occurring as a visible interruption in the immediate parent-adolescent interaction, can also predict a more generalized and stable perception of parental rejection – more precisely, of parental *indifference* - which, in turn, can lead to higher adolescent maladjustment over time. Indeed, despite most of the available studies in the literature have examined the role of parental rejection, including those in the field of adolescent PG (Throuvala, Janikian, Griffiths et al., 2019; Zhu et al., 2021), research investigating the phenomenon of parental phubbing should rather focus on parental indifference, which is only one of the different subdimensions

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included in the broader construct of parental rejection, specifically referring to both parental physical and, more importantly, to parental psychological unavailability, as explained in Chapter 2 (Rohner & Khaleque, 2005; Rohner et al., 2012). Based on this, parental indifference could be considered as a critical risk factor increasing adolescents' vulnerability to psychological and behavioural problems (Khaleque, 2015), including adolescent PG, as shown in the previous dyadic study (Chapter 4).

Moreover, the indirect association between parental phubbing and adolescent PG via the mediating role of parental indifference can be conceptualized through the lens of the Compensatory Internet Use Theory (CIUT) (Kardefelt-Winther, 2014). According to this theory, individuals who experience negative emotions arising from everyday life circumstances, such as after being phubbed by their parents, may engage in online behaviours (e.g., playing video games) as a coping strategy that can lead, in some cases, to the development of dysfunctional patterns of use. Thus, adolescent PG may result from adolescents' attempts to alleviate the negative affect associated with an increased and harmful perception of parental indifference over time (Shen et al., 2022; Timeo et al., 2019). Considering this evidence, the present study explored the potential mediating role of parental indifference to better understand the relationship between parental phubbing and adolescent PG.

The Crossover Effect Between Parental Behaviours

Adding to the literature, this third study not only distinguished between maternal and paternal behaviours, but also examined their potential crossover effect, whereby, although distinct, parents can mutually influence each other within the same family environment (Emery, 2014). As shown by previous research based on Family Systems Theory (Breaux et al., 2016; White & Klein, 2002), the psychological symptoms or behavioural problems of one parent may not only have a detrimental impact on his/her own relationship with the offsprings, but may also negatively affect the emotion socialization practices enacted by the other parent, since they may place strain on him/her to provide compensatory supportive reactions, ultimately undermining his/her own psychological resources. Consistent with this, similar interparental effects have been documented by Wang, Mao, Liu et al.

(2022) in a study testing the reciprocal associations between maternal/paternal phubbing and lower quality of maternal/paternal communication with their adolescent, which were all positively related to adolescent's depressive symptoms. Indeed, beyond implying the mutual influence between parental behaviours, the crossover effect may constitute a relevant mechanism possibly increasing the risk for adolescent maladjustment. As evidenced by Wu et al. (2022), the phubbing behaviour of one parent may be sufficient to eventually disrupt the behaviours of both parents, further lowering the quality of parental care and increasing adolescents' vulnerability to psychological and behavioural problems, including PG.

5.2 Specific Hypotheses

To the best of the knowledge, existing studies on parental phubbing and adolescent have all been conducted involving Chinese youths, using a cross-sectional design and measuring parental phubbing as a unique construct PG (Shen et al., 2022; Xie et al., 2021; Zhou et al., 2022). Therefore, this third study aims to expand current knowledge in three ways. First, it investigated the association between parental phubbing and adolescent PG in Europe, specifically among Italian adolescents. As indicated by Stevens et al. (2021), despite East Asian countries exhibiting higher prevalence rates of gaming-related problems and IGD, this condition constitutes a public health issue worldwide. Thus, cross-cultural research expanding current knowledge is necessary. Second, a two-wave longitudinal study was conducted to examine the direct and indirect effects of parental phubbing on later adolescent PG. Since longitudinal research allows the repeated measurement of the same variables over time, it is fundamental to test the direction and magnitude of causal relationships and observe the stability of effects over time, providing more robust empirical evidence than cross-sectional studies (Menard, 2002). This aspect is a noteworthy research target, since it is important to understand whether parental phubbing, beyond being deleterious in the short term, may also have a negative impact on the quality of parenting over time, for instance by determining a long-lasting increase in parental indifference, thus serving as a critical risk factor for adolescent PG. Third, since parental phubbing occurs in a

specific one-to-one interaction (e.g., between the adolescent and one specific parent), as indicated by Pancani et al. (2020), the specific and distinct impact of maternal and paternal phubbing on adolescent PG was evaluated, following an exploratory research approach to detect possible differences in the effects of phubbing behaviours carried out by Italian mothers and fathers. This aligns with previous research that distinguished between maternal and paternal phubbing and found associations with other adverse adolescent outcomes (e.g., Geng et al., 2022; Wu et al., 2022). In addition, this study also differentiated between maternal and paternal indifference, in line with extant literature on parental rejection, suggesting separate but equal consideration of the contribution of both parents to adolescent adjustment (Miranda et al., 2016). Accordingly, as shown in Fig. 1, this third study tested the following hypotheses:

Hypothesis 1a. Maternal phubbing at Wave 1 (W1) would positively predict adolescent PG at Wave 2 (W2).

Hypothesis 1b. Paternal phubbing at W1 would positively predict adolescent PG at W2.

Hypothesis 2a. Maternal phubbing at W1 would positively predict maternal indifference at W2.

Hypothesis 2b. Paternal phubbing at W1 would positively predict paternal indifference at W2.

Hypothesis 3a. Maternal indifference at W2 would be positively associated with adolescent PG at W2.

Hypothesis 3b. Paternal indifference at W2 would be positively associated with adolescent PG at W2.

Hypothesis 4a. Maternal indifference at W2 would mediate the relationship between maternal phubbing at W1 and adolescent PG at W2.

Hypothesis 4b. Paternal indifference at W2 would mediate the relationship between paternal phubbing at W1 and adolescent PG at W2.

Furthermore, to test the crossover effect between parental behaviours, in the first part of the mediation analyses, the hypothesized mediation model, which included two reciprocal paths between maternal and paternal behaviours (Fig. 1), was compared with an alternative model in which these two paths were removed.

Figure 1

The Hypothesized Mediation Model.
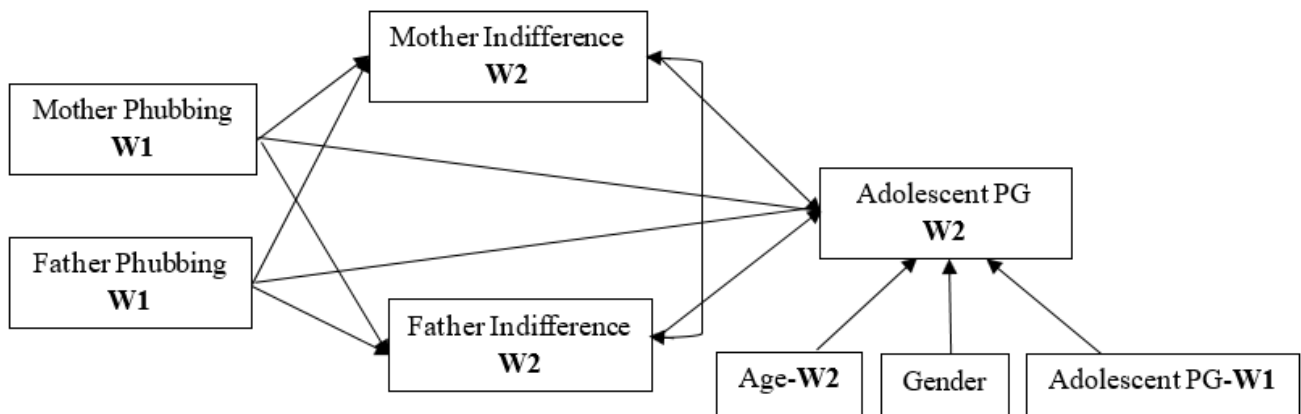
Note. PG = Problematic Gaming.

Accordingly, the following exploratory hypotheses were advanced:

Hypothesis 5a. Maternal phubbing at W1 would positively predict paternal indifference at W2.

Hypothesis 5b. Paternal phubbing at W1 would positively predict maternal indifference at W2.

Hypothesis 6a. Maternal indifference at W2 would mediate the relationship between paternal phubbing at W1 and adolescent PG at W2.

Hypothesis 6b. Paternal indifference at W2 would mediate the relationship between maternal phubbing at W1 and adolescent PG at W2.

In addition, existing research has shown mixed findings regarding the effects of parental phubbing according to the gender of adolescents. For instance, Xie et al. (2019) showed that male adolescents who had been phubbed by their parents were at a higher risk of developing deviant peer relationships and mobile phone addiction than female adolescents. Conversely, two other studies revealed that female adolescents were more likely to interpret the effects of parental phubbing as detrimental than males in terms of lower parent-adolescent communication (Wang, Mao, Liu et al., 2022) and increased maternal rejection (Wu et al., 2022). Hence, one further explorative aim of this study was to examine potential gender differences in the patterns of association between maternal and paternal phubbing and adolescent PG, as specified in the hypothesized model (*see* Fig.1).

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5.3 Materials and Method

5.3.1 Procedure

A two-wave longitudinal study with a six-month time interval was conducted in $n = 10$ Italian high schools. Following authorization by the school principals, W1 data collection occurred between October and November 2021, and W2 between April and May 2022. After parental informed consent and adolescent assent (or active informed consent for participants older than 18) were obtained, participants were invited to complete a series of online questionnaires administered via the platform Qualtrics®, which were identical in the two measurement occasions. Data collection took place at school, under the supervision of the researchers and their assistants, and lasted approximately 35 min. To allow for the matching of the responses between the two waves, participants were asked to create an "identifying code." Confidentiality was guaranteed. The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee for Psychological Research of the University of Padova (protocol number = 4331).

5.3.2 Participants

At W1, $n = 1281$ adolescents completed the online survey and $n = 1269$ at W2. However, due to the lack of correspondence between identifying codes provided by adolescents at the two measurement occasions, only the responses of $n = 1014$ (79.15%) participants were matched. The inclusion criteria approach followed four steps: first, the data of participants who did not play video games at both waves were excluded ($n = 347$); second, the data of adolescents who identified themselves as non-binary were excluded due to insufficient numerosity ($n = 9$) for multi-group analyses; third, the data of participants who did not report living with both parents were excluded ($n = 55$), since one aim of this study was to test the reciprocal influences between parental behaviours; fourth, participants with missing data in one or more of the variables of interest ($n = 46$) were excluded. The final sample comprised $n = 557$ adolescents (69% males). The mean age at W2 was 15.62 ($SD = 1.54$, range:13–20). Table 1 shows the socio-demographics characteristics of the sample and Table 2 illustrates participant's gaming habits and attributes.

Table 1

Sociodemographic Characteristics of the Sample (n = 557).

Variable	Categories	Frequencies (%)
Grade of High School	First	274 (49.2%)
	Second	84 (15.1%)
	Third	76 (13.6%)
	Fourth	71 (12.7%)
	Fifth	52 (9.3%)
Type of High School	Lyceum	206 (37.0%)
	Technical Institute	227 (40.8%)
	Professional Institute	124 (22.3%)
Country of Origin	Italy	523 (93.9%)
	Other (e.g., Romania, Albania, Morocco)	34 (6.1%)
Geographic Area in Italy	North	405 (72.7%)
	Centre	69 (12.4%)
	South and Islands	83 (14.9%)
Socio-Economic Status	Much better off	24 (4.3%)
	Better off	128 (23.0%)
	About the same	368 (66.1%)
	Less well off	27 (4.8%)
	Much less well off	1 (0.2%)
	Not declared	9 (1.6%)
Maternal Education	Primary school	4 (0.7%)
	Middle school	87 (15.6%)
	High school	225 (40.4%)
	Bachelor's/ Master's	111 (19.9%)
	Postgraduate /Specialization	32 (5.7%)
	Unknown	98 (17.6%)
Paternal Education	Primary school	7 (1.3%)
	Middle school	126 (22.6%)
	High school	206 (37.0%)
	Bachelor's/ Master's	78 (14.0%)
	Postgraduate /Specialization	39 (7.0%)
	Unknown	101 (18.1%)

Table 2

Gaming Habits and Attributes of the Sample (n = 557).

Variable	Categories	Frequencies (%)
Gaming Modality	Online and offline	440 (79.0%)
	Online	79 (14.2%)
	Offline	38 (6.8%)
Five Preferred Video Game Genres	Sport	90 (16.2%)
	Action/Adventure	85 (15.3%)
	FPS	81 (14.5%)
	Battle Royale	52 (9.3%)
	Sandbox	51 (9.2%)
Gaming Partner(s) [a]	Real life friends	349 (62.7%)
	Alone	328 (59.9%)
	Online friends	219 (39.3%)
	Siblings	147 (26.4%)
	Parents	38 (6.8%)
	Other relatives	30 (5.4%)
Devices Used to Play Video games [a]	Smartphone	419 (75.2%)
	Console	346 (62.1%)
	Computer	226 (40.6%)
	TV	134 (24.1%)
	Tablet	83 (14.9%)
Places Where to Play Video games [a]	At home, anywhere	340 (61.0%)
	At home, only in my bedroom	308 (55.3%)
	At school	85 (15.3%)
	At a friends' house	153 (27.5%)
	In public places	111 (19.9%)
Gaming Time in Minutes (Weekdays)	$M = 100$; $SD = 76$	
Gaming Time in Minutes (Weekend)	$M = 140$; $SD = 140$	

Notes. FPS = First-Person Shooters. M = Mean; SD = Standard Deviation.

[a] More than one option could be selected.

5.3.3 Measures

Maternal and Paternal Phubbing

Maternal and paternal phubbing behaviours were examined by Pancani et al. (2020) using the Parental Phubbing Scale (PPS). This scale was developed in Italian as an adaption of the Partner Phubbing Scale (Roberts & David, 2016) to the parental context and was psychometrically validated in a sample of adolescents. The PPS consisted of two identical subscales, each composed of 7 items, to distinctly measure mother phubbing (PPS-M) and father phubbing (PPS-F) (e.g., 'During a mealtime together, my mother/father pulls out and checks their smartphone'). Adolescents were invited to rate the frequency of each behaviour on a 5-point Likert scale, ranging from (1) 'never' to (5)'all the time'. Cronbach's alphas for mother phubbing at W1 was .86 (95% CI [.84, .87]), and for father phubbing at W1 was .87 (95% CI [.85, .88]).

Maternal and Paternal Indifference

Maternal and paternal indifference were examined using the Indifference/Neglect subscales of the Parental Acceptance and Rejection Questionnaire (Rohner & Khaleque, 2005; Italian validation: Rohner & Comunian, 2012). Each subscale is composed of 6 items assessing adolescents' perceptions of the enactment of different behaviours, reflecting the physical and psychological unavailability of their parents (e.g., 'My mother/father is too busy to answer my questions'). Participants were asked to provide their responses using a 4-point Likert scale from (1) 'almost never true' to (4) 'almost always true'. Reverse scoring was applied before summing items for the subscale. Cronbach's alpha for maternal indifference at W2 was .80 (95% CI [.77, .83]) and paternal phubbing at W2 was .80 (95% CI [.77, .82]).

Adolescent Problematic Gaming

Adolescent PG was assessed using the Internet Gaming Disorder Scale – Short Form (IGDS9-SF; Pontes & Griffiths, 2015; Italian validation: Monacis et al., 2016). This scale comprises nine items corresponding to the nine criteria identified in the fifth edition of the *Diagnostic and Statistical*

Manual of Mental Disorders (*DSM-5*; APA, 2013). Adolescents were asked to indicate the frequency of each symptom experienced in the last 12 months by responding on a 5-point Likert scale ranging from (1) 'never' to (5) 'very often.' An example of item is: 'How often do you systematically fail when trying to control or cease your gaming activity?'. In this study, adolescent PG was conceptualized as a continuum of severity following a dimensional approach applied in previous studies that measured the same outcome in non-clinical samples of adolescents (Ciccarelli et al., 2022; Zhang, Pu, et al., 2022). Thus, the total IGDS9-SF score served as the primary dependent variable, with higher scores representing higher adolescent PG. Cronbach's alphas for this measure were: at W1, α = .77 (95% CI [.74, .80]), and at W2, α = .79 (95% CI [.76, .82]).

5.3.4 Data Analytic Strategy

Descriptive statistics and bivariate Pearson's correlations were calculated using the Statistical Package for Social Science software (SPSS) V.28.0 software (IBM Corp., 2022). To estimate the pattern of relationships specified by the theoretical model, a path analytic model approach (i.e., structural equation modeling for observed variables) using a single observed score for each construct was employed, as implemented in previous studies (e.g., Dou et al., 2022; Wang, Mao, Liu et al., 2022). The mediation models were tested using the lavaan package (Rosseel, 2012) of the open-source software R (R Development Core Team, 2022), and the maximum likelihood method was used to estimate model parameters (Satorra & Bentler, 1994).

Based on the hypotheses, the mediation model included adolescent PG at W2 as the dependent variable, mother and father phubbing at W1 as the independent variables, mother and father indifference at W2 as the mediating variables, and two sociodemographic variables (age at W2 and gender) and the initial level of the dependent variable (adolescent PG at W1) as covariates of adolescent PG at W2. Additionally, the reciprocal paths between parental behaviours (mother phubbing at W1, → father indifference at W2, father phubbing at W1, → mother indifference at W2) were included in the model (Fig.1).

Since one aim of the present study was to test whether maternal and paternal behaviours mutually influenced each other, the hypothesized mediation model was compared to an alternative model in which the two reciprocal paths between parental behaviours were removed using the chi-square difference test (Satorra & Bentler, 2001) and information criteria indices, namely the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) (Van de Schoot et al., 2012). Mediation models were first evaluated for the total sample of participants using a single-group path model. Bootstrapping with n = 5000 iterations was employed to estimate 95% bias-correct confidence intervals (CI) of the indirect effects, which were considered significant if the CIs did not include zero (Hayes, 2013).

To evaluate the goodness of fit of the selected model, the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR) were inspected. For an acceptable fit, the CFI should be ≥ .90 (better if ≥ .95), the RMSEA should be ≤ .08 (better if ≤ .05), and the SRMR should be ≤ .08 (better if ≤ .05) (Kline, 2012). In addition, the explained variance of each endogenous variable (R^2) and the total coefficient of determination, which is commonly considered a reliable fit index for path analysis (TCD; Bollen, 1989; Jöreskog & Sörbom, 1996), were examined.

