



Problematic social networking sites use and attachment: A systematic review

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ABSTRACT

A systematic review of the literature was conducted to summarize research that examined the associations between problematic social networking sites use (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 duplicates 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.

1. Introduction

1.1. Social networking sites and problematic social networking sites use

In 2020, social networking sites (SNSs) were used by 49% of the worldwide population, tripling their total user base in the last decade and growing from 970 million in 2010 to more than three billion users in 2020 (Clement, 2020). SNSs are web-based services that are structured around three central features. First, users can create a personal profile, public or semipublic, which contains self-descriptive information; second, lists of connections are shown, which represent the user's online social connections and relations of varying strength and importance; third, rather than checking the users' profiles for updated content, most SNSs are organized around a stream of frequently updated content, which is primarily populated by posts from one's connections (Boyd & Ellison, 2007; Verduyn et al., 2017). Although Facebook remains the

most popular social networking platform, with 2.7 billion active users worldwide in 2020, an increasing number of people are moving to more recent platforms, such as Instagram, Snapchat or Twitter (Clement, 2020).

People may use SNSs for entertainment, to establish and maintain relationships, connect with others who share similar hobbies or interests, or fill up free time (Marino et al., 2016; Ryan et al., 2016). A number of studies have pointed out the potential benefits related to SNSs use (for a review, see Best et al., 2014). These include indirect positive effects on wellbeing through an increase in self-esteem and perceived social support, safe identity exploration, more opportunities for self-disclosure and positive social repercussions, such as wider social support (Ellison & Boyd, 2013; Gil de Zúñiga et al., 2017; Huang, 2016; Subrahmanyam et al., 2006; Verduyn et al., 2017). For example, a study by Burrow and Rainone (2017) showed that the number of "likes" individuals received on their Facebook profile picture was perceived as

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positive feedback and was positively associated with self-esteem. Furthermore, time spent using SNSs was associated with the extension of social capital (i.e., the number of offline relationships), thus increasing the individual's feeling of connectedness (Gil de Zúñiga et al., 2017; Verduyn et al., 2017). However, a minority of individuals use SNSs excessively and have difficulty controlling it (Bányai et al., 2017; Boer et al., 2020) – a pattern frequently described as “addictive” or “compulsive”.

Despite growing research in this field, there is currently no consensus on the conceptualization of addictive and compulsive behaviors related to SNSs (Carbonell & Panova, 2017; Fernandes et al., 2019; Rumpf et al., 2019). This is largely a consequence of the confusion about the definition of the broader phenomenon of problematic Internet use (Billieux, Schimmenti, et al., 2015; Kardefelt-Winther et al., 2017). A recent debate on the risk of “diagnostic inflation” pointed to the importance of having a clinically useful definition of problematic online behaviors (Starcevic et al., 2020). Numerous studies support the notion that the broad term “Internet addiction” may not be a unitary construct (e.g., Andreassen et al., 2016; Musetti et al., 2016a; Starcevic & Billieux, 2017) and that instead, it may refer to a spectrum of similar, yet distinct problematic behaviors associated with Internet use (Baggio et al., 2018). Moreover, the Internet may be regarded as a medium for problematic online behaviors, with the notion of an addiction “to the Internet” being untenable (Griffiths & Szabo, 2014; Perales et al., 2020).

In an attempt to overcome these limitations, Wegmann et al. (2022) proposed a multidimensional classification of problematic use of Internet activities, including problematic social networking sites use (PSNSU), based on four domains: a) number of DSM-5 diagnostic criteria for addictive disorders (e.g., loss of control, tolerance and preoccupation) met; b) severity of functional impairment; c) underlying psychological factors and processes; d) time spent online. In the present systematic review, we endorsed this comprehensive approach to identification of PSNSU, as research has been disparate in its theoretical and methodological underpinnings.

A variety of risk and protective factors have been found to be associated with PSNSU. Available evidence suggests that they include both 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). In recent years, the relationship between attachment and PSNSU has been receiving an increasing attention (D'Arienzo et al., 2019).

