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Full Length Article

Unpacking sexual behaviors in the digital era: A person-centered approach to online and offline activities

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ABSTRACT

The Internet has become a key medium for sexual exploration and gratification. This study aimed to identify latent subgroups based on engagement in offline sexual behaviors and Online Sexual Activities (OSAs); examine the extent to which classes are predicted by key sociodemographics and OSA motives; and investigate how classes differ on sex addiction, trait emotional intelligence (EI) and satisfaction with life (SWL). 639 Italian active OSA users (61.7 % females) aged 18–77 (M = 31.2, SD = 10.4) completed an online survey assessing: autoerotism, sexual intercourse and OSAs frequency (12 items); OSAs motives (18 items); Bergen-Yale Sex Addiction Scale; Trait Emotional Intelligence Questionnaire–Short Form; Satisfaction with Life Scale. Latent Class Analysis identified three classes: Solitary (32 %), characterized by solitary behaviors; In-person (45 %), marked by in-person sexual activity and limited OSAs; and Highly Engaged (23 %), with frequent offline and online sexual behaviors. R3STEP analysis showed that sex, living and relationship status, religiosity, number of occasional sexual partners, and motives such as Social Pressure, Coping/Escaping, and Fantasy distinguished the classes. The BCH procedure, used to examine distal outcomes, revealed that individuals in the Highly Engaged class exhibited the highest risk of sex addiction, followed by those in the Solitary and In-person classes. Compared to the In-person class, the Highly Engaged group reported lower levels of trait EI and SWL. Findings delve into diverse shapes of sexuality in the digital era, highlighting how and for whom sexual behaviors may be problematic and underscoring the importance of studying OSAs alongside offline sexual behaviors.

1. Introduction

As the boundary between the real and the virtual continues to dissolve, the Internet has come to play a central role in sexual exploration, communication, and gratification (Shaughnessy & Braham, 2021). Online Sexual Activities (OSAs) encompass a wide range of sexuality-related behaviors which take place online (Döring & Mohseni, 2018). Shaughnessy and colleagues (2011) classified these into three main categories: non-arousal OSAs, which do not elicit sexual arousal and involve activities such as seeking information about sexuality; solitary-arousal activities, which include behaviors like viewing explicit content or engaging in autoerotic practices; and partnered-arousal activities, which require interaction with at least one other person (e.g., sharing sexual fantasies via computer typing or microphone). Notably, studies suggest that between 33 % and 75 % of individuals engage in OSAs, underscoring their increasing prevalence and integration into contemporary sexual expression (Wéry & Billieux, 2017).

A growing body of research highlights the importance of individual differences in shaping both the expression and potential consequences of sexual behaviors. For example, men tend to report higher involvement in both sex and OSAs compared to women and are more oriented toward solitary-arousal activities. In contrast, women show a greater tendency to participate in partnered-arousal behaviors (Bélanger Lejars et al., 2020; Wéry & Billieux, 2017). Moreover, engagement in sex and OSAs appears to change across the lifespan (Ballester-Arnal et al., 2021; Karraker et al., 2011) and to be influenced by gender, sexual orientation, relationship status, religiosity, and living arrangements (Döring, 2009; McFarland et al., 2011; Ševčíková et al., 2021).

Earlier typologies of OSA users (e.g., Cooper et al., 1999; Delmonico & Miller, 2003) have offered valuable conceptual frameworks grounded in clinical insight and survey-based data. However, these models do not fully reflect the complexity of sexual behavior across both online and offline contexts. Moreover, OSA user profiles have rarely been examined using person-centered statistical methods. By employing Latent Class Analysis (LCA), this study moves beyond prior typologies, aiming to identify distinct user profiles based on actual patterns of engagement in

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a wide range of sexual behaviors, encompassing both offline and online modalities. The study also includes sociodemographic variables, motivational factors, and psychosocial outcomes (i.e., sex addiction, trait emotional intelligence, and life satisfaction). This allows us to explore how the profiles differ not only in what individuals do, but also in who they are and why they engage in these behaviors.

