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**EXAMINING PROBLEMATIC SOCIAL NETWORKING MEDIA USES FROM AN  
ATTACHMENT FRAMEWORK**

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## **PREMISE**

This thesis was composed as follows: an introduction in which the main theories related to the psychological construct of attachment will be set out. Next, the topic, related to the research project, of new technologies, specifically on social networking sites (SNS), their daily and possibly dysfunctional use, will be addressed. The focus will be directed towards the presentation of the relationship between problematic SNS use and attachment patterns. This examination will be carried out through three distinct studies, each contributing a unique facet to the comprehensive understanding of this connection.

## **1. INTRODUCTION**

### **1.1 A brief overview on attachment**

A comprehensive theory of relationships should provide interpretive models that take into account both normative phenomena and individual experiences in a person's overall functioning throughout life, from infancy to adulthood (Hazan & Shaver, 1994).

The British theorist and psychoanalyst, John Bowlby, in collaboration with Mary Ainsworth, an American researcher, integrated diverse perspectives from ethology, developmental psychology, psychoanalysis, and cognitive psychology. This effort of synthesis emerged from their initial studies in the 1950s and 1960s (Bowlby, 1969) and gave rise to a theory known as attachment theory. This theory has been the foundation of numerous writings and empirical investigations that have tested and refined the theory's solidity and scientific underpinnings over time.

Bowlby (1969, 1973, 1980) described attachment as a universal behavioral system, developed and perfected through natural selection, the presence of which would increase the

likelihood of survival and reproductive success in the face of environmental challenges. Among the behavioral systems mentioned by Bowlby (1969) are the behaviors of caregiving, exploration, affiliation and attachment to a primary caregiver. These systems allow the activation of defined behavioral patterns that are the same in almost all members of a species; thus, not dependent on learning but already present at the time of birth.

From the earliest stages of life, the infant possesses distinct modes of communication, such as vocalizations, cries, and smiles. These mechanisms serve to elicit specific responses from caregivers, aiming to secure assistance and protective intervention. In this context, the child possesses evolutionary survival-oriented relational patterns that are biologically integrated, prompting a natural inclination to form attachment bonds with individuals capable of providing protection (Bowlby, 1969). As time progresses, the child acquires and refines additional abilities, including motor skills, which allow not only for attracting protective figures but also for actively approaching or following them. To be more precise, a behavioral system like attachment consists of six fundamental components: 1) a distinct biological purpose intended to enhance the chances of survival and reproductive achievement; 2) situational triggers; 3) actions directed toward accomplishing a specific objective; 4) an objective that, upon attainment, deactivates the system; 5) particular cognitive tendencies; and 6) distinct neural connections that either stimulate or suppress the system.

In humans, the primary biological role of the attachment system is to safeguard the individual from potential environmental threats, especially during the developmental phase of childhood. To fulfill this objective, there is an inherent inclination for the child to prioritize maintaining a close bond with figures of attachment, namely caregivers (Bowlby, 1969). In later writings, Bowlby (e.g., 1988) argues that the attachment system, while particularly crucial in early life, continues to

operate throughout the entirety of an individual's lifespan. This system would manifest through thoughts and actions aimed at seeking and upholding proximity with other individuals recognized as significant points of reference. Bowlby (1988) proposes that this role becomes particularly prominent during challenging or traumatic life circumstances, wherein the assistance and solace extended by these significant figures contribute to the enhancement of adaptive and practical coping strategies. The efficient operation of this behavioral system holds considerable significance in preserving an individual's well-being. It also facilitates the cultivation of a positive self-concept and constructive perspectives within relationships (Bowlby, 1988).

During childhood, the primary figures to whom attachment is directed are typically the primary caregivers, usually one or both parents. However, in adulthood, an individual may establish attachment connections with various figures, including close friends or romantic partners. Furthermore, the figures to whom attachment is directed might vary depending on the context and can serve as sources of support only in specific scenarios. For instance, individuals might look to teachers in educational settings or therapists in clinical contexts for support (Dazzi & Zavattini, 2011). Initially, Bowlby (1969) argued that the attachment system becomes engaged exclusively in the presence of immediate and tangible threats. Confrontation with such dangers naturally triggers a need for protection. Conversely, when no threat is apparent, this system remains dormant. However, this theoretical framework would later undergo revisions in subsequent works (e.g., Bowlby, 1973). Specifically, alongside activations brought about by the presence of actual threats, even stimuli that aren't inherently hazardous but are perceived as such – like sudden noises, solitude, darkness, or separation from caregivers – can also prompt the attachment system into action. Strategies aimed at seeking closeness and intimacy include multiple behaviors that perform similar adaptive functions. These include attempts to draw the other person's attention in order to

restore or maintain closeness; exaggerated displays of negative emotions, such as distress or anger, that prompt the caregiver to provide help; rapprochement behaviors that lead to more physical or psychological contact; and explicit requests for support. These behaviors are part of an innate repertoire that the individual can draw on, consciously or unconsciously, and depending on the appropriateness of the response in a given situation (Bowlby, 1973).

Within the attachment theoretical perspective (see Cassidy & Shaver, 2016, for a review), it is possible to identify specific inherent tendencies within attachment figures that aim to foster the attainment of ideal bonding. First, attachment figures should place themselves in an attitude of readiness for the other's attempts to approach them in times of need and at an optimal distance in order to fulfill "proximity maintenance" (Hazan & Shaver, 1990, p. 4). Secondly, they should provide a so-called "safe haven" (Hazan & Shaver, 1994, p. 4), in order to be able to facilitate the process of reducing distress and suffering in the cared-for figure and at the same time be a source of relief and comfort. Finally, attachment figures should provide a secure base (Ainsworth et al., 1978; Bowlby, 1988) from which the individual can explore and learn about his or her surroundings and thereby be able to develop his or her skills and personality.

When these conditions are present, the individual perceives a sense of safety, security and emotional equilibrium, and is aware that care and support, represented by the proximity (real or imagined) of the attachment figure, will be available when needed. As a result, greater confidence in one's own abilities is generated, as well as a perception that the surrounding environment is an inherently safe place, that is, inhabited by people who are available and able to form rewarding relationships outside the attachment context. Conversely, when the caregiver is not physically or emotionally available, or is not sufficiently responsive, the goal underlying attachment, namely stability and security, cannot be achieved. In such cases, abandonment anxiety cannot be alleviated

in the child. Unconscious ideas and doubts would then form in him about the possibilities of reaching there "safe haven" (Hazan & Shaver, 1994, p. 4), and the world around him would turn into a threatening place, in which it is not possible to trust, and rely on, others. Doubts are also directed at oneself and one's ability to cope with such obstacles. For this reason, an inherent sense of distrust, vulnerability, and insecurity would increase in the child.

To summarize, then, attachment can be defined as a complex system comprising a set of behaviors, the structure of which may be dissimilar (e.g., crying, smiling, or attempts at rapprochement) but which serve the same function, namely, to reestablish closeness between individual and caregiver. Any obstacle, real or perceived, to maintaining closeness with the caregiver figure causes anxiety, which in turn triggers behaviors aimed at reestablishing closeness. These behaviors persist until the goal set by the attachment system is achieved, that is, the return to an internal emotional balance and the reestablishment of the affective bond. From this secure base, it will then be possible to develop exploratory and affiliative behaviors (Hazan & Shaver, 1994; Sroufe & Waters, 1977).

When consistently enacted within relational contexts, the attachment system enables the development of internalized representations of attachment figures. These cognitive affective schemas are referred to as "internal working models" (Bowlby, 1973; Collins & Read, 1990), aimed to facilitate the anticipation of forthcoming interactions with the reference figure, without the need therefore to rethink, from the beginning, any attempt at attachment bonding. Furthermore, these internal working models can be triggered both by the individual's internal emotional state and by contextual and motivational elements (Collins, 1996). These structures are not mere passive assimilations of past experiences; rather, they emerge as active and adaptive mental schemas that,

despite being challenging to reshape, tend to exert their influence predominantly outside of conscious awareness (Bowlby, 1980).

Mary Main and colleagues (1985) proposed a comprehensive definition of internal working models, which can be summarized as follows: internal working models are mental representations that include cognitive and affective components, and are an integral part of a more complex behavioral system aimed at actively seeking out reference figures. They are formed from internalized relational events, which include both the relationship with the caregiver and efforts to approach the caregiver in his or her absence. Such events must have, for the individual, an important meaning within the attachment system and with the caregiver, and would be explored as attempts to approach and maintain a sense of safety and security. Some internal working models may develop as early as the first months of life, and reached the first year of life, it is possible to distinguish different interindividual activations of internal working models within the child-caregiver relationship. These patterns integrate with the individual's cognitive, emotional, and behavioral apparatus; therefore, they affect protection-seeking behaviors, mnemonic and attentional organization, and internalized perceptions of self, reference figures, and the attachment bond. While growing up, these experiences become more abstract, and generalize into beliefs and expectations about others, others' ability to be sensitive and helpful, and the value of self (Collins, 1996). The consolidation of accessible operational patterns comes from the repetition of relational patterns with reference figures during childhood and adolescence, which gradually become part of the individual personality. Like other cognitive patterns, internal operating models tend to operate automatically and unconsciously, and are generally considered stable over time (Lyons-Ruth, 2007; McConnell & Moss, 2011). Consistency in representational models is provided by the establishment of a preferential bond with a caregiver during childhood, which will form the basis

for subsequent relationships in the life cycle (Bowlby, 1988). Hence, there is the possibility of attachment bonds developing within the child with multiple caregivers or reference figures, both during childhood and at later ages.

Over the years, a great deal of research has been conducted within the theoretical framework of attachment, consequently, an elaborate terminology has developed. Initially, Ainsworth et al. (1978) classified three broad categories of attachment patterns (secure, anxious-avoidant, anxious-resistant/ambivalent), with the later addition of the fourth category of disorganized attachment (Main & Solomon, 1986). In addition, Bartholomew and Horowitz (1991) theorized and provided empirical support for the idea that attachment patterns could be ascribed into quadrants formed by the two orthogonal dimensions of anxious attachment and avoidant attachment. Anxious attachment refers to the fear of rejection and abandonment and includes a general negative view of oneself and an inconsistent perception of the primary caregiver (who responds unreliably to the child's needs). Avoidant attachment denotes discomfort in being close to others and a generally stable preference for emotional distance from others. According to this classification, we refer to a secure (low anxiety and low avoidance), worried (high anxiety and low avoidance), rejecting (low anxiety and high avoidance), and fearful (high anxiety and high avoidance) style. Given this complex and elaborate terminology (e.g., Hazan & Shaver, 1990; Mikulincer & Shaver, 2008), the term "attachment pattern" (Ross, 2004) has been primarily used in the present research project to broadly refer to the entire attachment system, thus encompassing attachment dimensions (anxiety and avoidance) and attachment categories or styles (secure, preoccupied, rejecting, fearful, anxious-avoidant, anxious-resistant/ambivalent, disorganized).

## **1.2 Problematic social networking sites use and attachment**

Social Networking Sites (abbreviated in SNS) encompass online services wherein users can establish personal, public, or semi-public profiles, enabling interaction with others through digital devices and applications. This, in turn, gives rise to digital platforms for the creation of online social sharing networks (H. Y. Huang, 2016; Verduyn et al., 2017). Originating in the late 1990s, the first SNS have seen an exponential growth in both their prevalence and usage in recent years. Prominent among these platforms are Facebook, Twitter, Instagram, and TikTok, with billions of users across the globe (Dixon, 2023b). These SNS have become an integral aspect of countless individuals' lives, particularly among younger demographics, prompting researchers to delve into the potential impacts of these tools on well-being and development (Sarmiento et al., 2020).

While recent systematic reviews and longitudinal studies have indicated that the majority of users adopt a functional approach to SNS (e.g., Coyne et al., 2020; Orben, 2020), a minority of users exhibit patterns of excessive and uncontrolled usage. In spite of the growing body of research in this field, there is currently no unanimous agreement regarding the conceptualization of both the (ab)use phenomenon observed in SNS and the broader realm of the Internet. Certain authors (e.g., Griffiths, 2005) contend that it is valid to establish diagnostic criteria akin to those used for substance addictions and to categorize them as behavioral addictions. Conversely, other researchers (as discussed in Musetti et al., 2022) critique this standpoint, cautioning against the potential for "diagnostic inflation" and the "overpathologization" of common behaviors (Billieux et al., 2015). In a recent meta-analysis (Cheng et al., 2021), variations in the prevalence rate of dysfunctional social network usage were highlighted across 32 countries. This variance ranged from 5% to 25% of the examined samples, contingent on the particular classification framework adopted, be it based on psychopathology or problematic usage. It's noteworthy to highlight that an

ongoing debate surrounds the delineation of the concept (Starcevic et al., 2020), particularly due to the fact that within the DSM-5-TR (American Psychiatric Association, 2022), only Gambling Disorder is classified as a behavioral addiction disorder. In the present thesis, we will therefore refer to the construct of "Problematic Social Networking Sites Use" (PSNSU; Boer et al., 2020; Svicher et al., 2021), and not to that of "social network addiction", as there is, at present, insufficient clinical evidence to designate a psychopathological condition in its own right (Kardefelt-Winther et al., 2017; van Rooij & Prause, 2014).

PSNSU is characterized by (i) excessive preoccupation with social networks, (ii) a sense of urgency related to social network use, and (iii) impairment of the user's psychosocial functioning, such as interpersonal conflicts, work-related issues, or sleep difficulties (Andreassen, 2015; Brand et al., 2016). Studies to date have emphasized multiple risk factors for PSNSU of an individual (e.g., dysfunctional personality traits, psychopathological symptoms, emotional dysregulation; Rozgonjuk et al., 2020; Spada et al., 2015), relational (e.g., the quantity and quality of social support, or the ability to effectively use social networks; Ruggieri et al., 2020) and contextual (i.e., related to the specific characteristics of social networks, e.g., Twitter and Facebook are primarily used for social interactions and information sharing, while Instagram and Snapchat, based on photographic material, would provide users with more opportunities for self-expression; (Alhabash et al., 2014).

Among the various associated factors, attachment patterns have received increasing attention in the literature in recent years (D'Arienzo et al., 2019; Musetti et al., 2022). As emerged from a large number of studies and as expressed in the previous chapter of this thesis (Mikulincer & Shaver, 2003), a secure attachment pattern is associated with a positive representation of self and others, and this would facilitate the development of positive relationships, both online and offline,

thus reducing the risk of developing symptoms that can be linked to PSNSU (Savcı & Aysan, 2016). Insecure attachment, on the other hand, is associated with anxious and avoidant reactions in face-to-face interpersonal interactions. Online interactions, in contrast, would allow for greater distancing, thus generating less anxiety but at the same time increasing the risk of developing compensatory and avoidance strategies, as well as a greater inclination toward social network-mediated communication (Marci et al., 2021; Marino, Marci, et al., 2019).

### **1.3 The research project**

The present thesis developed from the observation that the phenomenon of PSNSU, although a widely studied research topic, needs further investigation to overcome the limitations of previous studies (e.g., Marino, Gini, et al., 2018; Orben, 2020) and expressed in previous chapters. Consequently, this project is designed with the objective of evaluating the existing relationship between PSNSU and users' attachment, while considering different mediating variables, in different age groups, and in different SNS platforms. Following the conceptualization implemented in the recent systematic review conducted by Musetti et al. (2022), the decision was made to adopt a dual-faceted strategy. This approach encompasses (i) a developmental standpoint that emphasizes the unique characteristics associated with varying developmental phases, and (ii) a comprehensive multidimensional approach. More precisely, this multidimensional approach encompasses different user attachment patterns, and PSNSU, where differentiation is drawn between general PSNSU and specific instances (such as the particular problematic use of TikTok).

A research project structured around one systematic review and three studies is proposed, each briefly outlined here and subsequently expounded upon in subsequent sections.

## **Problematic Social Networking Sites Use and attachment patterns: A systematic review**

A systematic literature review was undertaken to synthesize and provide an up-to-date overview of studies that have examined the associations between attachment patterns and PSNSU in both adolescents and adults.

### **Study 1: “Problematic social networking sites use and online social anxiety: The role of attachment, emotion dysregulation and motives”**

The first study, a cross-sectional examination, aims to investigate the interplay between attachment, PSNSU, and online social anxiety, including the mediating factors of emotional dysregulation and motivation to use SNS.

### **Study 2: “Examining the relationships between attachment, reflective functioning, motives, and Problematic Social Networking Site Use among elderly adults”**

The second study is oriented toward an often understudied demographic population (i.e., the elderly). With the aim of filling this gap in the existing literature, this study centers on investigating the SNS usage habits and extent of involvement among Italian adults aged 60 and above. Moreover, the study will introduce a model that examines the mediating role of mentalization (or reflective functioning; Fonagy & Target, 1997) and motivations for SNS use, in the relationship between adult attachment dimensions (both anxious and avoidant) and PSNSU.

### **Study 3: “A cross-national study on problematic TikTok use among youth: Exploring motivations, attachment, and self-esteem through network analysis”**

The third study employs a network analysis to investigate problematic TikTok use and the mutual associations with attachment, self-esteem, and user motivations. Participants included adolescents and young adults from China, Italy, and Spain.

## 2. SYSTEMATIC REVIEW<sup>1</sup>

### **Problematic Social Networking Sites Use and attachment patterns: A systematic review**

#### **2.1 Abstracts**

A systematic review of the literature was conducted to summarize research that examined the associations between PSNSU and attachment-related phenomena among adolescents and adults. Records were included in the systematic review if they presented original data, assessed attachment, and PSNSU, were published in peer-reviewed journals between 2004 and 2021, and were written in English. After duplicate removal, 373 studies were found eligible for scrutiny. Among the screened full texts, 32 articles met the eligibility criteria. The selected studies included a total of 16,938 participants. Findings from these studies highlighted that PSNSU is negatively associated with indicators of secure attachment and positively associated with indicators of attachment anxiety, whereas results regarding indicators of attachment avoidance were mixed. Furthermore, an analysis of mediators showed that the relationship between PSNU and attachment-related phenomena is affected by individual, interpersonal, and SNS-related variables. Future directions for research as well as implications for clinical practice are discussed.

#### **2.2 Introduction**

In 2020, nearly half of the global population (49%) engaged with SNS, marking a threefold growth over the previous decade, from 970 million users in 2010 to over three billion in 2020 (Clement, 2020). SNS, web-based platforms, revolve around three core features: the creation of personal profiles, connections showcasing online relationships of varying significance, and dynamic content streams from connections (Boyd & Ellison, 2007; Verduyn et al., 2017). While

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<sup>1</sup> This study was published in *Computers in Human Behavior* 131 (2022) 107199.

Facebook remains dominant, with 2.7 billion users in 2020, emerging platforms like Instagram, Snapchat, and Twitter are gaining traction (Clement, 2020).

SNS serve diverse purposes, from entertainment to relationship-building, shared interest connection, and leisure (Marino, Gini, et al., 2018; Ryan et al., 2016). Research highlights the positive outcomes of SNS use, including heightened self-esteem, perceived social support, identity exploration, self-disclosure opportunities, and broader social connections (Boyd & Ellison, 2007; Gil de Zúñiga et al., 2017; H. Y. Huang, 2016; Subrahmanyam et al., 2006; Verduyn et al., 2017). However, a subset of individuals struggles with excessive and uncontrollable SNS use, often termed "addictive" or "compulsive" (Bányai et al., 2017a; Boer et al., 2020)

Despite extensive research, consensus eludes to defining addictive SNS behaviors due to terminological debates and the broader context of problematic internet use (Billieux et al., 2015; Kardefelt-Winther et al., 2017). The term "Internet addiction" may encompass a spectrum of problematic behaviors (Andreassen et al., 2016; Musetti et al., 2016; Starcevic & Billieux, 2017). Given these debates, the term "Problematic Social Networking Sites Use" (PSNSU) is employed here to refer to excessive, impairing SNS engagement. PSNSU, characterized by excessive concern, urges, and interference with daily life, is distinct from non-problematic usage (Andreassen, 2015; Pontes et al., 2015). Although PSNSU denotes that a considerable amount of time is usually spent on SNS, it is qualitatively different from time-consuming, but non-problematic use of SNS (Pontes et al., 2015). PSNSU has been related to contextual factors (e.g., quality and quantity of online/offline social capital, use of social networks in the family environment; Ruggieri et al., 2020) and individual factors (e.g., dysfunctional personality traits, psychopathological symptoms, emotion dysregulation; (Rozgonjuk et al., 2020; Spada et al., 2015).

Attachment patterns have garnered increasing attention in relation to PSNSU (D'Arienzo et al., 2019). Initially proposed by John Bowlby (1969, 1973, 1980) to depict emotional bonds between children and caregivers, attachment theory was later extended to intimate relationships (Hazan & Shaver, 1990; Mikulincer & Shaver, 2008). Attachment was conceptualized as stable traits reflecting expectations, needs, and behaviors in close relationships (Bowlby, 1969, 1973), and with Internal working models developed early in life, shaping cognitive, emotional, and relational patterns. The term "attachment patterns" encompasses attachment dimensions (anxiety and avoidance) and styles (secure, avoidant, ambivalent, etc.), categorized historically by Ainsworth et al. (1978). Bartholomew (1990; Bartholomew & Horowitz, 1991) theorized and provided empirical support to the idea that attachment patterns could be described as occupying quadrants formed by the two orthogonal dimensions of attachment anxiety and attachment avoidance. Attachment anxiety refers to the fear of rejection and abandonment and includes an overall negative view of oneself and inconsistent perception of the primary caregiver (as responding unreliably to an infant's needs). Attachment avoidance denotes a discomfort with being close to others, compulsive self-reliance, and a generally stable preference for emotional distance from others (Mikulincer & Shaver, 2003). According to this classification, there are four attachment styles: 1) secure (low anxiety and low avoidance), 2) preoccupied (high anxiety and low avoidance), 3) dismissing (low anxiety and high avoidance), and 4) fearful (high anxiety and high avoidance). Empirical research has demonstrated that a secure attachment is usually characterized by positive beliefs about the self and others. Secure attachment patterns have been related to adaptive coping strategies, including a lowered risk of engaging in problematic online behaviors (Estevez et al., 2019). In contrast, insecure attachment patterns (preoccupied, dismissing, fearful) have been associated with problematic Internet use (Eichenberg et al., 2017;

Monacis, De Palo, Griffiths, Sinatra, et al., 2017; Schimmenti et al., 2014, 2017, 2021) and addictive-like behaviors more generally (Musetti et al., 2016; Schindler & Bröning, 2015). As social networking platforms are mostly used to establish and maintain online and offline relationships, an individual's attachment pattern may affect the use of such online networks.

According to the compensatory model of Internet use (Kardefelt-Winther, 2014), PSNSU may be an attempt to cope with negative life situations, with the use of SNS compensating for psychosocial problems, such as low self-esteem, depression, and loneliness (Benoit & DiTommaso, 2020; Shensa et al., 2018; Shi et al., 2017). Specifically, individuals with high attachment anxiety may rely excessively on SNS in an attempt to alleviate painful emotions (e.g., fear of rejection or loneliness) and seek comfort and a sense of belongingness online (Costanzo et al., 2021). Individuals with high attachment avoidance, in contrast, may overuse SNS and prefer them to actual interactions in the social world to maintain emotional distance with (and control over) others.

### **Aims**

The relationships between attachment and PSNSU have been studied extensively. However, only a single systematic review has examined the associations between attachment and “social media addiction” (D’Arienzo et al., 2019). The inclusion criteria of that systematic review were very broad and encompassed studies of Internet addiction and both grey and scientific literature. Furthermore, D’Arienzo et al. (2019) only reported results of studies concerning the dimensions of attachment anxiety and attachment avoidance.

Therefore, the present study expands on D’Arienzo and colleagues’ (2019) review by including the following features:

(a) we examine the relationship between PSNSU and attachment-related phenomena by taking into account the different theoretical approaches in the field of attachment;

(b) we examine the relationship between PSNSU and attachment-related phenomena separately in adults and adolescents because research has demonstrated that both SNS use and attachment-related phenomena are affected by developmental stages and contexts;

(c) we examine the mediators that may exert an effect on the relationship between attachment-related phenomena and PSNSU, considering that attachment influences the organization of relational experiences and corresponding behaviors.

These aspects of the present study may have crucial implications for efforts to prevent and alleviate PSNSU among youth and adults at the policy, institutional, social, and clinical levels.

### **2.3 Methods**

This study followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009). To ensure a thorough and transparent methodological procedure, the protocol for this review was registered on the International Prospective Register of Systematic Reviews (PROSPERO) data repository on January 2<sup>nd</sup>, 2021 (registration number: CRD42021224186).

#### **Information sources and search strategy**

The systematic literature search was initially conducted on December 12, 2020, by two authors. The literature search was then updated on June 17, 2021.

Articles were retrieved from Scopus, Web of Science, PubMed, and PsycINFO web databases. The search strategy included a combination of the key elements identified to address the research question of this systematic review, with the Boolean operators AND/OR, and restricted within Titles, Abstract, and Keywords.

The search string was: (“Attachment\*”) AND (“social media” OR “social network\*” OR “facebook” OR “twitter” OR “instagram” OR “snapchat”) AND (“problematic\*” OR “pathologic\*” OR “disorder\*” OR “misus\*” OR “overus\*” OR “compulsive\*” OR “excessive\*” OR “addict\*” OR “abus\*”). No further filter was applied. Furthermore, the reference lists of relevant empirical articles and reviews were scrutinized to identify potential additional articles.

## **2.4 Eligibility criteria**

Studies were required to meet all of the following inclusion criteria (IC):

- IC1: use of quantitative, qualitative, and/or mixed methods approaches (empirical data);
- IC2: use of a measure of the specific attachment-related phenomenon;
- IC3 use of a measure of PSNSU;
- IC4: date of publication between January 1<sup>st</sup>, 2004 and June 17, 2021 (rationale: Facebook was launched as the first large-scale SNS platform in 2004 and it is highly improbable that studies conducted prior to 2004 included measures of SNS activity);
- IC5: publication in peer-reviewed journals in English.

Studies were excluded if they met one of the following exclusion criteria (EX):

- EX1: review papers, theoretical papers, case reports, commentaries, editorials, and published conference proceedings;
- EX2: studies measuring exposure to other Internet activities such as video-gaming, unless SNS use was also measured.

## **2.5 Identification and selection of empirical studies**

All the papers collected through database searches were exported to the systematic reviews web application Rayyan (<https://rayyan.qcri.org/>). After duplicate removal, two authors independently assessed titles and abstracts to select the relevant studies. After this preliminary

screening, results were compared and in case of disagreements, the two authors resolved them by consensus. Eligibility assessment was subsequently performed using full texts. All studies that met the inclusion criteria and did not meet any of the exclusion criteria were reviewed for data extraction (see Figure 2.1). The AXIS tool was employed in the analysis and assessment of the risk of bias in the final sample, which is critical for appraising the quality of observational and cross-sectional studies (Downes et al., 2016). The AXIS tool provides an overall quality assessment of each study and comprises 20 items which are scored as follows: *Yes* = 1, *No* = 0, and *Don't know* = 0. The assessment includes study design, sample size justification, representativeness of the target population, sample selection, measurement validity and reliability, description of statistical methods, and reporting of funding and conflicts of interest. A total quality score from 0 to 20 was assigned to each study, with scores being interpreted as follows (see Casale & Banchi, 2020): 0-7 points denotes a low-quality study, 8-14 suggests a medium quality study and 15-20 points means a high-quality study.

### **Risk of bias**

The AXIS tool was employed in the analysis and assessment of the risk of bias in the final sample, which is critical for appraising the quality of observational and cross-sectional studies (Downes et al., 2016). The AXIS tool provides an overall quality assessment of each study and comprises 20 items which are scored as follows: *Yes* = 1, *No* = 0, and *Don't know* = 0. The assessment includes study design, sample size justification, representativeness of the target population, sample selection, measurement validity and reliability, description of statistical methods, and reporting of funding and conflicts of interest. A total quality score from 0 to 20 was assigned to each study, with scores being interpreted as follows (see Casale & Banchi, 2020): 0-7

points denotes a low-quality study, 8-14 suggests a medium quality study and 15-20 points means a high-quality study.