Finally, to explore whether the pattern of associations in the selected model differed as a function of adolescents' gender, multi-group path analyses were performed by examining a series of increasingly invariant and restrictive models using a nested model comparison (Jöreskog & Sörbom, 1996; Van de Schoot et al., 2012). As a result, three models were compared: Model 1, testing configural invariance (the same model was fitted in the two groups without any equality constraints on the model parameters); Model 2, testing the invariance of the intercepts (the intercepts for males and females were constrained to be equal); and Model 3, in which both the intercepts and regression coefficients of all items were constrained to be equal between groups. To compare the competing models, the Chi-Squared Difference Test (Satorra & Bentler, 2001) was applied: if the χ^2 values do not change significantly as the models become more restrictive, the constraints imposed on the more

restricted model do not worsen model fit. In addition, the null hypothesis of equality of the path coefficients across gender groups was also tested with a series of Wald Chi-Squared Tests of parameter equalities (e.g., Marino et al., 2023) using the "lavTestWald" function in R (Klopp, 2020; Rosseel, 2012).

5.4 Results

5.4.1 Preliminary Analyses

Table 3 presents the means, standard deviations, range, and bivariate Pearson's correlations of the main study variables in the total sample. The results indicated that the skewness and kurtosis of all variables fell within the acceptable range. Regarding Pearson's correlations, adolescent PG at W2 was positively associated with all study variables; small associations were observed between mother and father phubbing at W1 and adolescent PG at W2 and between mother and father indifference at W2 and adolescent PG at W2. Furthermore, reciprocal associations between maternal and paternal variables emerged for both phubbing behaviours at W1 and parental indifference at W2. In addition, the descriptive statistics (i.e., means and standard deviations) and bivariate Pearson's correlations of the main study variables by gender are reported in Table 4.

5.4.2 Single-Group Path Analyses

Two single-group path analyses were run to estimate the hypothesized mediation model (with reciprocal associations between parental behaviours) and alternative model (without reciprocal associations). Model comparison using the Chi-Squared Difference Test confirmed that adding the reciprocal paths between parental behaviours significantly improved model fit ($\Delta\chi^2_{(2)} = 15.045$, $p < .001$). Furthermore, the hypothesized mediation model showed lower AIC and BIC values ($\chi^2_{(6)} = 32.898$, AIC = 8778.9, BIC = 8843.8) compared to the alternative model ($\chi^2_{(8)} = 47.943$, AIC = 8790.0, BIC = 8846.2), indicating a better trade-off between model fit and complexity. Thus, the mediation model with reciprocal associations between parental behaviours was selected.

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Table 3

Descriptive Statistics and Bivariate Pearson's Correlations of the Main Study Variables in the Total Sample.

Variable	*M*	*SD*	Range	Skew	Kurt	1.	2.	3.	4.	5.	6.
1. Maternal Phubbing – W1	12.61	4.87	7-35	1.27	1.74	-					
2. Paternal Phubbing – W1	12.86	5.56	7-35	1.37	1.76	.33***	-				
3. Maternal Indifference – W2	9.83	3.50	6-24	0.94	0.15	.35***	.20***	-			
4. Paternal Indifference – W2	10.93	3.80	6-24	0.71	0.10	.23***	.39***	.48***	-		
5. Adolescent PG – W1	14.40	4.80	9-45	1.35	2.11	.16***	.16***	.20***	.18***	-	
6. Adolescent PG – W2	14.10	4.67	9-45	1.15	1.22	.17***	.17***	.29***	.20***	.62***	

Notes. n = 557 adolescent gamers. PG = Problematic Gaming. *M* = Mean, *SD* = Standard Deviation, Skew = Skewness, Kurt = Kurtosis.

*** $p < .005$.

Table 4

Descriptive Statistics and Bivariate Pearson's Correlations of the Main Study Variables by Gender Group (Male Correlations:

Below the Diagonal, Female Correlations: Above the Diagonal).

Variables	M (SD)		1.	2.	3.	4.	5.	6.
	Males (n = 388)	Females (n = 169)						
1. Maternal Phubbing – W1	12.19 (4.40)	13.58 (5.71)	-	.19*	.38***	.06	.19*	.17*
2. Paternal Phubbing – W1	12.11 (5.07)	14.56 (6.23)	.39***	-	.18*	.40***	.14*	.20**
3. Maternal Indifference – W2	9.71 (3.41)	10.08 (3.69)	.33***	.20***	-	.41***	.25***	.32***
4. Paternal Indifference – W2	10.46 (3.52)	12.00 (4.22)	.31***	.34***	.51***	-	.27***	.16*
5. Adolescent PG – W1	14.84 (4.88)	13.39 (4.48)	.19***	.23***	.20***	.19***	-	.61***
6. Adolescent PG – W2	14.24 (4.78)	13.77 (4.28)	.19***	.18***	.29***	.24***	.63***	-

Notes. n males = 388; *n* females = 169. PG = Problematic Gaming. *M* = Mean, *SD* = Standard Deviation.

***p <.001; **p <.01; *p <.05.

The estimation of the indices of the model with reciprocal associations between parental behaviours showed an adequate fit: CFI = .956, RMSEA = .090 [95% CI (.061, .121)], SRMR = .040. The TCD values for this model, standardized parameter estimates, standard errors and 95% confidence intervals are reported in Table 5.

Table 5

*Single-Group Path Analyses (Total Sample) and Multi-Group Path Analyses (Males vs. Females).*

	Total Sample (n = 557)			Males (n = 388)			Females (n = 169)		
Direct Paths	Est	SE	95% CI	Est	SE	95% CI	Est	SE	95% CI
M Phub-W1 → M Ind-W2	.32***	.03	.17, .39	.30***	.04	.16, .31	.30***	.04	.14, .34
M Phub-W1 → F Ind-W2	.12**	.04	.02, .15	.18***	.04	.07, .22	.06	.04	-.05, .13
M Phub-W1 → PG-W2	.03	.03	-.06, .07	.02	.05	-.07, .12	.05	.05	-.13, .06
M Ind-W2 → PG-W2	.17***	.05	.12, .32	.14**	.06	.07, .32	.22**	.08	.10, .43
F Phub-W1 → F Ind-W2	.35***	.02	.18, .39	.24***	.03	.10, .24	.39***	.04	.23, .44
F Phub-W1→ M Ind-W2	.09*	.03	.01, .11	.08	.03	-.01, .12	.11	.03	-.01, .14
F Phub-W1→ PG-W2	.04	.03	.02, .09	.01	.04	-.09, .07	.15*	.05	.01, .19
F Ind-W2→ PG-W2	.07	.04	-.10, .08	.05	.06	-.06, .19	.14*	.07	.01, .28
Age-W2 → PG-W2	-.09	.09	-.21, .16	-.02	.10	-.25, .14	-.01	.11	-.22, .21
PG-W1 → PG-W2	.59***	.03	.50, .63	.59***	.04	.49, .65	.60***	.06	.47, .70
Indirect Paths									
M Phub-W1 → M Ind-W2 → PG-W2	.05*	.01	.02, .08	.04*	.02	.01, .08	.08*	.02	.02, .11
M Phub-W1 → F Ind-W2 → PG-W2	.01	.00	-.01, .01	.01	.01	-.01, .03	.01	.01	-.01, .02
F Phub-W1 → F Ind-W2 → PG-W2	.01	.01	-.02, .02	.01	.01	-.01, .03	.06*	.02	.01, .09
F Phub-W1 → M Ind-W2 → PG-W2	.02	.01	.00, .03	.01	.01	-.01, .02	.02	.01	-.01, .04
Explained Variance									
R² M Ind-W2	.13			.12			.14		
R² F Ind-W2	.16			.13			.21		
R² PG-W2	.40			.40			.43		
TCD	.52			.51			.53		

Notes. Est = Standardized Parameter Estimates; SE = Standard Errors; LLCI = Lower Limit of the 95% Confidence Interval; ULCI = Upper Limit of the 95% Confidence Interval; M Phub = Mother Phubbing; F Phub = Father Phubbing; M Ind = Mother Indifference; F Ind = Father Indifference; PG = Problematic Gaming. ***p <.001; **p <.01; *p <.05.

The results of the mediation model in the total sample are also reported in Fig.2.

Figure 2

Standardized Parameters for the Mediation Model in the Total Sample.
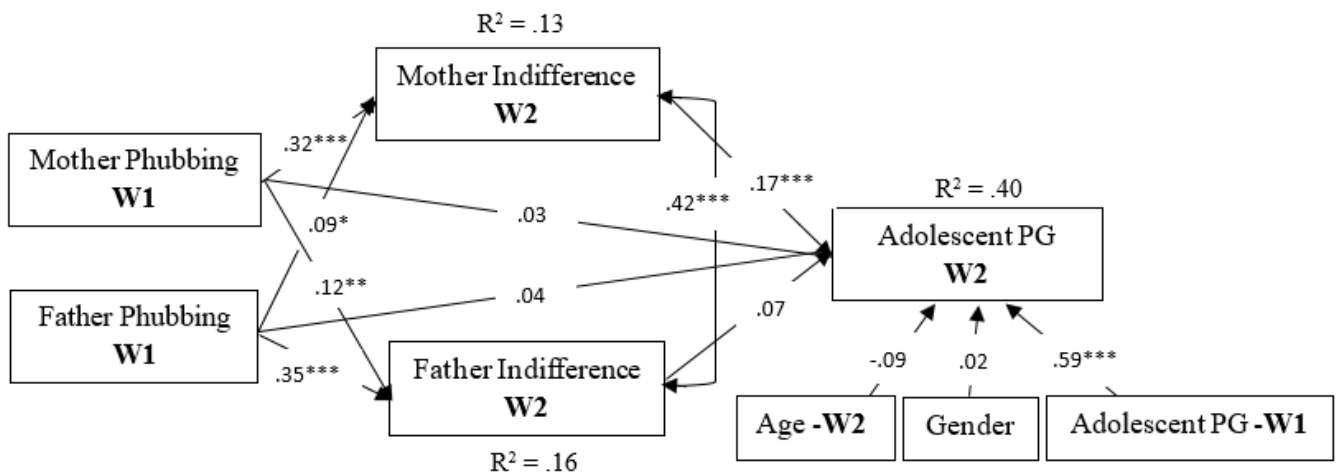
Notes. $n = 557$. PG = Problematic Gaming. Gender was coded as 0 = males, 1 = females.
***$p <.001$; **$p <.01$; *$p <.05$.

As can be seen, the results for the mediation model in the total sample showed that neither mother phubbing at W1 nor father phubbing at W1 were predictive of adolescent PG at W2, contrary to Hp1a and Hp1b. Yet, mother phubbing at W1 was positively associated with mother indifference at W2 and father phubbing at W1 was positively associated with father indifference at W2, providing support for Hp2a and Hp2b. Additionally, mother indifference at W2 positively predicted adolescent PG at W2 (Hp3a), while the association between father indifference at W2 and adolescent PG at W2 was nonsignificant. The estimation of the indirect effects using the bootstrapping method revealed that only mother indifference at W2 mediated the relation between mother phubbing at W1 and adolescent PG at W2, in line with Hp4a, whereas the mediating effect of father indifference at W2 between father phubbing at W1 and adolescent PG at W2 was not significant (Hp4b). Furthermore, regarding the crossover effect between parental behaviours, the findings showed that reciprocal associations emerged both between mother phubbing at W1 and father indifference at W2 and between father phubbing at W1 and mother indifference at W2, respectively supporting Hp5a and

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Hp5b. However, neither the mediating effect of mother indifference at W2 between father phubbing at W1 and adolescent PG at W2 nor the mediating effect of father indifference at W2 between mother phubbing at W1 and adolescent PG at W2 were significant, failing to support Hp6a and Hp6b. Lastly, age at W2 and gender did not significantly affect adolescent PG at W2. A moderate association between adolescent PG at W1 and adolescent PG at W2 was observed.

5.4.3 Multi-Group Path Analyses

To examine gender differences in the pattern of associations, multiple-group path analyses were fist conducted by comparing three nested models, testing: configural invariance (Model 1), invariance of the intercepts (Model 2), and invariance of the intercepts and regression coefficients (Model 3). Model comparison using the Chi-Squared Difference Test showed that the values across Model 1 and Model 2 did not change significantly ($\Delta\chi^2_{(3)} = 5.40$, $p = .144$); thus, the invariance of the intercepts between groups was supported. Following this phase, Models 2 and 3 were compared. Since the χ^2 values changed significantly ($\Delta\chi^2_{(10)} = 19.07$, $p < .05$), adding the equality constraints on the regression coefficients worsened model fit. Coherently, the omnibus Wald test of parameter constraints was statistically significant (Wald $\chi^2_{(10)} = 19.65$, $p < .01$). This evidenced the relevance of separately analyzing and comparing the regression coefficients between the two groups.

Specifically, the results indicated that three paths significantly differed between males and females: the path between mother phubbing and father indifference (which was not significant for females; Wald $\chi^2_{(1)} = 3.74$, $p < .05$); the path between father phubbing and adolescent PG (which was not significant for males; Wald $\chi^2_{(1)} = 3.47$, $p < .05$) and the path between father indifference and adolescent PG (which was not significant for males; Wald $\chi^2_{(1)} = 4.73$, $p < .01$). Furthermore, regarding the indirect effects, the mediating effect of father indifference at W2 between father phubbing and adolescent PG was significant only for females; Wald $\chi^2_{(1)} = 4.68$, $p < .01$. All the other direct and indirect paths did not significantly differ among males and females. Table 5 presents the results of Model 2 for males and females, respectively, including the standardized parameter

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estimates, standard errors, the 95% confidence intervals for both the direct and indirect effects, and the TCD for each group. In addition, the results of the mediation model for males and females are reported in Fig. 3 and Fig. 4 below.

Figure 3

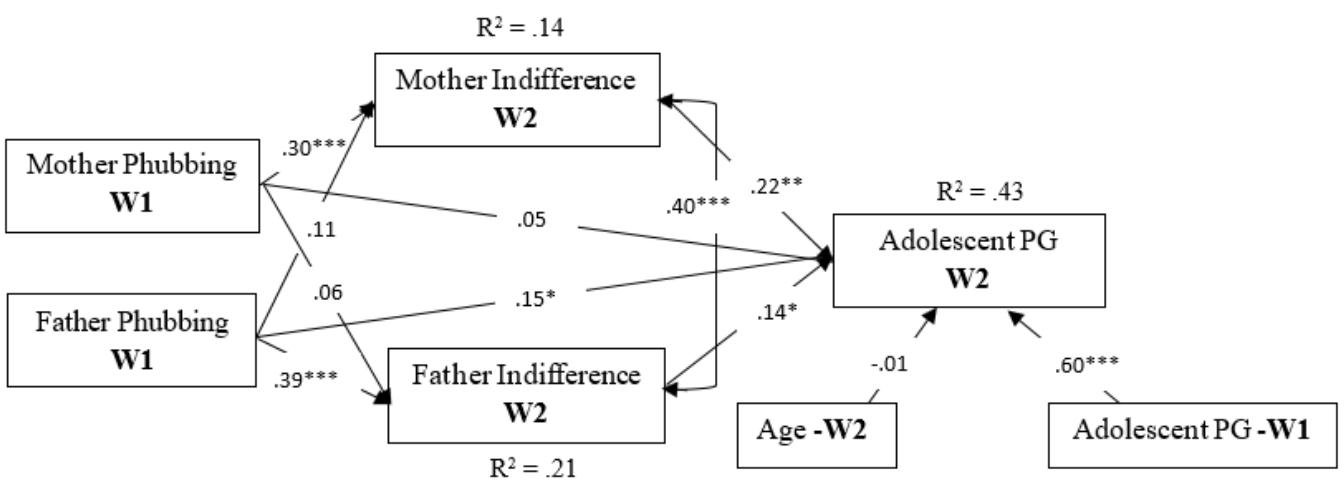*Standardized Parameters for the Mediation Model in the Group of Males.*
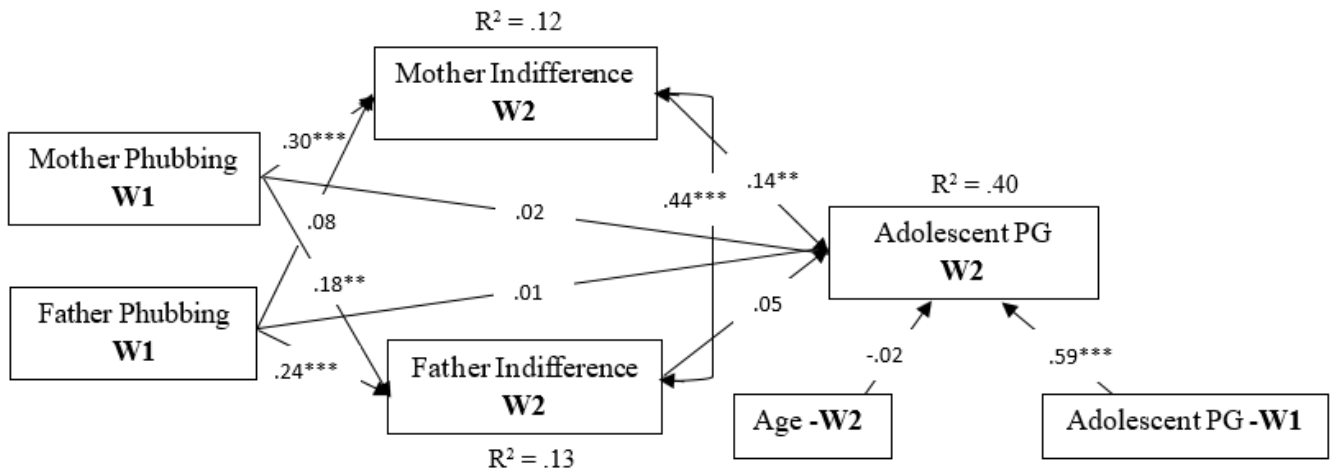
Note. n = 388. PG = Problematic Gaming. ***p <.001; **p <.01; *p <.05.

Figure 4

Standardized Parameters for the Mediation Model in the Group of Females.