1.2. Attachment and its relationships with problematic social networking sites use

Attachment is a well-established psychological construct. It refers to an inborn motivation system that leads individuals to establish and maintain relationships with significant figures in their lives (Bifulco & Thomas, 2012), from the cradle to the grave (Bowlby, 1988). Attachment theory was first proposed by John Bowlby (1969/82, 1973, 1980, 1988) to describe emotional bonds between children and their primary caregiver; the theory was later extended to include close and intimate relationships in adolescence and adulthood (Hazan & Shaver, 1990; Mikulincer & Shaver, 2008).

Attachment was originally conceptualized as a relatively stable and consistent trait-like domain (Bowlby, 1969/82, 1973) that reflects individual's systematic pattern of expectations, needs, emotions and social behaviors in close relationships (i.e., with parents and romantic partners; Schimmenti et al., 2021). According to this classical view, the internal working models of attachment (i.e., the affective and cognitive schemata including representations of self, other, and relationship between self and other; see Bowlby, 1973) develop during the first years of life within the parent-infant “dialogue” (Lyons-Ruth, 2006) and result in generally stable cognitive, emotional, and relational patterns.

Historically, Ainsworth et al. (1978) initially classified three major categories of attachment styles (i.e., secure, avoidant, and resistant/ambivalent), with later addition by Main and Solomon (1986) of the fourth category of disorganized attachment. Attachment styles are defined as the internalized mental representations of the self and others in close relationships (Cooper et al., 1998). Secure attachment arises from timely and consistent responses of caregivers to infant's needs, which leads to a perception of significant others as accessible and trustworthy (Sroufe & Waters, 1977). In contrast, if caregivers are emotionally detached from their children and value children's autonomy over affect communication, an avoidant style tends to develop. On the contrary, when caregivers provide inconsistent responses or persistently interfere with infant's activity, the infant will form an anxious attachment style. Both avoidant and anxious attachment styles imply insecure, yet organized, internal working models of attachment: avoidant individuals tend to dismiss affect and display constraints on closeness, whereas anxious individuals tend to display excessive desire for company and fear of separation from significant others (Bifulco & Thomas, 2012). Disorganized attachment style, often observed in maltreated children, corresponds to a failure to integrate internal working models of attachment into a coherent and unitary structure (Benoit, 2004).

Bartholomew (1990; Bartholomew & Horowitz, 1991) provided empirical support to the idea that attachment anxiety and attachment avoidance are dimensional, rather than categorical, constructs, with attachment anxiety referring to the fear of rejection and abandonment, and attachment avoidance denoting a discomfort with being close to others and a compulsive self-reliance (Mikulincer et al., 2003). In such theoretical framework, the attachment styles result from the interaction between the dimensions of anxiety and avoidance: 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).

In addition, attachment theorists have distinguished between stable and context-dependent facets of attachment-related phenomena (Cozzarelli et al., 2000). This theory suggest that specific contexts and relational environment may evoke different approaches to close relationships, so that domains of anxiety and avoidance might be differently reflected in their specific contextual behaviors, beside the prototypical attachment style that usually organizes an individual's affective life. Moreover, some scholars (e.g., Chen et al., 2020; Gillath & Shaver, 2007) consider attachment as a state-like characteristic, whereby attachment to significant others depends on the specific life events and situations.

Therefore, for the purpose of the present study we distinguish between a general (or structural) model of attachment and a contextual model of attachment (Caron et al., 2012). The general model considers attachment as a trait-like characteristic that is relatively stable during the life span, i.e., an overall and consistent pattern of individual's thoughts, feelings and behaviors that is seen in all significant relationships, irrespective of the relational context (Fraley, 2002; McConnell & Moss, 2011). The contextual model posits that attachment-related phenomena are relationship-specific, with one person simultaneously exhibiting different attachments while interacting with multiple significant others (Caron et al., 2012; Cozzarelli et al., 2000; Kobak, 1994; Lewis, 1994).

It is noteworthy that a substantial amount of research has been conducted within the attachment framework. As a consequence, an elaborate terminology has been developed (Ross, 2004). In the present systematic review, we will use the locution “attachment-related phenomena” as an umbrella term that encompasses a variety of constructs, including secure, avoidant, resistant/ambivalent, preoccupied, dismissing, fearful attachment styles, attachment anxiety and attachment avoidance. Definitions of these concepts are provided in Table 1.

Considering the specific purpose of the current study, empirical research has demonstrated that attachment security is related to

Table 1
Schematic representation of the attachment system.