## **2.6 Results**

### **Overview of empirical studies**

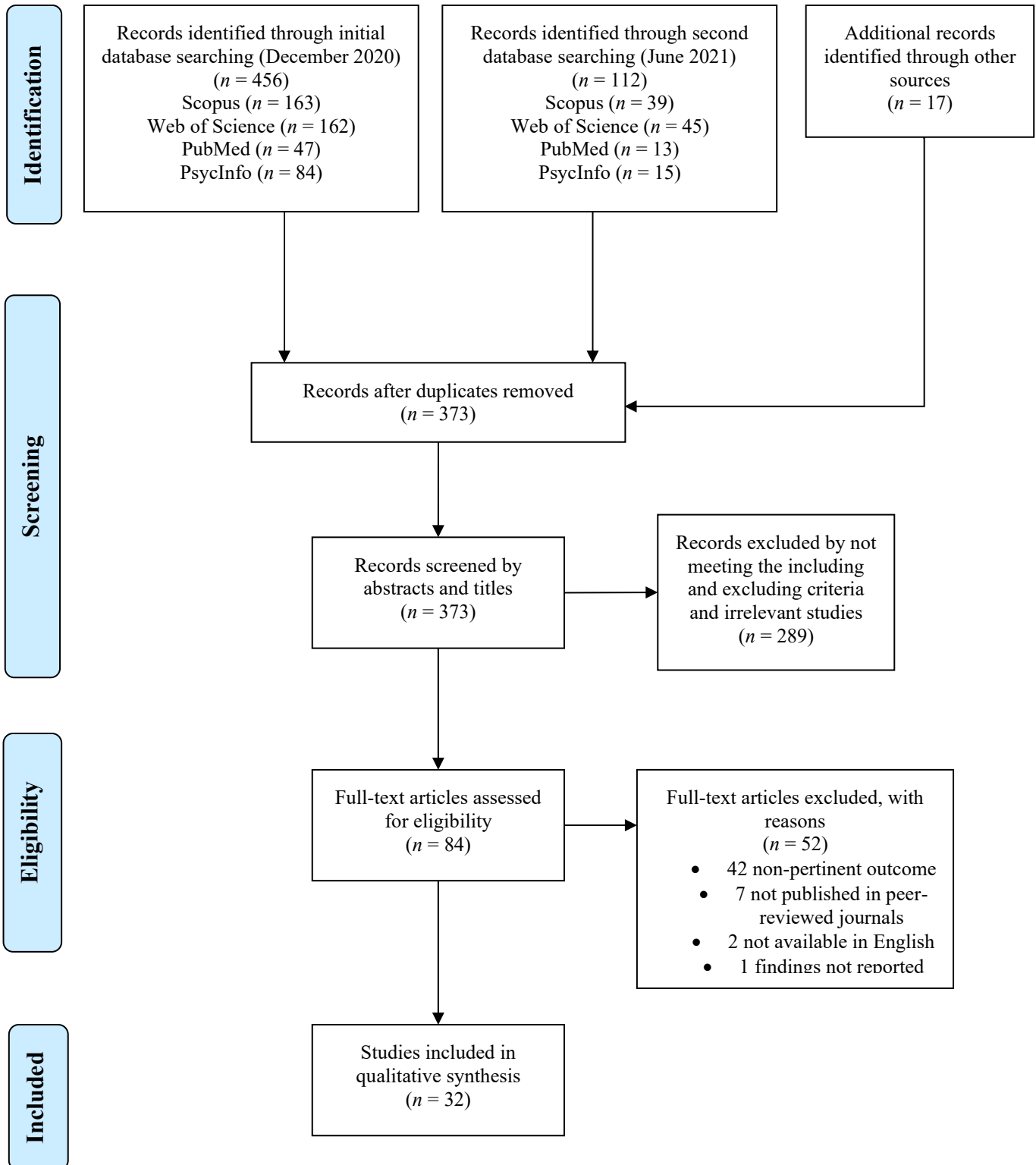
After duplicate records were removed, 373 articles were considered. The examination of their titles and abstracts detected 84 studies that fit the inclusion criteria. After scrutinizing their full text, an additional 52 papers were excluded, and 32 articles were retained and considered for our systematic review. Further information on the selection process and reasons for the exclusion of studies is provided in Figure 2.1.

### **Characteristics of the studies**

Table 2.1 presents the main characteristics of the final sample, i.e., studies included in the systematic review. All 32 studies were cross-sectional and were conducted with a total of 16,938 participants ( $M = 513.27$ ), with sample sizes ranging from 100 to 2,758. The proportion of females was 64.31% (information not available for one sample), and individuals of both genders participated in all studies but one. The age of the participants across the studies ranged from 11 to 72 years ( $M = 20.51$ ,  $SD = 6.07$ ; information partial or unavailable for three samples). Fourteen studies were conducted in Europe (United Kingdom, Italy, Portugal, France, Ireland), six studies were from East Asia (China, South Korea, Japan), three studies from North America (USA, Canada), Turkey, and Australia each, two from Iran, and one from Tunisia. While 17 articles reported on generic SNS, the remaining 15 articles focused on specific social media platforms: Facebook ( $n = 12$ ), Instagram ( $n = 2$ ), and Grindr ( $n = 1$ ).

**Figure 2.1**

*Flow diagram of the search strategy: Modified from the Preferred Reporting Items for Systematic reviews and Meta-Analyses statement flow diagram (Liberati et al., 2009)*



**Table 2.1***Studies on PSNSU and attachment patterns included in the review (n = 32)*

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range ( <i>M</i> , <i>SD</i> )	Attachment theoretical model	Findings
(Assunção et al., 2017)	Portugal	Cross sectional	<i>N</i> = 761 (46.3% females) Age = 14-18 ( <i>M</i> = 15.9, <i>SD</i> = 1.08)	Contextual (parents)	<b>Structural Equation Model</b> Quality of Emotional Bond ( $\beta = -0.16$ ), Inhibition of Exploration and Individuality ( $\beta = 0.18$ ), and Separation Anxiety ( $\beta = 0.28$ ) were associated with problematic Facebook use. The association between parental attachment dimensions ( $\beta = 0.23$ for quality of emotional bond; $\beta = 0.15$ for separation anxiety, and $\beta = 0.10$ for inhibition of exploration and individuality) and problematic social network use was partially mediated by alienation ( $R^2 = 0.25$ ; $p = 0.02$ ).
(Assunção & Matos, 2017)	Portugal	Cross sectional	<i>N</i> = 744 (46.1% females) Age = 14-18 ( <i>M</i> = 15.9, <i>SD</i> = 1.08)	Contextual (parents)	<b>MANOVA</b> Differences between clusters of Facebook users were found for parental attachment dimensions. High-problematic Facebook users reported higher levels of Inhibition of Exploration and Individuality ( $F = 21.42$ , $p \leq 0.001$ , $\eta^2 = 0.08$ ), and lower levels of quality of emotional bond ( $F = 15.08$ , $p \leq .001$ , $\eta^2 = 0.06$ ) compared to all other Facebook users. Problematic Facebook users reported higher levels of concerning to the maternal figure ( $F = 24.65$ , $p \leq 0.001$ , $\eta^2 = 0.09$ ) and higher levels of separation anxiety to the father ( $F = 8.81$ , $p \leq 0.001$ , $\eta^2 = 0.03$ ) compared to less problematic Facebook users. Concerning peer attachment, results showed that high-problematic Facebook users reported higher levels of alienation to peers than all other Facebook users ( $F = 32.6$ , $p \leq 0.001$ , $\eta^2 = 0.12$ ).
(Badenes-Ribera et al., 2019)	Italy	Cross sectional	<i>N</i> = 598 (54.2% females) Age = 12-17 ( <i>M</i> = 14.28, <i>SD</i> = 1.52)	Contextual (parents, peers)	<b>Multivariate multiple regressions</b> Regarding parental attachment dimensions, trust towards parents was negatively associated to relapse ( $\beta = -0.50$ ), withdrawal ( $\beta = -0.60$ ), and conflict ( $\beta = -0.42$ ); parental alienation was negatively associated with tolerance ( $\beta = -0.40$ ); communication with parents was positively linked with tolerance ( $\beta = 0.48$ ) and mood modification ( $\beta = 0.43$ ) symptoms of Facebook addiction among early adolescents. Whereas, among adolescents, parental alienation was positively related with tolerance ( $\beta = 0.19$ ), mood modification ( $\beta = 0.19$ ), and conflict ( $\beta = 0.15$ ) symptoms of Facebook addiction. Regarding peer attachment dimensions, trust towards peers was negatively associated with tolerance ( $\beta = -0.74$ ) and mood modification ( $\beta = -0.56$ ); communication with peers was positively associated with salience ( $\beta = 0.20$ ) among early adolescents. Whereas among adolescents, peer alienation was positively associated to all the six symptoms of Facebook addiction (salience: $\beta = 0.19$ ; tolerance: $\beta = 0.21$ ; mood modification: $\beta = 0.40$ ; relapse: $\beta = 0.29$ ; withdrawal: $\beta = 0.17$ ; conflict: $\beta = 0.27$ ).
(Baek et al., 2014)	South Korea	Cross sectional	<i>N</i> = 384 (40% females) Age = 18-25 ( <i>M</i> = 21.05, <i>SD</i> = 2.29)	Contextual (romantic partner)	<b>MANOVA, Moderation analyses</b> Fearful, dismissive, secure, and anxious attachment styles did not reveal significant differences in SNS addiction. Attachment styles moderated the effects of SNS motives and SNS use on SNS addiction. Regarding SNS motives, dismissive ( $\beta = 0.32$ ) and anxious ( $\beta = 0.24$ ) attachment styles moderated the positive relationships between interpersonal utility motive and SNS addiction, and between informational utility and SNS addiction. Fearful attachment style ( $\beta = -0.21$ ) moderated the relationship between pastime motive and SNS addiction. The positive association between time spent on SNS and SNS addiction was moderated by secure ( $\beta = 0.38$ ), fearful ( $\beta = 0.36$ ), and

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range ( <i>M</i> , <i>SD</i> )	Attachment theoretical model	Findings
(Ballarotto et al., 2021)	Italy	Cross sectional	<i>N</i> = 372 (57.8% females) Age = 14-18 ( <i>M</i> = 15.8, <i>SD</i> = 1.4)	Contextual (parents, peers)	anxious ( $\beta = 0.20$ ) attachment styles. The negative association between SNS use for parasocial interaction and SNS was moderated by dismissive ( $\beta = 0.21$ ) and anxious ( $\beta = 0.21$ ) attachment styles.  <b>Pearson's Product-Moment Correlation Analysis</b> Instagram addiction was negatively predicted by secure attachment to the mother ( $\beta = -0.26$ ) and peers ( $\beta = -0.04$ ). The severity of adolescents' actual clinical symptoms mediated the negative relationship between secure attachment patterns to the mother ( $\beta = -0.09$ ), the father ( $\beta = -0.06$ ) and peers ( $\beta = -0.04$ ) and PSNSU.
(Blackwell et al., 2017)	U.S.A.	Cross sectional	<i>N</i> = 207 (75.85% females) Age = 17-49 ( <i>M</i> = 22.15, <i>SD</i> = 7.38)	Contextual (romantic partner)	<b>Hierarchical regression analysis</b> Attachment avoidance ( $\beta = 0.14$ ) and anxiety ( $\beta = 0.23$ ) were both positively linked to social media addiction after controlling for age and personality dimensions. However, this relationship becomes insignificant when FOMO is included in the model.
(Boustead & Flack, 2021)	Australia	Cross sectional	<i>N</i> = 188 (67% females) Age = 18-72 ( <i>M</i> = 31.95, <i>SD</i> = 11.54)	Contextual (romantic partner)	<b>Mediation analyses</b> Prominent fear of missing out mediated the positive relationship between attachment anxiety and PSNSU ( $\beta = 0.33$ ).
(Chabrol et al., 2017)	France	Cross sectional	<i>N</i> = 456 (76% females) Age = 13-25 ( <i>M</i> = 20.5, <i>SD</i> = 2.5)	Contextual (parents, peers)	<b>Multiple regression analysis, Mediation analyses</b> Maternal overprotection was positively linked with problematic Facebook use symptoms among females ( $\beta = 0.12$ ) and males ( $\beta = 0.24$ ). In females, borderline traits fully mediated the positive link between maternal overprotection and problematic Facebook use symptoms. In males, maternal overprotection fully mediated the positive link between borderline traits and problematic Facebook use symptoms.
(A. Chen, 2019)	U.S.A.	Cross sectional	<i>N</i> = 314 (38.2% females) Age = <i>na</i> ( <i>M</i> = 23.37, <i>SD</i> = 4.59)	General	<b>Structural equation model</b> Satisfaction of psychological needs fully mediated the relationships between attachment anxiety and SNS addiction and between attachment avoidance and SNS addiction. Satisfaction of the need for self-presentation ( $B = 0.04$ , $SE = 0.02$ ) and the need for relatedness ( $B = 0.12$ , $SE = 0.03$ ) mediates the positive link between attachment anxiety and SNS addiction. Satisfaction of the need for autonomy ( $B = 0.07$ , $SE = 0.02$ ), the need for self-presentation ( $B = -0.04$ , $SE = 0.02$ ) and the need for relatedness ( $B = -0.03$ , $SE = 0.02$ ) mediated the link between attachment avoidance and SNS addiction.
(Y. Chen et al., 2020)	China	Cross sectional	<i>N</i> = 437 (70.48% females) Age = 16-30 ( <i>M</i> = 24.21, <i>SD</i> = 3.25)	General	<b>Correlation analysis, Moderation analysis</b> Attachment anxiety was positively linked with SNS addiction ( $r = 0.18$ , $p < 0.001$ ) and SNS addiction tendency ( $r = 0.21$ , $p < 0.001$ ). Attachment avoidance was positively linked with SNS addiction ( $r = 0.38$ , $p < 0.001$ ) and SNS addiction tendency ( $r = 0.30$ , $p < 0.001$ ). State attachment anxiety moderated the relationship between social anxiety and SNS addiction while state attachment avoidance showed no significant moderating effect between these two variables. The positive associations between social anxiety and SNS addiction were limited to SNS users with low state attachment anxiety ( $-1 SD$ ), higher social anxiety was linked with higher levels of SNS addiction ( $\beta$ simple slope = 0.32, $p < 0.001$ ) and SNS addiction tendency ( $\beta$ simple slope = 0.24, $p < 0.001$ ). On the contrary, for SNS users with high state attachment anxiety ( $+1 SD$ ), social anxiety was no longer associated with SNS addiction or SNS addiction tendency.

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range ( <i>M</i> , <i>SD</i> )	Attachment theoretical model	Findings
(Costanzo et al., 2021)	Italy	Cross sectional	<i>N</i> = 877 (59.5% females) Age = 18-68 ( <i>M</i> = 30.08, <i>SD</i> = 11.02)	General	<b>Mediation analyses</b> Prominent maladaptive daydreaming partly mediated the positive relationship between preoccupied attachment and PSNSU ( $B = 0.50, SE = 0.08$ ) and fully mediated the positive relationship between fearful attachment and PSNSU ( $B = 0.39, SE = 0.07$ ).
(Demircioğlu & Göncü Köse, 2020)	Turkey	Cross sectional	<i>N</i> = 455 (66% females) Age = 18-42 ( <i>M</i> = 21.36, <i>SD</i> = 2.20)	Contextual (romantic partner)	<b>Correlation analysis, Structural equation model</b> Fearful ( $r = 0.20, p < 0.05$ ) and preoccupied attachment styles ( $r = 0.22, p < 0.05$ ) were positively associated with social media addiction. Self-esteem partially mediated the positive link between preoccupied attachment style and social media addiction (indirect effect size for preoccupied attachment = 0.04, $p < 0.05$ ); and fully mediated the negative link between secure attachment style and social media addiction (indirect effect size for secure attachment = 0.03, $p < 0.05$ ).
(Demircioğlu & Göncü Köse, 2021)	Turkey	Cross sectional	<i>N</i> = 229 (67.7% females) Age = 18-32 ( <i>M</i> = 21.51, <i>SD</i> = 1.80)	Contextual (romantic partner)	<b>Correlation analyses, Structural equation model</b> Fearful attachment style is positively linked with PSNSU ( $r = 0.21, p < 0.01$ ). Relationship satisfaction partially mediated the positive link between fearful attachment and social media addiction (indirect effect size for fearful attachment = -0.04, $p < 0.05$ ). Secure, dismissive, and preoccupied attachment styles were not significantly related to social media addiction.
(Eroglu, 2016)	Turkey	Cross sectional	<i>N</i> = 322 (55% females) Age = 18-33 ( <i>M</i> = 20.61, <i>SD</i> = 1.82)	Contextual (romantic partner)	<b>Multiple regression analysis</b> Facebook addiction was negatively predicted by the secure ( $\beta = -0.40$ ) and dismissing ( $\beta = -0.17$ ) attachment styles and positively predicted by the preoccupied attachment style ( $\beta = 0.11$ ).
(Ershad & Aghajani, 2017)	Iran	Cross sectional	<i>N</i> = 100 (females = <i>na</i> ) Age = <i>na</i>	General	<b>Discriminant analysis</b> Ambivalent ( $F = 4.055, p < 0.01$ ) and avoidant ( $F = 8.897, p < 0.01$ ) attachment styles discriminated between students addicted and non-addicted to Instagram.
(Flynn et al., 2018)	Ireland	Cross sectional	<i>N</i> = 717 (80.6% females) Age = 18-65 ( <i>M</i> = 31, <i>SD</i> = 8.40)	Contextual (romantic partner)	<b>Hierarchical multiple regression, Mediation analyses</b> Attachment anxiety was positively associated with all facets of problematic Facebook use (i.e., $\beta = 0.12$ for self-disclosure, $\beta = 0.15$ for intrusive-risky/impulsive, $\beta = 0.28$ for social comparison, $\beta = 0.16$ for impression management, $\beta = 0.18$ for intrusive social, $\beta = 0.13$ for intrusive emotional). Attachment avoidance was positively associated with two facets of problematic Facebook use (i.e., $\beta = 0.21$ for impression management, $\beta = 0.11$ for intrusive social). The positive association between attachment anxiety and problematic Facebook use facets (with the exception of emotional consequences of intrusive Facebook use) was partially mediated by psychological distress. The relationship between attachment anxiety and social comparison, impression management, and intrusive-risky/impulsive facets of problematic Facebook use was partially mediated by self-esteem. The relationship between attachment avoidance and problematic Facebook use facets (with the exception of engagement in self-disclosures on Facebook) was mediated by psychological distress and self-esteem.
(Fujimori et al., 2015)	Japan	Cross sectional	<i>N</i> = 284 (54.23% females) Age = 18-29 ( <i>M</i> = 23.5, <i>SD</i> = 1.2)	Contextual (romantic partner)	<b>Multiple regression analyses, Structural equation model</b> SNS addiction was positively predicted by an ambivalent attachment style (males, $\beta = 0.19$ ; females, $\beta = 0.36$ ). The predictive role of an ambivalent attachment style was significantly stronger in females than in males ( $z = 5.04, p < 0.01$ ).

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range ( <i>M</i> , <i>SD</i> )	Attachment theoretical model	Findings
(Jayawardena et al., 2021)	Australia	Cross sectional	<i>N</i> = 118 (0% females) Age = <i>na</i> ( <i>M</i> = 33.62, <i>SD</i> = 12.67)	Contextual (romantic partner)	<b>Mediation analyses</b> The use of Grindr for self-esteem enhancement ( $\beta = 0.07$ ) and for companionship purposes ( $\beta = 0.13$ ) fully mediated the positive relationship between attachment anxiety and problematic Grindr use. The use of Grindr for escapism ( $\beta = 0.09$ ) and due to ease communication ( $\beta = 0.06$ ) fully mediated the positive relationship between attachment avoidance and problematic Grindr use.
(Kyeong Lee, 2017)	South Korea	Cross sectional	<i>N</i> = 185 (62.71% females) Age = <i>na</i> ( <i>M</i> = 40.13, <i>SD</i> = 10.66)	Contextual (romantic partner)	<b>Hierarchical regression analysis</b> Attachment avoidance was not associated with problematic SNS use ( $\beta = 0.09$ , ns) when implicit narcissism was entered in the hierarchical regression analysis. Attachment anxiety partially mediated the relationship between implicit narcissism and problematic SNS use ( <i>z</i> Sobel test = 6.68, $p < 0.001$ ).
(C. Liu & Ma, 2019a)	China	Cross sectional	<i>N</i> = 463 (74.29% females) Age = 17-24 ( <i>M</i> = 19.94, <i>SD</i> = 1.11)	Contextual (romantic partner)	<b>Correlation analysis, Mediation analysis</b> Attachment anxiety was positively associated with SNS addiction ( $r = 0.39$ , $p < 0.01$ ), whereas attachment avoidance was not significantly associated with SNS addiction. Online social support ( $B = 0.28$ , $SE = 0.09$ ) and fear of missing out ( $B = 0.51$ , $SE = 0.08$ ) partially mediated the positive association between anxious attachment and SNS addiction. Online social support fully and negatively mediated the relationship between avoidant attachment and SNS addiction ( $B = -0.03$ , $SE = 0.02$ ).
(C. Liu & Ma, 2019b)	China	Cross sectional	<i>N</i> = 463 (74.29% females) Age = 17-24 ( <i>M</i> = 19.94, <i>SD</i> = 1.11)	Contextual (romantic partner)	<b>Mediation analysis</b> The positive link between attachment anxiety and SNS addiction was partially mediated by emotion dysregulation (indirect effect = 0.58). Attachment avoidance was not positively associated with SNS addiction.
(Marino, Marci, et al., 2019)	Italy	Cross sectional	<i>N</i> <sub>1</sub> = 271 (67.9% females) Age <sub>1</sub> = 14-20 ( <i>M</i> = 17.02, <i>SD</i> = 1.56) <i>N</i> <sub>2</sub> = 336 (54.76% females) Age <sub>2</sub> = 14-20 ( <i>M</i> = 16.22, <i>SD</i> = 1.41)	Contextual (parents)	<b>Path analyses</b> Study 1: Problematic Facebook use was negatively associated with attachment security dimensions (i.e., $\beta = -0.17$ for trust, and $\beta = -0.22$ for communication) toward the mother but not toward the father and was positively associated with the attachment insecurity dimension of alienation toward both mother ( $\beta = 0.33$ ) and father ( $\beta = 0.17$ ). Metacognitions mediated the relationship between attachment dimensions (i.e., mother alienation, father alienation, and father communication) and problematic Facebook use ( $\chi^2/df = 0.763$ , CFI = 1.000, TLI = 1.025, SRMR = 0.008, RMSEA = 0.000 [0.000-0.108]). Study 2: Metacognitions mediated the relationship between both avoidance toward mother ( $\beta = 0.035$ ), and anxiety toward father ( $\beta = 0.042$ ) and problematic Facebook use. Fit indices showed a good fit of the model ( $\chi^2/df = 0.428$ , CFI = 1.00, TLI = 1.077, SRMR = 0.009, RMSEA = 0.000 [0.000-0.056]).
(Monacis, De Palo, Griffiths, Sinatra, et al., 2017)	Italy	Cross sectional	<i>N</i> = 712 (46.49% females) Age = <i>na</i> ( <i>M</i> = 21.63, <i>SD</i> = 3.90)	General	<b>Multiple regression analyses</b> Confidence ( $\beta = -0.24$ ) and discomfort with closeness ( $\beta = -0.07$ ) negatively predicted social media addiction, whereas need for approval ( $\beta = 0.17$ ) and relationship as secondary ( $\beta = 0.08$ ) positively predicted with social media addiction.

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range ( <i>M</i> , <i>SD</i> )	Attachment theoretical model	Findings
(Monacis, De Palo, Griffiths, & Sinatra, 2017)	Italy	Cross sectional	<i>N</i> = 734 (43.46% females) Age = 16-40 ( <i>M</i> = 21.63, <i>SD</i> = 3.95)	General	<b>Multiple regression analysis</b> Confidence was a negative predictor of SNS addiction ( $\beta = -0.303$ ), whereas Relationship as Secondary ( $\beta = 0.112$ ) and Need for Approval ( $\beta = 0.228$ ) were positive predictors of social media addiction.
(Moreau et al., 2015)	France	Cross sectional	<i>N</i> = 456 (76% females) Age = 12-25 ( <i>M</i> = 20.5, <i>SD</i> = 2.5)	Contextual (parents, peers)	<b>ANOVA</b> Differences among Facebook users were found for parental and peer attachment. "Borderline" Facebook users (i.e., higher levels of borderline personality traits) reported lower levels of parent and peer attachment and higher levels of problematic Facebook use than other Facebook users.
(Nasr & Rached, 2021)	Tunis	Cross sectional	<i>N</i> = 405 (47.4% females) Age = <i>na</i>	Contextual (peers)	<b>Structural equation model</b> Facebook addiction was negatively associated with attachment security dimension of trust toward peers ( $\beta = -3.46$ ) and was positively associated with attachment security dimension of communication toward peers ( $\beta = 4.48$ ).
(Shafiee et al., 2020)	Iran	Cross sectional	<i>N</i> = 241 (62.2% females) Age = 18-45	General	<b>Correlation analysis, structural equation model</b> Worry-ambivalent ( $r = 0.31$ ) and disorganize-ambivalent ( $r = 0.32$ ) attachment styles were positively correlated with PSNSU. Low self-directedness mediated the positive relationship between disorganize-ambivalent attachment style and PSNSU (CFI: 0.94, NFI: 0.92, RMSEA: 0.09).
(Tobin & Graham, 2020)	Australia	Cross sectional	<i>N</i> = 283 (84% females) Age = 18-71 ( <i>M</i> = 27.79, <i>SD</i> = 12.07)	General	<b>Correlation analysis, mediation analysis</b> Attachment anxiety ( $r = 0.25$ , $p < 0.01$ ) and attachment avoidance ( $r = 0.18$ , $p < 0.01$ ) were positively associated with problematic Facebook use. The relationship between attachment anxiety and problematic Facebook use was fully mediated by feedback sensitivity (standardized $ab = 0.11$ , 95% CI [0.05, 0.17]) when controlling for covariates.
(Vaillancourt-Morel et al., 2020)	Canada	Cross sectional	<i>N</i> = 2758 (81.1% females) Age = 14-25 ( <i>M</i> = 20.15, <i>SD</i> = 2.67)	Contextual (romantic partner)	<b>Correlation analyses, Moderated mediation model</b> Attachment anxiety is positively linked with PSNSU ( $r = 0.21$ , $p < 0.001$ ). Attachment avoidance was weakly positively linked with PSNSU ( $r = 0.05$ , $p < 0.05$ ). Attachment anxiety and avoidance interacted in predicting problematic Facebook use. This relationship was mediated by likes-seeking behaviors. The conditional indirect effect of attachment anxiety on problematic Facebook use via likes-seeking behaviors was positive at low levels (indirect effect = 0.10) and at high levels (indirect effect = 0.05) of attachment avoidance but was nonsignificant at very high levels of attachment avoidance (indirect effect = 0.02, ns).
(Worsley, Mansfield, et al., 2018)	United Kingdom	Cross sectional	<i>N</i> = 915 (68% females) Age = 18-25 ( <i>M</i> = 20.19, <i>SD</i> = 1.58)	Contextual (romantic partner)	<b>Hierarchical regression analysis, Mediation analysis</b> Problematic social media use was positively predicted by attachment anxiety ( $B = 0.18$ ) and negatively predicted by attachment avoidance ( $B = 0.13$ ). Psychological well-being partially mediated the relationship between anxious attachment and problematic social media use ( $b[SE] = 0.13 [0.02]$ ).

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range ( <i>M</i> , <i>SD</i> )	Attachment theoretical model	Findings
(Worsley, McIntyre, et al., 2018)	United Kingdom	Cross sectional	<i>N</i> = 1029 (74.8% females) Age = 17-25 ( <i>M</i> = 19.80, <i>SD</i> = 1.67)	Contextual (romantic partner)	<b>Correlation analysis, Mediation analysis</b> Problematic social media use was positively associated with attachment anxiety ( $r = 0.15, p < 0.01$ ) and negatively associated with attachment avoidance ( $r = -0.11, p < 0.01$ ). Attachment anxiety [ $b(SE) = -0.13 [0.04]$ ] and attachment avoidance ( $b(SE) = -0.11, [0.04]$ ) partially mediated the relationship between childhood maltreatment and problematic social media use.
(L. Young et al., 2020)	United Kingdom	Cross sectional	<i>N</i> = 124 (81% females) Age = <i>na</i> ( <i>M</i> = 30.58, <i>SD</i> = 12.01)	Contextual (romantic partner)	<b>Zero order correlations</b> Problematic social media use was positively correlated with both dimensions of anxious ( $r = 0.53, p < 0.01$ ) and avoidant attachment styles ( $r = 0.18, p < 0.01$ ).