Note. n = 169. PG = Problematic Gaming. ***p <.001; **p <.01; *p <.05.

5.5 Discussion

At the proximal level, studies on the association between parental phubbing and adolescent PG have received preliminary empirical support only from cross-sectional research conducted in China (Shen et al., 2022; Xie al., 2021; Zhou et al., 2022). Adding to the literature, this third longitudinal study was carried out within the European area, in Italy, and tested the direct and indirect impact of parental phubbing on later adolescent PG by distinguishing between maternal and paternal behaviours and exploring adolescent gender differences in the pattern of associations.

One contribution of the present study is that mother phubbing at W1 was positively associated with adolescent PG at W2 only at a bivariate level but not in the mediation model, partially disconfirming Hp1a. The absence of a direct effect between mother phubbing and adolescent PG in the complex model is surprising. In fact, according to Matthes et al. (2021), parents who excessively use their digital devices may increase the likelihood of adolescent problematic technology-related behaviours for many reasons; for instance, they may have only limited attentional resources left to control the activities of their adolescents (e.g., gaming) or they may reduce their credibility and rule-making legitimacy toward technology use (e.g., setting limits to access/time), which are fundamental to preventing PG (Colasante et al., 2022). Consistent with this, despite the relationships hypothesized and tested in the present study specifically referred to adolescent PG, it is worth noting that previous literature has shown that parental phubbing can predict a variety of problematic behaviours associated with the use of technology in adolescence, including, for instance, problematic smartphone use (Geng et al., 2021; Zhang et al., 2021) short-form videos addiction (Wang & Lei, 2022) and Internet addiction (Dai et al., 2024).

Adding further knowledge to the findings obtained in Study 2 (Chapter 4), the mediation analyses conducted in this study indicated that mother phubbing at W1 positively predicted the perception of maternal indifference at W2 (Hp2a), which in turn predicted higher adolescent PG at W2 (Hp3a). Consequently, in the present study, the indirect effect of mother phubbing at W1 on

adolescent PG at W2 via the mediating role of maternal indifference at W2 (Hp4a) was verified, yielding similar results for both male and female adolescents. As some scholars argued (Chotpitayasunondh & Douglas, 2018; Pancani et al., 2020), phubbing behaviour may be viewed as a new form of ostracism, which is a specific type of social exclusion mainly characterized by the act of ignoring others (Williams, 2009). Parental phubbing may be perceived as a social threat occurring in real-life interactions within the family, possibly leading adolescents to conclude that their parents are less interested in and sensitive to their needs. This perception of parental indifference may undermine adolescent adjustment (Khaleque, 2015). Notably, this is the first study showing that the negative effects of maternal phubbing may persist over time, resulting in less responsive maternal behaviours that may become habitual and deleterious, possibly heightening the risk for adolescent PG. According to the Temporary Need-Threat Model (Williams, 2009), individuals experiencing ostracism initially feel an increased negative affect and decreased satisfaction of their psychological needs (reflexive stage), and to deal with this unpleasant state, they start to adopt different coping strategies (reflective stage) (Riva & Eck, 2016). As evidenced by prior research, adolescents often use video games as a cognitive and behavioural strategy to face negative emotions arising from real-life stressors, such as problems with interpersonal relationships (Milani et al., 2018; Schneider et al., 2017). Furthermore, as explained by Zhu et al. (2021), following the assumptions of Self-Determination Theory (Deci & Ryan, 2000; 2017), adolescents may turn to gaming to restore basic psychological needs (e.g., the need for relatedness), which have been previously frustrated by negative parental behaviours. The risk, however, is that adolescents who intensively play video games as an alternative means to manage daily stressors or to achieve a sense of relatedness to others may develop a series of dysfunctional cognitions about the individual benefits of gaming (e.g., "I could not cope with stress without video games") and social benefits (e.g., "The online world is the only place I am respected") that may reinforce the maladaptive gaming patterns (Marino & Spada, 2017). Moreover, since the mediating effect of indifference conveyed by mothers was observed in both males

and females, the present study further corroborated the results obtained in the previous dyadic study (Chapter 4), by highlighting the crucial impact of low maternal emotional availability on the development of PG symptoms among Italian adolescents, which is consistent with previous findings on the broader construct of Internet addiction (Trumello et al., 2018). Indeed, despite both parents playing important roles in shaping adolescents' emotional experiences and well-being, adolescents often perceive their mothers as the primary source of emotional support (Van Lissa et al., 2019). Hence, the impact of maternal indifference may be highly deleterious to them regardless of their gender. This may be true, especially for those living in countries in which mothers constitute the primary caregiver and who devote more time to childcare, thus being more involved in daily parent-adolescent interactions and playing a central role in emotional socialization, as in Italy (Cannito & Scavarda, 2020; Eurostat, 2022) and China (Wu et al., 2022).

An innovative contribution of the current study is that the direct effect of father phubbing at W1 on adolescent PG at W2 (Hp1b) and its indirect effect via the mediating role of father indifference at W2 (Hp4b) were observed only in female adolescents. Consistent with a two-wave study by Geng et al. (2022), which showed a direct and positive effect of father phubbing at W1 on adolescent problematic use of digital technology at W2, in particular, smartphones, it is conceivable that fathers' technology-related behaviours, in particular, are considered as an example of imitation by adolescents. Since girls tend to perceive their fathers as more authoritative (McKinney & Renk, 2008), it is possible that observing the paternal figure intensively engaged in the use of digital devices may lead adolescent girls to assume that similar behaviours are acceptable, potentially heightening their intention to play video games on portable devices. This small effect among females is in line with the literature on Social Learning Theory (Bussey & Bandura, 1999), suggesting that girls, compared to boys, do not exclusively exhibit same-gender modelling behaviours. Yet, the absence of a direct effect of father phubbing on adolescent PG among males constituted an unexpected finding for at least two reasons: first, because it is well-established that boys favour male models and emulate

them (Bussey & Bandura, 1999); second, because, based on current evidence showing that males, compared to females, are more prone to use video games, both in general samples of adults (Su et al., 2020) and, specifically, between parents (Stockdale & Coyne, 2020), one might expect that the likelihood of fathers using their smartphones in the presence of their offspring, for instance, to game, may be higher compared to that of mothers and, thus, exert a substantial influence on the development of adolescent PG. However, this is only speculative, and future research is needed to examine the impact of parental phubbing on adolescent PG to replicate this study, possibly by explicitly investigating the different contents of smartphone activities (Park et al., 2021) by parents.

Interestingly, the indirect effect of father phubbing via the mediating role of father indifference (Hp4b) obtained in females is consistent with prior research, showing that Italian girls are more susceptible to the adverse influence of parental phubbing than boys (Pancani et al., 2020). In particular, the present results suggest that, for female adolescents, the experience of being ignored by fathers may be particularly harmful and trigger negative consequences - including higher adolescents' perception of paternal indifference - that may progressively consolidate, eventually leading to the establishment of maladaptive gaming patterns over time. In line with this, a study by Wang et al. (2022) revealed that the negative impact of parental phubbing on adolescent well-being via a reduced quality of the parent-adolescent relationship was more severe among female adolescents. Furthermore, a previous study by Yao et al. (2014) found that paternal rejection was significantly and positively associated with the Internet Addiction of daughters, but not of sons. One possible explanation could be that females may be more sensitive to social exclusion than males, as demonstrated by the experimental studies by Benenson et al. (2013). They found that female participants exhibited a higher speed toward detecting social exclusion cues and increased heart rates in response to social exclusion.

In addition to the distinct contribution of maternal and paternal behaviours to adolescent PG, the present results confirmed that the mediation model, in which these behaviours mutually

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influenced each other, showed a better fit with the data. Specifically, the findings in the total sample indicated that mother phubbing at W1 was positively associated with adolescents' perception not only of maternal indifference at W2 (Hp2a) but also of paternal indifference at W2 (Hp5a); the same pattern of reciprocal associations was observed for fathers, whereby increased father phubbing at W1 was associated with higher perception not only of father indifference at W2 (Hp2b) but also of mother indifference at W2 (Hp5b). These findings support the crossover effect between parental behaviours posited by Family Systems Theory (Emery, 2014). These results align with previous studies that documented the reciprocal and detrimental effects of both mother and father phubbing on mother and father-adolescent relationships, specifically in terms of increased parental rejection (Wu et al., 2022), higher social disconnectedness (Pancani et al., 2020) and reduced quality of communication (Wang, Mao, Liu et al., 2022). As argued by Wu et al. (2022), when one parent is heavily distracted by the smartphone in the presence of the offspring, the other parent may feel the responsibility to increase the amount of attention and energy directed toward the adolescent to ensure adequate parental care; however, this effort may conversely deplete parental psychological resources, ultimately increasing the perception of indifference from both parents. Although the current findings supported the presence of the crossover effect between parental behaviours, neither the mediating effect of mother indifference at W2 between father phubbing at W1 and adolescent PG at W2 (Hp6a) nor the mediating effect of father indifference at W2 between mother phubbing at W1 and adolescent PG (Hp6b) were significant. Furthermore, the multi-group analyses did not fully detect the crossover effect in males and females respectively; indeed, results indicated that only mother phubbing was positively associated with father indifference in the model of males. Additional research replicating this model with larger samples is required to better understand the potential gender differences underlying the reciprocal associations between maternal and paternal behaviours.

Finally, regarding the covariates, age at W2 and gender were not significantly associated with adolescent PG at W2. Beyond suggesting the relevance of studying this condition in both early,

middle, and late adolescence (Steinberg, 2017), this finding aligns with recent studies stressing the need to consider gaming as a favoured pastime activity and a potential problem, not only for male but also for female adolescents (King & Potenza, 2020). Indeed, moving forward the traditional masculine gaming culture, female gaming represents a growing phenomenon (Lopez-Fernandez et al., 2019). Finally, the moderate stability of adolescent PG over time aligns well with the findings of previous two-wave longitudinal studies of adolescent IGD (Teng et al., 2021; Wartberg et al., 2019).

5.5.1 Limitations

This study has some limitations. First, the data were collected using self-report measures. To improve the accuracy of estimates concerning digital technology use, objective measures directly acquired from devices (e.g., smartphone and console usage time) may be utilized (Geng et al., 2022). Furthermore, since parental phubbing is a behaviour that occurs in the context of parent-adolescent interactions, more rigorous assessments can entail experimental procedures applying observational methods to the study of dyadic interactions, which can be recorded and systematically micro-analysed (McHale et al., 2018). Second, the sample of adolescent gamers included only Italian participants and was unevenly distributed between genders: if, on one hand, the disproportion between males and females reflects current preferences for gaming among adolescents (Bender et al., 2020), on the other, it may have increased the uncertainty of the findings obtained in females. Therefore, larger longitudinal studies involving gender-balanced samples of adolescents living in different countries are required to increase the generalizability of our findings. Third, this study relied exclusively on adolescent perceptions; as demonstrated in Study 2 (Chapter 4), to gain an in-depth understanding of the association between parental behaviours and adolescent PG, information should be collected from multiple informants, such as parent-adolescent dyads (De Los Reyes & Ohannessian, 2016). Such research would enable the advancement of current knowledge by adding to the perspective of the phubbee (i.e., adolescent) and that of the phubbers (i.e., parents), for instance, by exploring the reasons behind the act of phubbing (Chotpitayasunondh & Douglas, 2018) or maternal and paternal

attachment styles (Zvara et al., 2020), which may shed further light on the parent-adolescent relationship. Fourth, despite being a longitudinal study, the design encompassed only two time points over a short period. Future research should assess each variable at multiple time points to provide more robust evidence of the causality and stability of the associations over time (Lin et al., 2020). Moreover, some of the estimated parameters of the proposed model were small. Thus, the practical significance of our results should be carefully considered. As this may be at least partially due to the non-clinical nature of our sample, further research involving clinical samples of adolescents is warranted. Finally, this study examined only maternal and paternal indifference as mediators. As suggested by prior research, other mediating variables, such as the need for affiliation (Xie & Xie, 2020), anxiety (Zhu & Chen, 2021) and self-esteem (Shen et al., 2022), should be investigated.

5.5.2 Conclusion

This third study expanded previous cross-sectional literature on parental phubbing and adolescent PG by using a two-wave longitudinal design that examined the direct and distinct impact of maternal and paternal phubbing on later adolescent PG, the mediating role of increased maternal and paternal indifference over time and possible gender differences among adolescents.

In line with Study 2 (Chapter 4), the results suggested that maternal behaviours may mostly impact adolescent PG from an emotional standpoint for both males and females. Adding novel evidence at the proximal level, the present findings also revealed that paternal behaviours might specifically influence the gaming activities of daughters. Parents and adolescents living in the digital era should be aware of the benefits and disadvantages associated with technology use in their daily lives to protect the quality of their relationships and avoid harmful outcomes.

To further understand the underlying mechanisms by which parental negative behaviours, such as parental indifference, may lead to higher adolescent PG, the next study (Chapter 6) will examine, at the individual level, the possible mediating role of basic psychological need satisfaction and frustration.

Chapter 6

Study 4: Maternal and Paternal Parenting and Adolescent PG: Exploring the Role of Basic Psychological Needs

This chapter was adapted from:

Pivetta, E., Costa, S., Marino, C., Bottesi, G., Vieno, A., & Canale, N. (under review). *Maternal and Paternal Parenting and Problematic Gaming in Adolescence: Modeling the Contribution of Basic Psychological Needs*. [Manuscript submitted for publication]

6.1 Rationale of the Study

As reported in Chapter 2, a recent meta-analysis on adolescent PG and other problematic Internet uses by Lukavskà et al. (2022) has identified two main categories of parenting: (i) general parenting, entailing traditional practices, such as providing warmth and control, and (ii) media-specific parenting, including parental mediation strategies to regulate the use of digital technology by the offsprings. This fourth study concentrated on the first category, by following the Motivational Model conceptualized by Skinner et al. (2005) within the framework of the Self-Determination Theory (SDT; Ryan & Deci, 2000; 2017), which was purposely selected to gain an in-depth understanding of the associations between parenting practices and adolescent PG by considering certain individual-level factors, specifically basic psychological needs.

Indeed, the Motivational Model (Skinner et al., 2005) considers the social context of parents as fundamental for the satisfaction and frustration of the basic psychological needs (i.e., needs for autonomy, competence and relatedness), which are described as "conditions that are essential to an entity's growth" (Ryan, 1995, p. 410). More precisely, the model identifies six core parenting practices, among which autonomy support (i.e., allowing freedom of expression and action), structure (i.e., providing clear guidelines and expectations) and warmth (i.e., conveying acceptance and

support) represent supportive parenting practices and have been consistently associated with more positive outcomes in adolescence (Abidin et al., 2022; Bülow et al., 2022; Vieno et al., 2007); while coercion (i.e., overcontrolling and being intrusive), chaos (i.e., being unpredictable and inconsistent), and rejection (i.e., expressing disapproval and aversion) are considered as thwarting parenting practices and have been found to increase adolescent maladjustment (Abidin et al., 2022; Costa et al., 2019; Skinner et al., 2016). Crucially, despite supportive environments have been primarily associated with well-being through need satisfaction, and thwarting environments have been related to maladjustment through need frustration, their cross-paths dynamics should also be considered (Vansteenkiste & Ryan, 2013). In other words, it is possible that supportive parenting may also act as a buffer against the development of problematic behaviours, possibly through a reduction of need frustration, and viceversa, thwarting parenting may hamper individual functioning, possibly through a decrease of need satisfaction (Vansteenkiste & Ryan, 2013).

In the field of adolescent PG, studies investigating parental behaviours by adopting the SDT perspective are scarce and further research is needed (Gugliandolo et al., 2020; Liang et al., 2021). Furthermore, to the best of the knowledge, none of the available studies has simultaneously examined all the above-mentioned parenting practices and distinguished them between mothers and fathers. For instance, one previous work by Gugliandolo et al. (2020) has evaluated the associations between two specific parenting practices, namely parental psychological control and parental autonomy support, and four adolescent technological problematic behaviours (including problematic gaming behaviour) and tested the mediating roles of both need satisfaction and frustration. The results showed that parental psychological control was significantly associated with PG behaviours and only need frustration mediated this relationship; hence, the authors argued that gaming may be used by adolescents particularly as a strategy to compensate for their unmet psychological needs and for the negative states, resulting, in this case, from the thwarting behaviour of parental psychological control (Gugliandolo et al., 2020). A similar argumentation has been provided by Zhu et al. (2021) as a

possible explanation for the association between parental rejection and PG in a longitudinal study involving Chinese adolescents; however, the mediating role of psychological basic needs was not tested in that study and thus remained unexplored.

Notably, an important limitation of current studies is that parenting practices have been investigated aggregately, using composite scores rather than distinct for mothers and fathers. However, the lack of analysis of the unique contribution of each parent may have overlooked potential gender-specific effects (Inguglia et al., 2018), as previously emerged in Study 3 (Chapter 5). In fact, it is possible that the maternal contribution may be primarily perceived in terms of emotional presence, conveyed through supportive and warmth parenting practices, while the paternal role may be mainly perceived in terms of coercive and disciplinary parenting practices (Yaffe, 2020). Furthermore, one previous study has found that perceived autonomy support from mothers, but not from fathers, was negatively associated with need frustration in adolescence (Costa et al., 2016). A work by Su et al. (2018), instead, has shown that it was the quality of father-adolescent relationship that specifically mediated the association between parental monitoring and adolescent Internet gaming disorder, stressing the need for further research in this domain.

At the individual level, in the gaming domain, the role of the psychological basic needs has been extensively studied in the literature (Allen & Anderson, 2018; Bender & Gentile, 2020; Przybylski & Weinstein, 2019). In fact, although both need satisfaction and need frustration in the real word may show a positive association with time spent playing video games (Przybylski & Weinstein, 2019), several studies have shown that was psychological need frustration to be consistently related to PG (Allen & Anderson, 2018; Mills et al., 2018; Przybylski & Weinstein, 2019). Following the suggestion by Vansteenkiste et al. (2013) to distinguish the lack (or low) fulfilment of the basic psychological needs from the more harmful experience of need frustration, in this fourth study the contribution of need satisfaction and need frustration was separately analysed.