TRAIT					STATE
Dimensional approach			Categorical approach		
Attachment anxiety	Attachment avoidance	Attachment security	Child attachment styles	Adult attachment styles	
Insecure features of attachment, including: - Heightened need for interpersonal closeness; - Expectation of separation, abandonment, or insufficient love; - Preoccupation with the availability and responsiveness of others; - Hyperactivation of the attachment system; - Negative representation of self (see Hazan & Shaver, 1987).	Insecure features of attachment, including: - Reluctance to trust others; - Devaluation of the importance of close relationships; - Avoidance of intimacy and dependance; - Heightened self-reliance; - Deactivation of the attachment system; - Negative representation of others (see Bowlby, 1980).	Sense of self-worth, confidence in one's abilities, comfort with close relationships and capacity for mutual dependence (see Mikulincer & Shaver, 2007).	Anxious-Avoidant: minimal response to separation, affective neutrality, limits interaction. Lacks confidence in social situations and expects relationship rejections. Maintains physical and emotional distance (Ainsworth et al., 1978). Secure: seeks balance of closeness and autonomy, able to negotiate conflict. Positive and reciprocal interactions. High sense of self-worth and self-efficacy. Modulates negative affect in constructive ways (Sroufe & Waters, 1977). Anxious-Resistant/ Ambivalent: desires intimacy and validation from others. Relational ambivalence. Fears rejection and abandonment (Ainsworth et al., 1978). Disoriented/Disorganized: disoriented, controlling, and/or disorganized behavior (e.g., rejecting and cheering at the same time; Main & Solomon, 1990). Unclassifiable: presence of indices of both severely insecure anxious-avoidant and anxious-resistant attachment that do not fit into any other style (often coded as the Disoriented/disorganized category; Main & Hesse, 1990).	Secure: low attachment anxiety, low attachment avoidance. Comfortable with intimacy and autonomy (Bartholomew, 1990 ; Bartholomew & Horowitz, 1991). Preoccupied: high attachment anxiety, low attachment avoidance. Overly dependent on others (Bartholomew & Horowitz, 1991). Dismissing: low attachment anxiety, high attachment avoidance. Maintains a sense of self-worth at the expense of intimacy. Denial of attachment needs (Bartholomew & Horowitz, 1991). Fearful: high attachment anxiety, high attachment avoidance. Desires intimacy but distrust others, avoids involvements in close relationships as they may imply rejection (Bartholomew & Horowitz, 1991).	Levels of attachment anxiety, avoidance, and security are dependent on situational circumstances. The internal working models represent a dynamic behavioral system that momentarily activates attachment styles specific for the context (see Gillath et al., 2009).

adaptive coping strategies, including a lowered risk of engaging in problematic online behaviors ([Estevez et al., 2019](#)). In contrast, insecure attachment-related phenomena have been associated with problematic Internet use ([Eichenberg et al., 2017](#); [Monacis et al., 2017a](#); [Schimmenti & Caretti, 2017](#); [Schimmenti et al., 2014, 2021](#)) and addictive-like behaviors more generally ([Musetti et al. 2016b](#); [Pace et al., 2013](#); [Schimmenti et al., 2012](#); [Schindler & Bröning, 2015](#)).

As SNSs are mostly used to establish and maintain online and offline relationships, an individual's attachment may significantly affect the way in which these sites are used.

According to the compensatory model of Internet use ([Kardesfelt-Winther, 2014](#)), PSNSU may be an attempt to cope with negative life situations, with use of SNSs 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 SNSs 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 SNSs and prefer them to actual interactions in the social world to maintain emotional distance with (and control over) others. Considering the developmental differences reported in the literature for both patterns of SNS use ([Stockdale & Coyne, 2020](#)) and attachment

([Theisen et al., 2018](#); [Waters et al., 2000](#)), research in this area has often examined adolescents and adult samples independently.

1.3. 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:

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

This study followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2010). 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 2nd, 2021 (registration number: CRD42021224186).

2.1. Information sources and search strategy

The systematic literature search was initially conducted on December 12, 2020, by two authors (AM and TM). 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.

2.2. 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 1st, 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.

2.3. 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 duplicates removal, two authors (AM and TM) 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 Fig. 1).

2.4. Risk of bias Please see the revised proof that I have sent to the Journal

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. The qualitative assessment outcome is presented in Table 4.