Notes. *na* = data not available.

The conceptualization of PSNSU and the corresponding terminology varied between studies. The majority of studies ( $n = 17$ ) endorsed the addiction framework and used terms such as “social networking addiction” or “Facebook addiction”.

The full range of measures used in the studies, frequency of their use, and assessed constructs are listed in Table 2.2. As many as 14 different instruments were employed for evaluating PSNSU. Thirteen studies used one of the Bergen Addiction Scales (i.e., the Bergen Facebook Addiction Scale – BFAS [Andreassen et al., 2016]; the Bergen Social Media Addiction Scale – BSMAS [Andreassen et al., 2016]; the Bergen Instagram Addiction Scale – BIAS [Ballarotto et al., 2021]), which appeared to be the most common tool for PSNSU assessment. Other frequently used instruments were the Generalized Problematic Internet Use Scale 2 (GPIUS 2; Caplan, 2010) and the Internet Addiction Test (IAT; K. S. Young, 1998), adapted for the SNS context.

**Table 2.2***Measurement instruments and dimensions listed in the included studies (n = 32)*

	Measures of Problematic Social Networking Sites Use	Construct dimensions	Studies	<i>n</i> of studies
<b>Problematic Social Networking Sites Use</b>	Behavioral Technology Addiction scale (BTA; Charlton, 2002)	Adapted for SNS context. Unidimensional construct	A. Chen (2019)	1
	Bergen Addiction Scales (i.e., the Bergen Facebook Addiction Scale – BFAS [Andreassen et al., 2012]; the Bergen Social Media Addiction Scale – BSMAS [Andreassen et al., 2016]; the Bergen Instagram Addiction Scale – BIAS [Ballarotto et al., 2021])	Salience, mood modification, tolerance, withdrawal, conflict, relapse	Badenes-Ribera et al. (2019); Ballarotto et al. (2021); Blackwell et al. (2017); Costanzo et al. (2021); Eroglu (2016); Jayawardena et al. (2021); Monacis, De Palo, Griffiths, & Sinatra, (2017); Monacis, De Palo, Griffiths, Sinatra, et al., (2017); Nasr & Rached (2021); Tobin & Graham (2020); Vaillancourt-Morel et al. (2020); Worsley, Mansfield, et al. (2018); Worsley, McIntyre, et al. (2018)	13
	Chinese Social Media Addiction Scale (CSMAS; C. Liu & Ma, 2018)	Preference for online social interactions, mood alteration, negative outcomes and continued use, compulsive use/withdrawal, salience, relapse	C. Liu & Ma, (2019a, 2019b)	2
	Compulsive Internet Use Scale (CIUS; Meerkerk et al., 2009)	Adapted for SNS context. Loss of control, preoccupation, withdrawal, coping and mood, conflict	Boustead & Flack (2021)	1
	Generalized Problematic Internet Use Scale 2 (GPIUS2; Caplan, 2010)	Adapted for SNS context. Preference for online social interaction, mood regulation, cognitive preoccupation, compulsive Internet use, negative outcomes	Assunção et al., (2017); Assunção & Matos (2017); Young et al. (2020)	3
	Instagram Social Network Inventory (ISNI; Ershad & Aghajani, 2017)	Unidimensional construct	Ershad & Aghajani (2017)	1
	Internet Addiction Test (IAT; Young, 1998)	Adapted for SNS context. Unidimensional construct	Baek et al. (2014); Chabrol et al. (2017); Moreau et al. (2015)	3
	Problematic and Risky Internet Use Screening Scale (PRIUSS; Jelenchick et al., 2014)	Adapted for SNS context. Social consequences, emotional consequences, risky and compulsive Facebook use	Flynn et al. (2018)	1
	Problematic Facebook Use Scale (PFUS; Marino et al., 2017)	Unidimensional construct	Marino, Marci, et al. (2019); Vaillancourt-Morel et al. (2020)	2
	Social Media Addiction Scale (SMAS; Tutgun-Ünal & Deniz, 2015)	Preoccupation, mood modification, relapse, conflict/problems	Demircioğlu & Göncü Köse (2020); Demircioğlu & Göncü Köse (2021)	2
Social Media Engagement Scale (SMES; Przybylski et al., 2013)	Unidimensional construct	Blackwell et al. (2017)	1	

Social Media Disorder Scale (SMDS; van den Eijnden, 2016)	Preoccupation, tolerance, withdrawal, persistence, displacement, problem, deception, escape, conflict	Shafiee et al. (2020)	1
Social Networking Sites Addiction Tendency Scale (SNSATS; Wilson et al., 2010)	Withdrawal, salience, loss of control	Y. Chen et al. (2020)	1
Social Networking Websites Addiction Scale (SNWAS; Turel & Serenko, 2012)	Conflict, withdrawal, relapse, salience	Y. Chen et al. (2020)	1

	Measures of attachment	Construct dimensions	Studies	<i>n</i> of studies
<b>Attachment</b>	Adult Attachment Scale (AAS; Collins & Read, 1990)	Attachment anxiety, attachment avoidance, attachment security	Ershad & Aghajani (2017); Tobin & Graham (2020)	2
	Attachment Style Questionnaire (ASQ; Feeney et al., 1994)	Confidence, discomfort with closeness, need for approval, preoccupation with relationship, relationship as secondary. Anxiety, avoidance	Monacis et al. (2017a; 2017b)	2
	Experience in Close Relationships Scale (ECRS; Brennan et al. 1998)	Attachment anxiety, attachment avoidance	Blackwell et al. (2017); Boustead & Flack (2021); A. Chen (2019); Flynn et al. (2018); Jayawardena et al. (2021); Kyeong Lee (2017); C. Liu & Ma (2019a; 2019b); Marino, Marci, et al. (2019); Vaillancourt-Morel et al. (2020); Young et al. (2020)	11
	Father and Mother Attachment Questionnaire (FMAQ; Matos & Costa, 2001)	Inhibition of exploration and individuality, quality of emotional bond, separation anxiety	Assunção et al. (2017); Assunção & Matos (2017)	2
	Internal Working Model Scale (IWMS; Toda, 1988)	Avoidant attachment, secure attachment, ambivalent attachment	Fujimori et al. (2015)	1
	Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987)	Mutual trust, quality of communication, alienation	Assunção et al. (2017); Assunção & Matos (2017); Badenes-Ribera et al. (2019); Ballarotto et al. (2021); Chabrol et al. (2017); Marino, Marci, et al. (2019); Moreau et al. (2015); Nasr & Rached (2021)	8
	Measurement of Attachment Qualities (MAQ; Carver, 1997)	Avoidance, security, ambivalence-merger, ambivalence-worry	Shafiee et al. (2020)	1
	Parental Bonding Instrument (PBI; Parker et al., 1979)	Neglectful parenting, optimal parenting, affectionless control, affectionate constrain	Chabrol et al. (2017); Moreau et al. (2015)	2
	Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991)	Attachment styles: secure, dismissing, preoccupied, fearful	Baek et al. (2014); Costanzo et al. (2021); Demircioğlu & Göncü Köse (2020); Demircioğlu & Göncü Köse (2021); Worsley, Mansfield, et al. (2018); Worsley, McIntyre, et al. (2018)	6

Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994)	Secure, dismissing, fearful, preoccupied	Eroglu (2016)	1
State Adult Attachment Measure (SAAM; Gillath et al., 2009)	Attachment anxiety, attachment avoidance	Y. Chen et al. (2020)	1

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The majority of studies ( $n = 24$ ) endorsed a contextual model of attachment, while eight studies endorsed a general model of attachment. Attachment-related phenomena were assessed by means of nine different instruments, with the Experience in Close Relationships Scale (ECRS; Brennan et al., 1998, or adapted versions) used most frequently, in 11 studies. Other commonly applied measures were the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) and the Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991, or adapted versions), used in eight and six studies, respectively.

### **Quality assessment**

Quality assessment was conducted using the AXIS tool (Downes et al., 2016). The scores for individual studies ranged from 9 to 19, with 14 studies scoring in the moderate range of quality and 18 studies scoring in the high range. The average score for all studies was 14.66 ( $SD = 2.22$ ). Overall, the studies had clear research aims and their design was deemed appropriate (questions 1 and 2). However, the vast majority did not justify or adequately clarify their sample size based on previous experiments or a priori power estimates (question 3) and additional 22 studies did not address and categorize non-responders adequately (question 7). Outcome variables were correctly measured with psychometrically adequate instruments and were appropriate for the aims of the study (questions 8 and 9), but the adopted statistical procedures were not properly and sufficiently described in 18 studies (question 10). The discussion and conclusions were found to be justified in 29 studies by the obtained results (question 17) and the intrinsic limitations of the study design were adequately acknowledged and described in 26 studies (question 18).

## **2.7 Main findings**

### **Direct associations between attachment and PSNSU**

#### **General model of attachment**

The eight studies adopting the general model of attachment (i.e., attachment phenomena as trait-like domains or dimensions) found an overall positive association between attachment anxiety and PSNSU (A. Chen, 2019; Chen et al., 2020; Costanzo et al., 2021; Ershad & Aghajani, 2017; Monacis et al., 2017a, 2017b; Shafiee et al., 2020; Tobin & Graham, 2020). The association between attachment avoidance and PSNSU was positive in three of these studies (Chen et al., 2020; Ershad & Aghajani, 2017; Tobin & Graham, 2020) and negative in one study (Monacis et al., 2017a). Secure attachment style was found to be a negative predictor of PSNSU in two studies (Monacis et al., 2017a, 2017b), while disorganized and anxious (i.e., preoccupied) attachment styles were positively associated with PSNSU in one study (Shafiee et al., 2020).

#### **Contextual model of attachment**

Concerning the studies adopting the contextual model of attachment (i.e., attachment phenomena as context-dependent and/or relation-dependent states), mixed results were observed. Different patterns of associations emerged depending on the relational context (i.e., parents, peers, and romantic partners) and the developmental stage of the sample (i.e., adolescents or adults).

#### **Studies of adolescents and young adults**

##### ***Attachment to parents and PSNSU***

Seven studies with adolescents and young adults examined the relationships with parents. A high quality of the emotional bond with parents (Assunção et al., 2017) and features of secure attachment to parents, such as high levels of perceived care and trust and good communication (Badenes-Ribera et al., 2019; Moreau et al., 2015), were negatively associated with PSNSU. Marino, Marci, et al. (2019) found that PSNSU was negatively associated with high levels of trust

and good communication in the relationship with the mother, but not in the relationship with the father. Similarly, Ballarotto et al. (2021) found that PSNSU was negatively associated with a secure attachment to the mother, but not to the father.

Several studies reported that features of insecure attachment to parents, such as maternal overprotection, inhibition of exploration, and high levels of separation anxiety with regards to parental figures, were positively associated with PSNSU (Assunção et al., 2017; Assunção & Matos, 2017; Chabrol et al., 2017; Marino, Marci, et al., 2019). Badenes-Ribera et al. (2019) found that parental alienation (i.e., a general feature of insecure attachment) was negatively associated with PSNSU among younger adolescents (aged 12-13 years), while being positively associated with PSNSU among older adolescents (aged 14-17 years).

#### *Attachment to peers and PSNSU*

Studies examining the relationship between PSNSU and attachment in the context of peer relationships were only conducted in adolescents and young adult samples. Ballarotto et al. (2021) found that adolescents' secure attachment to peers was negatively associated with PSNSU. Badenes-Ribera et al. (2019) reported that the attachment security dimension of trust toward peers among younger adolescents was negatively associated with PSNSU. Nasr et al. (2021) also found a negative association between PSNSU and the attachment security dimension of trust toward peers, but a positive association with the attachment security dimension of communication toward peers. Chabrol et al. (2017) and Moreau et al. (2015) found that secure attachment to peers was negatively associated with PSNSU in adolescent Facebook users with prominent borderline personality traits. Attachment insecurity (i.e., peer alienation) was positively associated with PSNSU among older adolescents, but not among younger adolescents (Badenes-Ribera et al., 2019).

## **Studies of adults**

### ***Attachment to partners and PSNSU***

Sixteen studies conducted in adult samples evaluated the relationship between PSNSU and adult attachment to romantic partners. Overall, higher levels of attachment anxiety were positively associated with PSNSU, while the pattern of associations between attachment avoidance and PSNSU was mixed – positive or negative, significant or nonsignificant, strong or weak (Blackwell et al., 2017; Flynn et al., 2018; Kyeong Lee, 2017; C. Liu and Ma, 2019a, 2019b; Vaillancourt-Morel et al., 2020; Worsley, Mansfield et al., 2018; Worsley, McIntyre et al., 2018; Young et al., 2020).

Regarding attachment styles, Baek et al. (2014) did not find significant differences between individuals with different attachments (i.e., fearful, dismissive, secure, and ambivalent) to their partners in terms of the association with PSNSU. Secure and dismissing attachment styles had a negative association with PSNSU (Eroglu, 2016), while the preoccupied style was directly and positively associated with PSNSU (Demircioğlu & Göncü Köse, 2020; Eroglu, 2016). Furthermore, the fearful attachment style was positively associated with PSNSU in two studies (Demircioğlu & Göncü Köse, 2020, 2021). In young adults, PSNSU was positively predicted by the ambivalent attachment style, especially among females (Fujimori et al., 2015).

### **Mediators of the associations between attachment and PSNSU**

Seventeen factors were found to mediate the relationship between attachment and PSNSU. These include: (a) individual factors (i.e., borderline personality traits, self-directedness, self-esteem, psychological distress, psychopathological symptoms, maladaptive daydreaming, emotion dysregulation, metacognition, well-being); (b) interpersonal factors (i.e., peer alienation, relationship satisfaction, online social support, fear of missing out [FOMO]); (c) SNS-related factors (i.e., feedback sensitivity, likes-seeking behaviors, meeting one's own psychological needs

via Facebook use [i.e., needs for self-presentation, autonomy and relatedness] and motivations [i.e., self-esteem enhancement and meeting the need for companionship] for SNS use).

### **Individual mediating factors**

*Borderline personality traits.* Chabrol et al. (2017) identified borderline personality traits such as intolerance of loneliness and “heightened need for social relationships” as mediators of the positive relationship between maternal overprotection and PSNSU, especially in female individuals.

*Self-directedness.* Shafiee et al. (2020) found that low self-directedness (i.e., the ability to control, regulate, and adapt behavior to adaptively respond to situations according to one’s goals and values) mediated the positive relationship between disorganized attachment style and PSNSU.

*Self-esteem.* Demircioğlu and Göncü Köse (2020) found that low self-esteem (i.e., the extent to which one values, approves, or likes oneself) partially mediated the positive link between preoccupied attachment style and PSNSU, while high self-esteem fully mediated the negative link between secure attachment style and PSNSU. Flynn et al. (2018) found that the positive relationship between attachment anxiety and different facets of PSNSU (i.e., social comparison, impression management, and impulsive/risky use) was partially mediated by low self-esteem.

*Psychological distress.* Flynn and colleagues (2018) found that the positive relationship between attachment avoidance and PSNSU facets (with the exception of engagement in self-disclosure on Facebook) was mediated by high levels of psychological distress (i.e., a state of emotional hardship that includes feelings associated with depression and anxiety).

*Psychopathological symptoms.* Ballarotto et al. (2021) found that the severity of adolescents’ current psychopathological symptoms (i.e., the score on the Symptom Checklist 90-R Global Severity Index) mediated the negative relationship between secure attachment to parents and peers and PSNSU.

*Maladaptive daydreaming.* Costanzo et al. (2021) found that prominent maladaptive daydreaming (i.e., a compulsive fantasy activity that interferes with interpersonal and social functioning) partly mediated the positive association between preoccupied attachment and PSNSU and fully mediated the positive relationship between fearful attachment and PSNSU.

*Emotion dysregulation.* C. Liu and Ma (2019b) found that difficulties in emotion regulation partly mediated the relationship between attachment anxiety and PSNSU.

*Metacognition.* Marino, Caselli, et al. (2019) found that efficient metacognitive abilities (i.e., monitoring, evaluation, interpretation, and regulation of cognition; Spada & Marino, 2017) mediated the negative relationship between secure attachment and PSNSU, while a deficiency in metacognitive abilities mediated the positive relationship between insecure attachment and PSNSU.

*Wellbeing.* Worsley, Mansfield et al. (2018) found that attachment anxiety and PSNSU were positively associated through mediating effects of low levels of psychological wellbeing (i.e., the global level of self-acceptance, autonomy, purpose in life, positive relations with others, environmental mastery, and personal growth).

### **Interpersonal mediating factors**

*Peer alienation.* Assunção et al. (2017) reported that peer alienation (i.e., adolescents' feelings of isolation, detachment from peers and anger towards them) mediated the positive association between several facets of insecure attachment to parental figures (i.e., low quality of emotional bond, high levels of separation anxiety, and inhibition of exploration and individuality) and PSNSU among adolescents.

*Relationship satisfaction.* University students with a fearful attachment style were more likely to have low levels of relationship satisfaction (i.e., the extent to which one is satisfied with

and happy and delighted about one's relationship), which in turn was positively associated with PSNSU (Demircioğlu & Göncü Köse, 2021).

*Online social support.* C. Liu and Ma (2019a) found that a high need for online social support (i.e., the support obtained via online settings) mediated the positive relationship between attachment anxiety and PSNSU.

*Fear of missing out.* C. Liu and Ma (2019a) and Boustead and Flack (2021) found that FOMO (i.e., the pervasive apprehension that others might be having rewarding experiences from which one is absent) mediated the positive relationship between attachment anxiety and PSNSU.

### **Mediating factors related to social networking sites**

*Feedback sensitivity.* Tobin and Graham (2020) found that high levels of feedback sensitivity (i.e., the responsiveness to the SNS feedback systems) mediated the positive association between attachment anxiety and PSNSU.

*Likes-seeking behaviors.* Vaillancourt-Morel et al. (2020) found that a positive association between attachment anxiety and PSNSU was mediated by prominent likes-seeking behaviors (i.e., behaviors aimed at obtaining more Facebook "likes"). Moreover, prominent likes-seeking behaviors mediated the positive relationship between attachment avoidance and PSNSU, when attachment anxiety was low and attachment avoidance was high (i.e., in dismissing attachment style). On the contrary, the indirect association between attachment avoidance and PSNSU was negative, when attachment anxiety was high and attachment avoidance was high (i.e., in fearful attachment style).

*Meeting psychological needs through SNS use.* A. Chen (2019) found that meeting the needs for self-presentation (i.e., individuals' need to communicate their identity to others) and relatedness (i.e., individuals' need to feel connected and interact with others) through Facebook mediated the positive relationship between attachment anxiety and PSNSU. Meeting the needs for

self-presentation, relatedness and autonomy through Facebook mediated the negative relationship between attachment avoidance and PSNSU.

*Motivations for SNS use.* Jayawardena et al. (2021) found that self-esteem enhancement (i.e., an improvement in the way a person evaluates himself/herself) and meeting the need for companionship (i.e., a desire not to be alone) as motivations for SNS use mediated the positive association between attachment anxiety and PSNSU. Meeting the needs for communication and escapism as motivations for SNS use mediated the positive association between attachment avoidance and PSNSU.

## **2.8 Discussion**

The present study aimed to systematically review and critically appraise existing research on the relationships between attachment and PSNSU. All studies contributed in specific ways to the elucidation of the associations between PSNSU and attachment. In line with the previous systematic review by D'Arienzo et al. (2019), our results showed that attachment anxiety was consistently and positively linked with PSNSU, whereas the results regarding attachment avoidance were mixed. However, we also found evidence that attachment security tends to protect from PSNSU. In addition, our review highlights that during adolescence the specific attachment contexts (e.g., relationship with parents or with peers) may differently affect PSNSU behaviors. Moreover, we also observed that factors at the intra-personal and interpersonal levels, as well as the way of using SNS, may mediate the relationship between attachment variables and PSNSU. The study of mediators is critical for developing adequate prevention and clinical programs for PSNSU, but it is also relevant for improving the communication policies of SNS industries.

### **Findings based on the general model of attachment**

Researchers who used the general model of attachment reported an overall negative association between secure attachment and PSNSU and a positive association between insecure attachment and PSNSU, with very few exceptions. Consistent findings were reported with regards to the positive association between attachment anxiety and PSNSU, suggesting that the internal representations of self and others embedded in the relational dispositions of anxiously attached individuals may lead to an overuse of SNS. Attachment anxiety may thus promote an overinvolvement with SNS as a dysfunctional way of coping with relational insecurities. Despite evidence is less strong for attachment avoidance, also in this case a positive association with PSNSU has been observed. In contrast, available evidence suggests that secure attachment (which involves a positive view of self and others, and also a balanced approach to relationships in the dialectic between dependency and autonomy) could constitute a protective factor against PSNSU. The findings derived from the general model of attachment are thus consistent with the literature that considers insecure attachment as a risk factor for psychopathological symptoms (Schimmenti & Bifulco, 2015), including addictive online behaviors (Musetti et al., 2018; Schimmenti et al., 2014). Moreover, results are congruent with an interpretation of secure attachment as a fundamental factor underlying solid social, emotional, and cognitive skills (Baldwin et al., 1996). To summarize, securely attached individuals may be more prone to use SNS to reinforce solid offline relationships and thus meet their need for closeness and autonomy (e.g., by cultivating ties with close friends or partners; Oldmeadow et al., 2013). In contrast, the use of SNS by anxiously attached individuals may temporarily alleviate their fear of rejection and abandonment (e.g., by compulsively seeking likes on their posts), but this can generate a vicious cycle that perpetuates excessive SNS use without mitigating attachment insecurity.

### **Findings based on the contextual model of attachment**

Researchers who used the contextual model of attachment showed that the relationships between PSNSU and attachment may vary depending on the specific interpersonal domain and the developmental stage of the SNS user. These findings are consistent with the view of attachment as sensitive to changes over age and experience (Chopik et al., 2013; Hudson et al., 2015).

#### **Attachment to parents in adolescents and PSNSU**

The present systematic review showed that in adolescents there was a more consistent association between insecure attachment and PSNSU in the context of the relationship with peers than in the context of the relationship with parents. This finding may be understood taking into consideration the developmental challenges that adolescents face as they emancipate from parents and achieve a sense of personal identity (Musetti, Grazia, et al., 2021). During this developmental phase, social roles and relationships change dramatically as attachment to parents becomes more vulnerable and the influence of family on adolescent development decreases (Zou & Wu, 2020), while relationships with peers become more important (Kerr et al., 2003). Thus, the quality of the relationship with parents does not necessarily affect SNS use by adolescents (Duque et al., 2017) and may not be strongly related to PSNSU (Badenes-Ribera et al., 2019).

#### **Attachment to peers in adolescents and PSNSU**

In accordance with the existing developmental literature which assumes a pivotal role of peer relationships during adolescence (e.g., Majorano et al., 2015; Musetti et al., 2020), variables reflecting peer alienation among adolescents and young adults were positively and consistently associated with PSNSU, while variables reflecting attachment security in peer relationships were generally negatively associated with PSNSU (Moreau et al., 2015; Oldmeadow et al., 2013).

It can be hypothesized that adolescents who established a secure attachment to parents during childhood tend to develop good interpersonal skills, which might be conducive to secure

relationships with peers (Assunção et al., 2017; Assunção & Matos, 2017) and a more adaptive use of SNS. It should not be overlooked that positive associations between good communication with peers (a feature of secure attachment) and PSNSU (Badenes-Ribera et al., 2019; Nasr et al., 2021) were observed. However, more specifically, Badenes-Ribera et al. (2019) found that good communication with peers was positively associated only with salience and mood modification features of PSNSU, which have previously been referred to as peripheral symptoms of PSNSU (Carbonell & Panova, 2017). Therefore, this association may reflect the high involvement in SNS use, rather than a genuine addictive behavior, by adolescents as socializing tools for maintaining close bonds with peers (Antheunis et al., 2016).

In fact, most adolescents regard SNS as essential tools for interacting with peers on a daily basis (Kwon et al., 2013). This calls for a balanced evaluation of SNS use among adolescents and especially a need to avoid pathologizing normative behaviors and distinguish between a high involvement in SNS use and PSNSU (Carbonell & Panova, 2017).

#### **Attachment to partners and PSNSU**

With regards to studies that examined adult attachment with romantic partners, attachment anxiety was consistently and positively associated with PSNSU. This finding may be partly explained by a tendency by individuals who feel insecure in romantic or intimate relationships to use SNS in a way that might alleviate their anxiety but ultimately lead to PSNSU. For example, such individuals may be more sensitive to the positive and negative comments to a post or to FOMO or may seek more “likes” and thereby spend an increasing amount of time using SNS (Boustead & Flack, 2021; C. Liu & Ma, 2019a). In contrast, the associations between attachment avoidance and PSNSU were inconsistent (i.e., a positive association was found in five studies, a negative association was reported in three studies, and there was no association in three studies). This finding could be ascribed to several factors, including use of different assessment instruments

(see section 2.3 and Table 2.3) and various meanings of the relationships with romantic partners (Oldmeadow et al., 2013). In addition, it may be that attachment avoidance is positively associated with PSNSU only in the context of high levels of attachment anxiety (Baek et al., 2014). Moreover, the construct of attachment avoidance itself includes at least two domains (Mikulincer & Shaver, 2007): the first concerns derogating attitudes (i.e., relationships devalued and seen as secondary), while the second pertains to withdrawing attitudes (i.e., discomfort with closeness). It is possible that individuals with derogating attitudes may be less likely to develop PSNSU due to their excessive self-reliance and disinterest towards interpersonal relations. On the contrary, SNS may be used by individuals with withdrawing attitudes as a way to develop and maintain connections with others, but at a safe distance (e.g., Vaillancourt-Morel et al., 2020).

### **Mediators of the relationships between attachment and PSNSU**

Our results suggest that focusing only on the relationships between attachment and PSNSU provides partial information. Therefore, examining the potential intervening factors in these relationships is critical.

Seventeen factors that our systematic review has identified as partial or full mediators of the relationships between various attachments and PSNSU can be construed as conferring additional risk for PSNSU, especially in the context of high levels of attachment anxiety. In this regard, the most frequently identified risk factors ( $n = 9$ ) included individual variables, such as low self-esteem (Flynn et al., 2018; Demircioğlu & Göncü Köse, 2020) and low well-being (Worsley, Mansfield et al., 2018). As expected, attachment also influenced interpersonal domains, such as FOMO (Boustead & Flack, 2021; C. Liu & Ma, 2019b), which in turn fostered PSNSU. Although less investigated, factors related to SNS use provided relevant insights on the specific online behaviors associated with PSNSU (e.g., self-esteem enhancement and meeting the need for companionship as motivations for SNS use (Jayawardena et al., 2021). Notably, no study reported

non-significant mediation results. Overall, these findings suggest that the relationship between PSNSU and attachment is affected by different phenomena, such as users' psychological functioning, their offline relationships, and their specific use of SNS.

Future interventions should strive to help individuals with personal and interpersonal insecurities adopt a more balanced self-esteem and improve social skills and coping (Marino, Marci, et al., 2019). The mediating roles of prominent borderline traits (Chabrol et al., 2017) and high levels of emotion dysregulation (C. Liu & Ma, 2019b), feedback sensitivity (Tobin & Graham, 2020), and likes-seeking behaviors (Vaillancourt-Morel et al., 2020) in the relationships between various attachment-related phenomena and PSNSU call for interventions aimed at improving emotion regulation strategies and difficulties in interpersonal interactions. Disentangling the contribution of different categories of risk factors may play an important role in prevention of PSNSU, though future research is needed to establish this.