6.2 Specific Hypotheses

Consistent with the Motivational Model by Skinner et al. (2005), the aims of this fourth study were to examine whether the supportive parenting practices (i.e., autonomy support, structure, warmth) and the thwarting practices (i.e., coercion, chaos and rejection) would be directly associated with adolescent PG; to test the associations between need satisfaction and need frustration and adolescent PG and to assess the mediating role of need satisfaction and need frustration between the parenting practices and adolescent PG. Consequently, the following hypotheses were tested:

Hypothesis 1. The supportive parenting practices would be negatively associated with adolescent PG.

Hypothesis 2. The thwarting practices would be positively associated with adolescent PG.

Hypothesis 3. The supportive parenting practices would be positively associated with need satisfaction and negatively associated with need frustration.

Hypothesis 4. The thwarting parenting practices would be negatively associated with need satisfaction and positively associated with need frustration.

Hypothesis 5. Need satisfaction would be negatively associated with adolescent PG.

Hypothesis 6. Need frustration would be positively associated with adolescent PG.

Hypothesis 7. Need satisfaction would primarily mediate the relationship between the positive parenting practices and adolescent PG and also, between the thwarting parenting practices and adolescent PG.

Hypothesis 8. Need frustration would primarily mediate the relationship between the thwarting parenting practices and adolescent PG, and also, between the thwarting parenting practices and adolescent PG.

Adding to the literature, two distinct models (i.e., one for mothers and one for fathers) were tested (*see* Fig.1). Finally, since previous studies have documented gender differences both in adolescent PG (Bender et al., 2020) and in the relationship between parenting practices and adolescent

adjustment (Ramírez-Uclés et al., 2018), an additional aim of this study was to explore potential differences between males and females in the hypothesized pattern of relationships among variables.

Fig. 1

The Hypothesized Model for the Associations between Maternal and Paternal Parenting Practices and Adolescent Problematic Gaming.
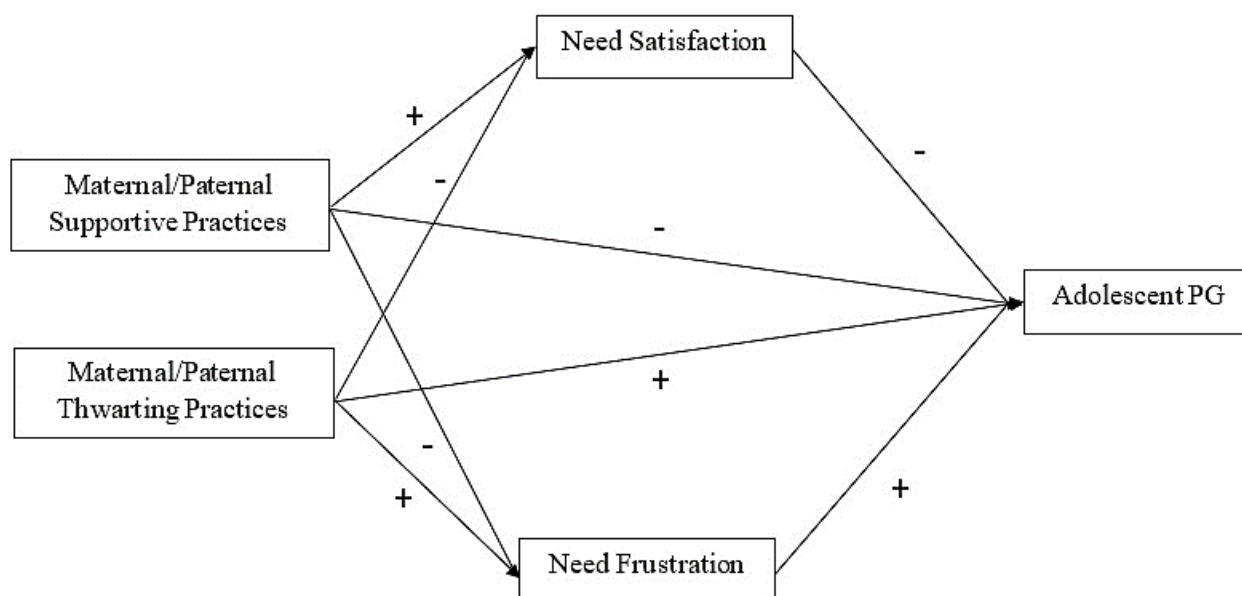
Notes. PG = Problematic Gaming. Autonomy-Support, Structure and Warmth were synthetically reported within the Variable Maternal/Paternal Need Supporting Practices; Coercion, Chaos and Rejection were synthetically reported within the Variable Maternal/Paternal Thwarting Practices. Age was included as a covariate of Need Satisfaction, Need Frustration and Adolescent PG.

6.3 Materials and Method

6.3.1 Procedure

Data were collected at $n = 14$ Italian public high schools between January and February 2023. After obtaining the school's authorization, parental informed consent and adolescent assent (or active informed consent for participants older than 18 years) were collected. Adolescents completed an

online survey lasting approximately 30 minutes that was delivered via the secure web-based platform Qualtrics®. Data collection took place during regular school hours under the supervision of the researchers and their assistants. Privacy and anonymity of the participants were guaranteed. The research was conducted in adherence to the Declaration of Helsinki and was approved by the ethical committee for Psychological Research of the University of Padova (protocol number: 5081).

6.3.2 Participants

A total of $n = 1784$ adolescents responded to the questionnaires. The data cleaning procedure followed three steps: first, participants who reported not to have played video games in the last 12 months ($n = 380$) were excluded; second, participants with missing data in the main study variables ($n = 188$) and in the gender variable ($n = 11$) were removed; third, participants self-identifying as non-binary ($n = 12$) were excluded due to insufficient numerosity for multi-group analyses. Thus, the analyses were run on a final sample of $n = 1193$ adolescent gamers ($M_{age} = 15.81$ ($\pm$ 1.58) years; age range = 13–21 years; 64.3% males). As for the studies reported in the previous chapters, Table 1 shows in detail the sociodemographic characteristics of the sample and Table 2 reports participants' gaming habits and attributes.

Table 1

Sociodemographic Characteristics of the Sample (n = 1193).

Variable	Categories	Frequencies (%)
Grade of High School	First	371 (31.1%)
	Second	329 (27.6%)
	Third	97 (8.1%)
	Fourth	235 (19.7%)
	Fifth	161 (13.5%)
Type of High School	Lyceum	485 (40.7%)
	Technical Institute	519 (43.5%)
	Professional Institute	189(15.8%)
Country of Origin	Italy	1128 (94.6%)
	Other (e.g., Romania, Albania, China)	44 (5.4%)
Geographic Area in Italy	North	978 (82.0%)
	Centre	45 (3.8%)
	South and Islands	170 (14.2%)
Socio-Economic Status	Much better off	83 (7.0%)
	Better off	316 (26.5%)
	About the same	690 (57.8%)
	Less well off	73 (6.1%)
	Much less well off	8 (0.7%)
	Not declared	12 (1.9%)
Maternal Education	Primary school	15 (1.3%)
	Middle school	211 (17.7%)
	High school	500 (41.9%)
	Bachelor's/ Master's	362 (30.3%)
	Postgraduate /Specialization	103 (8.6%)
	Unknown	2 (0.2%)
Paternal Education	Primary school	29 (2.4%)
	Middle school	292 (24.5%)
	High school	480 (40.2%)
	Bachelor's/ Master's	289 (24.2%)
	Postgraduate /Specialization	101 (8.5%)
	Unknown	2 (0.2%)

Table 2

Gaming Habits and Attributes of the Sample (n = 1193).

Variable	Categories	Frequencies (%)
Gaming Modality	Online and offline	839 (70.3%)
	Online	258 (21.6%)
	Offline	96 (8.0%)
Five Preferred Video Game Genres [a]	Action/Adventure	540 (45.3%)
	Sport	518 (43.4%)
	FPS	513 (43.0%)
	Battle Royale	493 (41.3%)
	RTS	466 (39.1%)
Gaming Partner(s) [a]	Alone	790 (66.2%)
	Real life friends	772 (64.7%)
	Online friends	433 (36.3%)
	Siblings	306 (25.6%)
	Other relatives	92 (7.7%)
	Parents	52 (4.4%)
Devices Used to Play Video games [a]	Smartphone	838 (70.2%)
	Console	690 (57.8%)
	Computer	476 (39.9%)
	TV	274 (23.0%)
	Tablet	213 (17.9%)
Places Where to Play Video games [a]	At home, anywhere	702 (58.8%)
	At home, only in my bedroom	633 (53.1%)
	At a friends' house	373 (31.3%)
	At school	294 (24.6%)
	In public places	204 (17.1%)
Gaming Time in Minutes (Whole Week)	$M = 113$; $SD = 105$	

Notes. FPS = First-Person Shooters; RTS = Real-Time Strategy. M = Mean; SD = Standard Deviation.

[a] More than one option could be selected.

6.3.3 Measures

Adolescent Problematic Gaming

To assess adolescent PG, the Internet Gaming Disorder Scale-Short Form (IGDS9-SF; Pontes et al., 2015; Italian validation: Monacis et al., 2016) was used. The nine items of the scale assess the frequency of difficulties and problems associated with gaming experienced in the last 12 months based on the criteria identified in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; APA, 2013). Items were rated on a five-point scale from (1) 'never' to (5) 'very often'. An example of item is: 'How often have you lost interests in previous hobbies and other entertainment activities as a result of your engagement with the game?'. Following a dimensional approach, adolescent PG was conceptualized on a continuum of severity, in line with previous research on this condition involving non-clinical samples of adolescents (Ciccarelli et al., 2022; Teng et al., 2020). Thus, items were summed to obtain a continuous score for adolescent PG, with higher scores indicating higher levels of PG severity. In this study, the Cronbach's α was .84 (95 % CI [.91, .93]).

Basic Psychological Needs Satisfaction and Frustration

To examine the satisfaction and the frustration of basic psychological needs (i.e., autonomy, competence, relatedness) in everyday life, the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015; Italian validation: Costa et al., 2018) was employed. The BPNSFS comprises 24 items divided into two subscales: needs satisfaction (12 items) and needs frustration (12 items) rated on a five-point scale from (1) 'completely disagree' to (5) 'completely agree'. An example of item for need satisfaction is: 'I feel close and connected with other people who are important to me'; an example of item for need frustration is: 'I feel forced to do many things I wouldn't choose to do'. The items composing each subscale were summed to obtain the total scores for needs satisfaction and frustration, respectively. In this research, the levels of reliability were good: satisfaction: α = .86 (95% CI [.85, .87]) and for frustration: α = .88 (95% CI [.87, .89].

Maternal and Paternal Parenting Practices

To investigate adolescents' perceptions of maternal and paternal practices, the Parents As Social Context Questionnaire (PASCQ; Skinner et al., 2005) was employed. The scale examines six core dimensions of parenting (i.e., autonomy support, structure, warmth, coercion, chaos, and rejection), which are separately evaluated for mothers and fathers by the adolescent using a four-point scale from (1) 'not at all true' to (4) 'very true'. Each subscale is composed of four items which are summed to obtain a total score for the corresponding parenting dimension. An example of item for autonomy support is: 'My mother/father tries to understand my point of view'; for structure is: 'My mother/father explains the reasons for our family rules'; for warmth is: 'My mother/father lets me know she/he loves me'. An example of item for coercion is: 'My mother/father is always telling me what to do'; for chaos is: 'My mother/father gets me at me with no warning'; for rejection is: 'Sometimes I wonder if my mother/father likes me'.

Despite the PASCQ has been validated and used in several studies worldwide (e.g. Abidin et al., 2019; Rebecka et al., 2020), the Italian validation is not available. Thus, a Confirmatory Factor Analysis (CFA) on the Italian back-translated version (Costa et al., 2019) was preliminarily performed by using the lavaan package (Rosseel, 2012) of the open-source software R (R Development Core Team, 2023). The diagonally weighted least squares (DWLS) estimator (Jöreskog & Sörbom, 1996) was employed to estimate model fit and the PASCQ was separately analysed for the maternal and paternal parenting practices.

Concerning maternal PASCQ, an initial CFA with each subscale composed of the four corresponding items revealed an adequate fit of the model and the data: $\chi^2(237) = 779.643$, $p < .001$; comparative fit index (CFI) = 0.99; root-mean-square error of approximation (RMSEA) = 0.04; 90% confidence interval (CI) [0.04, 0.05]. However, the analysis of the standardized factor loadings revealed a low factor loading for item 5 (.32, $p < .001$), while the factor loadings for all the other PASCQ items were significant at the $p < .001$ level and with factor loadings >.04, which is the

threshold value considered acceptable in the social sciences (Stevens, 2002). For this reason, a second CFA without item 5 was run. This second CFA confirmed an adequate fit of the model and the data: χ^2 (215) = 578.437, p <.001; comparative fit index (CFI) = 0.99; root-mean-square error of approximation (RMSEA) = 0.03; 90% confidence interval (CI) [0.03, 0.04]. All the standardized factor loadings were significant at the p < .001 level (range loading = 0.46 – 0.85), thus showing item convergent validity (Anderson & Gerbing, 1988).

Concerning paternal PASCQ, an initial CFA with each subscale composed of the four corresponding items revealed an adequate fit of the model and the data: χ^2(237) = 1141.830, p <.001; comparative fit index (CFI) = 0.98; root-mean-square error of approximation (RMSEA) = 0.05; 90% confidence interval (CI) [0.05, 0.06]. However, the analysis of the standardized factor loadings revealed a very low factor loading for item 5 (.14, p <.001), while the factor loadings for all the other PASCQ items were significant at the p < .001 level and with factor loadings >.04. For this reason, a second CFA without item 5 was run. This second CFA confirmed an adequate fit of the model and the data: χ^2 (215) = 727.853, p <.001; comparative fit index (CFI) = 0.99; root-mean-square error of approximation (RMSEA) = 0.04; 90% confidence interval (CI) [0.04, 0.05]. All the standardized factor loadings were significant at the p < .001 level (range loading = 0.54 – 0.89), thus showing item convergent validity (Anderson & Gerbing, 1988).

In this study, the reliability levels of the maternal subscales were for autonomy support: α = .78 (95% CI [.76, .80]), structure: α = .77 (95% CI [.75, .79]), warmth: α = .82 (95% CI [.80, .84]), coercion: α = .69 (95% CI [.66, .72]), chaos: α = .71 (95% CI [.69, .74]), rejection: α = .66 (95% CI [.63, .69]). The reliability levels for the paternal subscales were for autonomy support: α = .79 (95% CI [.77, .81]), structure: α = .80 (95% CI [.78, .81]), warmth: α = .85 (95% CI [.84, .86]), coercion: α = .66 (95% CI [.62, .69]), chaos: α = .70 (95% CI [.67, .73]), rejection: α = .66 (95% CI [.63, .70]).

6.3.4 Data Analytic Strategy

Descriptive statistics and bivariate Pearson's correlations were calculated using the Statistical Package for Social Science software (SPSS) V.28.0.1 (IBM Corp., 2023). To test the hypothesized model of the inter-relationships between the study variables, a path analytic approach (i.e., structural equation modelling for observed variables) was applied using the lavaan package (Rosseel, 2012) of the open-source software R (R Development Core Team, 2023). Specifically, a single observed score for each construct and the robust maximum likelihood method estimator (MLR) were used (Satorra & Bentler, 1994). To calculate indirect associations, the bootstrapping approach with 5000 resampling was applied and the 95% bias-corrected confidence intervals (CI) were estimated and considered significant if they did not include zero (Hayes, 2013). In the model, the supportive and the thwarting parenting practices were the independent variables; the satisfaction and the frustration of basic psychological needs were the mediating variables; and adolescent PG was the dependent variable; age was included as a covariate (Fig.1). To check the overall goodness of fit, the explained variance of each endogenous variable (R^2) and the total coefficient of determination (TCD), which is commonly considered a reliable fit index for path analysis (Bollen, 1989; Jöreskog & Sörbom, 1996), were considered. In addition, the Robust Comparative Fit Index (R-CFI), the Robust Root Mean Square Error of Approximation (R-RMSEA), and the Standardized Root Mean Square Residual (SRMR) were inspected. For an acceptable fit, the R-CFI should be $\geq$ .95, the R-RMSEA and the SRMR should be $\leq$ .05 (Kline, 2012). First, the two distinct models for maternal and paternal practices were tested in the total sample of participants. Secondly, to test for gender differences (males vs. females) in the associations between the study constructs, multi-group path analyses were conducted using a nested model comparison (Jöreskog & Sörbom, 1996; Van de Schoot et al., 2012), as done in the previous study (Chapter 5). Precisely, three increasingly invariant and restrictive models were compared: Model 1 testing configural invariance, Model 2 testing the invariance of the intercepts, and Model 3 in which both the intercepts and regression coefficients of all items were constrained to

be equal between groups. To compare the models, the scaled Chi-Squared Difference Test (Satorra & Bentler, 2001) was applied: if the χ^2 values change significantly as the models become more restrictive, the constraints imposed on the more restricted model worsen model fit. In addition, the null hypothesis of equality of the path coefficients across gender groups was tested with a series of Wald Chi-Squared Tests of parameter equalities (e.g., Marino et al., 2023) using the "lavTestWald" function in R (Klopp, 2020; Rosseel, 2012).

6.4. Results

6.4.1 Preliminary Analyses

The descriptive statistics and bivariate Pearson's correlations of the study variables in the total sample are presented in Table 3 (for maternal practices) and in Table 4 (for paternal practices). The skewness and kurtosis of all the variables fell within the acceptable range. Bivariate correlations between adolescent PG and all the study variables were statistically significant. Specifically, adolescent PG was negatively associated with all the supportive parenting practices (i.e., autonomy-support, structure and warmth) and positively associated with all the thwarting parenting practices (i.e., coercion, chaos, rejection) for both parents. Furthermore, adolescent PG was negatively associated with need satisfaction and positively associated with need frustration. Similar patterns of correlations were observed for males and females, as reported in Table 5 (for maternal practices) and Table 6 (for paternal practices), except for a non-significant association between maternal structure and adolescent PG in males. In addition, age negatively correlated with adolescent PG only in males.

Table 3

Descriptive Statistics and Bivariate Pearson's Correlations for Maternal Parenting Practices in the Total Sample.