2.5. Synthesis of results

The extracted data were synthesized in the following domains: Author(s); Year; Document type; Location; Study design (e.g., cross-sectional survey); Sample characteristics; Conceptualization of problematic SNS use; General and/or specific SNS problematic use (e.g., Facebook); SNS features; Measurement instruments for attachment-related phenomena; Type of attachment-related phenomena; Measurement instruments for PSNSU; Key findings.

3. Results

3.1. 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, 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 exclusion of studies is provided in Fig. 1 and Table S1.

3.2. Characteristics of studies

Table 2 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 in 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 SNSs, the remaining 15 articles focused on the specific social media platforms: Facebook ($n = 12$), Instagram ($n = 2$), and Grindr ($n = 1$).

The conceptualization of PSNSU and the corresponding terminology

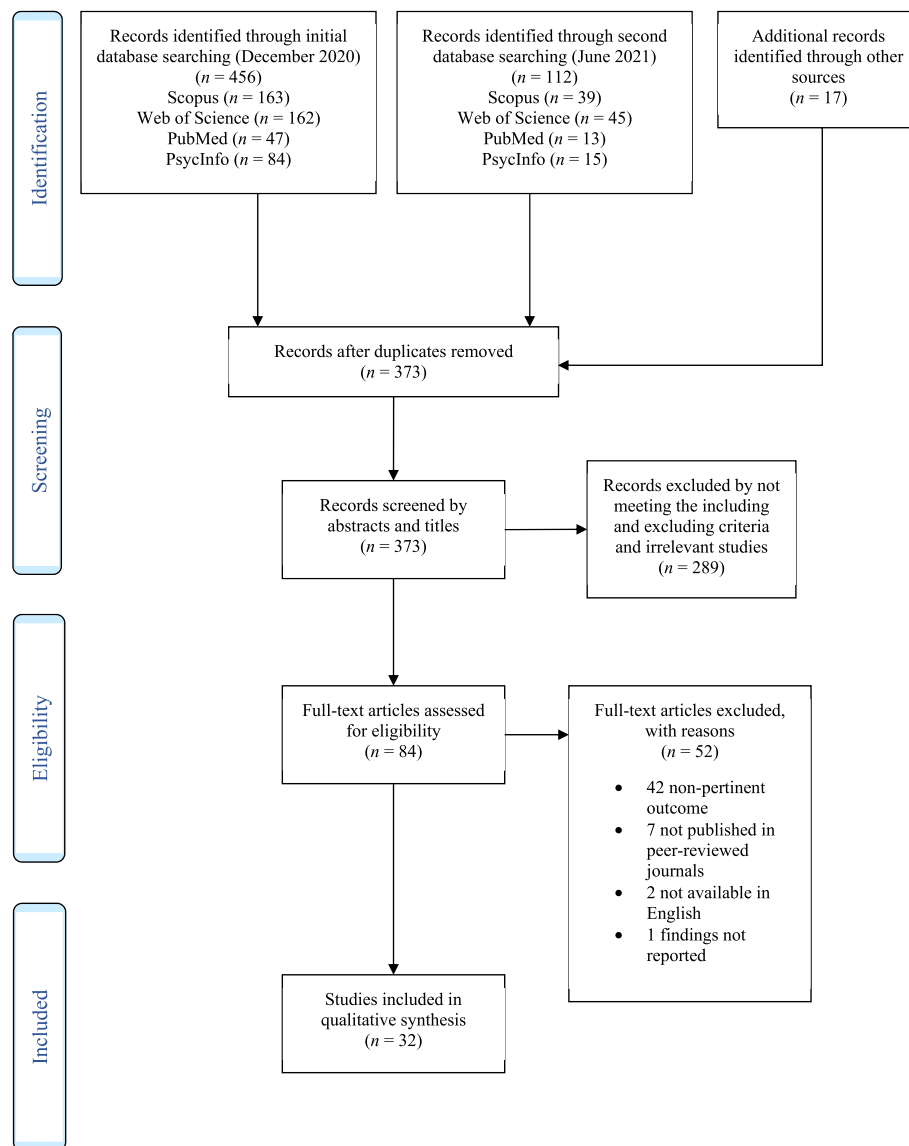


Fig. 1. Flow diagram of the search strategy: Modified from the Preferred Reporting Items for Systematic reviews and Meta-Analyses statement flow diagram (Moher et al., 2010).