### **Conceptualization of PSNSU**

Examining attachments in individuals with PSNSU is important because it could help understand the developmental origins of PSNSU and contribute to identification of the underlying emotional and interpersonal needs and the associated behavioral patterns. A SNS user can develop PSNSU as a consequence of the generally high levels of attachment anxiety or in the context of the specific relational difficulties (e.g., with high levels of anxiety in the relationships with peers).

### **Educational and preventative actions**

It is important to provide education to all the relevant stakeholders (e.g., teachers and parents) that maladaptive SNS use is strongly related to the person's psychological functioning and that it calls for understanding – not an outright condemnation. Therefore, enhancing emotion regulation and self-actualization of people with PSNSU, especially adolescents, could be more useful than attempts to control SNS use externally. Furthermore, a secure relationship between parents and

their children can promote a healthy SNS use, thereby preventing PSNSU. Educational interventions aimed at promoting secure attachment through emotionally responsive parenting during childhood and adolescence might help prevent PSNSU (Moretti et al., 2015; Tarabulsky et al., 2008).

### **Clinical implications**

Applying a process-based approach to clinical interventions (Kinderman et al., 2013), the specific individual, interpersonal, and SNS-related factors mediating the relationship between insecure attachment and PSNSU should be the major targets of tailored psychological interventions (Billieux et al., 2015b; Costanzo et al., 2021). Given that users may rely excessively on SNS to cope with emotional and interpersonal difficulties (e.g., Musetti, Starcevic, et al., 2021; Ruggieri et al., 2020), metacognitive, socio-emotional learning programs (Durlak et al., 2011) and mentalizing practice (e.g., Lecointe et al., 2016) could be used to alleviate PSNSU symptoms.

### **Social arena**

Finally, our findings also have broader implications. Given that online and offline activities intersect and interact composing our living environment (Musetti & Corsano, 2018), health policies should be adapted to incorporate our understanding of technology-related human behavior derived from attachment research. This largely pertains to efforts to promote attachment security while people interact in the “digital environment”. For example, detrimental SNS behaviors, such as cyberbullying, should be strongly discouraged and actively suppressed because they undermine security in peer relationships, which can lead to other detrimental consequences, including PSNSU (Hussain et al., 2021). Similarly, there is evidence that online groomers, who use SNS and other Internet platforms to seek contact and eventually abuse children and adolescents, select their victims also based on their attachment insecurities with parents and peers (Caretta et al., 2015; DeMarco et al., 2017). Promoting educational programs in schools to improve the quality of

relationships also in the context of SNS use among youth might be crucial for avoiding some of the most deleterious outcomes of PSNSU.

### **Limitations**

The present systematic review has a number of limitations. Some result from the rapidly changing landscape of SNS, which might have limited our “coverage” of the recently introduced SNS. Another limitation relates to our search and selection procedure. Thus, some relevant studies might have been overlooked if PSNSU was encompassed by the broad terms “Internet addiction”, “problematic Internet use” or “Internet use disorder” (Kuss & Billieux, 2017). Also, we only included articles published in English, which precluded us from considering potentially relevant articles published in other languages. In addition, we did not investigate specific SNS separately, since PSNSU refers to a general misuse of SNS. An important limitation pertains to the nature of the included studies, because they all relied on self-reported measures (susceptible to response bias), had a cross-sectional design (precluding investigation of causality) and recruited self-selected participants who are not necessarily representative of the general population. Finally, the reviewed studies relied on different measures of attachment and PSNSU. Although such a variety of instruments might have shed more light on the complexity of the relationships between attachment and PSNSU, it has also made it more difficult to compare the findings between these studies.

### **2.9 Conclusions and future directions**

Our systematic review presented an updated summary of the studies which investigated the links between PSNSU and specific attachment-related phenomena. High levels of attachment anxiety have consistently been associated with a greater severity of PSNSU, while inconsistent results regarding the relationship between attachment avoidance and PSNSU call for more research.

Individuals with a generally insecure attachment may develop PSNSU because they are more likely to use SNS as a dysfunctional way of coping in a variety of situations. Individual, interpersonal and SNS use-related factors seem to mediate the associations between insecure attachment and PSNSU. People with insecure attachment in the specific relational contexts may develop PSNSU because of poor coping with the vicissitudes of these specific relationships. A better understanding of the nature of attachment-related phenomena can help clinicians introduce tailored treatments of PSNSU.

Suggestions for future research include qualitative and longitudinal studies conducted in large and demographically diverse samples that would include individuals from more countries who belong to a greater range of age groups (e.g., older adults). Moreover, studies with priming techniques (Mikulincer & Shaver, 2001) could be designed using attachment primes in relation to PSNSU stimuli or PSNSU primes in relation to attachment stimuli to contextually activate different patterns of associations between attachment and PSNSU. In addition, experiential sampling methods using a behavioral measurement of PSNSU (e.g., time spent on SNS or number of published posts) would address the temporal and causal relations between attachment and PSNSU. Finally, future studies that concurrently analyze, different individual, interpersonal and SNS use-related factors in insecurely attached individuals who display PSNSU are warranted.

### 3. STUDY 1<sup>2</sup>

#### **Problematic Social Networking Sites Use and online social anxiety: The role of attachment, emotion dysregulation and motives**

##### **3.1 Abstract**

PSNSU and social anxiety are associated. SNS users may develop online social anxiety that may become a standalone problem. The present study aims to test the mediating role of emotion dysregulation and motives (coping, conformity, social, and enhancement) between attachment (anxiety and avoidance) and two outcomes (PSNSU and online social anxiety) in an integrated theory-driven model. Self-report questionnaires were completed by 756 SNS users (50.4% females;  $M_{\text{age}} = 28.74$  years,  $SD = 8.00$ ). Results of the path analysis supported the mediating role of emotion dysregulation in the association between attachment anxiety and both the outcomes and the serial mediating role via four and three motives in the association with PSNSU and online social anxiety, respectively. This study highlighted the role of several relational, emotional, and motivational factors that should be taken into account to tackle PSNSU and online social anxiety through clinical and prevention interventions.

##### **3.2 Introduction**

Some of the most widely used Social Networking Sites (SNS) in western countries include Facebook, Twitter, Instagram, and TikTok, with almost four billion total users in 2022 (Clement, 2022). Although recent systematic reviews and longitudinal studies have shown that most users use SNS in a functional way (e.g., Coyne et al., 2020; Orben, 2020; Shankleman et al., 2021), a minority (about 5%; Cheng et al., 2021) of users manifests an excessive and uncontrolled use, that

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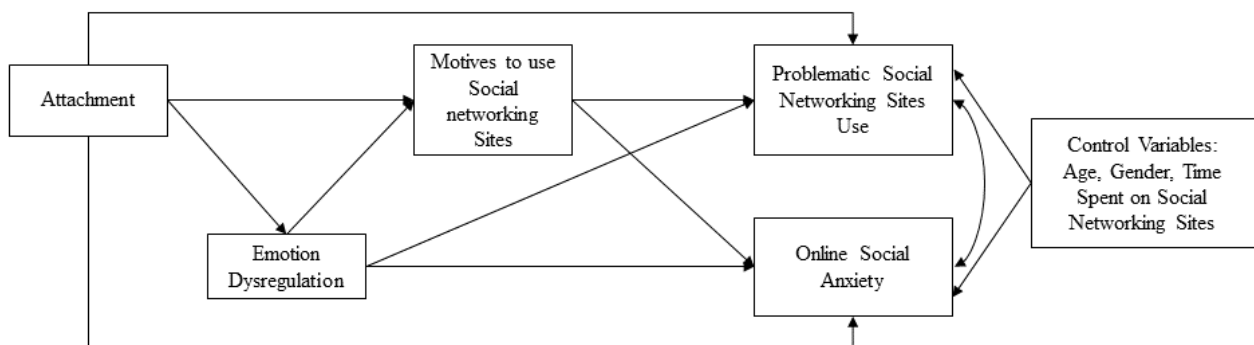
<sup>2 2</sup> This study was published in Addictive Behavior 138 (2023) 107572.

can lead to multiple negative consequences (C. Huang, 2022). Thus, people with "problematic social networking sites use" (PSNSU; Svicher et al., 2021) are characterized by a preference for online social interactions over face-to-face ones, excessive preoccupation with SNS, sense of urgency to use SNS, emotional imbalance, and impairment in users' psychosocial functioning, such as interpersonal conflicts, work-related issues, and sleep difficulties (Andreassen, 2015; Marino et al., 2017). However, PSNSU has not been recognized as a clinical disorder by diagnostic manuals including the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). Among the several correlates of PSNSU, social anxiety is one of the most investigated, given that people with social vulnerability are at risk of exponential growth in the use of the Internet for social interaction purposes (e.g., email and SNS). As emerged from numerous studies (e.g., Y. Chen et al., 2020; Markowitz et al., 2016; Yıldız Durak, 2020; Zsido et al., 2021), individuals with high levels of social anxiety are more prone to use technologically mediated communication since online social communication may be perceived as less threatening. Face-to-face communication skills may decline over time, while the overdependence on the Internet may intensify in a vicious cycle that perpetuates PSNSU (Huan et al., 2014). Beyond the view of social anxiety as a risk factor for PSNSU, it could also be the case that SNS users might develop specific online social anxiety-like fears deriving from their SNS use, such as online self-evaluation anxiety due to the view of their selves based on online others' evaluations (Alkis et al., 2017). Online social anxiety might arise from concerns about others' reactions to shared content on SNS, or it can manifest through fear to share content by individuals themselves or anxiety derived from contents pertaining to them but shared by others (Alkis et al., 2017). Moreover, especially new SNS users might experience difficulties in online social interactions and communication, and be concerned about the privacy of their private information (Alkis et al., 2017). From this perspective, taking all these possible symptoms together, online social anxiety

may be considered a specific maladaptive form of SNS use and may become problematic on its own, especially for people with vulnerability towards offline social anxiety but also for SNS users who experience symptoms of social anxiety arising from their SNS use as proposed by Alkis and colleagues (2017). Indeed, given the social nature of SNS and the similarities with other addictive behaviors, maladaptive use of SNS might cover both addiction-like symptoms such as cognitive preoccupation, compulsive use, and negative consequences (as in the case of PSNSU) and social anxiety-like symptoms, as in the case of online social anxiety. For this reason, in the present study, online social anxiety is included as an outcome along with PSNSU. Previous studies investigated many possible antecedents of PSNSU such as insecure attachment, emotion dysregulation, and motives to use SNS (e.g., D’Arienzo et al., 2019; Marino, Caselli, et al., 2019; Marino, Mazzieri, et al., 2018). However, to date and to the authors’ knowledge, no study has investigated the association of these constructs with PSNSU and online social anxiety in a sole theory-driven model. Thus, the present study focuses on several relational, emotional, and motivational factors that may lead to PSNSU and online social anxiety in an integrated model depicted in Figure 3.1.

**Figure 3.1**

*Proposed theoretical model.*



### *3.1.1 Attachment patterns as plausible antecedents of PSNSU and online social anxiety*

Attachment patterns have received increasing attention in the field of SNS in recent years (D'Arienzo et al., 2019). Briefly, attachment theory postulates the existence of a dispositional behavioral repertoire aimed at seeking and maintaining the proximity of significant others (i.e., attachment figures) who provide a sense of security and comfort (Bowlby, 1969). Such relational schemas develop during infancy and persist in a relatively stable manner during adulthood (Fraley, 2002). The quality of the interactions with such significant others defines the individual differences in the attachment patterns, which were commonly indicated as a combination of the two attachment dimensions of anxiety (i.e., the anxious need for other's acceptance and fear of rejection) and avoidance (i.e., the avoidance of intimacy in relationships and compulsive self-reliance; Bartholomew & Horowitz, 1991).

A positive association between attachment anxiety and PSNSU was reported in systematic reviews (D'Arienzo et al., 2019; Musetti et al., 2022; Stöven & Herzberg, 2021), suggesting a compensatory attempt to reduce separation anxiety, fear of rejection, and need for company. Furthermore, as emerging from several studies (see D'Arienzo et al., 2019), users with high attachment avoidance appear to feel connected while browsing other people's profiles without feeling threatened by unintended intimacy. Moreover, individuals with low state attachment anxiety (i.e., attachment anxiety temporarily activated by contextual and relational factors) were found to report higher PSNSU scores when they presented high levels of social anxiety (Y. Chen et al., 2020; Remondi et al., 2022). This may be due to socially anxious users tending to interpret social situations as more threatening and uncomfortable, due to biased cognitive beliefs (Nitzburg & Farber, 2013). Moreover, users with high levels of attachment anxiety appear to tend to satisfy

their social needs through SNS thus avoiding distressing face-to-face interactions (Y. Chen et al., 2020).

### *3.1.2. Emotion dysregulation and motives as mediators*

Beyond attachment patterns, several psychological factors have been found to be associated with PSNSU, such as psychological distress, deficiencies in reflective functioning, maladaptive cognitions as well as difficulties in emotion regulation, and motives to use SNS (e.g., (Casale & Banchi, 2020; Imperato et al., 2022; Musetti, Starcevic, et al., 2021).

According to the model of emotion regulation proposed by Gratz and Roemer (2004) and the motivational model proposed by Bischof-Kastner et al. (2014a), the current study focuses on emotion dysregulation and motives to use SNS as potential mechanisms involved in PSNSU and online social anxiety. Because of its integrating and transdiagnostic role, emotion dysregulation has been extensively investigated, including its associations with dysregulated Internet usage, and specific motives such as emotion suppression and escapism (Gioia et al., 2021).

The construct of emotion regulation refers to the awareness, understanding, and acceptance of emotions, and the ability to manage appropriate emotional responses to achieve personal goals and situational demands (Marino, Caselli, et al., 2019). Several cross-sectional and longitudinal studies have shown that emotion dysregulation is positively associated with problematic Internet use (Gioia et al., 2021; Pettorruso et al., 2020; Spada & Marino, 2017; Wartberg & Lindenberg, 2020), PSNSU (Hussain et al., 2021; Marino, Caselli, et al., 2019), and social anxiety related disorders, such as social phobia (Golombek et al., 2020). Specifically, it has been suggested (e.g., Marino, Caselli, et al., 2019) that SNS users who have difficulty regulating emotions (including emotional avoidance, lack of awareness, and poor impulse control) may tend to use SNS to regulate their emotions incurring and maintaining the problematic online behaviors via negative reinforcement, such as PSNSU and, eventually, online social anxiety. However, to date, despite

the evidence of the relationship between emotion dysregulation and social anxiety (e.g., Azad-Marzabadi & Amiri, 2017), there is a lack of studies exploring such association with online social anxiety.

People use SNS for a variety of purposes, which can be summarized as social connection (e.g., self-presentation, self-enhancement, or joining an online community), instrumental purposes (e.g., searching for information), or entertaining purposes (e.g., playing video games, watching video clips, listening to music; Kircaburun et al., 2020; Stöven & Herzberg, 2021; Zheng et al., 2020). According to the traditional motivational model of addictions (Cooper, 1994) applied to online behaviors, individuals' problematic online behaviors are motivated by expectancies that represent the valence (positive or negative) and the source (internal or external) of expected outcomes. It follows that four classes of motives can be generated: social (positive valence and external source; that is, expecting to gain social incentives and improve relationships with friends), conformity (negative valence and external source; using SNS because of friends' pressure and avoid social rejection), enhancement (positive valence and internal source; that is, expecting to improve positive affect using SNS), and coping (negative valence and internal source; that is, expecting to diminish bad feelings using SNS; Marino, Gini, et al., 2018). This model considers motives as proximal antecedents of problematic behaviors and they lead to engagement in the target behavior (Cooper, 1994). In line with this view, a recent longitudinal study (Q. Liu et al., 2022) confirmed the direction of the association between psychological needs and PSNSU, revealing that need for autonomy, competence and relatedness predicted social networking addiction at one year.

### *3.1.3. Hypothesized theoretical model developed for testing in the study*

The present study aimed at testing a model designed to assess the contribution of attachment patterns, emotion dysregulation, motives to use SNS on PSNSU, and online social anxiety simultaneously among Italian adults. The conceptual model is depicted in Figure 3.1. As

previously mentioned, a number of studies have shown that attachment patterns, emotion regulation, and motives for SNS use are associated with PSNSU. However, to date, no attempt has been made to examine the association of such psychological aspects with online social anxiety on SNS along with PSNSU.

First, two attachment dimensions (attachment anxiety and attachment avoidance) were included as independent variables in the current study, as they are plausible distal antecedents of problematic patterns of SNS use (e.g., Musetti et al., 2022). The quality of attachment relationships, both with parents and romantic partners, is considered as relatively stable over time because it reflects a systematic pattern of emotions and expectations towards close people (Schimmenti et al., 2021). Indeed, attachment is related to how individuals adjust their own emotional responses, and in turn to how they behave on the Internet and SNS (Schimmenti et al., 2021; W. Wang et al., 2018; Yu et al., 2013).

Secondly, emotion dysregulation was included as the first hypothesized mediator between attachment and problematic patterns of SNS use. Empirical studies (e.g., Liese et al., 2020) have shown that emotion dysregulation is negatively associated with secure attachment patterns and positively associated with insecure attachment patterns. For example, a study reported a partial mediation effect of emotion dysregulation between attachment anxiety and PSNSU (C. Liu & Ma, 2019b), thus suggesting a defective coping mechanism related to mood regulation. Attachment anxiety and attachment avoidance were found to have a positive association with emotion dysregulation and anxiety disorder symptoms (Marganska et al., 2013), accordingly attachment insecurity may support inadequate emotion regulation, increasing the likelihood of these disorders.

Thirdly, motives to use SNS were included as mediators between attachment and the two outcomes. Individual characteristics including attachment patterns (Baek et al., 2014), affective self-regulating abilities (Marino, Caselli, et al., 2019), and social anxiety tendency (Shensa et al.,

2018) have an impact on functional and dysfunctional SNS uses and motivations. Several motives for utilizing SNS have been associated with attachment anxiety and attachment avoidance. In particular, anxiously attached users exhibit stronger needs to belong and be well-liked, which in turn lead to feelings of fear of being excluded (Chang, 2019). Such users show an accentuated sensitivity to social feedback and an inclination for social comparison (Flynn et al., 2018; Oldmeadow et al., 2013). Moreover, maladaptive coping mechanisms involved in stressful life events and emotional difficulties may lead to the development of PSNSU (Pettorruso et al., 2020). As further examples, it has been found that attachment is indirectly associated with problematic use of specific SNS (i.e., Grindr, Facebook) via motivations related to companionship, escapism, and likes-seeking behaviors (Jayawardena et al., 2021; Vaillancourt-Morel et al., 2020). Another study (Chen, 2019) suggested that motives related to the satisfaction of the need for relatedness and self-presentation mediated the association between attachment anxiety and SNS addiction, further sustaining the hypothesized mechanism linking attachment to problematic patterns of SNS use via psychological motives.

Furthermore, motives to use SNS were included as serial mediators between emotion dysregulation and the two outcomes. To the authors' knowledge, no study specifically tested such association in a single model. However, a previous study on a different problematic online behavior (i.e., problematic gaming) showed that escapism motives partially mediated the relationship between difficulties in emotion regulation and problematic gaming (Blasi et al., 2019). Therefore, it is hypothesized that emotion dysregulation, as influenced by attachment, might strengthen certain motives to use SNS, which in turn are associated with PSNSU and online social anxiety. However, due to the lack of previous longitudinal studies on this specific series of mediators in the context of SNS and online social anxiety, an alternative model was tested, where

motives mediate the relationship between attachment and emotion dysregulation, which in turn is associated with the two outcomes.

Overall, the present study sought to test a single model in which it is hypothesized that attachment anxiety and avoidance are both directly and indirectly associated with PSNSU and online social anxiety, via emotion dysregulation (Mikulincer & Shaver, 2019) and different motives for SNS use (Stöven & Herzberg, 2021). Emotion dysregulation and motives, in turn, would be associated with levels of both PSNSU (Süral et al., 2019; Wartberg et al., 2021) and online social anxiety. Additionally, age, gender and time spent on SNS were included as control variables of the two outcomes because it has been repeatedly showed that being young (e.g., Livingstone, 2008), female (e.g., Hou et al., 2017; Kuss & Griffiths, 2017), and frequently using SNS (e.g., Zimmer, 2022) are risk factors for problematic patterns of SNS use (e.g., Marino, Gini, et al., 2018).

### **3.3 Methods**

#### *2.1. Participants and procedure*

An online questionnaire batch was used to collect data between December 2020 and January 2021 by means of advertisements shared in social network groups. Before starting the survey, all participants received information about the study and gave their online consent. The anonymity of the participants was guaranteed as no personal data or Internet Protocol address was collected. No compensation was given for participating in the study. Inclusion criteria were as follows: (i) being over 18 years; (ii) being able to complete questionnaires in Italian; and (iii) using at least one SNS. A total of 1017 individuals participated in the study, however incomplete questionnaires ( $n = 186$ ), questionnaires including more than 20% of missing data in the variables of interest ( $n = 19$ ), and non-binary identity ( $n = 2$ ) were excluded. Moreover, for the purpose of the current study, those

reporting not using any SNS ( $n = 43$ ) were also excluded. Using the Mahalanobis distance scores, 13 multivariate outliers were identified and removed. Therefore, the analyses were run on a final sample of 756 SNS users (50.4% females; mean age = 28.74 years,  $SD = 8.00$  years; age range = 19-69 years). Participants reported using SNS for about 2 hours and a half per day on average. Preferred SNS were WhatsApp, Facebook, Instagram, Telegram, TikTok, and YouTube. Twenty eight percent of respondents were university students and 66% workers, whereas the remaining were unemployed, housewives, or retired; 54.8% of the sample reported being single, 44.8% being in a stable relationship, and the remain was divorced or widowed.

This study was part of a larger research project on social media during the COVID-19 pandemic, and other data not related to the current study will be presented elsewhere. The study procedures were carried out in accordance with the Declaration of Helsinki. The Ethical Committee of the Center for Research and Psychological Intervention (CERIP) of the University of Messina approved the study (Protocol Number: 119094). All participants were informed about the study and all provided informed consent prior to the online survey, which took approximately 30 minutes to complete. This study did not involve human and/or animal experimentation.

### 3.2.2. Measures

*Problematic Social Networking Sites Use.* PSNSU was assessed with an adaptation of the Italian version of the Problematic Facebook Use Scale (Marino et al., 2017). Specifically, in each item the word “Facebook” was replaced with “social networking sites”. The scale includes 15 items (e.g., “*I prefer online social interaction over face-to-face communication*”; “*I would feel lost if I was unable to access social networking sites*”). Participants were asked to rate the extent to which they agreed with each item on an 8-point scale from 1 (*definitely disagree*) to 8 (*definitely agree*). Items were averaged to obtain continuous variables for a total score of PSNSU with higher

scores indicating higher levels of PSNSU. The Cronbach's alpha for the scale was .91 (95% CI .90-.92).

*Online Social Anxiety.* Online social anxiety was assessed with the Italian version (Ruggieri et al., 2020) of the Social Anxiety Scale for Social Media Users (SAS-SMU; Alkis et al., 2017). The scale includes 21 items (e.g., "*I am concerned about being ridiculed by others for the content I have shared*") about shared content anxiety, privacy concern anxiety, interaction anxiety, and self-evaluation anxiety. Participants were asked to rate how often they feel anxious or preoccupied on social media on a 5-point scale from 1 (*never*) to 5 (*always*). Items were averaged to obtain continuous variables for a total score of social anxiety concerning SM with higher scores indicating higher levels of online social anxiety. The Cronbach's alpha for the scale was .95 (95% CI .94-.95).

*Attachment.* Adult attachment was assessed with the Italian adaptation (Carli, 1995) of the Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991). The RQ includes four sentences each of which describes four prototypical attachment attitudes: (a) Secure ("*It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depending on me. I don't worry about being alone or having others non accept me*"); (b) Dismissing ("*I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me*"); (c) Preoccupied ("*I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them*"); (d) Fearful ("*I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others*"). Participants were required to indicate how well each

paragraph described them on a 7-point Likert scale from 1 (“*It does not describe me at all*”) to 7 (“*It very much describes me*”). Following previous research (Brennan et al., 1998), we used the scores on the four attitudes to calculate the two underlying dimensions of attachment anxiety [(fearful + preoccupied) – (secure + dismissing)] and avoidance [(fearful + dismissing) – (secure + preoccupied)]. The anxiety dimension refers to anxiety about abandonment, rejection, and unlovability, whereas the avoidance dimension refers to avoidance of dependency and intimacy.

*Emotion dysregulation.* Emotion dysregulation was assessed using the Italian version of the Difficulties in Emotion Regulation Strategies (DERS; Sighinolfi et al., 2010). The scale includes 36 items rated on a 5-point scale from 1 (“*Almost never*”) to 5 (“*Almost always*”) and covers six dimensions, labeled: lack of emotional awareness, lack of emotional clarity, difficulties controlling impulsive behaviors when distressed, difficulties engaging in goal-directed behavior when distressed, non-acceptance of negative emotional responses, and limited access to effective emotional regulation strategies. Items were averaged to obtain a continuous score for emotion dysregulation with higher scores indicating more difficulties in emotion regulation. The Cronbach’s alpha for the scale was .93 (95% CI .92-.94).

*Motives to use SNS.* Motives for using SNS were assessed with an adapted version of the Facebook Motives Questionnaire (Marino, Gini, et al., 2018; original version by Bischof-Kastner et al., 2014) to SNS in general. This adapted scale has already been used among Italian adults and showed good validity properties (Marino et al., 2016). Participants were asked how often they logged on SNS for different motivations, thinking of all the times they have been on SNS during the last 12 months. The scale includes four motives: coping (e.g., “*To forget your worries?*”), conformity (e.g., “*To be liked by others?*”), enhancement (e.g., “*Because it is exciting?*”), and social motive (e.g., “*To come into contact with others?*”). The questionnaire contains 16 items rated on a 5-point scale from 1 (“*Never or almost never*”) to 5 (“*Always or almost always*”) so that

higher scores indicate higher levels on each motive. The Cronbach's alphas for the subscales were as follows: .87 (95% CI .88-.89) for coping; .77 (95% CI .74-.80) for conformity; .70 (95% CI .67-.74) for enhancement; and .84 (95% CI .82-.86) for social motive.

### *3.2.3. Statistical analysis*

First, in order to test the associations between the variables of interest, correlation analyses were conducted. Second, the pattern of relationships specified by our hypothesized model (Figure 3.1) was examined through a path analysis, using the package Lavaan (Rosseel, 2012) of the software R (R Development Core Team, 2017) and utilizing a single observed score for each construct included in the model. The covariance matrix of the observed variable was analyzed with Robust Maximum Likelihood method estimator as some variables were non-normally distributed (see Table 3.1). The Sobel test (Baron & Kenny, 1986; Hayes, 2009) was used to test for mediation. To evaluate the goodness of fit of the model we considered the  $R^2$  of each endogenous variable and the total coefficient of determination (Bollen, 1989; Jöreskog & Sörbom, 1996). In the tested model, PSNSU and online social anxiety were the dependent variables, emotion dysregulation, and the four motives were the mediators, and attachment anxiety and avoidance were the independent variables, whereas age, gender, and time spent on SNS were included as control variables on the two outcomes (Figure 3.1).

## **3.4 Results**

Table 3.1 shows the means, standard deviations, range, skewness, kurtosis, and bivariate correlations between the variables included in the study. Most of the study variables were correlated with each other, with the exception of attachment avoidance which appears to be weakly and positively associated with online social anxiety and DERS, and negatively with social motive only. Of note is that a large positive correlation was found between PSNSU and online social

anxiety, as well as between DERS and the two outcomes. The strongest correlations were observed between coping motive and the two outcomes. Overall, time spent on SNS was positively associated with all the other variables with the exception of avoidance and with the strongest association observed with PSNSU. With regards to demographic characteristics, age was negatively, though weakly, associated with all variables of interest, whereas gender was positively and very weakly associated with the two outcomes, the two attachment dimensions, and two motives (coping and enhancement).