1.1. OSA user types: established typologies

To describe the diversity of individuals engaging in OSAs, several typologies have been proposed. Some of the earliest and most influential contributions to the understanding of patterns of engagement were offered by Cooper and colleagues (1999) and Delmonico and Miller (2003).

Delmonico and Miller's classification (2003) focused on how people engage in OSAs and emphasized the role of social interaction preferences. They identified three types of uses: solitary, partnered, and compulsive use. Solitary use is typically observed in individuals who primarily engage in online sexual activities to obtain sexually arousing material – typically downloaded, viewed offline, and incorporated into their sexual fantasies – while also preferring minimal social interaction. Partnered use characterizes individuals who actively seek and enjoy the social interaction associated with online sexual activities (e.g., flirting, seducing, being seduced, etc.). Lastly, compulsive users are those who tend to exhibit more pronounced negative consequences.

Cooper and colleagues (1999; 2004) classified OSA users into three profiles based on compulsivity and risk: sexually compulsive users, recreational users, and at-risk users. Sexually compulsive users often engage in compulsive behaviors, demonstrate established patterns of unconventional sexual practices, and frequently experience significant life challenges. Recreational users engage in OSAs in a relatively casual manner, driven mainly by curiosity and entertainment, without reporting significant issues with compulsion or loss of control. At-risk users are individuals who do not have a history of sexual compulsivity but may develop problematic engagement due to the Internet's unique characteristics, namely accessibility, affordability, and anonymity (Triple A Engine, Cooper, 1998). Within this category, three subtypes have been identified. The Stress-Reactive Type turns to OSAs to distract themselves during periods of high stress, or to escape or to manage distress. The Depressive Type is characterized by chronic depression, dysthymia, anxiety, or feelings of loneliness, and uses Internet sex as temporary relief from their emotional discomfort (Cooper et al., 1999). The Fantasy Type engages in online sexual behaviors they would not pursue offline, which can lead to increasingly extreme fantasies or negative impacts on intimate relationships, particularly among individuals with preexisting compulsive tendencies (Cooper et al., 2004). Collectively, these at-risk subtypes differ primarily in their motivations for engaging in OSAs, whether it be escaping real-life difficulties, seeking relief from personal struggles, or retreating into a fantasy world to explore alternative identities in virtual spaces (for a comprehensive review on motives underlying the engagement in OSAs, see Castro-Calvo et al., 2018). Notably, these motives are commonly linked to problematic and addictive behaviors, particularly those associated with excessive Internet use (Biolcati et al., 2021; Melodia et al., 2022).

1.2. Understanding problematic sexual behaviors in digital contexts through motivational models

While often experienced as pleasurable, exploratory, and normative, only for a small subset of individuals OSAs can become excessive or difficult to control, leading to adverse outcomes in various aspects of their lives, a pattern in which men appear to be at greater risk (Wéry & Billieux, 2017). These features are typically associated with sex addiction, also referred to as compulsive sexual behavior or hypersexuality, defined by persistent, repetitive sexual thoughts, urges and behaviors that interfere with psychosocial functioning (Soraci et al., 2023). Although not formally recognized as a distinct disorder in the DSM-5, sex addiction shares core characteristics with other behavioral addictions, including loss of control, escalation, and continued engagement despite negative consequences (Soraci et al., 2023).

Motivational models of addiction emphasize that the same behavior may serve different psychological purposes, such as enhancement, coping, social connection, or escapism (Bäcklund et al., 2022; Cooper et al., 2016; Cox & Klinger, 2004). Within the framework of Uses and Gratifications Theory (Katz et al., 1973), OSAs may be conceptualized as goal-directed behaviors through which individuals actively seek to fulfill specific psychological, emotional, or interpersonal needs (Peter & Valkenburg, 2009; Ruggiero, 2000). Accordingly, the meaning and consequences of online behavior depend less on the medium itself – which can be used to serve a wide range of purposes – and more on the underlying needs and motivations that drive individuals to engage with it (Hudson & Marshall, 2018; Ruggiero, 2000). Empirical studies have consistently shown that specific motives such as mood regulation and anonymous fantasizing are particularly associated with compulsive or problematic patterns of OSAs use (Bolshinsky & Gelkopf, 2019; Brahim et al., 2019; Castro-Calvo et al., 2018). Thus, integrating motivational divers may provide deeper insight into who is more likely to develop compulsive OSA use, and for what reasons.