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 3. 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., 2012]; 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; Young, 1998), adapted for SNSs context.

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.

3.3. Quality assessment

Quality assessment was conducted using the AXIS tool (Downes et al., 2016) and the related findings are displayed in Table 4. 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

Table 2

Studies on Problematic Social Networking Sites Use (PSNSU) and attachment included in the review (n = 32).

Authors (year)	Country	Design	Sample characteristics N (gender distribution) Age = range (M, SD)	Attachment theoretical model	Findings
Assunção et al. (2017)	Portugal	Cross sectional	N = 761 (46.3% females) Age = 14–18 (M = 15.9, SD = 1.08)	Contextual (parents)	Structural Equation Model 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 and Matos (2017)	Portugal	Cross sectional	N = 744 (46.1% females) Age = 14–18 (M = 15.9, SD = 1.08)	Contextual (parents)	MANOVA 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 ($F = 15.08$, $p \leq 0.001$, $\eta^2 = 0.06$) 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	N = 598 (54.2% females) Age = 12–17 (M = 14.28, SD = 1.52)	Contextual (parents, peers)	Multiple regression analyses 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	N = 384 (40% females) Age = 18–25 (M = 21.05, SD = 2.29)	Contextual (romantic partner)	MANOVA, Moderation analyses 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 SNSs and SNS addiction was moderated by secure ($\beta = 0.38$), fearful ($\beta = 0.36$), and 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.
Ballarotto et al. (2021)	Italy	Cross sectional	N = 372 (57.8% females) Age = 14–18 (M = 15.8, SD = 1.4)	Contextual (parents, peers)	Pearson's Product-Moment Correlation Analysis 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 to the mother ($\beta = -0.09$), the father ($\beta = -0.06$) and peers ($\beta = -0.04$) and PSNSU.
Blackwell et al. (2017)	USA	Cross sectional	N = 207 (75.85% females) Age = 17–49 (M = 22.15, SD = 7.38)	Contextual (romantic partner)	Hierarchical regression analysis 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 and Flack (2021)	Australia	Cross sectional	N = 188 (67% females) Age = 18–72 (M = 31.95, SD = 11.54)	Contextual (romantic partner)	Mediation analyses Prominent fear of missing out mediated the positive relationship between attachment anxiety and PSNSU ($\beta = 0.33$).
Chabrol et al. (2017)	France	Cross sectional	N = 456 (76% females) Age = 13–25 (M = 20.5, SD = 2.5)	Contextual (parents, peers)	Multiple regression analysis, Mediation analyses 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

(continued on next page)

Table 2 (continued)

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range (<i>M</i> , <i>SD</i>)	Attachment theoretical model	Findings
A. Chen (2019)	USA	Cross sectional	<i>N</i> = 314 (38.2% females) Age = <i>na</i> (<i>M</i> = 23.37, <i>SD</i> = 4.59)	General	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. Structural equation model 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	Correlation analysis, Moderation analysis 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 <i>SD</i>), higher social anxiety was linked with higher levels of SNS addiction (β simple slope = 0.32, $p < 0.001$) and SNS addiction tendency (β simple slope = 0.24, $p < 0.001$). On the contrary, for SNS users with high state attachment anxiety ($+1$ <i>SD</i>), social anxiety was no longer associated with SNS addiction or SNS addiction tendency.
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	Mediation analyses 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)	Correlation analysis, Structural equation model 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)	Correlation analyses, Structural equation model 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)	Multiple regression analysis 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 and Aghajani (2017)	Iran	Cross sectional	<i>N</i> = 100 (females = <i>na</i>) Age = <i>na</i>	General	Discriminant analysis 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)	Hierarchical multiple regression, Mediation analyses 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

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Table 2 (continued)