Variable	M	SD	Range	Skew	Kurt	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Aut. Supp.	13.08	2.62	4-16	-1.06	.69	-								
2. Structure	12.09	2.81	4-16	-0.64	-0.08	.62***	-							
3. Warmth	13.64	2.66	4-16	-1.29	1.28	.70***	.62***	-						
4. Coercion	5.49	2.11	3-12	0.78	-0.03	-.58***	-.37***	-.40***	-					
5. Chaos	7.26	2.73	4-16	0.82	0.14	-.54***	-.44***	-.45***	.59***	-				
6. Rejection	6.45	2.55	4-16	1.27	1.42	-.58***	-.38***	-.54***	.56***	.58***	-			
7. NS	43.71	8.19	12-60	-0.41	.07	.41***	.31***	.35***	-.22***	-.28***	-.30***	-		
8. NF	29.56	9.86	12-60	.043	-.36	-.32***	-.20***	-.25***	.35***	.40***	.40***	-.56***	-	
9. PG	14.53	5.68	9-45	1.46	2.49	-.17***	-.09***	-.11***	.25***	.23***	.21***	-.18***	.32***	-

Notes. $n = 1193$ adolescents. Aut. Supp. = Autonomy Support; NS = Need Satisfaction; NF = Need Frustration; PG = Problematic Gaming. M = Mean, SD = Standard Deviation, Skew = Skewness, Kurt = Kurtosis. ***$p <.001$; *$p <.05$.

Table 4

Descriptive Statistics and Bivariate Pearson's Correlations for Paternal Parenting Practices in the Total Sample.

Variable	*M*	*SD*	Range	Skew	Kurt	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Aut. Supp.	12.74	2.78	4-16	-0.98	.57	-								
2. Structure	11.93	2.99	4-16	-0.66	-0.10	.65***	-							
3. Warmth	12.86	2.99	4-16	-0.89	.05	.73***	.61***	-						
4. Coercion	5.42	2.09	3-12	0.93	.38	-.55***	-.36***	-.39***	-					
5. Chaos	7.00	2.71	4-16	1.00	0.67	-.55***	-.47***	-.46***	.60***	-				
6. Rejection	6.57	2.63	4-16	1.18	1.10	-.58***	-.42***	-.55***	.52***	.60***	-			
7. NS	43.71	8.19	12-60	-0.41	.07	.44***	.32***	.35***	-.21***	-.28***	-.30***	-		
8. NF	29.56	9.86	12-60	.043	-.36	-.33***	-.22***	-.25***	.33***	.38***	.39***	-.56***	-	
9. PG	14.53	5.68	9-45	1.46	2.49	-.16***	-.09**	-.12***	.24***	.22***	.22***	-.18***	.32***	-

Notes. n = 1193 adolescents. Aut. Supp. = Autonomy Support; NS = Need Satisfaction; NF = Need Frustration; PG = Problematic Gaming. M = Mean, SD = Standard Deviation, Skew = Skewness, Kurt = Kurtosis. ***p <.001; ** p < .01; *p <.05.

Table 5

Descriptive Statistics and Bivariate Pearson's Correlations for Maternal Parenting Practices across Gender Groups (Females above the Diagonal [n = 426]; Males below the Diagonal [n = 767]).

Variable	Females		Males		Correlations								
	M	SD	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Aut. Supp.	12.71	2.94	13.29	2.40	-	.70***	.76***	-.71***	-.60***	-.71***	.45***	-.36***	-.23***
2. Structure	12.12	2.90	12.07	2.76	.59***	-	.68***	-.53***	-.59***	-.56***	.35***	-.27***	-.15***
3. Warmth	13.42	2.94	13.76	2.48	.65***	.58***	-	-.56***	-.57***	-.69***	.37***	-.28***	-.16***
4. Coercion	5.76	2.22	5.35	2.03	-.48***	-.28***	-.29***	-	.61***	.64***	-.33***	.36***	.23***
5. Chaos	7.75	2.92	6.98	2.58	-.49***	-.36***	-.36***	.58***	-	.61***	-.30***	.37***	.15***
6. Rejection	7.06	2.99	6.11	2.19	-.45***	-.26***	-.41***	.51***	.54***	-	-.34***	.38***	.20***
7. NS	41.68	8.29	44.84	7.92	.37***	.30***	.34***	-.14***	-.24***	-.24***	-	-.66***	-.19***
8. NF	33.49	10.1	27.38	9.01	-.26***	-.18***	-.22***	.33***	.40***	.37***	-.46***	-	.31***
9. PG	13.39	5.36	15.16	5.76	-.18***	-.07	-.10**	.29***	.32***	.28***	-.23***	.43***	-

Notes. Aut. Supp. = Autonomy Support; NS = Need Satisfaction; NF = Need Frustration; PG = Problematic Gaming. M = Mean, SD = Standard Deviation, Skew = Skewness, Kurt = Kurtosis. ***$p < .001$; **$p < .01$; *$p < .05$.

Table 6

Descriptive Statistics and Bivariate Pearson's Correlations for Paternal Parenting Practices across Gender Groups (Females above the Diagonal [n = 426]; Males below the Diagonal [n = 767]).

Variable	Females M	SD	Males M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Aut. Supp.	12.30	3.10	12.98	2.54	-	.67***	.78***	-.61***	-.60***	-.71***	.45***	-.35***	-.20***
2. Structure	11.39	3.29	12.23	2.76	.61***	-	.68***	-.40***	-.49***	-.54***	.34***	-.22***	-.16***
3. Warmth	12.73	3.32	12.93	2.79	.69***	.56***	-	-.47***	-.56***	-.68***	.35***	-.26***	-.14***
4. Coercion	5.54	2.19	5.36	2.03	-.51***	-.33***	-.34***	-	.61***	.60***	-.27***	.35***	.25***
5. Chaos	7.57	2.91	6.69	2.54	-.51***	-.44**	-.39***	.60***	-	.65***	-.29***	.34***	.18***
6. Rejection	7.13	3.02	6.25	2.33	-.44***	-.31***	-.43***	.46***	.54***	-	-.29***	.33***	.20***
7. NS	41.68	8.29	44.84	7.92	.41***	.28***	.36***	-.17***	-.23***	-.26***	-	-.66***	-.19***
8. NF	33.49	10.1	27.38	9.01	-.28***	-.16***	-.24***	.32***	.37***	.40***	-.46***	-	.31***
9. PG	13.39	5.36	15.16	5.76	-.16***	-.08*	-.12**	.24***	.29***	.28***	-.23***	.43***	-

Notes. Aut. Supp. = Autonomy Support; NS = Need Satisfaction; NF = Need Frustration; PG = Problematic Gaming. M = Mean, SD = Standard Deviation, Skew = Skewness, Kurt = Kurtosis. ***p <.001; **p <.01; *p <.05.

6.4.2 Single-Group Path Analyses

First, two single-group path analyses were conducted to estimate the hypothesized mediation models for maternal and paternal parenting practices. Model fit indices indicated an adequate fit for both models. Specifically, for the model of mothers, the TCD was .34 and the squared multiple correlations showed that a modest portion of the variance could be explained by the study variables (18% for needs satisfaction, 22% for need frustration, and 14% for adolescent PG). Additionally, the R-CFI was .998, the R-RMSEA was .034 (95% CI [.009, .058]), and the SRMR was .014. For the model of fathers, the TCD was .35 and the squared multiple correlations indicated that the model accounted for 20% of the variance in needs satisfaction, 20% in need frustration, and 15% in adolescent PG. The R-CFI was .998, the R-RMSEA was .032 (95% CI [.004, .056]), and the SRMR was .018.

The results of the path analyses with maternal and paternal parenting variables in the total sample are reported in Table 7. In the model of mothers, only the thwarting parenting practice of coercion was positively associated with adolescent PG, while the direct paths between all the other parenting practices and adolescent PG were not significant. Furthermore, results indicated that need frustration was positively related to adolescent PG, and age was negatively related to adolescent PG. The mediator need satisfaction was significantly and positively associated with the independent variables of autonomy-support, warmth and coercion, and was negatively associated with rejection; the mediator need frustration was significantly and positively related with the independent variables of coercion, chaos and rejection. In addition, the estimation of the 95% bias-corrected confidence intervals (CI) using the bootstrapping method showed a statistically significant mediating role only of need frustration in the relationships between the thwarting parenting practices and adolescent PG. All the other direct and indirect paths in the model of mothers were not significant (Table 7).

In the model of fathers, similarly to the model of mothers, only the thwarting parenting practice of coercion was positively associated with adolescent PG, while the direct paths between all

the other parenting practices and adolescent PG were not significant. Moreover, results indicated that need frustration was positively related to adolescent PG, and age was negatively related to adolescent PG. The mediator need satisfaction was only significantly and positively associated with the independent variable of autonomy-support, whereas the mediator need frustration was negatively associated with the independent variables of autonomy support and positively associated with the independent variables of chaos and rejection. Concerning the indirect paths, statistically significant mediating roles only of need frustration were observed between adolescent PG and paternal autonomy-support, and between adolescent PG and the thwarting parenting practices. All the other direct and indirect paths in the model of fathers were not significant (Table 7). The results concerning the mediating variable of need satisfaction, which were all not significant in both maternal and paternal models, are reported in Table 8.

Table 7

Path Analyses for the Models of Maternal and Paternal Parenting Practices and Adolescent PG in the Total Sample.

	Maternal Practices				Paternal Practices			
	β	*SE*	LLCI	ULCI	*β*	*SE*	LLCI	ULCI
Direct Paths								
Aut. Support → NS	.28***	.04	.19	.37	.37***	.04	.27	.46
Structure → NS	.04	.03	-.03	.11	.04	.03	-.02	.11
Warmth → NS	.08*	.04	.01	.16	.03	.04	-.04	.11
Coercion → NS	.07*	.03	.01	.14	.06	.03	-.01	.15
Chaos → NS	-.06	.03	-.14	.00	-.04	.03	-.12	.02
Rejection → NS	-.08*	.04	-.16	.00	-.05	.03	-.12	-.01
Age → NS	-.04	.02	-.10	.01	-.03	.02	-.09	.02
Aut. Support → NF	-.07	.04	-.16	.01	-.12**	.04	-.21	-.03
Structure → NF	.04	.03	-.02	.11	.03	.03	-.03	.10
Warmth → NF	.03	.03	-.04	.10	.05	.04	-.02	.14
Coercion → NF	.08*	.03	.00	.15	.06	.03	-.01	.12
Chaos → NF	.21***	.03	.14	.29	.18***	.03	.11	.25
Rejection → NF	.22***	.03	.16	.30	.22***	.03	.15	.29
Age → NF	.07**	.02	.01	.12	.05*	.02	.01	.11
Aut. Support → PG	-.01	.05	-.10	.08	.04	.05	-.05	.14
Structure → PG	.01	.03	-.06	.08	.05	.03	.02	.12
Warmth → PG	.04	.04	-.04	.11	-.02	.04	-.11	.06
Coercion → PG	.12**	.03	.05	.20	.13**	.03	.05	.21
Chaos → PG	.06	.04	-.02	.14	.04	.04	-.03	.12
Rejection → PG	.01	.04	-.06	.09	.05	.04	-.03	.13
NS → PG	-.01	.03	-.08	.06	-.01	.03	-.09	.05
NF → PG	.25***	.03	.18	.32	.26***	.03	.17	.32
Age → PG	-.13***	.02	-.18	-.08	-.14***	.02	-.19	-.09
Indirect Paths								
Aut. Support → NF→ PG	-.01	.02	-.09	.01	-.02*	.02	-.11	-.01
Structure → NF → PG	.01	.01	-.01	.05	.01	.01	-.01	.05
Warmth → NF → PG	.01	.02	-.02	.06	.01	.02	-.01	.07
Coercion → NF → PG	.02*	.02	.01	.11	.02*	.02	.01	.09
Chaos → NF → PG	.05***	.02	.06	.17	.04***	.02	.05	.14
Rejection → NF → PG	.05***	.03	.07	.19	.05***	.02	.07	.18
R^2 NS	.18				.20			
R^2 NF	.22				.20			
R^2 PG	.14				.15			
TCD	.34				.35			

Notes. n = 1193 adolescents. *β* = Standardized Parameter Estimates; SE = Standard Errors; LLCI = Lower Limit of the 95% Confidence Interval; ULCI = Upper Limit of the 95% Confidence Interval; TCD = Total Coefficient of Determination. NS = Need Satisfaction; NF = Need Frustration, PG = Problematic Gaming. ***$p < .001$; **$p < .01$; *$p < .05$.

Table 8

Indirect Paths with Needs Satisfaction as Mediator for the Models of Maternal and Paternal Parenting Practices and Adolescent PG in the Total Sample.

	Maternal Practices				Paternal Practices			
	β	*SE*	LLCI	ULCI	β	*SE*	LLCI	ULCI
Aut. Support → NS → PG	-.003	.023	-.052	.039	-.007	.029	-.074	-.041
Structure → NS → PG	-.000	.005	-.012	.008	-.001	.004	-.012	.006
Warmth → NS → PG	-.001	.007	-.018	.013	-.001	.004	-.012	.006
Coercion → NS → PG	-.001	.009	-.021	.015	-.001	.009	-.024	.013
Chaos → NS → PG	.001	.006	-.012	.014	.001	.005	-.008	.013
Rejection → NS → PG	.001	.008	-.013	.020	.001	.005	-.007	.014

Notes. n = 1193 adolescents. β = Standardized Parameter Estimates; SE = Standard Errors; LLCI = Lower Limit of the 95% Confidence Interval; ULCI = Upper Limit of the 95% Confidence Interval; NS = Need Satisfaction; PG = Problematic Gaming.

6.4.3 Multi-Group Path Analyses

To test for gender differences in the associations specified by the mediation models, multi-group (males vs. females) path analyses were conducted (Table 9). Results from the nested model comparison using the Chi-Squared Difference Test indicated that: (i) between Model 1 and Model 2, the values changed significantly in both the model of mothers ($\Delta\chi^2_{(9)}$ = 58.20, $p < .001$) and of fathers ($\Delta\chi^2_{(9)}$ = 74.81, $p < .001$); (ii) between Model 2 and Model 3, the values changed significantly in both the model of mothers ($\Delta\chi^2_{(23)}$ = 195.25, $p < .001$) and of fathers ($\Delta\chi^2_{(23)}$ = 200.35, $p < .001$), thus neither the invariance of the intercepts nor the invariance of the regression coefficients were supported. Coherently, the omnibus Wald test of parameter constraints was statistically significant in both the model of mothers (Wald $\chi^2_{(23)}$ = 47.09, $p < .01$), and of fathers (Wald $\chi^2_{(23)}$ = 53.07, $p < .001$). These results indicated that gender did influence the magnitude of the model paths, thus stressing the relevance of separately analyzing and comparing the regression coefficients between the two groups.

Specifically, in the model of mothers, two paths significantly differed between males and females: the path between maternal chaos and adolescent PG (which was not significant for females; Wald $\chi^2_{(1)} = 6.35$, $p < .05$); and the path between age and adolescent PG (which was not significant for females; Wald $\chi^2_{(1)} = 8.63$, $p < .01$). The total amount of variance explained by the model of mothers was TCD = .37 for males and TCD = .31 for females, and the squared multiple correlations indicated that the model accounted for 17 % and 21 % of the variance in need satisfaction, for males and females respectively, 21% and 19% in need frustration, and 26% and 12% in adolescent PG. In the model of fathers, four paths significantly differed between males and females: the path between paternal autonomy-support and need frustration (which was not significant for males; Wald $\chi^2_{(1)} = 5.04$, $p < .05$); the path between paternal rejection and need frustration (which was not significant for females; Wald $\chi^2_{(1)} = 5.14$, $p < .05$); the path between paternal chaos and adolescent PG (which was not significant for females; Wald $\chi^2_{(1)} = 4.11$, $p < .05$); and the path between age and adolescent PG (which was not significant for females; Wald $\chi^2_{(1)} = 9.29$, $p < .01$). All the other paths did not significantly differ among males and females. The total amount of variance explained by the model of fathers was TCD = .38 for males and TCD = .31 for females, and the squared multiple correlations indicated that the model accounted for 19 % and 20 % of the variance in need satisfaction, for males and females respectively, 20% and 17% in need frustration, and 26% and 12% in adolescent PG.

Table 10 reports the indirect associations of need frustration in the multi-group path analyses for the models of mothers and fathers, which were all small and comparable among males and females based on the results of the Wald Chi-Squared Tests. Furthermore, as reported in Table 10, the indirect associations of need satisfaction were all not significant.

Table 9

Multi-Group Path Analyses for the Models of Maternal and Paternal Parenting Practices and Adolescent PG.