1.3. Problematic OSAs: a compensatory use perspective

Sex addiction is not simply an expression of heightened sexual desire but is often linked to underlying emotional dysregulation (Rahm-Knigge et al., 2023). Many individuals engage in compulsive sexual behaviors to regulate emotional states such as anxiety, loneliness, or boredom (Lew-Starowicz et al., 2020), reflecting a compensatory mechanism also observed in other behavioral and Internet-related addictions (Brand et al., 2019; Kardefelt-Winther, 2014). This dynamic is effectively described by the Compensatory Internet Use Theory (CIUT) (Kardefelt-Winther, 2014), which builds on the Uses and Gratifications Theory by integrating findings on the relationship between psychosocial wellbeing and problematic internet use. According to CIUT, digital environments are frequently used to cope with psychosocial difficulties and unmet emotional needs, as well as to avoid negative emotions or adverse life circumstances.

1.4. Individual vulnerability: the role of trait emotional intelligence

In this context, the role of emotional competencies becomes particularly relevant, as they may influence how individuals manage distress and whether they turn to OSAs as a coping strategy. Previous research has linked lower emotional intelligence to increased engagement in risky sexual behaviors during adolescence, a higher number of sexual partners, and greater difficulty in forming and maintaining mutually satisfying relationships (Knopp, 2021; Lando-King et al., 2015; Morelli et al., 2023; Wollny et al., 2020). Rather than addressing emotional intelligence as a broad construct, the present study focuses on trait emotional intelligence (EI). Trait EI is defined as a constellation of emotion-related self-perceptions situated at the lower levels of personality hierarchies and integrates the affective dimension of personality (Petrides et al., 2007). Due to its dispositional nature, trait EI offers a particularly valuable lens for understanding susceptibility to maladaptive emotion regulation strategies, such as compulsive engagement in OSAs. High levels of trait EI have consistently been identified as a protective factor against behavioral addictions, particularly those related to Internet use and digital technologies (Biolcati et al., 2025). Furthermore, trait EI has been positively associated with overall psychological adjustment and satisfaction with life (Bhullar et al., 2012; Di Fabio & Kenny, 2016).

1.5. The present study: profiling OSA users through a person-centered approach

Previous typologies of OSA users, grounded in clinical experience and survey-based research, have offered valuable conceptual models for understanding different modes and degrees of OSAs engagement. However, the study of OSA users would benefit from the application of person-centered statistical approaches, such as Latent Class Analysis (LCA) or Latent Profile Analysis (LPA). These methods can empirically detect unobserved subgroups based on individuals' response patterns and offer deeper insights into individual heterogeneity (Lefkowitz & Vasilenko, 2014). They may not only uncover new patterns of engagement but also provide empirical support for the existing typologies. More importantly, by identifying behavioral subgroups and then examining how they differ in their motivational risk factors and distal psychosocial outcomes, these approaches can shed light on the psychological mechanisms that underlie different patterns of sexual behavior, including those occurring in technology-mediated contexts.

Several authors have begun to employ these approaches to examine patterns of OSAs and associated risks (Chen et al., 2024; Fong et al., 2025), as well as to explore the motivational drivers underlying specific behaviors such as sexting and pornography use (Currin & Garos, 2024; Maitland & Neilson, 2023), highlighting their potential for further development. Despite these advancements, to our knowledge no previous study has employed person-centered statistical approaches to identify user profiles based on engagement in multiple and diverse types of OSAs, and to examine how these latent profiles differ in terms of the motivational factors underlying such behaviors. Furthermore, OSAs have often been studied in isolation from offline sexual behaviors, with most research focusing exclusively on either technological phenomena or sexuality, rarely integrating the two. This separation leaves open critical questions about "the ways in which technology affects, is used for, integrated with, and shaped by sexuality" (Shaughnessy & Braham, 2021, p. 147).