**Table 3.1***Correlation matrix for the study variables.*

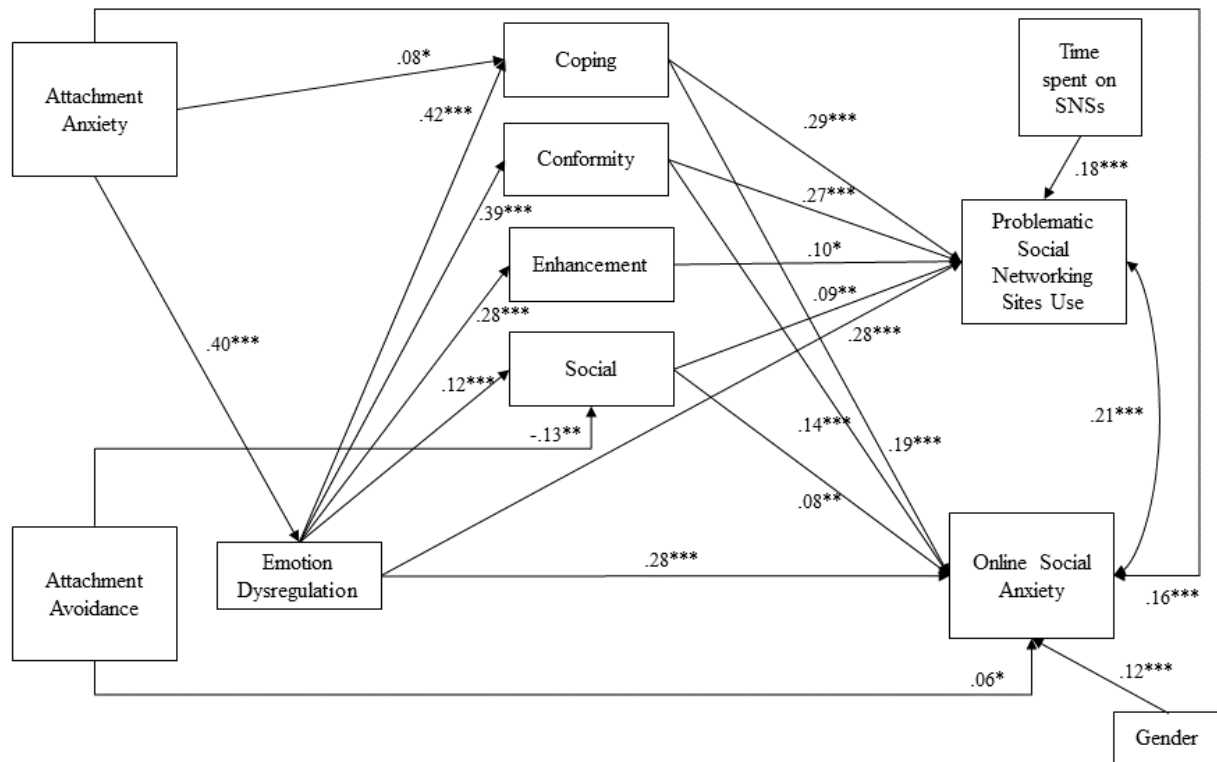
	<i>M</i>	<i>SD</i>	Range	Skewness (.089)	Kurtosis (.176)	1	2	3	4	5	6	7	8	9	10	11
1. PSNSU	2.20	1.11	1-6.07	1.06	.50	-										
2. Online social anxiety	2.07	.77	1-4.62	.51	-.42	.54***	-									
3. Anxiety	-.96	4.40	-12-11	.18	-.67	.25***	.36***	-								
4. Avoidance	.49	4.42	-12-11	.16	-.56	.01	.13***	.23***	-							
5. DERS	2.33	.60	1.11-4.44	.53	-.01	.53***	.49***	.39***	.08*	-						
6. Coping	1.88	.90	1-5	1.19	.95	.63***	.49***	.24***	.04	.46***	-					
7. Conformity	1.44	.60	1-4	1.60	2.26	.58***	.43***	.16***	.006	.41***	.48***	-				
8. Enhancement	1.97	.72	1-5	.74	.34	.52***	.38***	.08*	.01	.28***	.63***	.46***	-			
9. Social	2.51	.98	1-5	.45	-.45	.37***	.23***	-.04	-.11**	.09**	.35***	.33***	.51***	-		
10. SNS time	2.45	1.70	0-12	1.45	3.56	.37***	.15***	.09**	.002	.17***	.29***	.16***	.29***	.29***	-	
11. Age	28.73	8.00	19-69	-	-	-.27***	-.17***	-.15***	-.12**	-.22***	-.26***	-.13**	-.29***	-.24***	-.26***	-
12. Gender	-	-	-	-	-	.09*	.20***	.14***	.08*	.03	.21***	.05	.09**	.04	.06	-.05

*Notes.* \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ;  $N = 756$ ; males (1) - females (2); PSNSU = Problematic Social Networking Sites Use; Anxiety = Attachment Anxiety; Avoidance = Attachment Avoidance; DERS = Difficulties in Emotion Regulation Strategies; SNS time = hours spent daily on social networking sites.

The theoretical model was tested including all the variables of interest. Several coefficients did not reach statistical significance: the links between attachment avoidance and four mediators (i.e., DERS, coping, conformity, enhancement), and PSNSU; the associations between attachment anxiety and three mediators (i.e., conformity, enhancement, social), and PSNSU; the association between enhancement and online social anxiety; the associations between age and gender with PSNSU and between age, gender, time spent on SNS with online social anxiety. Those links were removed step-by-step in order to obtain a parsimonious model in which all paths were significant at least at the  $p < .05$  level. As shown in Figure 3.2, the two attachment dimensions were directly but weakly associated with one outcome (online social anxiety). Overall, positive and medium associations were found especially between attachment anxiety and DERS, and between DERS, two motives (i.e., coping and conformity), and the two outcomes. Smaller associations were observed between DERS and the other two motives (i.e., enhancement and social) that, in turn, were weakly associated with PSNSU. As shown in Table 3.2, several indirect associations were found to be significant. Results of the Sobel test supported the mediating role of DERS in the association between attachment anxiety and both the outcomes and the serial mediating role of DERS and the four motives in the same associations. Attachment avoidance was only associated with social motive which, in turn, was weakly associated with both outcomes.

**Figure 3.2**

*Tested model of the inter-relationships between the study variables.*



Notes. \* $p < 0.05$ , \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ;  $N = 756$ ; Gender: males (1) - females (2).

The squared multiple correlations for the endogenous variables indicate that the model accounts for 49% of the variance of PSNSU and 36% of online social anxiety. Less variance is explained for mediators: 16% for DERS, 21% for coping, 15% for conformity, 8% for enhancement, and 3% for social motive. Finally, the total amount variance explained by the model (Total Coefficient of Determination,  $TCD = .28$ ) indicated an acceptable fit to the observed data. In terms of effect size,  $TCD = .28$  corresponds to a correlation of  $r = .53$ . According to the Cohen's (1988) traditional criteria, this is a medium effect size.

**Table 3.2**

*Standardized direct, indirect, and total effects of the independent variables (attachment anxiety and attachment avoidance) on the two outcomes (PSNSU and online social anxiety) via the mediators (emotion dysregulation and motives to use SNS).*

Independent	Mediators	PSNSU				Outcome			
		Beta	SE	<i>z</i>	<i>p</i>	Beta	SE	<i>z</i>	<i>p</i>
Anxiety		-	-	-	-	.163	.032	4.89	<.001
	DERS	.111	.016	6.44	<.001	.111	.018	6.12	<.001
	Total effect via DERS	-	-	-	-	.274	.033	8.16	<.001
	DERS→Coping	.049	.009	4.82	<.001	.033	.008	4.17	<.001
	Total effect via DERS and Coping	-	-	-	-	.196	.033	5.73	<.001
	DERS→Conformity	.041	.007	5.26	<.001	.021	.006	3.14	.002
	Total effect via DERS and Conformity	-	-	-	-	.051	.029	1.73	.084
	DERS→Enhancement	.011	.004	2.24	.025	-	-	-	-
	DERS → Social	.004	.002	2.05	.040	.004	.002	1.97	.049
	Total effect via DERS and Social	-	-	-	-	.167	.032	4.97	<.001
Avoidance		-	-	-	-	.062	.029	2.08	.037
	Social	-.011	.005	-2.12	.034	-.010	.005	-2.09	.037
	Total effect via Social	-	-	-	-	.051	.029	1.73	.084

*Notes.* PSNSU = Problematic Social Networking Sites Use; Anxiety = Attachment Anxiety; Avoidance = Attachment Avoidance; DERS = Difficulties in Emotion Regulation Strategies.

### **3.5 Discussion**

The goal of the present study was to examine the contribution of theory-driven factors to PSNSU and online social anxiety. Bivariate correlations showed that the two outcomes were associated with each other sustaining the idea that socially anxious individuals may perceive online interactions as safer but engage in maladaptive safety behaviors that may lead to a long-term preference for online communications rather than face-to-face interactions (Carruthers et al., 2019).

With regards to attachment, bivariate correlations indicated a positive association between attachment anxiety and the two outcome variables and between attachment avoidance and online social anxiety. Overall, results are in line with a recent systematic review (Musetti et al., 2022), indicating a clear association between attachment anxiety and PSNSU, while findings on attachment avoidance appeared to be more controversial. However, when emotion dysregulation and motives were included in the path analysis, the results of this study provided additional evidence on the weak associations between attachment anxiety, attachment avoidance and online social anxiety. That is, interestingly, results from the path analysis suggested that individuals with attachment insecurities are more likely to develop PSNSU because they have more difficulties in satisfying their social and emotional needs.

With regards to attachment anxiety, it was positively associated with emotion dysregulation, which, in turn, was positively associated with PSNSU (Faghani et al., 2020). Attachment anxiety implies an overinvolvement in SNS as an attempt to deal with fear of abandonment and rejection (L. Young et al., 2020). As such, people high in attachment anxiety may tend to have more difficulties in emotion regulation resulting both in PSNSU, for example using of SNS for mood regulation and cognitive preoccupation about what happens on SNS (e.g., Marino et al., 2017), and in online social anxiety, for example developing specific fears about shared contents, and self-

evaluation anxiety (Alkis et al., 2017). Further, difficulties in regulating emotions were associated with stronger motives to use SNS to satisfy psycho-social needs. Specifically, the strongest associations were observed between emotional dysregulation and the two motives with negative valence (i.e., coping and conformity). This is not surprising because people experiencing difficulties in emotion regulation are likely to attempt to manage engaging in dysfunctional strategies, such as using SNS to decrease unwanted negative internal states (i.e., coping) and to decrease the feeling of being excluded from others (i.e., conformity). Coherently, these two motives are also the ones showing the strongest associations with the two outcomes. Indeed, coping and conformity are often considered more problematic as compared to enhancement and social motives (Marino, Mazzieri, et al., 2018) because they are driven by the expectancy to decrease a negative state, which is, on the contrary, often frustrated rather than satisfied on SNS (Brand et al., 2016; O'Day & Heimberg, 2021). Overall, enhancement is only associated with PSNSU, while the three other motives (coping, conformity, and social) are associated with both PSNSU and online social anxiety. This could indicate that socially anxious individuals compensate for poor relational skills with coping mechanisms, with the intent of presenting themselves as more socially competent (Kardefelt-Winther, 2014).

With regard to attachment avoidance, results from the path analysis showed that it had an overall marginal role in explaining the two outcomes. Specifically, attachment avoidance was only directly and weakly related to online social anxiety. This suggests that SNS users with high levels of avoidance attachment may employ SNS not to interact and create close contacts, a situation in which they expose themselves to possible judgment, but to create relationships at a distance so as not to confront others and keep the relation under control (L. Young et al., 2020). Moreover, attachment avoidance was negatively associated with the social motive, which, in turn, was positively but weakly associated with both PSNSU and online social anxiety. It could be argued that individuals with high levels of attachment avoidance and withdrawing attitudes (Mikulincer

& Shaver, 2007) may not use SNS interactively, due to preoccupations with reciprocal relationships with others. Instead, they would fulfill their social needs and motivations by establishing a safe distance from other individuals (Vaillancourt-Morel et al., 2020). Consequently, it could be noted that people suffering from online social anxiety are afraid of others because of cognitive biases and negative implicit evaluations of others, showing continuity between offline relational impairment and online socializations (Weidman & Levinson, 2015). This is in line with recent studies (Ali et al., 2021), that suggested a close relation between avoidance of direct social contacts, implicit negative evaluations and fear of rejection, and compulsive social networking sites usage. Social interaction may thus be mediated by a compensatory use of online social platforms (Xie & Karan, 2019).

Regarding the control variables, results from the present study indicated that time spent on SNS is directly associated with PSNSU and online social anxiety, suggesting that a longer time spent on SNS is related to more PSNSU and online social anxiety. However, some authors (e.g., Laconi et al., 2015; Marino, Gini, et al., 2018) showed that prolonged use alone does not necessarily imply problematic or addictive behaviors but may increase the likelihood of loss of control over SNS use. Regarding gender differences, in the present study females reported higher levels of PSNSU and online social anxiety in line with several previous research (Marino, Mazzieri, et al., 2018).

Our findings have implications that need to be acknowledged. The creation of digital social environments (Musetti & Corsano, 2018) is leading more individuals to use SNS as extensions and alternatives to face-to-face interactions. This could result in unsuccessful or maladaptive cognitive and behavioral schemata that could have clinical implications. Psychological and preventive interventions should address the specific intrapersonal and interpersonal mediating factors between different attachment dimensions, PSNSU, and the individual's propensity to online social anxiety (Ruggieri et al., 2020; Zsido et al., 2021).

### *Limitations*

The present study has a number of limitations. PSNSU is a concept that is still being debated (see Starcevic et al., 2020; Svicher et al., 2021). As such, PSNSU was evaluated as a whole phenomenon and in the present study no specific social media was separately explored. Moreover, given the cross-sectional design of the study, the direction of the association is only suggestive and no definitive conclusions can be drawn about the stability of the identified mediated effects. In order to partially overcome this issue, an alternative model (with motives and emotion dysregulation as serial mediators) was explored. This model has a comparable fit to the original model. However, the alternative model accounts for less variance of the two outcomes and mediators (44% for PSNSU; 33% for online social anxiety; 6% for coping; 2% for conformity; 7% for enhancement; 1% for social; 29% for emotion dysregulation). Thus, longitudinal studies are still needed to inspect causality relationships among the variables and further examine the proposed serial mediations.

Given that previous studies have shown distinct effects of the COVID-19 pandemic on mental health, particularly during the early stages of the pandemic compared to pre-pandemic outbreak (Aknin et al., 2022; Robinson et al., 2022), and on social media usage (Bailey et al., 2022; Litwin & Levinsky, 2022), our results may have been affected by the context during the administration of the questionnaires.

Furthermore, we used a snowball convenience sampling, not necessarily representing the general population, and the obtained data were collected through self-report measures, thus being susceptible to response bias. Finally, we did not include a measure of offline social anxiety, therefore we could not draw any conclusions about the risk of developing online social anxiety in absence of pre-existing vulnerabilities to social anxiety.

### *Conclusions*

Despite these limitations, the presented model revealed a complex intertwined phenomenon related to emotional, social, and cognitive factors that at least partially explained the mechanism underlying the relationship between attachment patterns, PSNSU, and online social anxiety. Emotion dysregulation and specific psycho-social motives are strictly associated with two different sides of maladaptive SNS use (i.e., PSNSU and online social anxiety) and, as such, could be tackled through clinical and prevention interventions.

## **4. STUDY 2**

### **Examining the relationships between attachment, reflective functioning, motives, and Problematic Social Networking Site Use among elderly adults**

#### **4.1 Abstract**

In recent years, SNS have become integral to daily life across different age groups, reflecting its global influence. Despite extensive research on adolescents and young adults, there is a growing recognition of the need to study the psychological impact of SNS among older adults due to their rising demographic importance. This study explores the relationships between attachment, reflective functioning, motives for SNS use, and PSNSU among elderly. The final sample comprised 4,947 adults aged 60 years or older, primarily Italian, recruited via snowball sampling. Various measures were used, including the Relationship Questionnaire for attachment, the Bergen Social Media Addiction Scale for PSNSU, the Reflective Functioning Questionnaire for mentalization, and the adapted Facebook Motives Questionnaire for motives to use SNS. Attachment anxiety positively predicted PSNSU, indicating that individuals with higher attachment anxiety are more susceptible to engaging in problematic online behaviors. Mediation analysis revealed that difficulties in reflective functioning (i.e., hypomentalization), characterized by difficulties in understanding and interpreting one's own and others' mental states, mediated the relationship between attachment anxiety and PSNSU. Additionally, motives for SNS use, particularly Coping, Conformity, and Enhancement, were identified as mediators between attachment anxiety and PSNSU. These motives suggest that older adults with higher attachment anxiety may resort to SNS for coping, validation, and self-presentation. The study underscores the significance of considering attachment anxiety and hypomentalization as factors associated with PSNSU among older adults, shedding light on the role of cognitive and emotional processes in online behaviors. While acknowledging limitations related to cultural and methodological aspects,

this study offers valuable insights for researchers and practitioners in understanding and addressing PSNSU in the elderly population. By recognizing attachment anxiety, hypomentalization, and specific motives as significant factors in problematic online behaviors, this study contributes in improving users' comprehension of SNS and in the creation of strategies to encourage responsible and more beneficial SNS usage among older adults.

## **4.2 Introduction**

In recent decades, SNS have become an integral part of daily life for millions around the world, encompassing individuals of various age groups. The rapid advancement of digital technology and communication has increased the importance of SNS in both Western (Pérez-Castro et al., 2021) and Eastern countries (Yao et al., 2021). With the proliferation of smartphones and increased Internet accessibility, individuals have become increasingly engaged with SNS platforms, leading to a significant rise in online activity. In fact, the amount of time spent online has steadily increased over the past 10 years (Johnson, 2022). Though extensive research has centered on adolescents and young adults regarding their use of SNS (Varona et al., 2022), there is an increasing acknowledgment of the importance of investigating this phenomenon among older adults (Ramírez-Correa et al., 2023; Rondán-Cataluña et al., 2020). This recognition stems from the fact that older adult population is experiencing a faster growth rate than any other age segment in western societies, particularly in Europe (Eurostat, 2023), highlighting the need to understand their SNS usage patterns and potential implications.

Research on the impact of SNS on older users' mental health has yielded mixed findings, highlighting both positive and negative effects (Newman et al., 2021), however, it is crucial to approach these findings with caution due to the limited number of studies and the potential constraints in the sampling methodology used (Wiwatkunupakarn et al., 2022). On one hand, SNS offer a range of benefits. They provide opportunities for increased social support: one of the main

reasons for SNS use among elderly users is to allow individuals to connect with others and maintain close relationships with family and friends (Hussenoeder, 2022; Jung et al., 2017). SNS also offer perceived emotional support, with users finding solace, empathy, and validation through online interactions (Hu et al., 2022), especially after specific training to the use of SNS (Rolandi et al., 2020). One concerning trend is the increasing number of elderly adults living in solitude, without the company of close relatives. This situation of isolation can lead to various mental health issues, notably depression, which in turn may have detrimental effects on the overall health and well-being of this age group (Marzan et al., 2022). Indeed, certain studies have indicated that SNS use among older individuals may be associated with a modest reduction in levels of depression and perceived loneliness (Wiwatkunupakarn et al., 2022). Additionally, these platforms serve as valuable sources of health information, promoting health literacy and enabling users to access valuable resources (Prochaska et al., 2017). Furthermore, SNS have been leveraged as platforms for health promotion campaigns, disseminating information and fostering healthy behaviors (Korjian & Gibson, 2022). On the other hand, research has also identified adverse outcomes associated with SNS use. Poor sleep quality has been reported among individuals who engage in prolonged SNS use, potentially due to increased exposure to stimulating content and disrupted sleep patterns (MacKenzie et al., 2022), however mixed results emerged among elderly, after controlling for previous mental health and sleep problems (van Der Velden et al., 2019). Furthermore, anxiety and psychological distress have been associated with problematic SNS use, particularly when individuals experience social comparison, cyberbullying, or fear of missing out (Keles et al., 2020).

Within the spectrum of SNS users, a subset of individuals develops a dysfunctional usage known as Problematic Social Networking Sites Use (PSNSU) (Musetti et al., 2022). PSNSU is characterized by reduced impulse control over online behaviors, persistence in repeating problematic online behaviors despite negative consequences, and functional impairment in various

aspects of everyday life, including study, work, or social activities (Bányai et al., 2017b; Cataldo et al., 2022). This phenomenon has been found to have adverse effects on personal health and psychological well-being (Marino, Gini, et al., 2018). To gain insight into the factors contributing to harmful outcomes and understand why certain users are more susceptible to developing dysfunctional behavioral patterns, it is crucial to develop a comprehensive understanding of the specific behaviors or online activities that may lead to such conditions. This is particularly relevant for older adults, as they may be at an increased risk of social isolation, loneliness, and a lack of social support due to decreased social interaction (van Ingen et al., 2017). However, SNS also hold potential benefits for older adults, offering opportunities to alleviate social isolation, facilitate meaningful connections, and improve emotional well-being (Khosravi et al., 2016; Winstead et al., 2013). By engaging with SNS, older adults can overcome barriers posed by geographical distance or limited mobility, fulfilling their need for social connection and meaningful relationships, including those with family and acquaintances (Leist, 2013). Through these digital platforms, older adults can maintain and strengthen their bonds with family members, reconnect with long-lost acquaintances, and foster new connections with individuals who share similar interests or backgrounds.

Despite the increasing interest in PSNSU, the majority of studies have primarily focused on adolescents and young adults, neglecting the examination of SNS use and potential dysfunctional usage among older populations (Jung & Sundar, 2016). Therefore, there is a pressing need to investigate the behavioral patterns and motivations that lead to SNS use among older individuals. This exploration can shed light on possible discrepancies and correspondences in how SNS are used and perceived across different age groups. Expanding research efforts to include older adults is essential for developing a comprehensive understanding of the impact of SNS on their well-being and identifying potential strategies to promote healthy and beneficial SNS use among this population. Such insights can inform interventions and support systems tailored to the specific

needs of older adults, ultimately enhancing their social connectedness, emotional well-being, and overall quality of life.

The present study aimed to investigate the relationships between attachment, reflective functioning, motives to use SNS, and PSNSU among adults aged 60 years and older. In particular, the two dimensions of insecure attachment – anxiety and avoidance - have been identified as a potential contributor for PSNSU (Marino et al., 2022). Attachment anxiety is characterized by a heightened need for reassurance, fear of rejection, and a tendency to seek validation from others (Griffin & Bartholomew, 1994). This heightened need for validation and reassurance may drive individuals to use SNS as a way to compensate for poor relational skills, potentially leading to problematic uses (Kardefelt-Winther, 2014). However, the relationship between attachment avoidance and PSNSU is less clear and warrants further investigation (see the systematic review by Musetti et al., 2022). Attachment avoidance is characterized by a discomfort with emotional intimacy and a tendency to avoid close relationships. Individuals with high attachment avoidance may engage in excessive online interactions as a way to maintain emotional distance and avoid intimacy (D'Arienzo et al., 2019). Still, the specific mechanisms through which attachment avoidance may contribute to PSNSU require further exploration.

Reflective functioning encompass the ability to comprehend and make sense of one's own mental states as well as the mental states of others (Fonagy et al., 2016). Studies indicate that specific elements of reflective functioning, such as hypomentalization (limited capacity to mentalize) and hypermentalization (excessive yet inaccurate mentalization), may be associated with PSNSU (Imperato et al., 2022). These findings suggest that a general deficiency in reflective functioning could potentially serve as a risk factor for the development of PSNSU symptoms. In other words, individuals who struggle to effectively understand and interpret their own and others' mental states may be more prone to engaging in problematic behaviors on SNS. In addition, the motives that underly for engaging in SNS usage can vary widely among individuals, and include

coping mechanisms, conformity, enhancement of self-esteem, and social connection. Research suggests (e.g., Marino et al., 2022) that specific motives to use SNS, such as coping motives (using SNS to alleviate stress or escape from negative emotions) and conformity motives (using SNS to fit in or conform to social norms), may be positively associated with PSNSU. These motives may drive individuals to rely excessively on SNS as a means of coping with challenges or seeking validation, potentially leading to PSNSU. Additionally, social motives, such as seeking social connection and maintaining relationships, may have a more nuanced association with PSNSU (e.g., Schivinski et al., 2020). While social motives can provide positive outcomes and fulfill individuals' social needs, excessive reliance on SNS for social interaction may lead to neglect of offline relationships, and social isolation, thereby increasing the risk of developing PSNSU.

In addition, individuals' motivations for engaging in SNS usage can vary widely among individuals, and include coping mechanisms, conformity, self-esteem enhancement, and social connection. Existing research (e.g., Marino et al., 2022) showed that specific motives for using SNS, such as coping motives (using SNS to alleviate stress or escape negative emotions) and conformity motives (using SNS to fit in or conform to social norms), are positively associated with PSNSU. These motives can drive individuals to excessively rely on SNS as a coping mechanism or for seeking validation, potentially leading to the development of PSNSU. Moreover, social motives, including the desire for social connection and relationship maintenance, may exhibit a more nuanced association with PSNSU (e.g., Schivinski et al., 2020).

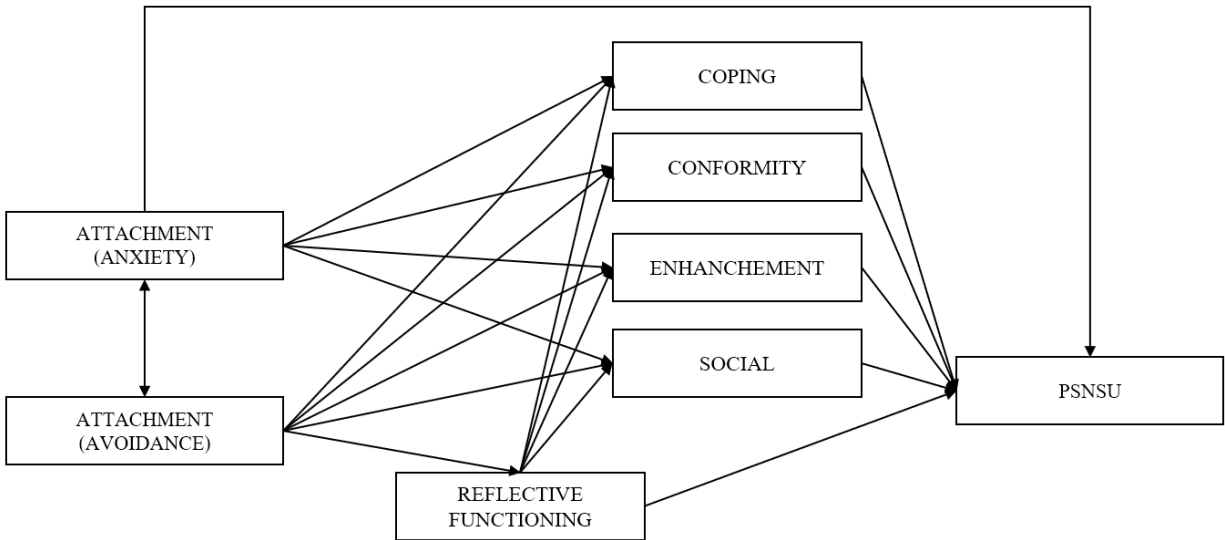
The present study adopts a mediation analysis design to comprehensively examine the relationships between attachment, reflective functioning, motives to use SNS, and PSNSU among adults aged 60 years and older. This approach allows for a detailed exploration of direct and indirect effects, in particular how attachment styles might relate to PSNSU directly or indirectly through specific motives for SNS use and individuals' reflective functioning.

Based on previous studies (e.g., Musetti et al., 2022), the study objectives were as follows: (1) investigate the association between the two attachment dimensions (attachment anxiety and attachment avoidance) and PSNSU among older adults. Specifically, the study aimed to examine whether there is a direct association between the two attachment dimensions and PSNSU in this population; (2) explore the indirect association between motives for SNS use, reflective functioning, and PSNSU. This objective focused on investigating the potential mediating roles of motives for SNS use (i.e., Coping, Conformity, Enhancement, and Social motives) and reflective functioning in the relationships between attachment dimensions and PSNSU. Regarding the potential indirect effects between variables, we hypothesize, along with recent findings (e.g., Marino et al., 2022) that (a) attachment may have an indirect effect on motives for SNS use over PSNSU, in particular higher levels of attachment anxiety may lead to an increased Coping motive, and subsequently to PSNSU; (b) likewise, attachment avoidance may be negatively associated with the Social motive, leading to a greater likelihood of experiencing PSNSU; (c) expanding on findings observed in adolescents and young adults (Imperato et al., 2022; Musetti, Starcevic, et al., 2021), we hypothesize that lower reflective functioning among older adults may contribute to adopting SNS as a coping mechanism or seeking validation, thus increasing the risk of developing PSNSU.