	Maternal Practices								Paternal Practices							
	Males (*n* = 767)				Girls (*n* = 426)				Males (*n* = 767)				Girls (*n* = 426)			
	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI	β	SE	LLCI	ULCI
Direct Paths																
Aut. Supp. → NS	.22***	.05	.12	.33	.35***	.08	.19	.51	.32***	.06	.20	.44	.43***	.08	.26	.59
Structure → NS	.06	.04	-.02	.15	.05	.06	-.08	.18	.01	.04	-.07	.09	.07	.06	-.04	.19
Warmth → NS	.11*	.04	.02	.20	.04	.08	-.11	.20	.11*	.04	.01	.20	-.02	.07	-.17	.13
Coercion → NS	.11*	.04	.03	.20	-.01	.06	-.14	.12	.08	.04	-.01	.17	.01	.06	-.11	.03
Chaos → NS	-.07	.04	-.16	.01	-.03	.06	-.15	.09	-.02	.04	-.11	.06	-.05	.06	-.17	.07
Rejection → NS	-.09*	.04	-.18	-.01	.01	.07	-.15	.15	-.08*	.04	-.16	-.01	.06	.06	-.07	.19
Age → NS	-.08*	.03	-.15	-.01	.01	.04	-.08	.08	-.07	.03	-.14	.01	.01	.04	-.07	.10
Aut. Supp. → NF	-.01	.05	-.10	.11	-.11*	.08	-.33	-.01	-.05	.05	-.16	.05	-.20*	.08	-.36	-.04
Structure → NF	.01	.04	-.07	.09	.02	.06	-.10	.15	.07	.04	-.01	.15	.02	.06	-.10	.15
Warmth → NF	-.03	.04	-.12	.05	.12	.07	-.02	.27	-.04	.05	-.15	.06	.09	.07	-.06	.24
Coercion → NF	.09*	.04	.01	.17	.09	.07	-.05	.23	.07	.04	-.01	.16	.13*	.06	.01	.25
Chaos → NF	.23***	.04	.14	.32	.17*	.07	.03	.31	.17***	.04	.08	.26	.14*	.06	.02	.26
Rejection → NF	.19***	.04	.10	.27	.19**	.07	.05	.33	.24***	.04	.16	.33	.08	.07	.05	.22
Age → NF	.09*	.03	.03	.16	.06	.04	-.02	.14	.07*	.03	.01	.14	.06	.04	-.02	.14
Aut. Supp. → PG	-.01	.05	-.10	.09	-.11	.08	-.27	.05	-.02	.05	-.07	.13	-.04	.08	-.42	.27
Structure → PG	.04	.04	-.03	.12	-.01	.06	-.13	.13	.05	.03	-.02	.12	-.06	.06	-.19	.06
Warmth → PG	.05	.04	-.03	.14	.01	.07	-.12	.16	.01	.04	-.07	.10	.06	.08	-.10	.23
Coercion → PG	.09*	.04	.01	.17	.11	.07	-.04	.26	.06	.04	-.02	.15	.14*	.06	.01	.26
Chaos → PG	.12**	.04	.03	.21	-.07	.07	-.21	.05	.11*	.04	.02	.21	.03	.06	-.15	.09
Rejection → PG	.05	.04	-.03	.13	.03	.07	-.13	.16	.07	.04	-.01	.16	.04	.08	-.12	.20
NS → PG	-.07	.04	-.15	.01	.06	.06	-.06	.20	-.06	.04	-.14	.01	.04	.07	-.08	.18
NF → PG	.33***	.03	.25	.41	.30***	.06	.17	.43	.34***	.04	.25	.42	.28***	.06	.14	.41
Age → PG	-.20***	.03	-.26	-.14	-.04	.04	-.13	.03	-.21***	.03	-.27	-.15	-.05	.04	-.13	.02
R^2 NS	.17				.21				.19				.20			
R^2 NF	.21				.19				.20				.17			
R^2 PG	.26				.12				.26				.12			
TCD	.37				.31				.38				.31			

Notes. β = Standardized Parameter Estimates; SE = Standard Errors; LLCI = Lower Limit of the 95% Confidence Interval; ULCI = Upper Limit of the 95% Confidence Interval; TCD = Total Coefficient of Determination. NS = Need Satisfaction; NF = Need Frustration, PG = Problematic Gaming. ***$p < .001$; **$p < .01$; *$p < .05$.

Table 10

Indirect Paths with Needs Frustration and Need Satisfaction as Mediators in the Multi-Group Path Analyses for the Models of Maternal and Paternal Parenting Practice.

	Maternal Practices								Paternal Practices							
	Males (*n* = 767)				Girls (*n* = 426)				Males (*n* = 767)				Girls (*n* = 426)			
	β	*SE*	LLCI	ULCI	*β*	*SE*	LLCI	ULCI	*β*	*SE*	LLCI	ULCI	*β*	*SE*	LLCI	ULCI
Aut. Supp.→ NF→ PG	-.01	.04	-.07	.08	-.02	.05	-.20	-.00	-.01	.04	-.13	.04	-.03*	.05	-.20	-.01
Structure → NF → PG	.01	.03	-.05	.06	.01	.03	-.06	.09	.02	.03	-.01	.12	.01	.03	-.04	.07
Warmth → NF → PG	-.01	.03	-.09	.04	.03	.04	-.01	.16	-.01	.03	-.10	.04	.02	.03	-.03	.12
Coercion → NF → PG	.03*	.04	.01	.17	.02	.05	-.03	.19	.01	.04	-.01	.16	.03*	.04	.01	.20
Chaos → NF → PG	.07**	.04	.09	.25	.03*	.04	.01	.18	.05**	.03	.06	.21	.04*	.03	.01	.15
Rejection → NF → PG	.06**	.04	.08	.26	.05*	.04	.02	.21	.07**	.04	.12	.31	.03*	.03	.02	.12
Aut. Supp.→ NS → PG	-.016	.026	-.095	.006	.024	.046	-.039	.148	-.022	.034	-.125	.009	.021	.055	-.064	.153
Structure → NS → PG	-.005	.011	-.037	.004	.003	.014	-.017	.040	-.001	.007	-.018	.013	.004	.012	-.015	.035
Warmth → NS → PG	-.008	.014	-.052	.003	.003	.015	-.023	.041	-.007	.013	-.045	.003	-.001	.011	-.028	.021
Coercion → NS → PG	-.001	.017	-.064	.004	-.008	.016	-.038	.031	-.006	.014	-.051	.004	.001	.014	-.028	.033
Chaos → NS → PG	.001	.010	-.005	.035	-.005	.012	-.035	.016	.002	.008	-.012	.022	-.002	.012	-.035	.016
Rejection → NS → PG	.007	.015	-.004	.053	.000	.014	-.029	.031	.006	.011	-.004	.040	-.003	.013	-.015	.039

Notes. *β* = Standardized Parameter Estimates; SE = Standard Errors; LLCI = Lower Limit of the 95% Confidence Interval; ULCI = Upper Limit of the 95% Confidence Interval. NF = Need Frustration; PG = Problematic Gaming. Indirect Paths with NS as mediating variable were all non-significant and were not reported for presentation simplicity purposes. **p <.01; *p <.05.

6.5 Discussion

This fourth study added to the literature by separately investigating, at the proximal level, the direct associations between different supportive and thwarting parenting practices (of both mothers and fathers) and adolescent PG, at the individual level, their indirect associations via need satisfaction and need frustration, and potential gender differences in the pattern of associations. Overall, among the parenting practices, the findings showed direct associations only between certain thwarting practices and adolescent PG, providing support for the crucial role of the negative social environments in increasing adolescent maladjustment and problematic use of video games (Costa et al., 2019; Coşa et al., 2022).

Specifically, it was observed that the coercive behaviours by both mothers and fathers were positively associated with PG in the total sample of adolescents. This parenting practice is characterized by high demandingness for strict obedience and intrusive control (Skinner et al., 2005), which may elicit psychological reactance among the youth, especially in the case that it targets adolescents' preferences and choices (for instance, regarding media use) (Valkenburg et al., 2013). Indeed, considering that adolescents typically could reject the constraints imposed by the authority figures, and given that gaming is a spare time activity that can be freely chosen, it is plausible that the more adolescents perceive their parents to control their duties and even their pastimes, the more they are willing to play video games as an act of defiance and an attempt to remark their own independence (Van Petegem et al., 2015). Of note, however, individual vulnerabilities and gaming-related features may increase the risk that adolescents choosing to play video games intensively fail to control their activities, ultimately developing addictive patterns of use (Kiràly et al., 2023).

In addition to coercion, multi-group analyses revealed that maternal and paternal chaos were positively related to adolescent PG in males. This is in line with previous literature showing that living with inconsistent and unpredictable parents, whose behaviours contribute to generate confusion and disorganization, could constitute a critical risk factor for PG (Nielsen et al., 2020). This finding

may be noteworthy also considering the recent challenges posed by the Covid-19 pandemic that has been found to increase parental difficulties and family chaos, leading to higher adolescent maladjustment (Masten, 2021). Consistent with a previous study on Internet addiction (Zhang, Lin, et al., 2022), our findings suggest that males in particular may be less tolerant of ambiguity and uncertainty, and thus, they may turn to video games to manage the associated negative emotions or, alternatively, to search and interact with a more structured environment. As postulated by the Compensatory Internet Use Theory (CIUT; Kardefelt-Winther, 2014), individuals experiencing unpleasant states arising from stressful life situations, such as problems with their parents, may be particularly motivated to use technology as a coping strategy or to compensate for what is lacking in real life.

In line with this, this fourth study provided support for the prominent role of need frustration, not only as a critical factor associated with higher PG, but also as a possible mechanism suitable to explain the relationship between the thwarting parenting practices and PG. Differently from need satisfaction, which was associated with PG and all the parenting practices in the expected directions but only at a correlational level, need frustration was found to significantly mediate the relationship between adolescent PG and coercion, chaos and rejection in the models of both parents and among all adolescents. These results align with the most recent conceptualizations and findings regarding the Basic Psychological Need Theory, which evidence a clear distinction between (low) need satisfaction and need frustration (Rodríguez-Meirinhos et al., 2020; Vansteenkiste et al., 2020). In fact, it is the experience of need frustration that may be mostly detrimental and pathogenic, since it constitutes "an active threat of the psychological needs", rather than just an absence of their fulfilment (Vansteenkiste et al., 2020, p.9). In line with this, Przbylski et al. (2019) found that need frustration in daily life, but not low need satisfaction, was positively associated with dysregulated gaming among British adolescents. What is likely to happen, according to Mills and Allen (2020), is that the experience of need frustration may undermine one's own psychological resources for self-control,

that is the ability to manage emotions, thoughts and behaviours (Nigg, 2016). As a result, it may be speculated that adolescents having their psychological needs frustrated by negative parental behaviours may have only limited resources left to effectively regulate their gaming activities. The fact that the mediational role of need frustration was observed for the thwarting behaviours of both parents further stresses the harmful nature of such practices (Keijser et al., 2020). Notably, while maternal rejection in this study was positively associated with need frustration in both males and females, confirming the centrality of mothers in the emotional domain (Putnick et al., 2012), paternal rejection was positively related to need frustration only in males, providing initial evidence for a higher susceptibility of boys to their fathers' disapproval and/or detachment. One possible explanation could be that fathers, compared to mothers, may behave in a more distant way with their offsprings, especially with their sons, who thus may suffer for this lack of closeness more intensively than daughters (Ramírez-Uclés et al., 2018).

Furthermore, the present study expanded the knowledge on the mediating role of need frustration between the positive practice of autonomy-support, previously measured unitedly for the parents, and adolescent PG (Gugliandolo et al., 2020), by specifically evidencing this link in the model of fathers. This is consistent with the Father-Child Activation Relationship Theory (Paquette, 2004), which stresses the centrality of the paternal role in promoting adolescents' volitional functioning and psychological freedom (Ryan & Deci, 2017; Vrolijk et al., 2020). As recently pinpointed by Van Petegem et al. (2023), autonomy-related developmental processes are fundamental for a positive adolescent growth and for the development of adaptive coping. Since PG may indeed arise from adolescents' dysfunctional attempts to regulate negative affect and compensate for un-met needs (Kardefelt-Winther, 2014), it is possible that the more fathers enact such autonomy granting behaviours, the more they can protect adolescents from the development of this problematic behaviour by reducing their need frustration and the associated negative emotions that may push them to play (Przbylski et al., 2019; Vansteenkiste & Ryan, 2013). Specifically, this study further showed

that paternal autonomy support was negatively associated with need frustration in females, suggesting that girls in particular may be more attentive and sensitive to the buffering effects of this parenting practice compared to boys. Alternatively, it may also be the case that socializing agents, such as fathers, may act differently towards males versus females, for instance, by considering their daughters more capable of decision making and thus granting them autonomy with higher indulgence (Hu et al., 2021; Rodríguez-Meirinhos et al., 2020). However, these findings should be considered as preliminary and future research is encouraged to replicate and extend them.

6.5.1 Limitations

Some limitations should be acknowledged. First, the cross-sectional design did not allow to infer causality, thus longitudinal research is needed to confirm the directionality of the hypothesized associations. Additionally, despite the distinction between maternal and paternal variables may have provided more accurate findings on the contribution of each parent, the reciprocal effects between the parenting practices of the two parents were not investigated. In line with the Family Systems Theory (Lerner et al., 2015), future studies should consider the possibility to test an integrative model including the presence of mutually influential relationships between maternal and paternal practices. A further step could also be to examine the potential bidirectional associations between parental behaviours and adolescent PG. Indeed, as demonstrated by previous longitudinal cross-lagged studies (Lin et al., 2020; Su et al., 2018), not only parental practices may affect adolescent PG, but also adolescent PG may exert an influence on parental practices. Another limitation was that the significant effects observed in the mediational models were small in magnitude, thus the robustness of our results is reduced (Kirk, 2003). Moreover, the final sample included only Italian adolescents and was imbalanced between males and females, limiting the generalizability of the findings, both in terms of culture and of gender. Future research should not only involve larger and cross-national samples of adolescents, but also include participants who identify themselves beyond the binary gender, in such a numerosity to implement multi-group analyses (de Graaf et al., 2021). In addition,

to gain a deeper understanding of the links between parenting and adolescent PG, research should collect data also from parents, as previously done in Study 2 (Chapter 4), possibly using a multi-informant approach to examine convergence and divergence between parent and adolescent reports (De Los Reyes et al., 2019). Finally, to study the correlates of adolescent PG, this research concentrated on certain parenting practices and on overall need satisfaction and need frustration in daily life. Future research should further explore the complexity of basic psychological needs by isolating and inspecting each of them (e.g., Costa et al., 2019; Inguglia et al., 2018) and should consider the effects of other variables, for instance, adolescent need satisfaction in-game (Bender & Gentile, 2020) and deviant peer affiliation (Lin et al., 2020), both found to enhance the risk for adolescent PG.

6.5.2 Conclusion

This fourth study shed new light on the direct and indirect associations between certain supportive (i.e., autonomy support, structure, warmth) and thwarting (i.e., coercion, chaos, rejection) parenting practices and adolescent PG, by distinguishing between mothers and fathers and by examining the mediating roles of need satisfaction and need frustration. On one hand, these findings highlight the importance for parents of being fully aware of the possible associations between their parenting practices and adolescent PG; on the other, they suggest that adolescents should be adequately informed not only about the potential links between their experience of need frustration and the development of PG, but also about the possible alternatives that exist in real life to fulfil their unmet psychological needs.

Chapter 7

General Discussion

7.1 New Findings about PG in Adolescence

The present doctoral dissertation provided new insights into adolescent PG and its associations with parental and family factors following a comprehensive approach that progressively sharpened the focus from distal to proximal and individual levels. Drawing from the theoretical frameworks of the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) and the Ecological Techno-Subsystem Theory (Johnson & Puplampu, 2008), the research project involved a logical succession of four studies designed to gain an in-depth investigation of different parent-adolescent correlates in relation to the problematic use of video games in youth, which yielded three main findings at three different levels.

First, at a macro-level (Study 1), government investments in social protection policies, in terms of public expenditures in benefits in kind for children and families, were found to decrease the risk of adolescent PG among adolescents living in 30 European countries. From a psychological perspective, the provision of such economic resources may lower the likelihood of dysfunctional parenting practices (Masarik & Conger, 2017), which can be critical in increasing adolescents' tendencies to develop maladaptive patterns of video games use (Nielsen et al., 2020).

Along this line, at a proximal level, both the dyadic study (Study 2) and the longitudinal study (Study 3) demonstrated that maternal indifference played a central role in potentially heightening adolescent PG. Therefore, having a more physically and psychologically unavailable mother, which can be predicted by her phubbing behaviours, may be particularly harmful for adolescents, who, in turn, may decide to play video games in the attempt to cope with the negative emotions or to compensate for unmet needs (Kardefelt-Winther, 2014). Furthermore, Study 3 (Chapter 5) documented that also paternal phubbing may exert an indirect influence on daughters from an

emotional standpoint, stressing the relevance to consider both maternal and paternal parenting practices in relation to adolescent maladjustment (Miranda et al., 2016) and adolescent PG (Bussone et al., 2020).

Finally, at the individual level, Study 4 (Chapter 6) provided specific knowledge into a possible psychological mechanism underlying the association between maternal and paternal parenting and adolescent PG, by primarily showing that three thwarting practices enacted by both parents, namely coercion, chaos and rejection - of which parental indifference constitutes an expression (Rohner et al., 2012) - were indirectly associated with adolescent PG via increased frustration of basic psychological needs.

The three abovementioned findings have been obtained by means of different research designs and statistical procedures purposely selected to analyze the data of different samples of participants at three different levels (i.e., macro-level, proximal level and individual level). More precisely, the links between parental factors and adolescent PG have been tested in a representative sample of high schools students living in 30 European countries who participated in the international ESPAD survey (ESPAD Group, 2019) ($n = 88\ 998$; 49.2% males), in two large samples of Italian adolescent gamers recruited from different high schools located in five regions of Italy, ranging from the North (Veneto and Lombardy), to the Centre (Tuscany) and the South (Campania and Sicily) (first sample: $n = 557$; 69% males; second sample: $n = 1193$; 64.3% males), and in a relatively small sample of Italian mothers ($n = 137$), who were formally invited to take part in the study via the informed consent that was required to allow their sons and daughters' participation.

With regards to the macro-level, entailing the structural determinants of a nation (Bronfenbrenner & Morris, 2006), Study 1 (Chapter 3), has investigated the contribution of benefits in kind for children and families in accounting for the risk of PG among European adolescents. To the best of the knowledge, this was the first study that has documented the possible protective role of government expenditures in social protection policies in relation to adolescent PG, thus providing an

important contribution to the youth gaming research from a public health perspective. In fact, very few studies in the literature have concentrated their attention on broader contextual factors associated with adolescent PG (Cheng et al., 2018; Strizek et al., 2020; van der Neut et al., 2023; Vashishtha et al., 2022). As suggested by Dahlgren and Whitehead (2021, p.21), a good strategy to prevent adolescent maladjustment and to promote health is "to think beyond health services and the health sector to the wider social determinants of health in local environments and society". In line with this, scholars have begun to encourage and develop comprehensive theoretical models of Internet use disorders (e.g., Lee et al., 2019) that consider understudied macro-level factors to achieve a more complete picture of the condition.

According to the results obtained in Study 1 (Chapter 3), higher government investments in family benefits may significantly reduce the risk of PG in a representative sample of European students. Remarkably, the provision of such economic resources may have important implications from two different perspectives: (i) the investment perspective, and (ii) the family process perspective (Yeung et al., 2002; Lebihan & Takongmo, 2018). In other words, from a pragmatical point of view, families receiving an additional income from national governments may increase their possibility to purchase materials, activities and services that can help adolescents to distract from gaming and, importantly, promote their engagement in alternative experiences that can build their human capital. Furthermore, consistent with the Family Stress Model (Masarik & Conger, 2017), family benefits may contribute to alleviate the economic pressure and psychological stress experienced by parents, which, in turn, may decrease the likelihood of disrupted parenting practices, ultimately resulting in fewer adolescent gaming problems (Nielsen et al., 2020; Sarti et al., 2013). This first study thus expanded previous research by showing the relevance to adopt a broader contextual approach to the study of the associations between parental behaviours and adolescent PG, to allow the identification of possible macro-level factors that can be considered by policymakers when delineating institutional programs aimed at promoting healthy behaviours in youth (Gennetian et al., 2021). Furthermore, the

results were obtained from representative samples of students that have received relatively little attention in the gaming research field (King et al., 2020; van der Neut et al., 2023).