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range (<i>M</i> , <i>SD</i>)	Attachment theoretical model	Findings
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)	self-disclosures on Facebook) was mediated by psychological distress and self-esteem. Multiple regression analyses, Structural equation model SNSs 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 ($z = 5.04$, $p < 0.01$). Mediation analyses 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. Hierarchical regression analysis 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 (z Sobel test = 6.68, $p < 0.001$). Correlation analysis, Mediation analysis 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 ($B = -0.03$, $SE = 0.02$). Mediation analysis 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. Path analyses 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]). Multiple regression analyses 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. Multiple regression analysis 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. ANOVA 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. Structural equation model 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 ($\beta = 4.48$). Correlation analysis, structural equation model 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-
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)	
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)	
Liu and 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)	
Liu and 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)	
Marino et al. (2019)	Italy	Cross sectional	<i>N</i> ₁ = 271 (67.9% females) Age ₁ = 14–20 (<i>M</i> = 17.02, <i>SD</i> = 1.56) <i>N</i> ₂ = 336 (54.76% females) Age ₂ = 14–20 (<i>M</i> = 16.22, <i>SD</i> = 1.41)	Contextual (parents)	
Monacis et al. (2017a)	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	
Monacis et al. (2017b)	Italy	Cross sectional	<i>N</i> = 734 (43.46% females) Age = 16–40 (<i>M</i> = 21.63, <i>SD</i> = 3.95)	General	
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)	
Nasr and Rached (2021)	Tunis	Cross sectional	<i>N</i> = 405 (47.4% females) Age = <i>na</i>	Contextual (peers)	
Shafiee et al. (2020)	Iran	Cross sectional	<i>N</i> = 241 (62.2% females) Age = 18–45	General	

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Table 2 (continued)

Authors (year)	Country	Design	Sample characteristics <i>N</i> (gender distribution) Age = range (<i>M</i> , <i>SD</i>)	Attachment theoretical model	Findings
Tobin and 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	ambivalent attachment style and PSNSU (CFI: 0.94, NFI: 0.92, RMSEA: 0.09). Correlation analysis, mediation analysis 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)	Correlation analyses, Moderated mediation model 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, and Corcoran (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)	Hierarchical regression analysis, Mediation analysis 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]).
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)	Correlation analysis, Mediation analysis 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.
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)	Zero order correlations Problematic social media use was positively correlated with both dimensions of anxious ($r = 0.53$, $p < 0.01$) and avoidant attachment styles ($r = 0.18$, $p < 0.01$).

design were adequately acknowledged and described in 26 studies (question 18).

3.4. Main findings

3.4.1. Direct associations between attachment and problematic social networking sites use

3.4.1.1. 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).

3.4.1.2. 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).

3.4.1.2.1. Studies of adolescents and young adults.

A. Attachment to parents and problematic social networking sites use

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 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 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).

Table 3

Measurement instruments and dimensions listed in the included studies (n = 32).

	Measures of Problematic Social Networking Sites Use	Construct dimensions	Studies	N of studies
Problematic Social Networking Sites Use	Behavioral Technology Addiction scale (BTA; Charlton, 2002)	Adapted for SNSs 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 et al. (2017a, 2017b); Nasr and Rached (2021); Tobin and Graham (2020); Vaillancourt-Morel et al. (2020); Worsley, Mansfield, and Corcoran (2018); Worsley, McIntyre, et al. (2018)	13
	Chinese Social Media Addiction Scale (CSMAS; Liu & Ma, 2018)	Preference for online social interactions, mood alteration, negative outcomes and continued use, compulsive use/withdrawal, salience, relapse	Liu and Ma (2019a; 2019b)	2
	Compulsive Internet Use Scale (CIUS; Meerkerk et al., 2009)	Adapted for SNSs context. Loss of control, preoccupation, withdrawal, coping and mood, conflict	Boustead and Flack (2021)	1
	Generalized Problematic Internet Use Scale 2 (GPIUS2; Caplan, 2010)	Adapted for SNSs context. Preference for online social interaction, mood regulation, cognitive preoccupation, compulsive Internet use, negative outcomes	Assunção et al. (2017); Assunção and Matos (2017); Young et al. (2020)	3
	Instagram Social Network Inventory (ISNI; Ershad & Aghajani, 2017)	Unidimensional construct	Ershad and Aghajani (2017)	1
	Internet Addiction Test (IAT; Young, 1998)	Adapted for SNSs 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 SNSs 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 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	N of studies
Attachment	Adult Attachment Scale (AAS; Collins & Read, 1990)	Attachment anxiety, attachment avoidance, attachment security	Ershad and Aghajani (2017); Tobin and 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 and Flack (2021); A. Chen (2019); Flynn et al. (2018); Jayawardena et al. (2021); Kyeong Lee (2017); Liu and Ma (2019a; 2019b); Marino 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 and 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 and Matos (2017); Badenes-Ribera et al. (2019); Ballarotto et al. (2021); Chabrol et al. (2017); Marino et al. (2019); Moreau et al. (2015); Nasr and 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