The model of the study is depicted in Figure 4.1.

**Figure 4.1**

*Model of the study*



*Notes.* PSNSU = Problematic Social Networking Sites Use.

The present study aimed to address the limited research on SNS use among older adults, specifically focusing on PSNSU. As older adults increasingly adopt SNS platforms, it is crucial to understand the implications of SNS use on their well-being and social functioning. While SNS use among older adults presents opportunities for social connection and resource access, it also poses challenges such as social isolation and decreased well-being.

### **4.3 Methods**

#### *Participants and procedures*

A total of 7,073 online surveys were completed for this study. However, due to incomplete data or outlier identification, 2,126 cases were excluded from the analysis. Consequently, the final sample consisted of 4,947 adults (58% females; 94% Italian), aged 60 years or older ( $M_{\text{age}} = 66.98$ ;

$SD_{age} = 6.99$ ), recruited through snowball sampling. Inclusion criteria included being equal to or above the age of 60 years old, being able to understand questionnaires in Italian and completing the survey in its entirety. Participants took part in the study anonymously, and prior to starting the questionnaires, participants were provided with a brief explanation of the study's objectives and procedures. They then provided informed consent electronically. The collected data was part of a larger research project on social media. Ethical approval for the study was obtained from the Ethics Committee of the University of Parma, Italy (Protocol number 0085794), and the study adhered to the principles outlined in the 1964 Declaration of Helsinki and its subsequent amendments.

## **Measures**

### *Attachment*

To assess adult attachment, the Relationship Questionnaire (RQ; Italian version by Carli, 1995) was utilized. The RQ is specifically designed to measure attachment styles in adults and comprises four distinct styles: Secure, Preoccupied, Fearful-Avoidant, and Dismissive-Avoidant. It consists of four statements, each representing one of the typical attachment attitudes. Participants were instructed to rate the extent to which each statement described their own attachment style on a 7-point Likert scale, ranging from 1 (*It does not describe me at all*) to 7 (*It very much describes me*). Consistent with previous studies (Brennan et al., 1998), the scores obtained for the four attachment attitudes were utilized to calculate the two underlying dimensions of attachment: attachment anxiety [(fearful + preoccupied) - (secure + dismissing)] and attachment avoidance [(fearful + dismissing) - (secure + preoccupied)]. One statement corresponding to the Style A (Secure) is “*It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.*” The RQ has been widely employed in research and has consistently demonstrated robust psychometric properties, including reliability and validity

(Wongpakaran et al., 2021). Additional descriptive information about the implemented instruments is reported in Table 4.1.

#### *Problematic Social Networking Sites Use*

PSNSU was assessed using the Italian version (Monacis, De Palo, Griffiths, & Sinatra, 2017) of the Bergen Social Media Addiction Scale (BSMAS; Andreassen et al., 2016). The BSMAS is designed to evaluate individuals' tendencies towards addiction related to their social media usage, incorporating addiction components such as salience, mood modification, tolerance, withdrawal, conflict, and relapse. It consists of six items, each targeting one of the core addiction components, for example "*How often during the past 12 months have you felt an urge to use SNS more and more?*". Participants rated their experiences over the past 12 months on a 5-point Likert scale, ranging from 1 (very rarely) to 5 (very often). The BSMAS has demonstrated favorable psychometric properties and has been validated in diverse populations and cultural contexts (Fournier et al., 2023). In the current study, the internal consistency of the scale, as assessed by Cronbach's  $\alpha$ , was found to be 0.84.

#### *Reflective functioning*

The eight-item Reflective Functioning Questionnaire (RFQ-8; Fonagy et al., 2016; Italian validation by Morandotti et al., 2018) is a self-report questionnaire for the evaluation of an individual's capacity for mentalization and reflective functioning, which refers to the ability to understand and interpret one's own and others' mental states. It assesses how individuals make sense of their own thoughts and emotions as well as how they perceive and understand the thoughts and emotions of others. The RFQ eight items include statements such as "*People's thoughts are a mystery to me*" and "*I find it hard to know what I am feeling*". Participants rate each statement using a seven-point Likert scale, from 1 (*strongly disagree*) to 7 (*strongly agree*). In the context of this specific study's results, we considered only the dimension of hypomentalization in the RFQ

as the other dimension (i.e., hypermentalization) did not show statistical significance. Similarly, in Tables 4.1 and 4.3, only one dimension of the RFQ is reported, as the other dimension was found to be statistically non-significant. Hypomentalization refers to a deficiency in an individual's reflective functioning, specifically related to their ability to understand and interpret their own and other's mental states and emotions accurately and effectively. People with hypomentalization may find it challenging to identify and articulate their feelings, thoughts, and intentions, leading to a reduced capacity to self-reflect and comprehend their internal experiences and. This deficit in reflective functioning can hinder their ability to establish meaningful interpersonal connections and may potentially contribute to various psychological difficulties (see Fonagy et al., 2016),

#### *Motives to use SNS*

Different motives to use SNS were measured with an adaptation of the Facebook Motives Questionnaire (Marino et al., 2016); original version by (Bischof-Kastner et al., 2014b). Hence, the word "Facebook" was replaced with "Social Networking Sites" for general SNS context. The questionnaire consists of 16 items rated on a 5-point Likert scale, ranging from 1 ("*Never or almost never*") to 5 ("*Always or almost always*"), so that higher scores indicate higher motivational levels. In particular, this questionnaire covers four motivational subscales: Coping (e.g., "*To forget about your problem*"), Conformity (e.g., "*To be liked by others*"), Enhancement (e.g., "*Simply because it is fun*"), and Social (e.g., "*To share a special occasion with friends*"). The Cronbach's  $\alpha$  for each motive was as follows: 0.89 for Coping; 0.78 and Conformity; 0.74 for Enhancement; and 0.88 for Social motive.

**Table 4.1***Scales descriptives*

	min	max	<i>M</i>	<i>SD</i>	95% IC	Skewness	Kurtosis
RQ Anxiety	-12.00	12.00	-1.50	3.90	[-1.61, -1.39]	0.31	-0.23
RQ Avoidance	-12.00	12.00	0.22	4.07	[0.10, 0.33]	0.07	-0.67
RFQ Hypomentalization	6.00	30.00	9.46	4.11	[9.35, 9.58]	1.42	1.97
PSNSU	0.00	3.00	0.61	0.59	[0.60, 0.63]	1.33	1.56
FMQ Coping	4.00	20.00	6.77	3.52	[6.67, 6.87]	1.42	1.50
FMQ Conformity	4.00	20.00	6.02	2.79	[5.95, 6.10]	1.66	2.40
FMQ Enhancement	4.00	20.00	7.09	3.03	[7.01, 7.18]	1.11	1.13
FMQ Social	4.00	20.00	9.96	4.59	[9.83, 10.09]	0.34	-0.92

*Note.* RQ = Relationship Questionnaire; RFQ = Reflective Functioning Questionnaire; PSNSU = Problematic social networking sites use; FMQ = Facebook Motives Questionnaire.

**Statistical Analysis**

Statistical analysis was carried out using the R language with the following packages: ltm (Rizopoulos, 2006), DescTools (Signorell et al., 2019), and lavaan (Rosseel, 2012). After conducting descriptive analysis, Spearman correlations were calculated to examine the relationships between the variables of interest. Furthermore, path analysis was used to analyze the relationship pattern outlined in the theoretical model. Given the non-normal distribution of all variables, the covariance matrix of the observed variables was examined using the maximum likelihood method estimator, and bootstrap confidence intervals and standard errors were implemented. The goodness of fit of the model was assessed by considering the  $R^2$  values of each endogenous variable and the total coefficient of determination (Bollen, 1989). In the tested model, PSNSU was the dependent variable, while mentalization and the four motives served as mediators. Attachment anxiety and avoidance were the independent variables.

#### 4.4 Results

The results of the study are synthetically presented in Tables 4.2 and 4.3. Table 4.2 presents the descriptive statistics of the sample, while Table 4.3 shows the Spearman correlations among the variables examined in the study. Most variables displayed significant correlations, except for attachment avoidance, which showed weak associations with PSNSU ( $\rho = 0.06, p < 0.001$ ), Coping motive ( $\rho = 0.04, p = 0.03$ ), and Social motive ( $\rho = -0.08, p < 0.001$ ). PSNSU showed weak correlations with motives: Coping ( $\rho = 0.09, p < 0.001$ ), Conformity ( $\rho = 0.06, p < 0.001$ ), Enhancement ( $\rho = 0.08, p < 0.001$ ), and Social ( $\rho = 0.01, p < 0.001$ ). Notably, a substantial positive correlation emerged between hypomentalization and all motives. Particularly strong correlations were observed with Coping ( $\rho = 0.69, p < 0.001$ ), Conformity ( $\rho = 0.56, p < 0.001$ ), and Enhancement ( $\rho = 0.65, p < 0.001$ ), while a moderate correlation was found with the Social motive ( $\rho = 0.45, p < 0.001$ ).

The strongest correlations were observed between the Coping motive and the two outcomes: hypomentalization ( $\rho = 0.69, p < 0.001$ ) and Enhancement ( $\rho = 0.71, p < 0.001$ ).

The theoretical model encompassing all variables of interest was tested (Figure 4.1). The direct effect is significant for attachment anxiety ( $\beta = 0.05 [0.03; 0.07], z = 4.29, p < 0.001$ ), but not for attachment avoidance ( $\beta = 0.003 [-0.02; 0.02], z = 0.332, p = 0.74$ ). The indirect effect, which involved hypomentalization and motives with attachment anxiety as an independent parameter, is statistically significant for Coping ( $\beta = 0.005 [0.003; 0.008], z = 4.72, p < 0.001$ ), Conformity ( $\beta = 0.001 [0; 0.002], z = 2.59, p = 0.01$ ), and Enhancement ( $\beta = 0.002 [0.001; 0.003], z = 3.88, p < 0.001$ ), but not for the Social motive ( $\beta = 0 [0; 0], z = -0.46, p = 0.65$ ). The indirect effect, which involved only motives with attachment anxiety as an independent parameter, yielded the same results: Coping ( $\beta = 0.09 [0.07; 0.11], z = 10.58, p < 0.001$ ), Conformity ( $\beta = 0.04 [0.03;$

0.04],  $z = 7.91$ ,  $p < 0.001$ ), Enhancement ( $\beta = 0.02$  [0.02; 0.03],  $z = 5.57$ ,  $p < 0.001$ ), but not for the Social motive ( $\beta = 0$  [0; 0.001],  $z = 0.47$ ,  $p = 0.64$ ).

**Table 4.2**

*Demographic characteristics of the sample*

<i>N</i> = 4,947		
<i>Variable(s)</i>	<i>n</i>	%
<b>Education</b>		
Primary school license	694	14.0
Middle school diploma	1,169	23.6
High school diploma	2,048	41.4
University degree	929	18.8
Postgraduate level	107	2.2
<b>Occupational status</b>		
Employed	2,112	42.6
Unemployed	250	5.1
Retired	2,417	48.9
Other	168	3.4
<b>Relational status</b>		
Single	450	9.1
Married	3,268	66.1
Divorced	535	10.8
Widowed	694	14.0

**Table 4.3***Correlation matrix*

	1	2	3	4	5	6	7
1. RQ Anxiety	-						
2. RQ Avoidance	0.13***	-					
3. RFQ Hypomentalization	0.16***	0.01	-				
4. PSNSU	0.08***	0.06***	0.08***	-			
5. FMQ Coping	0.2***	0.04*	0.69***	0.09***	-		
6. FMQ Conformity	0.18***	-0.01	0.56***	0.06***	0.59***	-	
7. FMQ Enhancement	0.1***	-0.03	0.65***	0.08***	0.71***	0.61***	-
8. FMQ Social	0.04*	-0.08***	0.45***	0.04*	0.46***	0.55***	0.61***

*Note.* \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ;  $N = 4,947$ . RQ = Relationship Questionnaire; RFQ = Reflective Functioning Questionnaire; PSNSU = Problematic Social Networking Sites Use; FMQ = Facebook Motives Questionnaire.

**4.5 Discussion**

The present study aimed to explore the relationships between attachment styles, reflective functioning, motives for using SNS, and PSNSU among elderly. The findings shed light on the complex interplay between these variables and provide valuable insights into the factors that contribute to PSNSU in this population.

Consistent with previous research on diverse populations (e.g., Musetti et al., 2022), the current findings revealed that attachment anxiety was positively associated with PSNSU. The direct association between attachment anxiety and PSNSU was supported by the present results, as a statistically significant positive association was observed between these two variables. This finding suggests that individuals who exhibit higher levels of attachment anxiety may be more susceptible to experiencing PSNSU. In particular, attachment anxiety is characterized by a fear of rejection, a heightened need for reassurance, and a strong desire for validation from others. These individuals may turn to SNS as a means to fulfill their emotional needs and seek validation through

online interactions (Kardefelt-Winther, 2014). The virtual environment of SNS offers a platform where they can receive instant feedback, likes, and positive comments, providing a sense of acceptance and belonging that may be lacking in their offline relationships (Tobin & Graham, 2020). Attachment avoidance, on the other hand, did not show a significant direct effect on PSNSU. The first objective of the study was partially supported by the findings, since the avoidance dimension was not found to be statistically significant in the direct relationship between attachment and PSNSU. This suggests that the inclination to avoid close relationships may not play a prominent role in driving problematic online behaviors among older adults in this study. These results emphasize the importance of considering attachment anxiety style in understanding the motivations underlying PSNSU in this population. The findings revealed significant indirect effects for motives such as Coping, Conformity, and Enhancement, which acted as mediators in the association between attachment anxiety and PSNSU. This supports the second objective, which focused on exploring the indirect association between motives for SNS use, reflective functioning, and PSNSU. Furthermore, the study expanded on previous findings observed in adolescents (Imperato et al., 2022), demonstrating that reflective functioning also played indirect roles in PSNSU among older adults. Lower levels of reflective functioning were linked to a higher likelihood of using SNS as a coping mechanism or seeking validation, potentially contributing to higher levels of PSNSU. This finding supports the idea that reflective functioning may serve as a protective factor against PSNSU and highlights the importance of considering these cognitive processes in understanding this phenomenon among older adults. Furthermore, this implies that older adults who exhibit higher levels of hypomentalization may encounter challenges in effectively comprehending and interpreting their own emotions and the mental states of others (L. Young et al., 2020). By engaging in SNS use, these individuals may compensate for their difficulties in understanding and navigating social and emotional cues in offline interactions, finding validation and a sense of belonging in the virtual realm.

Furthermore, the study findings revealed that three distinct motives for using SNS, namely Coping, Conformity, and Enhancement, acted as mediators in the association between attachment anxiety and PSNSU. These findings suggest that older adults with higher levels of attachment anxiety may resort to SNS as a means to address and manage negative emotions (i.e., through the Coping motive). By engaging with SNS, they seek solace, distraction, or emotional support, utilizing the platform as a coping mechanism to alleviate distress and regulate their emotional well-being (M. Gu, 2022). Additionally, older adults with attachment anxiety may employ SNS to conform to prevailing social norms and expectations (i.e., through the Conformity motive). They may feel compelled to align themselves with popular trends, conformist behaviors, or group norms that are prevalent within the SNS environment, striving for a sense of acceptance and belonging (Kim et al., 2019). Moreover, the motivation to enhance self-presentation emerged as another significant factor in the relationship between attachment anxiety and PSNSU. Older adults with higher attachment anxiety levels may utilize SNS to curate and present a carefully crafted image of themselves to others. By selectively showcasing positive aspects of their lives or idealized self-representations, they seek validation, admiration, and social approval from their online peers (Vogel & Rose, 2016). Interestingly, the Social motive for using SNS did not show a significant indirect effect on PSNSU, suggesting that older adults with attachment anxiety may not rely heavily on SNS for social connection and relationship maintenance. This finding may be attributed to the fact that older adults in our sample were predominantly Italian, a culture that values face-to-face interactions and traditional forms of socialization (Casale & Fioravanti, 2011). Consequently, the need for social connection and meaningful relationships among older adults in this context may be met through offline interactions, and SNS may serve a more limited role in satisfying these needs.

## **Limitations**

It is important to acknowledge several limitations of the present study. Firstly, the data collection relied on online surveys, which may introduce selection biases and restrict the generalizability of the findings. Secondly, our study focused specifically on Italian older adults, and cultural factors may influence SNS use and motivations differently in other populations. Replicating these findings in different cultural contexts is crucial for enhancing the generalizability of the results. Furthermore, due to the cross-sectional nature of the study, establishing causal relationships between the variables is challenging. Longitudinal studies are necessary to explore the temporal dynamics and potential bidirectional influences among attachment styles, motives, reflective functioning, and PSNSU. Lastly, it is important to acknowledge an additional limitation. The results revealed weak strength in certain relationships, particularly in the context of mediation analyses, suggesting that the observed factors may have a limited impact on the development of PSNSU among elderly. Several factors could contribute to the obtained results, including the presence of measurement limitations. Specifically, the assessment of complex constructs, such as attachment styles, reflective functioning, and motives for SNS use through self-report questionnaires may introduce biases related to subjectivity. Participants' responses may be influenced by various factors, such as social desirability bias or difficulties in accurately assessing their own internal experiences. Consequently, the observed relationships may not fully capture the true associations between the variables, leading to weaker effect sizes.

Despite these limitations, the present study provides important preliminary insights regarding the development of PSNSU among elderly. Future research should strive to address these limitations by utilizing more comprehensive and rigorous measurement approaches, ensuring a more representative sample, and incorporating longitudinal designs to establish causal relationships, and considering a wider range of contextual factors that may influence these associations.

## **Conclusions**

In conclusion, the current study sheds light on the relationships between attachment styles, reflective functioning, motives for SNS use, and PSNSU among older adults. The findings highlight the importance of attachment anxiety as a significant predictor of PSNSU, indicating that individuals with higher attachment anxiety may be more vulnerable to engaging in dysfunctional online behaviors. Additionally, hypomentalization was identified as a crucial mediator between attachment anxiety and PSNSU, suggesting that older adults with higher attachment anxiety may struggle to accurately understand their own and others' mental states, leading them to rely on SNS as a coping mechanism. Furthermore, the current results revealed that Coping, Conformity, and Enhancement motives mediate the relationship between attachment anxiety and PSNSU. This implies that older adults with higher attachment anxiety may turn to SNS as a means to alleviate negative emotions, conform to social norms, or enhance their self-presentation, which, in turn, contribute to the development of problematic online behaviors. Overall, our study contributes valuable insights to the body of literature on PSNSU among older adults. By identifying attachment anxiety, hypomentalization, and specific motives as key factors in the development of dysfunctional online behaviors, our findings can inform researchers and practitioners in their efforts to address and prevent PSNSU use among elderly.

## 5. STUDY 3

### **A cross-national study on problematic TikTok use among youth: Exploring motivations, attachment, and self-esteem through network analysis**

#### **5.1 Abstract**

The present cross-sectional study examined the mutual association between motivations, attachment, self-esteem, and patterns of problematic TikTok use among 3,313 adolescent and young adult TikTok users in three culturally distinct countries: China, Italy, and Spain. A network analysis was employed to examine specific network configurations within each nation and the interconnected relationship between them. All three networks showed significant associations within the motivations cluster, suggesting shared patterns across the countries. The results partially supported the hypothesis of an active and passive use of TikTok. Notably, a positive association between producing and participating motives emerged across China, Italy, and Spain, suggesting that active engagement with TikTok is common. However, the impact of passive use varies across cultures. Additionally, the study identified the presence of both addictive-like and compensatory tendencies in problematic TikTok use across the three networks, suggesting a multifaceted nature of TikTok-related issues. Furthermore, the results pertaining to attachment dimensions displayed mixed cross-cultural variations, emphasizing the need to conduct more specific studies. Overall, the findings indicate cross-cultural differences in TikTok use patterns, yet they also hint at underlying shared tendencies. It is thus important to consider cultural factors in future studies to better understand the phenomenon. Despite limitations, this study provides valuable insights into the relationship between TikTok problematic use, motivations, and attachment. The findings can inform the development of culturally sensitive interventions to promote healthy TikTok use and mitigate the risks associated with problematic use.

## 5.2 Introduction

TikTok, the international version of DouYin (抖音 in Chinese) and previously known as musical.ly (Sun et al., 2020) is a rapidly expanding social networking site (SNS) that has gained increasing popularity since its founding in 2016 (Dixon, 2023a). With millions of active users around the globe (Ceci, 2022), TikTok is an online platform for short-form video sharing, providing individuals with the ability to create, share, and engage themselves in a wide variety of video content. Users have the opportunity to produce and upload brief musical videos, participate in viral challenges, discover content created by other users, and interact through comments, likes, and shares (Anderson, 2020). TikTok has garnered interest from people of all ages, but it has gained particular appeal among adolescent and young adult users who actively create, watch, and respond to content on the app. According to current data, 21.5% of female users and 17.4% of male users worldwide are 24 years old or younger (Ceci, 2023). With its emphasis on short video sharing, the app has emerged as an ideal platform for user-generated content and has enabled users to express themselves creatively (Chu et al., 2022). However, in spite of its widespread popularity, concerns have been raised about the potential adverse impact on users' mental health and overall well-being of adolescent users, who may be more vulnerable to the app's influence (Marengo et al., 2022; McCashin & Murphy, 2023; Miranda et al., 2023). Studies on SNS use regarding users' mental health have indicated both positive and negative outcomes (Appel et al., 2020; Coyne et al., 2020; Marttila et al., 2021; Valkenburg, 2022; Valkenburg et al., 2022). For example, greater social support and social capital (Hussenoeder, 2022), perceived emotional support (Hu et al., 2022), access to health information (Prochaska et al., 2017), and health promotion (Korjian & Gibson, 2022) are some of the benefits of using SNS, including TikTok. However it's worth noting that only a minority of SNS users may develop symptoms related to problematic patterns of SNS use, which has been linked, among others, to higher levels of depression (Y. Chen et al., 2022;

Yoon et al., 2019), poor sleep quality (MacKenzie et al., 2022), anxiety and psychological distress (Keles et al., 2020).

TikTok has become one of the most popular SNS today, particularly among young users (Vaterlaus & Winter, 2021). The rise of TikTok's popularity as a pioneering short-form video sharing platform has generated substantial interest regarding the motivations that lead individuals to participate in its dynamic content environment. These motivations encompass a diverse range of factors, including seeking social interaction with friends and family, archiving captivating content, expressing one's identity, by creating and sharing videos that reflect the user's personality, interests, and values, seeking moments of escapism from the stresses of everyday life, and engaging in passive content exploration (Omar & Dequan, 2020; Qin et al., 2023). An investigation into the motivations driving TikTok usage offers valuable insights into the underlying psychological mechanisms potentially implicated in the problematic use of this platform. Furthermore, numerous studies (see Musetti et al., 2022 for a review) have revealed the relevance of users' individual attachment in providing deeper insights into how users engage with SNS, including TikTok and its problematic uses. More specifically, attachment theory provides a framework for assessing individuals' desires for connection, affirmation, and security through interactions with others (Cassidy & Shaver, 2016). Within this framework, the two primary dimensions of attachment insecurity (i.e., attachment anxiety and attachment avoidance) significantly influence users' behaviors, either fostering active engagement, the pursuit of validation, or a tendency to withdraw from interaction. Importantly, research suggests that these attachment dimensions can be associated with problematic patterns of SNS use, including TikTok (Marino et al., 2022). Several studies have examined the universal applicability of the core principles of attachment theory and to evaluate the cross-national validity of attachment assessments. Although the proportion of individuals classified as having secure attachment versus insecure attachment remains relatively stable across different countries, variations exist in the

categorization of insecurely attached individuals as avoidant or resistant (Hoenicka et al., 2022; Li et al., 2014; Rothbaum et al., 2000).

In addition, self-esteem emerged as a critical dimension that intertwines with users' TikTok experiences and the psychological factors associated with problematic online behaviors (Cingel et al., 2022; Savira et al., 2022). High self-esteem may drive users to confidently share their creative expressions, while low self-esteem might lead to more passive consumption patterns or heightened sensitivity to interactions with others (Amoda et al., 2022). Moreover, self-esteem and attachment are intrinsically linked, as evidenced by numerous studies over the years (e.g., Bylsma et al., 1997; Kawamoto, 2020). By exploring the mutual relations of self-esteem, motivations, and attachment in the network analysis, we can gain insights into how these psychological factors collectively contribute to users' problematic behaviors on TikTok.

The phenomenon of problematic use, characterized by excessive preoccupation with SNS, neglect of real-life responsibilities, emotional and psychological distress, poses a notable concern not only for users but also for public health on a broader scale (McCashin & Murphy, 2023; Musetti et al., 2022). The intrinsic design of the platform, with its swift content consumption and viral trends, may foster an environment conducive to compulsive behavior patterns, posing a threat especially to susceptible young users. The instant gratification and social validation derived from garnering likes, shares, and followers can inadvertently lead to a cycle of constant seeking and validation, progressively detaching users from their offline reality (Bossen & Kottasz, 2020).

The present study focused on adolescents and young adult TikTok users, aiming to explore their motivations for TikTok use, attachment, self-esteem, and problematic TikTok symptoms. Adolescents and young adults are particularly susceptible to the detrimental aspects of TikTok, as specific psychological processes emerge (Chao et al., 2023), such as a heightened susceptibility to the influence of peers, the formation of a more autonomous and distinct personal identity, and an

intense craving for social validation from peers and the broader online community (Hernández-Serrano et al., 2022).

The study has been designed to comprehensively explore TikTok problematic usage patterns, motivations, and their associations with individual attachment dimensions and self-esteem across diverse contexts. We aimed to explore the differences and shared aspects between Western and Eastern societies, regarding online behaviors and specific psychological aspects. Specifically, our study focused on Italy, Spain, and China due to their unique cultural characteristics and substantial TikTok user base (Cuesta-Valiño et al., 2022; L. Gu et al., 2022; Marengo et al., 2022). In Western cultures there's often a pronounced emphasis on self-expression, which can lead to specific effects on SNS use (Steinsbekk et al., 2021). In contrast, Eastern societies, where collectivism and social harmony are frequently prioritized, we observe distinct and unique online behaviors (Stump & Gong, 2020). Recognizing the global phenomenon that TikTok has become, investigating the motivations behind its problematic use and its psychological associations not only in different age groups (Gaia et al., 2021; Piteo & Ward, 2020) but also different cultures and countries is paramount (Craig et al., 2020). As TikTok surpasses both geographical and cultural confines, exploring the motivations for its usage and its potential effects on users' well-being across nations offers a comprehensive understanding of its impact and the interplay between cultural norms, values, and societal contexts that may shape users' experiences. Furthermore, an exploration of TikTok's impact across diverse cultures serves not merely as an academic endeavor but also holds practical implications as well. Understanding the complex connections between eastern and western cultural differences and similarities in cultural norms and motivations for TikTok use can inform the design of culturally sensitive interventions aimed at promoting and encouraging healthy usage habits and mitigating potential risks. This approach enables the tailoring of strategies that align with users' specific cultural contexts, thereby enhancing the effectiveness and efficacy of interventions to ensure a positive and responsible digital experience.

### **5.3 Methods**

#### *Procedure*

In accordance with prior research (e.g., Consoli et al., 2020; Mannarini et al., 2023), adult participants were recruited through the snowball sampling technique (Fricker, 2008) using social media platforms such as Facebook and Twitter. Eligibility criteria included (i) being in the age range between 18 and 24 years old; (ii) signing an informed consent; (iii) providing complete responses; and (iv) possessing the capability to fully complete the assessment procedure.