With regards to the proximal level, another interesting finding of Study 1 (Chapter 3) was that parental regulation was found to be negatively associated with adolescents' maladaptive patterns of video games use, suggesting that parents defining clear rules and expectations towards their offsprings' behaviours may indeed protect them from the onset of PG (Schneider et al., 2017). However, the way in which parental regulation occurs may determine a great difference in its potential beneficial effects: while active regulation, also referred to as active mediation, entailing an open parent-adolescent communication on the limits and contents of video games, may encourage healthy gaming behaviours, restrictive mediation, characterized by unquestionable parental decisions on video games use, may instead have a counterproductive effect, exposing adolescents to an increased risk of PG, rather than protecting them (Nielsen et al., 2019). Consistent with this, a recent meta-analysis by Lukavskà et al. (2022) showed that restrictive mediation by parents was positively associated with PG among older adolescents. Indeed, by limiting adolescents' autonomy and volitional functioning, parents may elicit psychological reactance in their sons and daughters, who, in turn, may decide to play video games excessively as an oppositional defiance to parental firm restrictions (Lukavskà et al., 2022; Soenens et al., 2015).

Furthermore, it is worth noting that the increasing groundbreaking advancements in digital technology are making video games use more and more complex and difficult for parents to control, to the point that some caregivers may feel outsmarted by their sons and daughters (Fam et al., 2022). Thus, even if adolescents are restricted to play certain video games, they may be able to download them from alternative sources which lie far beyond parental knowledge, or to access them by using one of the multiple digital devices they use to carry out daily activities, such as tablets and smartphones. Based on this evidence, as observed by Valkenburg et al. (2013, p.448), "parental mediation of adolescents' media use could be more difficult than the regulation of behaviours in other

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domains" and thus it should be carefully investigated in future studies and explicitly addressed with parents in the context of prevention and intervention programs. Furthermore, beyond the distinction between active and restrictive mediation, it may also be important to consider the modalities in which parents deal with these practices, which can be either autonomy-supportive or controlling/coercive, respectively promoting or hindering a healthy use of video games in youth (Valkenburg et al., 2013). Consistent with this, results from Study 4 (Chapter 6) revealed that coercion by both mothers and fathers was directly associated with higher levels of PG in the total sample of Italian adolescents, suggesting that the more parenting practices tend to demand strict obedience and impose firm constraints on adolescent' free time activities, without allowing the possibility to make autonomous choices, the more likely they are to lead adolescents to reactive disobedience and to the development of dysregulated behaviours (Coşa et al., 2023).

Indeed, during the critical period of adolescence, the universally growth-promoting role of parents should take the forms of an active involvement that encourages youths to make decisions in a progressively independent way, while maintaining high levels of responsiveness, openness and interest towards them (Soenens et al., 2019). As emerged from two meta-analyses conducted by Pinquart (2017a, 2017b), living with parents that are less sensitive and responsive towards adolescents and their needs may significantly increase the risk of developing a variety of internalizing and externalizing problems in youth. Consistent with this, both Study 2 (Chapter 4) and Study 3 (Chapter 5) of the present doctoral dissertation documented the potential detrimental role of parental indifference, conceived as parental physical and, more importantly, psychological unavailability (Rohner et al., 2012), in heightening the risk of adolescent PG among adolescents, in line with previous research (Bulanik et al., 2020).

More precisely, in Study 2 (Chapter 4), despite the shared perceptions between mothers and adolescents tested by means of the CFM model did not reach conventional levels of statistical significance, a negative correlation between maternal indifference and adolescent PG emerged from

the reports of both informants. This result constitutes an important finding, since it firstly suggested that both adolescents and their mothers recognized that having a mother who is little emotionally present may indeed lead adolescents to develop maladaptive patterns of video games use. There are many possible explanations for this association, as discussed in the present chapter.

For instance, according to the personality subtheory of the Parental Acceptance and Rejection Theory (Rohner & Khaleque, 2005; Rohner et al., 2012), individuals who experience one of the forms of parental rejection, such as parental indifference, are more likely to develop feelings of impaired self-esteem, referring to one's own perception of self-worth and value (Rosenberg, 1965), and of impaired self-efficacy, entailing a sense of competence and mastery (Bandura, 1977), together with a negative world view (Khaleque, 2015). Furthermore, parental indifference may lead adolescent to think of themselves as unworthy of care and attention from significant others, which are harmful thoughts than can increase negative affect and emotional distress (Rohner et al., 2012).

As a result, since video games allow to boost self-esteem in an alternative and protective environment and offer the possibility to achieve a sense of mastery (Tichon & Tornqvist, 2016), it is possible that adolescents may turn to them to compensate for what they lack in real life and to improve their emotional well-being. Coherently, a study by Throuvala, Janikian et al. (2019) has found that maternal rejection was indirectly associated with PG via the mediating role of core self-evaluations, including lower self-esteem, lower self-efficacy and a negative world view (Judge et al., 1997) in a sample of young gamers in Greece. In fact, consistent with the Compensatory Internet Use Theory (Kardefelt-Winther, 2014) illustrated in Chapter 1, the use of Information and Communication Technologies (ICTs), including gaming, may constitute a valid means through which individuals can cope with their individual and interpersonal real-life problems, alleviate the associated negative affect and compensate for un-met needs, as documented in previous studies involving adolescents (Männikkö et al., 2017; Estevez et al., 2019).

Considering that the CFM analyses computed in Study 2 (Chapter 4) indicated a lack of dyadic similarity between mothers' and adolescents' reports, which suggests that each informant may have a unique interpretation of the same phenomenon (Valdes et al., 2016), it may be interesting to ascertain whether mothers acknowledging the association between their indifference and PG in their offsprings may also provide a similar interpretation for such an association or, more probably, they may have different opinions to explain the possible underlying mechanisms. Since it may be difficult to capture this aspect by solely using quantitative measures like questionnaires, future studies involving mother-adolescent dyads should employ multi-method assessments, by also integrating the use of qualitative techniques, such as focus groups interviews, to further explore concordance and discordance between the perspectives of mothers and adolescents in relation to the development of problematic patterns of gaming (Adler et al., 2019).

Adding a further piece of evidence at the proximal level, Study 3 (Chapter 5) showed that maternal indifference was predicted by maternal phubbing behaviours, which refer to parental excessive use of smartphones during daily interactions with their offsprings (Chotpitayasunondh & Douglas, 2016). In line with the Ecological Techno-Subsystem Theory introduced by Johnson and Puplampu (2008), this finding reflects the relevance to consider the pervasive influence of digital technology on modern parent-adolescent relationships and on adolescent adjustment. Consistent with this, a recent systematic review on the effects of ICTs on family relationships (Tammisalo & Rotkirch, 2022) has shown that parental use of personal devices, such as smartphones and tablets, was mostly negatively associated with the quality of parenting and the well-being of family members due to different relationship-interfering aspects. Indeed, while there may still be some inaccuracies in current literature regarding a definite terminology and operationalization of parental smartphone use while being with the offsprings (Frackowiak et al., 2023), with some scholars using the term "parental phubbing" (Pancani et al., 2020) and some others using "parental technoference" (Stockdale et al., 2018) or "parental distraction with technology" (Canale, Pivetta et al., 2023; McDaniel & Radetsky,

2018), a growing amount of evidence has documented the detrimental effects of such a technology-related behaviour on parenting and adolescent well-being in the last years, regardless of the label used to identify the phenomenon (Liu et al., 2021; Stockdale et al., 2018; Xiao et al., 2022; Zhang et al., 2023).

Since phubbing may be conceived as a form of social exclusion occurring in the family context (Roberts & David, 2017; Pancani et al., 2020), it is important to remind that it may elicit a series of long-lasting negative consequences previously documented for the developmental population, that can be manifested in the emotional, cognitive and behavioural health domains (Timeo et al., 2019; Zhang et al., 2023). In this regard, a longitudinal study by Di Giunta et al. (2022) involving Italian adolescents has demonstrated that higher maternal rejection was positively associated with increased levels of aggressive problems and depressive symptoms one year later which, in turn, were associated with lower self-efficacy in the regulation of anger and sadness. As suggested by Timeo et al. (2019), playing video games could be viewed as a cognitive strategy for coping with negative emotions by refocusing and shifting the attention from an unpleasant interpersonal situation into something more tolerable. However, while this strategy may be helpful to lower the levels of arousal in the immediate phases following social exclusion, it may be ineffective in the long term, since it does not allow adolescents to face and deal with the negative emotions in an adaptive way (Riva & Eck, 2016). Coherent with this, a systematic review on the use of emotion regulation strategies associated with video gaming has shown that adolescents with higher PG reported to adopt more maladaptive strategies, such as avoidance and suppression (Marchica et al., 2019). Following this line, as evidenced in a literature review by Gioia et al. (2021), several studies have indicated that the lack of a good parent-adolescent relationship may negatively affect emotion regulation abilities, which, in turn, may heighten the risk of developing Internet-use disorders in youth.

The fact that, in Study 3 (Chapter 5), maternal indifference at Wave 2 was found to significantly mediate between maternal phubbing at Wave 1 and adolescent PG at Wave 2 for both

male and female participants, indicated the central influence of maternal emotional contribution on all the offsprings, irrespectively of their gender. The negative impact of mothers being excessively engaged with the use of their smartphones during daily situations may be perceived as especially harmful for adolescents living in countries where mothers still constitute the primary source of emotional support, by being actively involved in daily childcare and devoting more time to listening and interacting with children and adolescents, such as in Italy (Cannito & Scavarda, 2020).

However, it should be noted that results from Study 3 (Chapter 5) suggested that also the phubbing behaviours by fathers may have an indirect impact on daughters from an emotional standpoint, highlighting the importance to equally consider, but possibly distinguish, maternal and paternal parenting practices in relation to adolescent PG. Indeed, with fathers assuming a more present and nurturing role than in the past and, contrarily, with mothers being more engaged with the labour market, higher gender equality and increased similarities in the physical and emotional care of the offsprings can be observed (Miranda et al., 2016; Offer & Kaplan, 2021). In fact, as highlighted in a study by Offer & Kaplan (2021), despite the breadwinning role of fathers remains important, a new masculinity ideology has begun to emerge, with an increasing number of men being willing to make efforts to align their work with a more active involvement in childcare, especially in terms of emotional engagement and parental responsibility towards the offsprings' well-being.

At the individual level, results from Study 4 (Chapter 6) confirmed that both maternal and paternal (thwarting) parenting practices may be significantly associated with adolescent PG, specifically via the key mediating role of adolescents' basic psychological need frustration. This research adds novel information to current knowledge because it offers another, evidence-based explanation for the possible mechanisms underlying the associations between thwarting parenting behaviours, including parental coercion, chaos and rejection, and the development of maladaptive patterns of video games use in both male and female adolescents.

According to the most recent theorizations on the Basic Psychological Need Theory (Vansteenkiste & Ryan, 2013; Vansteenkiste et al., 2020), psychological need frustration should be clearly distinguished from need satisfaction based on their asymmetrical relationship, whereby the lack of need satisfaction may not necessarily determine the presence of need frustration, while the presence of need frustration implies the absence of need satisfaction. In this regard, Study 4 (Chapter 6) specifically demonstrated that it is the active frustration of basic psychological needs by mothers and fathers that may be the most deleterious and harmful factor contributing to heighten adolescents' risk to play video games in a dysfunctional way, in line with previous research (Gugliandolo et al., 2020). Therefore, rather than documenting the contributions of supportive parenting practices and of psychological need satisfaction, findings from Study 4 (Chapter 6) seemed to provide major support for the "dark side of human functioning" (Vansteenkiste et al., 2020; p.9). Indeed, they primarily indicated that adolescents living with parents that are overcontrolling, unpredictable and/or rejective, may experience an important threat to their psychological needs, which, in turn, may induce them to play video games in the attempt to restore such frustrated needs in an alternative manner (Allen & Anderson, 2018; Przybylski & Weinstein, 2019). To illustrate the conceptual differentiation and imbalance between thwarting and supportive parenting practices, Soenens et al. (2019, p.43) provided the following example: "When parents rebuff or ignore adolescents' calls for comfort and emotional support they thwart adolescents' need for relatedness in a more direct fashion compared to when parents merely display little affection and warmth in parent-adolescent interactions.".

Based on this and consistent with the idea of Vansteenkiste et al. (2020), it can be concluded that a low presence of need satisfaction, as well as limited positive parenting practices, may not be sufficiently detrimental to determine adolescent maladjustment and the development of PG; rather, it is the actual enactment of thwarting parenting practices, as documented in Study 2, 3 and 4, and the effective experience of need frustration, as shown in Study 4, that may be particularly painful and dangerous for adolescents having access to video games. In fact, as postulated by Bender & Gentile

(2020), the risk is that the possibility to achieve need satisfaction in-game, as exemplified by the sentences 'I find the relationships I form in this game fulfilling' or 'I experienced a lot of freedom in the game' may be so valuable for gamers having their real-life needs frustrated, that it may lead them to over-rely on this activity to the detriment of an adaptive individual functioning putting adolescent at higher risk of social withdrawal (Ferrante & D'Elia, 2022; Lancini, 2020).

7.2 Limitations and Future Research Directions

Despite the present doctoral project could be considered as an original piece of work providing novel evidence on how parental factors and behaviours can be associated with heightened adolescent PG at multiple levels, each of the four studies presented some specific limitations, which have been reported in detail in Chapters 3, 4, 5 and 6, suggesting the need to explore several open issues in future research.

First, all the studies reported in this thesis specifically focused and demonstrated how parental contribution can affect adolescent maladjustment, in particular problematic patterns of video games use, consistent with well-established theories in parenting psychology (e.g., Belsky & Jaffee, 2015; Skinner et al., 2005; Rohner & Khaleque, 2012). However, as postulated by several ecological systems theory, including the Rainbow Model of Health Determinants (Dahlgren & Whitehead, 1991; 2021) on which this work was grounded, influences between systems should be considered as bidirectional. Therefore, studying the impact of parental behaviours on adolescent PG without examining, inversely, the possible impact of adolescent PG on parental behaviours may have provided relevant, yet limited evidence, since it may have explored only one facet of the complex picture (Koning et al., 2018; Lerner et al., 2015). Indeed, as explained by Lerner and Castellino (2002) in their seminal work on developmental systems theory, the study of the dynamics between individuals and their proximal social contexts - composed of other individuals, such as parents - should simultaneously consider their mutual influences, as they are all involved in interdependent and constantly changing relationships. In this vein, the study of the crossover effect between phubbing

and indifference of mothers and fathers examined in Study 3 (Chapter 5) may be considered as an important empirical contribution showing the effective presence of reciprocal influences between parents.

Therefore, to further expand the knowledge in the field, future research should consider the use of longitudinal cross-lagged panel models (CLPM), designed to specifically test the prospective and mutual effects between one set of variables and another set (Orth et al., 2021). In this regard, a recent study using CLPM conducted in China (Zhou et al., 2023) has shown that not only family dysfunction directly increased PG among adolescents, but also that higher levels of adolescent PG directly predicted increased experience of family dysfunction. This finding is worth of special attention, since it underscores the presence (and possible consolidation) of a vicious cycle of maladjustment within the family, which may exacerbate the problems of both adolescents and their parents, further fuelling psychopathology. In the light of this, further studies are needed to disentangle the possible reciprocal associations between parental behaviours and adolescent PG.

Second, another important limitation of the present research project is that it only examined the proximal context of parents, without considering the possible contribution and interaction with other proximal contexts, such as that of peers and of siblings, who also constitute influential social components of adolescent PG (Zhu et al., 2015). For instance, results from a longitudinal CLPM study by Lin et al. (2020) have demonstrated that deviant peer affiliation mediated the association between parental psychological control and adolescent PG. In other words, adolescents experiencing more psychological control by their parents were more likely to seek friendships with unconventional and problematic peers, which, in turn, increased their willingness to play video games to integrate into the group (Lin et al., 2020). Crucially, as shown by Angelini, Pivetta et al. (2023), adolescents' perceptions of the use of video games by their friends and of social norms pushing them to engage in the activity of gaming to comply with the expectations of others and to align with the goals established by the group, could be considered as key risk factors for PG.

Together with peers, future studies should also conduct and in-depth examination of the contribution of siblings, which has been largely understudied (Coyne et al., 2016; Lin et al., 2021). Indeed, considering that siblings may serve as a secure base for an adolescent, since they can provide unconditional support and encourage the sharing of emotions (Mota & Matos, 2015), it is plausible to hypothesize that they may play a buffering role between negative parent-adolescent relationships and adolescent PG. While, to the best of the knowledge, this hypothesis has not been tested yet, a study by Lin et al. (2021) involving dyads of adolescent gamers and their brothers/sisters has instead shown mutual negative effects of PG on their levels of psychological distress and insomnia symptoms by means of an actor-partner interdependence model. In addition, drawing from previous evidence on gambling behaviours among Italian adolescents (Canale et al., 2017b), it may be interesting to verify whether students having older siblings who play video games may display a heightened risk of PG compared to those who do not have gamer siblings and it may also be ascertained whether parental knowledge may act as a salient protective factor.

Third, in view of these social aspects and of the ever-increasing rates of children and adolescents having access to digital media at a very early age (Jeong et al., 2021; Rega et al., 2023), another important limitation of the present research project is that the target population involved only students attending high schools, thus providing limited evidence on the use of video games in the larger group of youths. As a result, a possible suggestion for future studies may be to expand the age range of the target population by involving students younger than those involved in the present studies, thus including students attending elementary and middle schools. This may allow to detect specific age-related patterns of maladaptive video games use and possible dysfunctional social correlates, that should be promptly addressed to discourage the consolidation of dysregulated gaming habits and minimize the harms deriving from the establishment of a full-fledged PG condition later in adolescence (Bender et al., 2020). In this regard, future research could draw inspiration from the methodology applied by the Health Behaviour in School-aged Children study (HBSC), which is one

of the world's largest and long-running international collaborative research project on children and adolescents' health that specifically distinguishes between youth aged 11, 13, 15 and 17 years to investigate trends and possible predictors of problematic behaviours (Lazzeri et al., 2021; Moor et al., 2020; Vieno et al., 2018).