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Table 3 (continued)

Measures of Problematic Social Networking Sites Use	Construct dimensions	Studies	N of studies
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, and Corcoran (2018); Worsley, McIntyre, et al. (2018) Eroglu (2016)	6
Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994)	Secure, dismissing, fearful, preoccupied		1
State Adult Attachment Measure (SAAM; Gillath et al., 2009)	Attachment anxiety, attachment avoidance	Y. Chen et al. (2020)	1

B. Attachment to peers and problematic social networking sites use

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).

3.4.1.2.2. Studies of adults. Attachment to partners and problematic social networking sites use.

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; Liu & Ma, 2019a, 2019b; Vaillancourt-Morel et al., 2020; Worsley, Mansfield, & Corcoran, 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, 2021). In young adults, PSNSU was positively predicted by the ambivalent attachment style, especially among females (Fujimori et al., 2015).

3.4.2. Mediators of the associations between attachment and problematic social networking sites use

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).

3.4.2.1. 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 et al. (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. Liu and Ma (2019b) found that difficulties in emotion regulation partly mediated the relationship between attachment anxiety and PSNSU.

Metacognition. Marino 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, and Corcoran (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).

3.4.2.2. 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

Table 4
Quality assessments and total scores using the AXIS tool (Downes et al., 2016).

Authors (year)	1	2	3	4	5	6	7	8	9	10	11	12	13 *	14	15	16	17	18	19 *	20	Total quality score/20	Quality rating
Assunção et al. (2017)	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	16	High
Assunção and Matos (2017)	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	16	High
Badenes-Ribera et al. (2019)	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	16	High
Baek et al. (2014)	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	N	N	Y	Y	Y	Y	N	N	14	Moderate
Ballarotto et al. (2021)	Y	Y	N	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	N	Y	16	High
Blackwell et al. (2017)	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	N	N	Y	N	Y	Y	N	N	13	Moderate
Boustead and Flack (2021)	Y	Y	N	N	N	N	N	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	N	Y	13	Moderate
Chabrol et al. (2017)	Y	Y	N	Y	Y	N	N	Y	Y	N	Y	Y	N	N	Y	Y	Y	N	N	Y	14	Moderate
A. Chen (2019)	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	N	15	High
Y. Chen et al. (2020)	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y	N	Y	Y	N	Y	16	High
Costanzo et al. (2021)	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	16	High
Demircioğlu & Gönçü Köse (2020)	Y	Y	N	Y	Y	Y	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	N	Y	15	High
Demircioğlu & Gönçü Köse (2021)	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	Y	Y	N	N	Y	15	High
Eroglu (2016)	Y	Y	N	Y	Y	N	N	Y	Y	N	N	Y	N	N	Y	Y	Y	Y	N	N	13	Moderate
Ershad et al. (2017)	Y	Y	N	N	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y	N	N	N	10	Moderate
Flynn et al. (2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	N	Y	19	High
Fujimori et al. (2015)	Y	Y	N	N	Y	N	N	Y	Y	N	N	Y	N	N	Y	Y	Y	Y	N	N	12	Moderate
Jayawardena et al. (2021)	Y	Y	N	N	N	N	N	Y	Y	N	N	Y	N	N	Y	Y	Y	Y	N	Y	12	Moderate
Kyeong Lee (2017)	Y	Y	N	N	Y	na	N	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	N	N	13	Moderate
Liu and Ma (2019a)	Y	Y	N	Y	na	na	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	15	High
Liu and Ma (2019b)	Y	Y	N	Y	na	na	N	Y	Y	N	N	Y	N	N	Y	Y	Y	Y	N	Y	13	Moderate
Marino et al. (2019)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	19	High
Monacis et al. (2017a)	Y	Y	N	Y	Y	Y	N	Y	Y	N	Y	Y	N	N	Y	Y	N	N	N	Y	14	Moderate
Monacis et al. (2017b)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	Y	18	High
Moreau et al. (2015)	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	Y	Y	N	Y	15	High
Nasr and Rached (2021)	Y	Y	N	N	N	N	N	Y	Y	N	N	Y	N	N	Y	Y	N	N	na	Y	9	Moderate
Shafiee et al. (2020)	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	N	Y	Y	Y	Y	N	N	Y	16	High
Tobin and Graham (2020)	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	N	N	14	Moderate
Vaillancourt-Morel et al. (2020)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	Y	18	High
Worsley et al. (2018a)	Y	Y	N	Y	na	na	Y	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	N	Y	14	Moderate
Worsley et al. (2018b)	Y	Y	N	Y	na	na	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	N	Y	15	High
Young et al. (2020)	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	N	N	Y	Y	Y	Y	N	Y	15	High
Mean																					14.66	
Standard Deviation																					2.22	