Regarding the involvement of underage participants (i.e., 12 to 17 years old), data collection was carried out in middle and high schools with the approval of the school administration. Before commencing data collection, the study was presented to the parents or legal guardians of each participant, explaining them with details about the study's objectives and procedures. Upon obtaining formal authorization from the school, the study was also introduced to minors aged 12 to 17 within local schools. Subsequently, the parents or legal guardians granted their informed consent, and the minors showed their eventual agreement to participate by giving their consent. Participants took part in the research anonymously. Ethical approval for the study was obtained from the Ethics Committee of the University of Parma, Italy, and the study adhered to the principles outlined in the 1964 Declaration of Helsinki and its subsequent amendments.

#### *Sample size determination*

The sample size was predetermined based on previous research. According to studies, for a 12-node network (i.e., comprising 12 variables), it was ensured that almost 500 participants per group would be guaranteed (Epskamp et al., 2018; Fried & Cramer, 2017).

#### *Participants*

A total of 3,313 participants were recruited from China, Italy, and Spain. Among Chinese participants ( $n = 966$ ), 169 (17.5%) were males, and 797 (82.5%) were females, ranging from 12

to 24 years old ( $M = 18.08$ ,  $SD = 1.89$ ). Italian participants ( $n = 1,739$ ) included 452 (26.0%) males, 1,259 (72.4%) females, 15 (0.9%) non-binary, and 13 (0.7%) who identified as “Other”, aged from 12 to 24 years old ( $M = 17.89$ ,  $SD = 2.43$ ). Spanish participants ( $n = 608$ ) comprised 207 (34%) males, 394 (64.8%) females, and 7 (1.2%) non-binary individuals, with ages ranging from 12 to 24 years old ( $M = 16.45$ ,  $SD = 1.76$ ).

### *Measures*

#### *Rosenberg Self-Esteem Scale (RSES)*

The RSES (Rosenberg, 1965) was designed to assess an individual’s self-esteem and self-worth. It is a widely used self-report tool that measures the individuals’ feelings about themselves and their overall self-worth, in both clinical and the general population. For the present study, the Italian version (Prezza et al., 1997), the Chinese version (Jiang et al., 2023), and the Spanish version (Gómez-Lugo et al., 2016) of the RSES were used. The scale consists of 10 statements or items and participants are asked to evaluate their feelings on a 4-point Likert-type scale (from 1 = “not at all” to 4 = “always”) and it provides a unidimensional factor structure. Items include “I feel that I am a person of worth, at least on an equal plane with others”; “I feel that I have a number of good qualities”; “I certainly feel useless at times”. The responses to each of these statements are then summed, with higher scores indicating a global higher self-esteem. In the present study, the RSE showed a high internal consistency (Cronbach’s  $\alpha = 0.869$ ).

#### *Relationship Questionnaire (RQ)*

Attachment was measured with the RQ (Bartholomew & Horowitz, 1991). For the present study, the Italian (Carli, 1995), the Chinese (D. Wang et al., 2018), and the Spanish (Yáñez-Yaben & Comino, 2011) adaptations of the RQ were adopted. The RQ includes sentences describing four prototypical attachment attitudes, one secure and three insecure: (a) Secure (“It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depending on me. I don’t worry about being alone or having others non accept me”); (b)

Dismissing (“*I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me*”); (c) Preoccupied (“*I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don’t value me as much as I value them*”); (d) Fearful (“*I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others*”). Participants were required to indicate how well each paragraph described them on a 7-point Likert scale from 1 (“*It does not describe me at all*”) to 7 (“*It very much describes me*”). The four patterns were used to score the underlying dimensions of attachment anxiety [(fearful + preoccupied) – (secure + dismissing)] and avoidance [(fearful + dismissing) – (secure + preoccupied)]. The anxiety dimension is related to abandonment, rejection, and feelings of being unloved, while the avoidance dimension involves a reluctance to rely on others and establish close emotional bonds (Brennan et al., 1998).

#### *Bergen Social Media Addiction Scale (BSMAS)*

In the present study, a specific adaptation was made to the BSMAS (Andreassen et al., 2016), which is itself an adapted version of the previously validated Bergen Facebook Addiction Scale (BFAS; Andreassen et al., 2012). For the present study, the Italian version (Monacis, De Palo, Griffiths, & Sinatra, 2017), the Chinese version (Yam et al., 2019), and the Spanish version (Copez-Lonzoy et al., 2023) of the scale were used. Specifically, the term “Facebook”, originally used in the scale, was replaced with “TikTok”, since the focus of this study was to explore the associations related to the problematic use of this specific SNS. The BSMAS evaluates the individual’s tendency to addiction-like behaviors while using SNS. It consists of six statements, each measuring a specific symptom of problematic TikTok use: salience, mood modification, tolerance, withdrawal, conflict, and relapse (Fournier et al., 2023). The BSMAS comprises

sentences such as “*How often during the past 12 months have you felt an urge to use TikTok more and more?*” or “*How often have you used TikTok in order to forget about personal problems?*”. Participants rated their experiences over the past 12 months on a 5-point Likert scale, ranging from 1 (“*very rarely*”) to 5 (“*very often*”). The BSMAS has demonstrated favorable psychometric properties (Monacis, De Palo, Griffiths, & Sinatra, 2017). In the present study, the internal consistency of the scale was high ( $\alpha = 0.88$ ).

#### *Motives for TikTok use*

We used the Users’ motivations questionnaire to assess the motives for TikTok use (adapted from Lee et al., 2015 and Omar & Dequan, 2020). Participants were requested to express their level of agreement on a Likert-like scale (from 1 = “*Strongly disagree*” to 5 = “*Strongly agree*”). The 28-item questionnaire comprehensively covered five distinct motives for TikTok use. The first motive, Social Interaction, contained eight items such as “*To interact with a number of people*” and “*To maintain a good relationship with others (for networking)*”. Archiving included statements such as “*To save personal or others’ interesting short videos*”, and “*To compile a series of short videos*”. For Self-expression, the third motive, participants had to answer items including “*To provide my update*”, or “*To express my actual self*”. Escapism contained items such as “*To escape from reality*” and “*To avoid loneliness*”. The fifth motive, Peeking, included four items (“*To peek on videos that people post*” and “*To stalk videos uploaded by my friends*”). Recent studies has indicated good psychometrics properties for the questionnaire (Omar & Dequan, 2020).

#### *TikTok usage behaviors*

In assessing behaviors related to TikTok usage, we designed a questionnaire based on the frameworks proposed by Omar and Dequan (2020) and Shao (2009), outlining three distinct user approaches to TikTok: Consuming, Participating, and Producing. Respondents were requested to rate their agreement on a scale from 1 = “*Strongly disagree*” to 5 = “*Strongly agree*” for 17 statements, such as “*Watch performance and imitation-type videos*” (Consuming), “*Share others’*

*videos on TikTok*” (Participating), and “*Simply produce videos without using TikTok’s functions*” (Producing). Furthermore, for the purpose of enhancing the network analysis and the interpretability of the study findings, TikTok usage behaviors were integrated within the framework of motivations for TikTok usage, consistent with Shao (2009) and Omar and Dequan (2020). This approach allowed for a comprehensive exploration of user engagement, showing an interconnectedness between motives and behaviors in the context of TikTok use.

### *Statistical analyses*

Statistical analyses were performed using R software and the following packages: *bootnet* (Epskamp et al., 2018), *mgm* (J. M. B. Haslbeck & Waldorp, 2020), *NetworkComparisonTest* (van Borkulo et al., 2022), *networkTools* (Jones, 2020), *qgraph* (Epskamp et al., 2012), *psych* (Revelle, 2018), *psychTools* (Revelle, 2020), and *tidyverse* (Wickham et al., 2019).

According to guidelines, preliminary analyses were performed – such as the level of informativeness of each variable (Mannarini et al., 2023; Mullarkey et al., 2019, 2021; Panzeri et al., 2021) as well as the strength of their linear association (Howell, 2013; Tabachnick & Fidell, 2014).

Following this, in order to investigate potential variations in facets of problematic TikTok use across countries, a MANOVA was performed with Bonferroni correction. Partial eta-squared ( $\eta^2_p$ ) and Cohen’s *d* were used to evaluate general and specific mean comparison, respectively. The aforementioned effect sizes were interpreted using the following benchmarks: null ( $\eta^2_p < .10$ ;  $d < .20$ ), small ( $\eta^2_p$  from .10 to .059;  $d$  from .20 to .49); moderate ( $\eta^2_p$  from .060 to .139;  $d$  from .50 to .79); large ( $\eta^2_p > .140$ ;  $d > .80$ ) (Cohen, 1988).

A psychometric network analysis was employed to assess the relationships between different aspects of problematic TikTok use within each individual country (Costantini et al., 2015; Costantini & Perugini, 2016; Epskamp, 2017; Mannarini et al., 2023; Marchetti, 2019) using the EBICglasso algorithm (Costantini et al., 2015; Epskamp, 2017; Golino & Epskamp, 2017).

Furthermore, following the procedure described by Fritz and colleagues (2019), each of the psychometric network analyses was corrected by sex and age (Fritz et al., 2019; Santos et al., 2018). Statistical properties of the psychometric network were calculated. First, the stability of the psychometric network model was evaluated by bootstrapping (1000 bootstrap) 95% confidence intervals around edge weights. Second, the *CS*-coefficient (correlation stability coefficient) was computed: values higher or equal to .50 indicates optimal stability (Epskamp et al., 2018; Fried et al., 2018).

Node predictability was calculated. Also, centrality indices (*z*-score) were computed to examine measures of nodes centrality. In particular, strength (*i.e.*, the number of edges – relationships – connected with a node) and expected influence (*i.e.*, the amount of variance of a node/item is explained by the edges connected to that specific node/item) were computed (Dalege et al., 2017; Epskamp, 2017; J. M. Haslbeck & Waldorp, 2018; McNally et al., 2017). Furthermore, the differences between edge-strength, edge-expected influence, and edge-weights were carried out.

Lastly, ‘network comparison tests’ (NCTs) – with Bonferroni correction – were used to evaluate psychometric network structural differences among countries (*i.e.*, China vs. Italy; China vs. Spain; Italy vs. Spain) (Elliott et al., 2020; Fritz et al., 2018; van Borkulo et al., 2022).

## **5.4 Results**

### *Preliminary analysis*

The level of informativeness of each variable was evaluated and none of them was found to be poorly informative (*i.e.*, 2.5 *SD* below the mean). Consequently, each variable was retained and used to perform the psychometric network analysis. Moreover, an inspection of bivariate relationships (Pearson’s bivariate correlation coefficients) revealed the absence of excessive linear associations.

### *Differences among patterns of problematic TikTok use*

A statistically significant multivariate effect was found: Wilks's  $\Lambda = .528$ ,  $F = 72.970$ , with  $p < .001$ ,  $\eta^2_p = .274$  (large effect) – suggesting statistically significant between-groups differences.

Considering Salience, MANOVA showed statistically significant differences among the three Countries:  $F = 86.039$ ,  $p < .001$ ,  $\eta^2_p = .049$  (small effect). Considering Tolerance, MANOVA showed statistically significant differences among the three Countries:  $F = 33.156$ ,  $p < .001$ ,  $\eta^2_p = .020$  (small effect). Considering Mood Modification, MANOVA showed statistically significant differences among the three Countries:  $F = 12.329$ ,  $p < .001$ ,  $\eta^2_p = .007$  (null effect). Considering Relapse (Rlp), MANOVA showed statistically significant differences among the three Countries:  $F = 70.940$ ,  $p < .001$ ,  $\eta^2_p = .041$  (small effect). Considering Withdrawal (Wth), MANOVA showed statistically significant differences among the three Countries:  $F = 253.405$ ,  $p < .001$ ,  $\eta^2_p = .133$  (moderate effect). Considering Conflict, MANOVA showed statistically significant differences among the three Countries:  $F = 9.689$ ,  $p < .001$ ,  $\eta^2_p = .006$  (null effect). Considering Anxious Attachment (AnA), MANOVA showed statistically significant differences among the three Countries:  $F = 62.657$ ,  $p < .001$ ,  $\eta^2_p = .036$  (small effect). Considering Avoidant Attachment, MANOVA showed statistically significant differences among the three Countries:  $F = 81.930$ ,  $p < .001$ ,  $\eta^2_p = .047$  (small effect). Considering Self-Esteem, MANOVA showed statistically significant differences among the three Countries:  $F = 74.128$ ,  $p < .001$ ,  $\eta^2_p = .043$  (small effect). Considering Social Interaction, MANOVA showed statistically significant differences among the three Countries:  $F = 362.126$ ,  $p < .001$ ,  $\eta^2_p = .180$  (large effect). Considering Archiving, MANOVA showed statistically significant differences among the three Countries:  $F = 231.678$ ,  $p < .001$ ,  $\eta^2_p = .123$  (moderate effect). Considering Self Expression, MANOVA showed statistically significant differences among the three Countries:  $F = 283.232$ ,  $p < .001$ ,  $\eta^2_p = .146$  (large effect). Considering Escapism, MANOVA showed statistically significant differences among the three Countries:  $F = 12.154$ ,  $p < .001$ ,  $\eta^2_p = .007$  (null effect). Considering Peeking, MANOVA showed

statistically significant differences among the three Countries:  $F = 130.271, p < .001, \eta^2_p = .073$  (moderate effect). Considering Consuming, MANOVA showed statistically significant differences among the three Countries:  $F = 12.717, p < .001, \eta^2_p = .008$  (null effect). Considering Participating (Prt), MANOVA showed statistically significant differences among the three Countries:  $F = 246.553, p < .001, \eta^2_p = .130$  (moderate effect). Considering Producing, MANOVA showed statistically significant differences among the three Countries:  $F = 116.470, p < .001, \eta^2_p = .066$  (moderate effect).

### *Stability analysis*

Stability analyses were conducted individually for each psychometric network.

*China.* Stability analyses showed that the network model had excellent edge stability: *CS*-coefficient = .75, optimal expected influence stability: *CS*-coefficient = .75; and optimal strength stability: *CS*-coefficient = .75. In addition, the 95% confidence intervals around edge weights suggest optimal stability of the edges of the psychometric network. Therefore, the network model was considered accurate.

*Italy.* Similarly, in this instance, stability analyses indicated that the network model exhibited excellent edge stability: *CS*-coefficient = .75, optimal expected influence stability: *CS*-coefficient = .75; and optimal strength stability: *CS*-coefficient = .75. Moreover, the 95% confidence intervals around edge weights suggest optimal stability of the edges of the psychometric network. Thus, the network model was considered accurate.

*Spain.* Finally, once again, stability analyses demonstrated that the network model maintained excellent edge stability: *CS*-coefficient = .75, optimal expected influence stability: *CS*-coefficient = .75; and optimal strength stability: *CS*-coefficient = .75. Moreover, the 95% confidence intervals around edge weights suggest optimal stability of the edges of the psychometric network. As a result, in this instance as well, the network model was deemed to be accurate.

### *Network structure*

*China.* The psychometric network model revealed numerous moderately significant statistical associations among variables (Figure 5.1; top-left), indicating several connections within the cluster of variables associated with motivations for using TikTok and fewer connections to variables related to attachment, self-esteem, and problematic TikTok use. Specifically, the thickest edge was found between Self-Expression and Archiving (weight = .574) and the second thicker edge was found between Peeking and Consuming (weight = .503).

*Italy.* Similarly, the psychometric network model displayed numerous moderately significant statistical associations among variables (Figure 5.1; top-right), indicating connections within the group of variables associated with motivations for using TikTok and fewer connections to variables related to attachment, self-esteem, and problematic TikTok use. Specifically, the thickest edge was found between Self-Expression and Archiving (weight = .558) and the second thicker edge was found between Tolerance and Salience (weight = .541).

*Spain.* Once again, the psychometric network model revealed several moderate statistically significant relationships among variables (Figure 5.1; bottom-left) – showing a number of connections within the cluster of variables associated with motivations for TikTok use, but no connections among variables related to attachment, self-esteem, and problematic TikTok use. More in detail, the thickest edge was found between Self-Expression and Archiving (weight = .590), and the second thicker edge was found between Tolerance and Salience (weight = .460).

### *Centrality indices*

*China.* Centrality indices (z-score) revealed that Self-Expression, Peeking, Tolerance, and Archiving had the highest node ‘strength’ and ‘expected influence’ while Self-Esteem and Avoidant Attachment had the lowest ‘strength’ and ‘expected influence’ (Figure 5.2 – red line).

*Italy.* Centrality indices (z-score) revealed that Mood modification, Self-Expression, and Tolerance had the highest node ‘strength’ while Avoidant Attachment had the lowest. Moreover,

Tolerance and Arc Archiving had the highest ‘expected influence’ while Self-Esteem had the lowest (Figure 5.2 – green line).

*Spain.* Centrality indices (z-score) revealed that Self-Expression, Mood modification and Tolerance had the highest node ‘strength’ while Anxious Attachment, Avoidant Attachment, and Self-Esteem had the lowest. Moreover, Archiving, Participating, and Tolerance had the highest ‘expected influence’ while Avoidant Attachment, Anxious Attachment, and Self-Esteem had the lowest (Figure 5.2 – blue line).

#### *Network comparison*

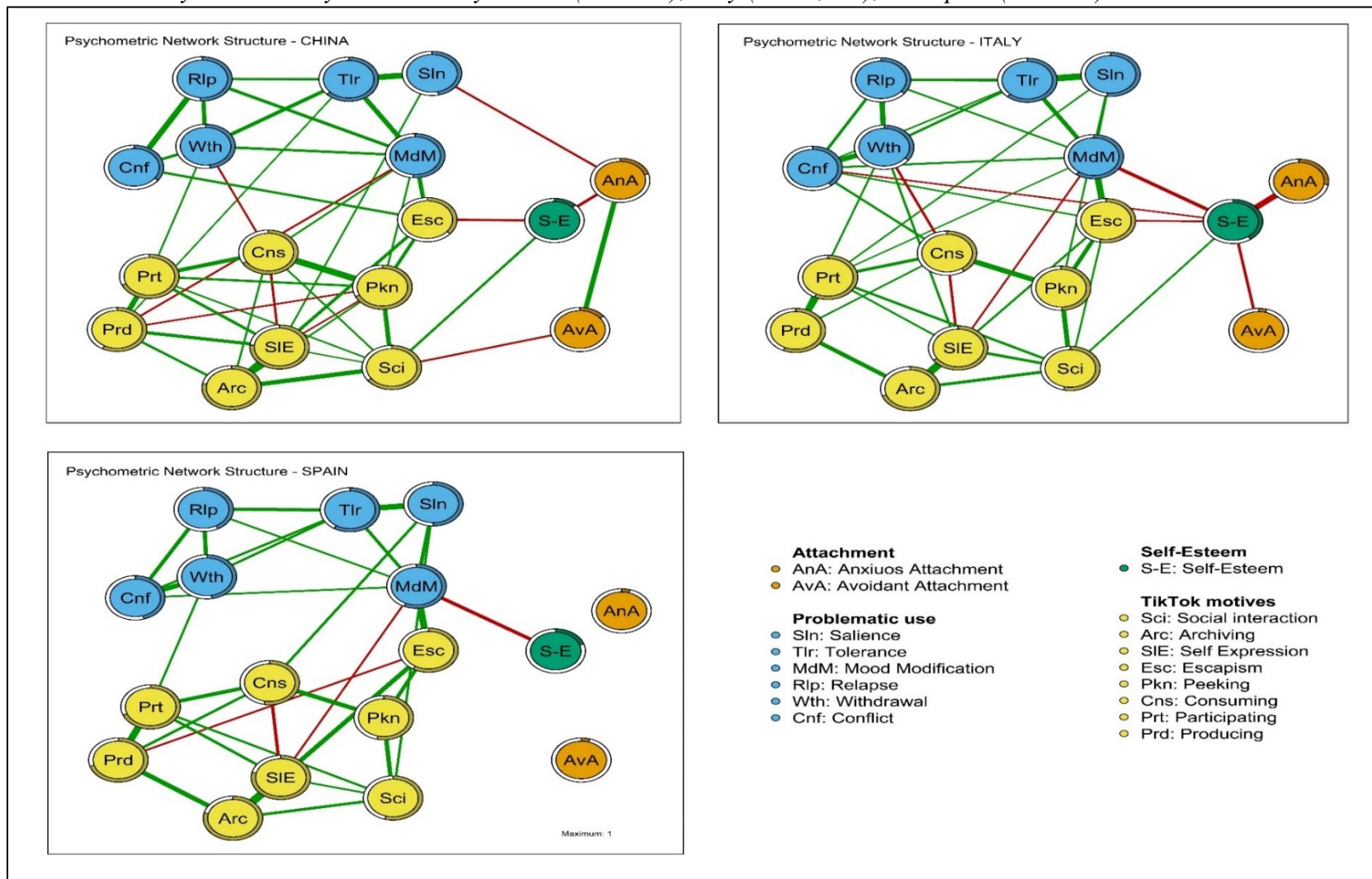
*China-Italy.* The NCT showed that the two network structures were not invariant ( $M = 0.288$ ,  $p < .001$ ) but with a similar global strength – China (8.094) vs. Italy (7.832) –  $S = 0.262$ ,  $p = .729$ . Moreover, as reported in Table 5.1 and Table 5.2, the NCT showed differences in edge strength as well as in centrality indices.

*China-Spain.* The NCT showed that the two network structures were not invariant ( $M = 0.288$ ,  $p = .034$ ) but with a similar global strength – China (8.094) vs. Spain (7.083) –  $S = 1.010$ ,  $p = .269$ . The NCT revealed variations in edge strength and centrality indices.

*Italy-Spain.* The NCT showed that the two network structures were not invariant ( $M = 0.420$ ,  $p < .001$ ) but with a similar global strength – Italy (7.832) vs. Spain (7.083) –  $S = 0.748$ ,  $p = .441$ . Also in this case, as reported in Table 5.1 and Table 5.2, the NCT showed differences in edge strength as well as in centrality indices.

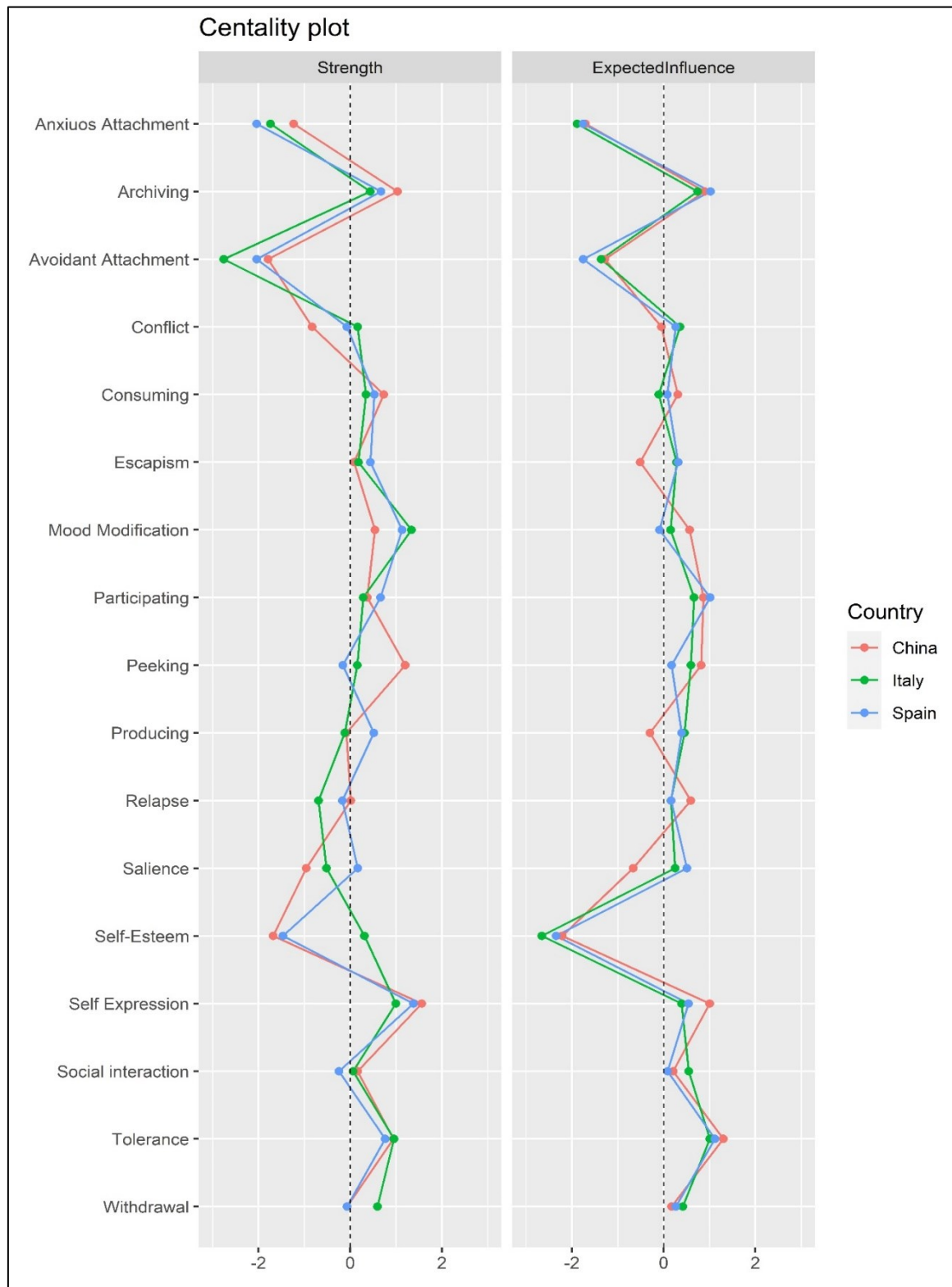
**Figure 5.1**

*Psychometric network analysis divided by each Country: China (N = 966), Italy (N = 1,739), and Spain (N = 608)*



*Note.* Green lines refer to positive associations, red lines refer to negative associations. The thickness of the line's edge represents the association strength.