Fourth, although the variables analysed in the four studies have been demonstrated to explain a significant part of the variance of adolescent PG, from a macro-level to an individual level, there are several other factors that have not been investigated. With regards to the proximal context of parents, it may be interesting to conduct a more in-depth exploration of parental mediation practices, for instance by considering the potential influence of parental representations of digital activities or parents' own use (and co-use) of video games (Rega et al., 2023). Indeed, as proposed by Van Petegem et al. (2019), it is possible that mothers and fathers holding more negative views about gaming may be more prone to adopt a controlling style when mediating their offsprings' activities, while parents acknowledging the possible benefits of video games may be more likely to develop autonomy-supportive mediation strategies. In this area, studies investigating possible gender differences between mothers and fathers are needed. Furthermore, as initially demonstrated by Stockdale and Coyne (2020), parent's own gaming activities, especially if excessive, may lead to decreased parental efficacy and competence in parenting practices, including the regulation of adolescents' video games use, thus acting as risk factors that are worthy of additional research attention. Notably, future studies on parental factors should also more closely examine the effects of co-use, that is the joint use of video games by adolescents and their parents, since this mediation practice has been recently found to be positively associated with adolescent PG (Fam et al., 2023), contrary to the expectations based on previous research involving children, as reported in Chapter 2.

In addition, with regards to the individual factors, which have received relatively little attention in this doctoral dissertation, despite Study 4 (Chapter 6) provided support for the critical role of basic psychological needs, it may also be useful to examine the possible mediating and/or

moderating roles of additional variables, including self-control (Niu et al., 2020), trait emotional intelligence (Gugliandolo et al., 2015), uncertain reflective functioning (Musetti et al., 2021), maladaptive cognitions (Shen et al., 2022), intolerance of uncertainty (Bottesi et al., 2020) and emotion dysregulation (Gioia et al., 2021), all of which have been previously found to significantly explain the associations between parental factors and psychopathology among adolescents and young adults. Among these variables, emotion dysregulation in particular should receive attention for at least two reasons: first, because a substantial number of studies has demonstrated that the lack of emotional awareness, emotional clarity and control, and the non-acceptance of negative emotional responses (Gratz e Roemer, 2004), as well as expressive suppression and the lack of cognitive reappraisal (Gross & John, 2003), are associated with higher PG among adolescents, who may play video games as a maladaptive coping strategy to temporarily alleviate dysphoric states (Bender et al., 2020; Estèvez et al., 2017; Gioia et al., 2021; Kökönyei et al., 2019; Marchica et al., 2019); second, because literature has evidenced clear associations between negative parental behaviours and the development of emotion regulation difficulties during adolescence, as recently reported in a systematic review and meta-analysis (Goagoses et al., 2023). Indeed, as explained in the well-established Tripartite Model of the Impact of the Family on Children's Emotion Regulation and Adjustment (Morris et al., 2007), children and adolescents primarily learn about emotion regulation strategies through socialization processes that occur within the family context, via observation (e.g., modeling) parenting practices (e.g., reactions to emotions), and the emotional climate of the family (e.g., warm, controlling). Specifically, when the climate is negative, adolescents are at higher risk of becoming emotionally reactive and less emotionally secure (Morris et al., 2007).

In the light of this, it may be interesting that future studies examining the associations between parental behaviours and adolescent PG include the assessment of emotion regulation skills and difficulties, not only of adolescents, but also of their parents, to gain a better understanding of possible

protective components and, importantly, of potential dysfunctional cycles of intergenerational transmission (Li et al., 2019).

Furthermore, it may also be interesting to conduct multi-group and cluster analyses based on adolescent personality traits and/or psychopathological comorbidities (e.g., anxiety disorders, affective disorders) to acquire further knowledge of how the experience of PG may vary among the youth based on their individual characteristics and to provide information useful to design more tailored clinical interventions (González-Bueso et al., 2020).

An additional limitation of the present research project is represented by the use of self-report assessment tools. While, on one hand, especially online questionnaires can be useful to promote adolescents' willingness to participate and disclose information because of the familiarity with the Internet environment, on the other, these self-administered measures are subjected to many well-known biases, including those related to social desirability, memory recall, interpretation of questions and introspective abilities requiring self-reflection (Dunning et al., 2004; Pivetta et al., 2019). To provide a more accurate and in-depth assessment of adolescent PG, the use of self-report questionnaires should be integrated with qualitative measurement tools, such as semi-structured interviews (Koo et al., 2017). Indeed, as suggested by Wegmann et al. (2022), an approach combining quantitative techniques (e.g., number of criteria fulfilled) with qualitative ones (e.g., investigating daily functional impairment and the involvement of psychological features), may be particularly useful to identify Internet-use disorders. In this regard, studies involving clinical samples of adolescents (and their parents) rather than community samples should be employed to gain more robust evidence on the individual and interpersonal mechanisms underlying this condition in youth (Bender et al., 2020; Torres-Rodriguez et al., 2018a). Furthermore, the use of multi-method research, entailing a number of alternative designs (e.g., convergent parallel, exploratory sequential, embedded) may also be a valuable strategy to further explore complex relationships, such as the association between parental behaviours and adolescent PG, since it offers the possibility to test the

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same hypotheses in different modalities, and even more interestingly, to inform subsequent data collections in case of exploratory sequential designs (Creswell & Clark, 2011). With specific regards to social exclusion, it may be useful to incorporate experimental studies using mental visualization techniques and cyberball paradigms, to detect its possible negative effects on adolescents' behaviours and emotions (Gabbiadini & Riva, 2018).

Another limitation of the present studies is that the calculation of the statistical power has only been implemented in Study 2 (Chapter 4) by means of Monte Carlo analyses (Muthén & Muthén, 2002), in view of the low numerosity of the dyadic sample of mothers and adolescents on which model parameters had to be estimated. Nevertheless, all types of studies should implement statistical power analyses to bolster their methodological rigor, with estimates of the reliability of sample size, given a desired significance level and expected effect size, being computed and discussed (Cohen, 2013).

Finally, an additional limitation is that the four studies included in the present doctoral dissertation were not pre-registered. In terms of transparency and openness, with regards to Study 1 (Chapter 3), macro-level data were obtained from international public datasets (i.e., Eurostat, WorldBank) and from national thematic reports available online (Kaluđerović & Golubović, 2019; Mustafa & Haxhikadrija, 2019), while the sharing of individual-level data was not legally permissible due to the exclusive property rights on the dataset of the ESPAD Project (ESPAD Group, 2020b). With regards to Study 2 (Chapter 4) and Study 3 (Chapter 5), the data availability statements inserted in the online publications (Pivetta et al., 2023; Pivetta et al., 2024) explicitly report that the datasets can be made available upon request to the authors of the manuscript; the same will be applied for Study 4 (Chapter 6), which is currently under review. Furthermore, in all the studies, data cleaning procedures, the computations of variables and the data analytic strategies have been described in detail to facilitate reproducibility. Nevertheless, increased adherence to Open Science practices could have been achieved, for instance by using the Open Science Framework (OSF) (https://osf.io/) web

application to archive and share workflows, materials, codes, datasets in commonly used file formats and supplementary information to maximize interoperability among researchers and enhance reuse by scholars worldwide by remaining publicly available for years. In addition, electronic copies of the works could have been placed in online repositories, such as PsyArXiv (https://osf.io/preprints/psyarxiv), a free preprint service for the psychological sciences also related to the OSF project. Indeed, transparency, openness and reproducibility are three fundamental aspects that allow to accomplish the main objectives of Open Science, which consist into ensuring higher reliability of the research findings and greater trust in scientific research (Stracke, 2020).

7.3 Implications for National Policies, Prevention and Intervention

Findings of the present dissertation provided novel and robust evidence on the associations between parental factors and adolescent PG at multiple levels, which can have some important implications for national governments, healthcare professionals, adolescents and families (Table 1).

At a macro-level, it was found that a possible determinant of higher PG risk was national expenditures on social protection policies, specifically in the form of benefits in kind for children and adolescents, aimed at supporting parental efforts in child-rearing (Lebihan & Takongmo, 2018). According to this finding, future welfare state policies should introduce additional economic measures and funds to help the most disadvantaged families or, at least, maintain current legislative frameworks addressing social and individual health issues (Bradshaw, 2012; Lewis, 2018). Furthermore, it may be useful that national governments implement universal prevention programs aimed at raising public awareness of the possible risk factors and detrimental consequences characterizing the condition of PG in youth, which may lead to long-lasting negative effects at the individual and social levels (Bender et al., 2020; King et al., 2022). As proposed by Lopez-Fernandez and Kuss (2020), this objective may be achieved through the dissemination of the evidence-based information deriving from applied research through institutional webpages, national campaigns and other scientific European initiatives promoting a controlled use of digital technology. Consensus

guidelines containing general and specific recommendations and information about symptoms and strategies to regulate gaming to minimize harm delineated by gaming experts (both researchers and clinicians) could also be made available to the general population (Kiràly et al., 2020; Petry, 2019).

Moreover, from a structural and legislative standpoint, the obligation of reporting information on the content and age-appropriateness of video games based on international rating systems, such as the Pan European Game Information (PEGI and the Entertainment Software Rating Board (ESRB), may help parents to make informed choices on the purchase and regulation of their offsprings' video games use (King & Delfabbro, 2017). It would also be appropriate that ICT industries and national governments jointly work on possible strategies to limit the availability of video games in youth, for instance, by developing effective parental control systems or, when parents are unable to intervene, automatic fatigue systems, programmed to monitor user's playtime, and, eventually, send warning messages or reduce in-game rewards to induce adolescents to stop gaming (Kiràly et al., 2018; King et al., 2022).

At the proximal level, results from the present studies underscore the importance of including both mothers and fathers in the preventive efforts and in the interventions aimed at reducing dysfunctional use of video games in youth (Bonnaire et al., 2019; Nielsen et al., 2022).
Indeed, to further explain the association between parental indifference and adolescent PG that emerged in Study 2 (Chapter 4), Study 3 (Chapter 5) suggested that an excessive smartphone use by both parents may significantly decrease the quality of parenting behaviours as perceived by their offsprings. As pinpointed by Lippold et al. (2022), parent technology use can hinder mindful parenting, conceptualized by Kabat-Zinn & Kabat-Zinn (1997) as the commitment to pay full attention to one's own child and to parenting in a peculiar way, that is intentionally, in the present moment and with a non-judgemental attitude. More specifically, according to Lippold et al. (2022), parental misuse of personal devices has the potential to negatively impact all the five key components of mindful parenting that include: listening with full attention, self-regulation in the parent–child

relationship, emotional awareness of self and child, nonjudgmental acceptance of self and child, and compassion for self and child. These components are fundamental to promote thriving parenting strategies, characterized by higher involvement and responsiveness, which can foster closeness and intimacy in parent-adolescent relationships and produce beneficial effects on the psychological well-being of both parents and their offsprings (Bögels & Restifo, 2014; Kabat-Zinn & Kabat-Zinn, 2021). Consequently, if parents are distracted by their digital devices during time spent with their children, they may have difficulties maintaining awareness of the present moment and may be unable to adequately listen to their adolescents' thoughts and needs. Therefore, on one hand, practitioners should help mothers and fathers acknowledge and minimize the detrimental effects of parental phubbing (Liu et al., 2021); on the other, they should encourage and guide parents to engage in more sensitive and supportive parenting practices that convey empathy and warmth, for instance, by using thematic role-playing activities and parent-training programs (Briesmeister, 2007; Soenens et al., 2019; Throuvala, Griffiths, Rennoldson et al., 2019).

Furthermore, results from Study 4 (Chapter 6) highlighted the usefulness of adopting the SDT not only to understand human motivation (Ryan et al., 2023), but also as a framework to implement parenting interventions tackling adolescent maladjustment (Grolnick et al., 2021). From a practical standpoint, structured interviews and psycho-educational sessions promoting parental awareness of the barriers towards their parenting goals, the detrimental effects of their thwarting practices and the strategies to support their offsprings' psychological needs (especially of autonomy) might be useful (Grolnick et al., 2021; Van Petegem et al., 2017). In the field of PG, to the best of the knowledge, only one previous study has developed and validated a parent-based program following the SDT principles and provided preliminary evidence on its effectiveness in alleviating game-related problems in youth (Li, Chau et al., 2019).

In addition, in the most severe and persistent cases of adolescent PG, both parents and adolescents should be involved in family-based therapeutic sessions, guiding all family members

towards the promotion of positive family relationships, characterized by open communication and high emotional expression, and fostering adolescents' motivation towards a healthy change (Bonnaire et al., 2019). Specifically, based on the results obtained in Study 2 (Chapter 3), which suggested the presence of discordant rather than concordant mothers' and adolescents' perspectives on the same phenomenon, it may be particularly helpful for both parents and adolescents to explicitly address and discuss their diverging interpretations as part of the clinical treatment, to facilitate mutual understanding and to ameliorate family dynamics (Becker-Haimes et al., 2018, Nielsen et al., 2021). In this vein, an innovative application of (multidimensional) family therapy has been recently proposed by Nielsen et al. (2022), who introduced in-session gaming as a tool to reduce problems in family functioning, specifically with the intent to elicit, while the adolescent is playing, clinically relevant emotions, divergent opinions and transactions among family members, that can be adequately analysed and elaborated with the help of the clinician.

Finally, since findings from the present studies offered some insights on possible gender differences both between parents and between adolescents, it may be useful to consider them in the context of prevention programs designed to tackle problematic technology use in both adults and their offsprings, as well as in the context of family therapy sessions. As a result, it appears of paramount importance to move beyond the biases and stereotypes associated with the traditional masculine culture of gaming by recognizing that PG among girls is also a growing phenomenon deserving research and clinical attention (King & Potenza, 2020; Lopez-Fernandez et al., 2019), and, coherently, to stimulate an active discussion of gaming-related problems in both male and female students.

At the individual level, considering that adolescents may over-rely on video games to satisfy their basic psychological needs or to avoid real-life stressors arising from negative interpersonal relationships (Bender et al., 2020; Lopez-Fernandez et al., 2021; Männikkö et al., 2017), it may be useful to implement school-based prevention programs that can guide them to understand the role of the motives underlying their gaming activities, to learn how to use adaptive coping strategies, and to

enhance psychological resilience (Canale et al., 2019; Estevez et al., 2019; Paulus et al., 2018). Furthermore, school-based educational programs should also teach adolescents how to recognize the signs of an unhealthy use of digital technology, reinforce interpersonal skills that promote positive real-world interactions with parents and peers, and support pastimes activities and physical exercises that can increase self-esteem and empowerment (King et al., 2022).

Additionally, since need frustration in particular emerged as a possible risk factor for adolescent PG in Study 4 (Chapter 6), prevention and intervention programs should promote adolescents' awareness of the direct links between this aspect and their gaming activities and should guide to identify possible alternatives to fulfil their un-met basic psychological needs (Przbylski et al., 2019). For example, Kaya et al. (2023) suggested that adolescents should be supported in finding meaning in life and in experiencing a sense of responsibility by engaging in daily important tasks, which are two aspects found to play a serial mediating effect in the association between basic psychological needs and PG.

Since PG among adolescents should be better understood as a "multidimensional syndrome of behavioural problems", as proposed by Nielsen et al. (2020, p.381), the most promising approaches could be the ones that simultaneously help adolescents and their parents to strengthen their personal and interpersonal skills, by integrating different modules including psycho-education, individual psychotherapy, group training sessions and family therapy, as preliminarily tested through the PIPATIC program (Programa Individualizado Psicoterapéutico para la Adicción a las Tecnologías de la información y la comunicación) in Spain (Torres-Rodrìguez et al., 2018b) and the Resource-Strengthening Training for Parents of Adolescents with Problematic Gaming (Res@t-P) in Germany (Hülquist et al., 2022).

Table 1

Main Recommendations to Stakeholders Based on the Findings of the Present Dissertation.

Macro-level

- Maintaining or implementing social protection policies aimed at providing economic resources to help parents in child-rearing;

- Delineating universal prevention programs to raise parents' and adolescents' awareness of the possible risk factors and detrimental consequences characterizing PG;

- Promoting the dissemination of evidence-based information (e.g., via institutional websites, campaigns) and consensus guidelines on how to maintain a healthy use of video games;

- Encouraging collaboration between ICT industries and national governments to identify possible strategies to limit a prolonged use of video games in youth.

Proximal level

- Including both mothers and fathers in the programs aimed at reducing adolescent PG and discuss with them about possible gender differences in parenting practices;

- Examining with parents the specific modalities according to which they can regulate adolescent's gaming activities, namely in an autonomy-supportive or controlling way;

- Guiding parents to identify and limit the detrimental effects of digital technology misuse;

- Teaching parents mindfulness techniques, to foster positive parent-adolescent relationships and to prevent the frustration of their offsprings' basic psychological needs.

Individual level

- Implementing school-based prevention programs to promote adolescents' understanding of the motives underlying their use of video games and learning of adaptive coping strategies;

- Strengthening adolescents' interpersonal skills to deal with problematic family interactions;

- Increasing adolescents' awareness of the role of basic psychological needs frustration and helping them to identify possible alternative activities to gaming to satisfy their needs.

7.4 Concluding Remarks

Since the ever-increasing use of video games among adolescents, besides offering many benefits, may also become problematic for certain young users, research investigating the possible risk and protective factors in this phase of life is needed. Responding to this call, the logical succession of the four studies reported in the present doctoral dissertation provided new insights and relevant information on the associations between different parental factors and adolescent PG, by progressively sharpening the focus from distal to proximal and individual levels. Despite there is still a lot of ground to be covered in the field of adolescent PG, the present findings could be considered as a valuable contribution for the design and implementation of social welfare policies by national governments, for tailored prevention programs addressing adolescent PG promoted by mental health services, and for practitioners supporting both adolescents and their parents in the development of a healthy use of digital technologies.

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