Note. Y = Yes, N = No, na = Don't know.

* Items 13 and 19 are reverse coded.

See Appendix for the AXIS tool questions.

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. 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. 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.

3.4.2.3. 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 SNSs 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 SNSs 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 SNSs 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 SNSs use mediated the positive association between attachment anxiety and PSNSU. Meeting the needs for communication and escapism as motivations for SNSs use mediated the positive association between attachment avoidance and PSNSU.

4. 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.

4.1. 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 over-involvement with SNSs 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 SNSs 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 SNSs 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.

4.2. 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).

4.2.1. Attachment to parents in adolescents and problematic social networking sites use

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 et al. 2021a). 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).

4.2.2. Attachment to peers in adolescents and problematic social networking sites use

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 SNSs. 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 SNSs 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 SNSs as essential tools for interacting with peers on a daily basis (Kwon et al., 2013). This calls for a balanced evaluation of SNSs use among adolescents and especially a need to avoid pathologizing normative behaviors and distinguish between a high involvement in SNSs use and PSNSU (Carbonell & Panova, 2017; Tóth-Király et al., 2019).

4.2.3. Attachment to partners and problematic social networking sites use

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 SNSs 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 SNSs (Boustead & Flack, 2021; 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 3.2 and Table 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, SNSs 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).

4.3. Mediators of the relationships between attachment and problematic social networking sites use

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 (Demircioğlu & Göncü Köse, 2020; Flynn et al., 2018) and low well-being (Worsley, Mansfield, & Corcoran, 2018). As expected, attachment also influenced interpersonal domains, such as FOMO (Liu & Ma, 2019; Boustead & Flack, 2021), 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 et al., 2019). The mediating roles of prominent borderline traits (Chabrol et al., 2017) and high levels of emotion dysregulation (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.

4.4. Implications

The findings of this systematic review have implications in the realm of a better understanding, prevention and treatment of PSNSU.

4.4.1. Conceptualization of PSNSU

Examining attachment 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).

4.4.2. 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).

4.4.3. 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, Philippot, et al., 2015; Costanzo et al., 2021). Given that users may rely excessively on SNSs to cope with emotional and interpersonal difficulties (e.g., Musetti et al., 2021b; 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.

4.4.4. 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 SNSs 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 (Caretti 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.

4.5. Limitations

The present systematic review has a number of limitations. Some result from the rapidly changing landscape of SNSs, which might have limited our “coverage” of the recently introduced SNSs. 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 SNSs separately, since PSNSU refers to a general misuse of SNSs. 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.

4.6. 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 SNSs 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, experimental 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 SNSs 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.

Declaration of competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Appendix

Introduction

- 1 Were the aims/objectives of the study clear?

Methods

- 2 Was the design appropriate for the stated aim?
- 3 Was the sample size justified?
- 4 Was the target/reference population clearly defined? (Is it clear who the research was about?)
- 5 Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?
- 6 Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?
- 7 Were measures undertaken to address and categorize non-responders?
- 8 Were the risk factor and outcome variables measured appropriate to the aims of the study?
- 9 Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?
- 10 Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., *p* values, CIs)
- 11 Were the methods (including statistical methods) sufficiently described to enable them to be repeated?

Results

- 12 Were the basic data adequately described?
- 13 Does the response rate raise concerns about non-response bias? *
- 14 If appropriate, was information about non-responders described?
- 15 Were the results internally consistent?
- 16 Were the results for the analyses described in the methods, presented?

Discussion

- 17 Were the authors' discussions and conclusions justified by the results?
- 18 Were the limitations of the study discussed?

Other

- 19 Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results? *
- 20 Was ethical approval or consent of participants attained?

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chb.2022.107199>.

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