**Figure 5.2**  
*Centrality plot*



*Note.* Values on the x-axis are standardized values, z-scores (maximum x-axis limit: -3; +3)

**Table 5.1***Differences between edge weights among countries*

Variable 1	Variable 2	China vs Italy	China vs Spain	Italy vs Spain
Salience (Sln)	Tolerance (Tlr)	1.000	1.000	1.000
Salience (Sln)	Mood modification (Mdm)	1.000	1.000	1.000
Tolerance (Tlr)	Mood modification (Mdm)	1.000	1.000	1.000
Salience (Sln)	Relapse (Rlp)	1.000	1.000	1.000
Tolerance (Tlr)	Relapse (Rlp)	1.000	1.000	1.000
Mood modification (Mdm)	Relapse (Rlp)	1.000	1.000	1.000
Salience (Sln)	Withdrawal (Wth)	1.000	1.000	1.000
Tolerance (Tlr)	Withdrawal (Wth)	1.000	1.000	1.000
Mood modification (Mdm)	Withdrawal (Wth)	1.000	1.000	1.000
Relapse (Rlp)	Withdrawal (Wth)	1.000	1.000	1.000
Salience (Sln)	Conflict (Cfn)	1.000	1.000	1.000
Tolerance (Tlr)	Conflict (Cfn)	1.000	1.000	1.000
Mood modification (Mdm)	Conflict (Cfn)	1.000	1.000	1.000
Relapse (Rlp)	Conflict (Cfn)	< .001	1.000	1.000
Withdrawal (Wth)	Conflict (Cfn)	< .001	.653	1.000
Salience (Sln)	Anxious Attachment (AnA)	.462	.109	1.000
Tolerance (Tlr)	Anxious Attachment (AnA)	1.000	1.000	1.000
Mood modification (Mdm)	Anxious Attachment (AnA)	1.000	1.000	1.000
Relapse (Rlp)	Anxious Attachment (AnA)	1.000	1.000	1.000
Withdrawal (Wth)	Anxious Attachment (AnA)	1.000	1.000	1.000
Conflict (Cfn)	Anxious Attachment (AnA)	1.000	1.000	1.000
Salience (Sln)	Avoidant Attachment (AvA)	1.000	1.000	1.000
Tolerance (Tlr)	Avoidant Attachment (AvA)	1.000	1.000	1.000
Mood modification (Mdm)	Avoidant Attachment (AvA)	1.000	1.000	1.000
Relapse (Rlp)	Avoidant Attachment (AvA)	1.000	1.000	1.000
Withdrawal (Wth)	Avoidant Attachment (AvA)	1.000	1.000	1.000
Conflict (Cfn)	Avoidant Attachment (AvA)	1.000	1.000	1.000
Anxious Attachment (AnA)	Avoidant Attachment (AvA)	< .001	.245	1.000
Salience (Sln)	Self-Esteem (S-E)	1.000	1.000	1.000
Tolerance (Tlr)	Self-Esteem (S-E)	1.000	1.000	1.000
Mood modification (Mdm)	Self-Esteem (S-E)	.054	.381	1.000
Relapse (Rlp)	Self-Esteem (S-E)	1.000	1.000	1.000
Withdrawal (Wth)	Self-Esteem (S-E)	1.000	1.000	1.000
Conflict (Cfn)	Self-Esteem (S-E)	1.000	1.000	1.000
Anxious Attachment (AnA)	Self-Esteem (S-E)	< .001	< .001	< .001
Avoidant Attachment (AvA)	Self-Esteem (S-E)	1.000	1.000	1.000
Salience (Sln)	Social interaction (Sci)	1.000	1.000	1.000
Tolerance (Tlr)	Social interaction (Sci)	1.000	1.000	1.000
Mood modification (Mdm)	Social interaction (Sci)	1.000	1.000	1.000
Relapse (Rlp)	Social interaction (Sci)	1.000	1.000	1.000
Withdrawal (Wth)	Social interaction (Sci)	1.000	1.000	1.000
Conflict (Cfn)	Social interaction (Sci)	1.000	1.000	1.000
Anxious Attachment (AnA)	Social interaction (Sci)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Social interaction (Sci)	1.000	1.000	1.000
Self-Esteem (S-E)	Social interaction (Sci)	1.000	1.000	1.000
Salience (Sln)	Archiving (Arc)	1.000	1.000	1.000
Tolerance (Tlr)	Archiving (Arc)	1.000	1.000	1.000
Mood modification (Mdm)	Archiving (Arc)	1.000	1.000	1.000
Relapse (Rlp)	Archiving (Arc)	1.000	1.000	1.000
Withdrawal (Wth)	Archiving (Arc)	1.000	1.000	1.000
Conflict (Cfn)	Archiving (Arc)	1.000	1.000	1.000
Anxious Attachment (AnA)	Archiving (Arc)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Archiving (Arc)	1.000	1.000	1.000
Self-Esteem (S-E)	Archiving (Arc)	1.000	1.000	1.000
Social interaction (Sci)	Archiving (Arc)	.136	.571	1.000
Salience (Sln)	Self-Expression (Sle)	.190	1.000	1.000
Tolerance (Tlr)	Self-Expression (Sle)	1.000	1.000	1.000
Mood modification (Mdm)	Self-Expression (Sle)	1.000	1.000	1.000

Relapse (Rlp)	Self-Expression (Sle)	1.000	1.000	1.000
Withdrawal (Wth)	Self-Expression (Sle)	1.000	1.000	1.000
Conflict (Cfn)	Self-Expression (Sle)	1.000	1.000	1.000
Anxious Attachment (AnA)	Self-Expression (Sle)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Self-Expression (Sle)	1.000	1.000	1.000
Self-Esteem (S-E)	Self-Expression (Sle)	1.000	1.000	1.000
Social interaction (Sci)	Self-Expression (Sle)	1.000	1.000	1.000
Archiving (Arc)	Self-Expression (Sle)	1.000	1.000	1.000
Saliency (Sln)	Escapism (Esc)	1.000	1.000	1.000
Tolerance (Tlr)	Escapism (Esc)	1.000	1.000	1.000
Mood modification (Mdm)	Escapism (Esc)	< .001	.190	1.000
Relapse (Rlp)	Escapism (Esc)	1.000	1.000	1.000
Withdrawal (Wth)	Escapism (Esc)	1.000	1.000	1.000
Conflict (Cfn)	Escapism (Esc)	1.000	.707	1.000
Anxious Attachment (AnA)	Escapism (Esc)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Escapism (Esc)	1.000	1.000	1.000
Self-Esteem (S-E)	Escapism (Esc)	1.000	1.000	1.000
Social interaction (Sci)	Escapism (Esc)	1.000	1.000	1.000
Archiving (Arc)	Escapism (Esc)	< .001	1.000	1.000
Self-Expression (Sle)	Escapism (Esc)	1.000	1.000	.707
Saliency (Sln)	Peeking (Pkn)	.272	1.000	1.000
Tolerance (Tlr)	Peeking (Pkn)	1.000	1.000	1.000
Mood modification (Mdm)	Peeking (Pkn)	.490	1.000	1.000
Relapse (Rlp)	Peeking (Pkn)	1.000	1.000	1.000
Withdrawal (Wth)	Peeking (Pkn)	1.000	1.000	1.000
Conflict (Cfn)	Peeking (Pkn)	1.000	1.000	1.000
Anxious Attachment (AnA)	Peeking (Pkn)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Peeking (Pkn)	1.000	1.000	1.000
Self-Esteem (S-E)	Peeking (Pkn)	1.000	1.000	1.000
Social interaction (Sci)	Peeking (Pkn)	1.000	1.000	1.000
Archiving (Arc)	Peeking (Pkn)	1.000	1.000	1.000
Self-Expression (Sle)	Peeking (Pkn)	1.000	1.000	1.000
Escapism (Esc)	Peeking (Pkn)	1.000	1.000	1.000
Saliency (Sln)	Consuming (Csn)	1.000	1.000	1.000
Tolerance (Tlr)	Consuming (Csn)	1.000	1.000	1.000
Mood modification (Mdm)	Consuming (Csn)	1.000	1.000	1.000
Relapse (Rlp)	Consuming (Csn)	1.000	1.000	1.000
Withdrawal (Wth)	Consuming (Csn)	1.000	1.000	1.000
Conflict (Cfn)	Consuming (Csn)	1.000	1.000	1.000
Anxious Attachment (AnA)	Consuming (Csn)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Consuming (Csn)	1.000	1.000	1.000
Self-Esteem (S-E)	Consuming (Csn)	1.000	1.000	1.000
Social interaction (Sci)	Consuming (Csn)	1.000	1.000	1.000
Archiving (Arc)	Consuming (Csn)	1.000	1.000	1.000
Self-Expression (Sle)	Consuming (Csn)	1.000	1.000	1.000
Escapism (Esc)	Consuming (Csn)	1.000	1.000	1.000
Peeking (Pkn)	Consuming (Csn)	.462	.027	1.000
Saliency (Sln)	Participating (Prt)	.598	1.000	1.000
Tolerance (Tlr)	Participating (Prt)	1.000	1.000	1.000
Mood modification (Mdm)	Participating (Prt)	1.000	1.000	1.000
Relapse (Rlp)	Participating (Prt)	1.000	1.000	1.000
Withdrawal (Wth)	Participating (Prt)	1.000	1.000	1.000
Conflict (Cfn)	Participating (Prt)	1.000	1.000	1.000
Anxious Attachment (AnA)	Participating (Prt)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Participating (Prt)	1.000	1.000	1.000
Self-Esteem (S-E)	Participating (Prt)	1.000	1.000	1.000
Social interaction (Sci)	Participating (Prt)	1.000	1.000	1.000
Archiving (Arc)	Participating (Prt)	1.000	1.000	1.000
Self-Expression (Sle)	Participating (Prt)	1.000	1.000	1.000
Escapism (Esc)	Participating (Prt)	1.000	1.000	1.000
Peeking (Pkn)	Participating (Prt)	1.000	1.000	1.000
Consuming (Csn)	Participating (Prt)	1.000	1.000	1.000
Saliency (Sln)	Producing (Prd)	1.000	1.000	1.000
Tolerance (Tlr)	Producing (Prd)	.245	1.000	1.000
Mood modification (Mdm)	Producing (Prd)	.218	1.000	1.000

Relapse (Rlp)	Producing (Prd)	1.000	1.000	1.000
Withdrawal (Wth)	Producing (Prd)	1.000	1.000	1.000
Conflict (Cfn)	Producing (Prd)	1.000	1.000	1.000
Anxious Attachment (AnA)	Producing (Prd)	1.000	1.000	1.000
Avoidant Attachment (AvA)	Producing (Prd)	1.000	1.000	1.000
Self-Esteem (S-E)	Producing (Prd)	1.000	1.000	1.000
Social interaction (Sci)	Producing (Prd)	1.000	1.000	1.000
Archiving (Arc)	Producing (Prd)	< .001	.027	1.000
Self-Expression (Sle)	Producing (Prd)	< .001	< .001	1.000
Escapism (Esc)	Producing (Prd)	1.000	1.000	1.000
Peeking (Pkn)	Producing (Prd)	1.000	1.000	1.000
Consuming (Csn)	Producing (Prd)	1.000	1.000	1.000
Participating (Prt)	Producing (Prd)	1.000	1.000	1.000

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*Note.* Bonferroni's corrected  $p$ -values were reported. In bold were highlighted statistically significant differences

**Table 5.2***Differences between centrality indices (raw scores) among countries*

Variable	China vs Italy		China vs Spain		Italy vs Spain	
	Strength	Expected influence	Strength	Expected influence	Strength	Expected influence
Saliency (Sln)	1.000	.136	1.000	.286	1.000	1.000
Tolerance (Tlr)	1.000	1.000	1.000	1.000	1.000	1.000
Mood modification (Mdm)	1.000	1.000	1.000	1.000	1.000	1.000
Relapse (Rlp)	1.000	.279	1.000	1.000	1.000	1.000
Withdrawal (Wth)	1.000	1.000	1.000	1.000	1.000	1.000
Conflict (Cfn)	1.000	1.000	1.000	1.000	1.000	1.000
Anxious Attachment (AnA)	1.000	<b>.014</b>	<b>&lt; .001</b>	1.000	<b>.014</b>	<b>.014</b>
Avoidant Attachment (AvA)	1.000	1.000	<b>.020</b>	1.000	1.000	1.000
Self-Esteem (S-E)	<b>&lt; .001</b>	<b>&lt; .001</b>	1.000	1.000	<b>&lt; .001</b>	<b>&lt; .001</b>
Social interaction (Sci)	1.000	1.000	1.000	1.000	1.000	1.000
Archiving (Arc)	.068	1.000	1.000	1.000	1.000	1.000
Self-Expression (Sle)	1.000	<b>&lt; .001</b>	1.000	1.000	1.000	1.000
Escapism (Esc)	1.000	1.000	1.000	1.000	1.000	1.000
Peeking (Pkn)	.381	1.000	<b>.020</b>	.136	1.000	1.000
Consuming (Csn)	1.000	1.000	1.000	1.000	1.000	1.000
Participating (Prt)	1.000	1.000	1.000	1.000	1.000	1.000
Producing (Prd)	1.000	<b>.034</b>	1.000	.714	1.000	1.000

*Note.* Bonferroni's corrected *p*-values were reported. In bold were highlighted statistically significant differences

## 5.5 Discussion

The present study explored the associations between attachment, self-esteem, motivations, and patterns of problematic TikTok use in young users (i.e., adolescents and young adults) across three countries with distinct cultural backgrounds: China, Italy, and Spain. Through the analyses, several noteworthy findings emerged that provided insights into motivations for TikTok use and different psychological variables, as well as cross-cultural variations in these associations.

The network analyses revealed that there were specific patterns of associations between the factors related to motivations for using TikTok, attachment, self-esteem, and problematic TikTok use in each of the three countries. All countries exhibited moderately significant statistical associations within the cluster related to motivations for using TikTok, and there were also some significant differences between the countries related to attachment, self-esteem, and problematic TikTok use that could have been due to cultural factors. One common pattern was that the factors related to motivations for using TikTok were all associated with each other moderately. This suggests that the motivations for using TikTok could be interrelated (Omar & Dequan, 2020).

### *Active and passive use of TikTok*

The positive association between producing and participating motives in the three networks can be seen as an important finding that clarifies users' active engagement with the platform (for a recent and detailed description of the active-passive model of SNS use, see Verduyn et al., 2022). This association suggests that individuals who are inclined to actively create and share content on TikTok (the producing motive) are also more likely to engage in activities that involve interacting with others and contributing to the TikTok community (the participating motive). In essence, these users not only consume content but actively contribute to the platform's content pool and engage in discussions or interactions. The consistent positive association between participating and withdrawal motives across all three networks suggests that individuals who actively participate on

TikTok, by creating and sharing content or engaging in discussions, might also be more prone to experiencing withdrawal symptoms when they are unable to access or use the platform. This pattern could be indicative of a deeper and potentially more compulsive engagement with TikTok among active users, leading to problematic or addictive-like behaviors. However, it's essential to interpret the other associations in light of their respective networks. In China, the producing motive was negatively associated with the mood modification motive. This association might indicate that Chinese young users who actively produce content are less likely to use TikTok as a means of mood regulation or emotional escape, and that active content creators on TikTok may engage with the platform for different purposes than those who primarily use it for mood regulation. On the other hand, in the Italian network, the positive association between the participating motive (which is closely associated with producing) and mood modification implies that individuals who actively engage with TikTok, including creating and participating in content, are more likely to use the platform for mood regulation. This suggests that in the Italian context, active engagement on TikTok might serve as a means to alleviate negative emotions or enhance mood. It's possible that the act of actively participating in the TikTok community, whether through content creation or interaction, provides users with a sense of connection and emotional support, which can contribute to mood enhancement. These differences suggest cultural variations in how TikTok is utilized and the motivations behind its use.

The consistent positive association between consuming and peeking motives in all three networks indicates that these two variables may be closely related in the context of TikTok use, possibly due to their shared characteristics as relatively passive and spontaneous TikTok usage patterns (Verduyn et al., 2022). Consuming primarily involves watching and scrolling through content without actively contributing. It could be interpreted as a passive engagement with the platform, requiring minimal commitment and interaction with the TikTok community. Similarly, the peeking motive, characterized by casual and impulsive browsing, also lacks deep involvement

or engagement. This behavior aligns with the passive use of SNS, where users browse through content or profiles without actively participating in discussions or sharing their own content. In the Chinese and Italian networks, Consuming was negatively associated with the withdrawal symptom of problematic TikTok use (see Figure 5.1). In the Spanish network, on the other hand, the consuming motive was positively associated with salience, a peripheral symptom of problematic use (Fournier et al., 2023). These patterns suggest that the consistent negative association with withdrawal in both China and Italy might indicate that passive consumption may mitigate withdrawal symptoms. However, in Spain, the positive association with salience suggests that passive consumption could heighten the sense of the platform's importance without necessarily alleviating withdrawal symptoms.

#### *Compensatory and addictive-like use of TikTok*

A notable commonality across the three networks involves the presence of both addictive-like and compensatory tendencies in problematic TikTok use. The addictive pattern is characterized by strong connections with central symptoms of TikTok problematic use, such as relapse, withdrawal, and conflict (Fournier et al., 2023). These central symptoms reflect core aspects of problematic online behavior and indicate a more severe problematic TikTok use. In contrast, the compensatory pattern is linked to peripheral symptoms like salience and tolerance. While still indicative of problematic use, this pattern may represent a less severe form, where individuals use TikTok to compensate for certain needs or habits. The positive association between peeking and escapism motives, which was positively linked to mood modification and negatively with self-esteem, suggests a compensatory use of TikTok. In detail, escapism, a key facet of problematic online behaviors (Jouhki et al., 2022), was linked to two significant aspects of TikTok problematic use. Firstly, there was a positive association with the peeking motive, reflecting how young users who engage in casual and impulsive content browsing often do so as a form of escape. Secondly, escapism was positively linked to the mood modification motive in the three networks,

implying that younger individuals turn to TikTok as a tool for mood regulation or to escape from negative emotions. It suggests that TikTok provides a means of altering one's emotional state, offering a form of solace or distraction from everyday pressures. The negative association between escapism and self-esteem further suggests a potential compensatory dimension of TikTok problematic use (Kardefelt-Winther et al., 2017). It underscores how TikTok, for some users, serves not only as an escape from daily pressures but also as a way to bolster self-esteem indirectly by temporarily setting aside personal concerns.

#### *Cultural differences between networks*

Remarkably, across all three nations, the most robust connection was found between self-expression and archiving motives within the networks. This result may indicate that young people from three different cultural backgrounds possess a strong inclination toward expressing themselves creatively and preserving content on TikTok. It highlights that TikTok serves not just as a means of entertainment but also as a platform for personal expression and the self-promotion of one's digital identity, extending existing studies on TikTok (Oktarini et al., 2022). However, further examinations of the differences between the three networks denote that cultural factors could be relevant. In Italy and Spain, there was a negative association between self-expression and mood modification motives, indicating that, for adolescents and young adults in these countries, using TikTok as a tool for creative self-expression may be less connected to mood regulation and problematic online behaviors. In contrast, the Chinese network presents a distinct pattern. Here, self-expression exhibits a positive association with salience, a peripheral symptom of problematic TikTok use (Fournier et al., 2023). This contrast between Western countries (Italy and Spain) and Eastern countries (China) may be rooted in differing cultural norms and suggests a potential cultural contrast in the role of self-expression on SNS (Jackson & Wang, 2013). In Eastern cultures like China, where there may be stronger norms of conformity and collective values (G. Wang & Liu, 2010; L. Wang et al., 2002), self-expression could take on a different significance. The

positive association with the salience symptom suggests that, in this context, self-expression may be linked to a heightened sense of importance in maintaining a social presence on TikTok, and a desire for social recognition (T. Wang et al., 2021). Consequently, TikTok young users in China may be more inclined to perceive their self-expression as central to their online identity, potentially leading to the platform's elevated importance (i.e., salience) in their lives, thus leading to possible problematic compensatory uses of the platform.

### *Centrality indices*

Examining the centrality indices indicated variations in the importance of specific variables within the three network structures. In the Italian context, the tolerance symptom and the archiving motive emerged as central variables, with notably high node strength and expected influence. Furthermore, mood modification and self-expression had the highest node strength. This suggests that Italian TikTok users may not only prioritize tolerance for various content and preserve and organize content on the platform but also utilize the platform as a means to regulate their moods and creatively express themselves. This finding underscores the importance of these factors as primary drivers of TikTok problematic use within the Italian cultural context, further expanding previous studies in the context of SNS and particularly of TikTok (Marino et al., 2020).

In the Chinese context, the network analysis revealed a distinct pattern characterized by several moderately significant statistical associations among variables within the motivations cluster. Notably, the most robust connection was identified between self-expression and archiving motives. This finding underscores the application's role as a medium for creative self-expression and content preservation in the Chinese cultural context. Additionally, a significant connection existed between peeking and consuming, emphasizing the importance of content consumption alongside content creation. It is worth noting that while the Chinese network exhibited these distinctive connections, fewer associations were evident between motivations and variables related to attachment, self-esteem, and problematic TikTok use, suggesting that the primary drivers of

TikTok use in China are rooted in creative expression and content engagement. Cultural factors, such as the emphasis on collective and social connections, might contribute to these motivations for TikTok use in the Chinese context (L. Wang et al., 2002).

In the Spanish network, self-expression emerged as a central variable, indicating its potential significance in comprehending TikTok use patterns in Spain. This centrality underscores the notion that individuals in Spain may place particular emphasis on self-expression as a driving force behind their TikTok activities, in accordance with prior research (Omar & Dequan, 2020). Additionally, mood modification and tolerance also exhibited high centrality, albeit slightly less pronounced than that of self-expression. This implies that individuals in Spain might prioritize mood enhancement and maintain a certain level of content tolerance while engaging with TikTok (Peris et al., 2020). Notably, unlike in Italy and China, attachment anxiety (AnA), attachment avoidance (AvA), and self-esteem did not display high centrality in the Spanish network. Instead, the motivation of participating was prominently present and exhibited significant influence, further illustrating the distinctive usage patterns observed in Spain compared to the other two countries.

#### *Attachment*

Interestingly, the present study revealed notable differences in attachment dimensions across the three countries, challenging the conventional notion from Bowlby's attachment theory (Bowlby, 1988), which posited attachment as a universal construct. While China showed a significant positive association between attachment anxiety and attachment avoidance, Italy and Spain did not exhibit this association. Furthermore, both the Italian and Chinese networks showed a connection between attachment dimensions and self-esteem, suggesting that attachment may serve as a precursor to self-esteem levels. However, this link was notably absent in the Spanish network, indicating potential cultural differences in how attachment relates to self-esteem within these contexts. Further, and only in the Chinese network, attachment anxiety was negatively connected with the salience symptom. Attachment anxiety, typically associated with a heightened

need for closeness and reassurance in interpersonal relationships (Mikulincer & Shaver, 2007), appears to have a different relationship with the perception of salience on TikTok in the Chinese context. One possible interpretation could be related to cultural norms and values in China, where collectivism and group cohesion are often highly regarded (G. Wang & Liu, 2010). Individuals who show high levels of attachment anxiety in this cultural context might find comfort and a sense of inclusion on TikTok, leading to a reduced perception of salience as a problematic symptom. Nonetheless, it's important to approach this finding cautiously and recognize that cultural and individual differences in attachment dimensions may yield different interpretations (Hoenicka et al., 2022; Sagi, 1990). Further cross-national research is needed to better understand the relationship between attachment, cultural norms, and problematic use symptoms in the context of TikTok and other social media platforms (Monacis, De Palo, Griffiths, Sinatra, et al., 2017).

### *Conclusions*

In summary, the present study explored the mutual associations between attachment dimensions, self-esteem, and motivations for TikTok use, alongside its problematic patterns, among young users in China, Italy, and Spain. Furthermore, in the context of problematic SNS use among adolescents and young adults, this study serves as an important extension of existing cross-national research (Zhang et al., 2023). In terms of network structures, all three countries showed a robust connection between self-expression and archiving motives, indicating a cross-cultural inclination for creative self-expression and content preservation on TikTok. However, while distinctions emerged in the centrality analyses, they were not notably strong, indicating the possibility of shared TikTok problematic usage patterns among adolescent and young adult users. The findings also suggest the potential differentiation of two distinct patterns of problematic TikTok use: one characterized by compulsive and addictive-like behaviors, which aligns with central symptoms of problematic TikTok use (Fournier et al., 2023), and another oriented toward compensatory uses, linked with peripheral symptoms (Karddefelt-Winther et al., 2017). Moreover,

it's worth noting that motivations for using TikTok may be related to cultural values, norms, and societal dynamics to varying degrees. Ultimately, although we speculated on potential cross-cultural variations in users' attachment dimensions, the evidence was not robust enough to draw definitive conclusions, emphasizing the need for further research in this area.

Future studies in this domain could focus more on the interplay between cultural variables and individual motivations, and specific domains of problematic SNS use (PSNSU). Furthermore, further studies in this field should encompass interdisciplinary collaborations between psychology, sociology, and cultural studies. By adopting a multidisciplinary approach, researchers could gain a more comprehensive understanding of the interplay between culture, motivations, and PSNSU, including TikTok problematic use. Moreover, comprehending the motivations behind TikTok use across different cultural contexts can facilitate the design of targeted interventions for young individuals, who are known to be at higher risk of developing symptoms associated with problematic online behaviors, as supported by numerous studies (Chentsova et al., 2023; Moretta et al., 2023). For example, in Italy, where self-expression and content preservation are central motivations, interventions could focus on encouraging creative self-expression through healthier means. Recognizing that certain motives may lead to problematic TikTok use, educators, parents, and mental health professionals can use this information to educate users about healthy online behaviors. Early intervention strategies can be developed to address potential issues related to excessive use.

### *Limitations*

Several limitations need to be considered when interpreting the outcomes of the present study. Firstly, the research design employed was cross-sectional, which restricts the possibility of establishing causal inferences regarding the observed associations. Future longitudinal studies could provide a more comprehensive understanding of the dynamics between TikTok motives, attachment dimensions, self-esteem, and problematic usage patterns across different cultural

contexts. While considerable efforts were made to ensure the validity and reliability of the used measures, reliance on self-reported data introduced potential response biases and social desirability effects (Kreitchmann et al., 2019). Participants were assured of anonymity and encouraged to respond truthfully, but the impact of these biases cannot be completely ruled out. Moreover, the research focused exclusively on three specific countries (China, Italy, and Spain), limiting the generalizability of the results to a broader global context. Including a more diverse range of cultural backgrounds would offer a more comprehensive perspective on cross-cultural variations in TikTok use. Additionally, the sample size and representativeness of participants might have influenced the findings, and larger, more diverse samples could yield different results. Finally, while we have addressed several key limitations, other potential confounding variables or limitations specific to our study may exist, which future research should explore. These limitations notwithstanding, this study offers valuable insights into the relationship between cultural contexts and problematic patterns of TikTok use, encompassing attachment, motivations, and self-esteem among adolescents and young adult users in three distinct populations, and providing a promising basis for future research in this evolving field.

## 6. CONCLUSIONS

Within the context of the prevailing digital era, the present thesis has undertaken a systematic exploration into the association between SNS, human psychological dynamics, and their connection with overall well-being. Starting with a systematic review, the current thesis investigated the multifaceted repercussions that SNS exerts on users' mental health. This analysis revealed a spectrum of effects, encompassing both positive dimensions and negative aspects including manifestations of dysfunctional tendencies.

Building on these insights, the series of three empirical studies conducted in this work have provided an in-depth investigation into the realm of SNS and TikTok, a prominent exemplification of contemporary social media. The rise of TikTok has brought into focus its dual potential: a conduit for creative expression and, concurrently, a potential source for problematic usage patterns. The present work also focused on the underlying motivations pushing users towards SNS engagement, the entwined dynamics of attachment styles, the role of self-esteem, and the emergence of problematic behaviors as potential consequences.

Encompassing an inclusive and diverse demography spanning various age groups and utilizing diverse methodologies, the findings of this thesis have identified some of the factors that influence motivations, attachment patterns, and the emergence of tendencies toward problematic usage. While there exists a common and shared motivation for connections with others, self-expression, and curiosity that bind users on a global scale, it's essential to recognize that different aspects lead to SNS use in different age groups. Moreover, this work has highlighted the peculiar dynamics between attachment styles and self-esteem within the digital realm, offering valuable insights into how these psychological factors influence user behaviors and emotional responses.

Crucially, the findings of this thesis also point to the existence of problematic usage of TikTok, raising significant questions about the possible consequences of overly involved

participation in this particular SNS. The feedback loop of instant gratification and validation intrinsic to SNS interactions underscores the likelihood of compulsive behaviors, potentially leading to a neglect of real-life obligations and well-being. The study emphasized that while these online applications and platforms offer unprecedented avenues for connection, creativity, and information dissemination, they simultaneously possess the capacity to impose adverse impacts on users' mental health.

It is essential to highlight the observed variability in attachment measures, which is a critical aspect that necessitates a more extensive discussion (for an overview of the instruments, refer to the Systematic Review and Table 2.2). The differences among these measures, as noted in the Systematic Review, add complexity to the results interpretation. This complexity is particularly evident when considering the differences in these measures not only across various cultural contexts but also in different relational settings, such as those involving parents or peers. In particular, the implications associated with different relationships and the potential impact on psychological well-being implies further explorations (see for example, Study 2 and Study 3). For instance, the Adult Attachment Scale (Collins & Read, 1990) and the Attachment Style Questionnaire (Feeney et al., 1994) explore adult attachment dynamics, while the Father and Mother Attachment Questionnaire (Matos & Costa, 2001) and the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987) examine contextual relationships within family and peer contexts.

Moreover, along with these findings and conclusions, emphasizing a crucial aspect, the presented studies utilized self-report instruments, which inherently have limitations. Frequently employed in psychological research, self-report instruments rely on participants' subjective perspectives, potentially introducing biases such as social desirability and memory recall, and thereby limiting the generalizability of the results of complex phenomena (Kreitchmann et al., 2019). The recognition of both the constructive and detrimental dimensions of online engagement

offers a valid direction for designing interventions and policies that foster responsible and healthy digital experiences. In our digitally connected world, this research stands as a reminder that while social media platforms facilitate connectivity and creative expression, they also bring forth challenges that demand thoughtful consideration.

In conclusion, this thesis encompasses a comprehensive overview of the consequences of SNS and a detailed analysis of TikTok's various facets. Its contribution extends beyond academic discussions, extending into practical initiatives aimed at fostering a balanced interaction with digital technology. By acknowledging the opportunities and challenges presented by SNS, this thesis lays the groundwork for balanced interventions on users' psychological well-being.

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