Building on these gaps in literature, the present study pursues three primary goals. First, it aims to identify distinct subgroups of OSA users based on their engagement in various sexual behaviors, including autoerotism, in-person sexual intercourse and several OSAs, using a latent class analytic approach. Second, given the critical role of individual differences in shaping the nature and outcomes of OSAs engagement, the present study aims to examine the extent to which the identified classes are predicted by key sociodemographic correlates and motivations for engaging in OSAs. Third, to provide a more comprehensive understanding of OSA users, the study aims to investigate how the identified subgroups differ with respect to relevant psychosocial variables, such as sex addiction risk, trait EI, and life satisfaction.

2. Methods

2.1. Participants and procedure

This observational and cross-sectional study is part of the larger project "*The shapes of sexuality in the digital era*" (original title: "*Le forme della sessualità nell'era digitale*"), which investigates current sexuality among adults in Italy. Participants were recruited using a snowball sampling technique and invited to complete an anonymous online survey developed using Qualtrics and distributed via email, social media, and messaging apps. Inclusion criteria for participation in the broader project were being 18 years or older and currently residing in Italy. However, for the purposes of the present study, the sample was restricted to individuals who reported having used the Internet or digital technologies for purposes related to sexuality, sexual arousal, and/or sexual pleasure at least once in the past 12 months. This criterion was adopted to ensure alignment with the study's specific aim of identifying patterns of engagement among active users of OSAs. Potential participants received an invitation that included a short description of the study and the survey link. The initial page of the survey provided an information sheet about the study as well as the informed consent form. Participants were required to give their consent before proceeding with the questionnaire. No incentives or rewards were offered for participation. All respondents could only complete the survey once and were encouraged to share the survey link with others who met the eligibility criteria. The study was approved by the Ethical Committee of University of Bologna (Approval No. 0031816; February 06, 2024) and was conducted in accordance with the ethical outlined in the 1964 Declaration of Helsinki and its later amendments. Data collection was conducted from February 7 to May 4, 2024.

The survey link was accessed by 1196 individuals, of whom 1186 agreed to participate. Those who failed to meet inclusion criteria (N = 2), those who did not complete the survey (N = 314) and those who did not use Internet and/or digital technologies for purposes related to sexuality, sexual arousal, and/or sexual pleasure either in the lifetime (N = 204) or during the last year (N = 27) were removed, resulting in a final sample size of 639.

2.2. Measures

2.2.1. Socio-demographics

Sociodemographic variables collected were age (in years), sex assigned at birth, gender identity and sexual orientation (as defined by APA, 2020), level of education, occupational status, religious or spiritual belief, living status, current relationship status and lifetime number of sexual partners without emotional or romantic involvement.

Details on the socio-demographic variables, including the original items and response options collected in the study, are reported in Supplementary Material (Table S1).

2.2.2. Sexual activities

Twelve items were developed to assess the frequency with which each respondent engaged in autoerotic behavior, face-to-face sexual intercourse, and OSAs over the past year.

The item "In the past year, how frequently have you engaged in masturbation?" was used to assess the frequency of autoerotism over the past year. The item "In the past year, how frequently have you had sexual encounters with another person? By 'sex,' we refer to any type of sexual contact, not only sexual intercourse but also, for example, giving or receiving oral sex or engaging in manual stimulation of the genitals to achieve or provide sexual pleasure." was used to assess the frequency of in-person sexual activity over the past year. Participants responded using a Likert-type scale with the following response options: 1 = "Never in my life," 2 = "Never or almost never in the past year (about once every 5–6 months)," 3 = "About once every 2–3 months," 4 = "About once a month," 5 = "2–3 times a month," 6 = "1–2 times a week," 7 = "3–4 times a week," 8 = "Almost every day," 9 = "Every day," and 10 = "More than once a day."

Regarding OSAs, a total of 10 items were created in accordance with previous literature (Ballester-Arnal et al., 2021; Barrense-Dias et al., 2022; Boer et al., 2021; Döring et al., 2017, 2021; Shaughnessy et al., 2011). Participants were asked to report the frequency with which they had engaged in specific behaviors during the last year, including searching for sexually arousing content online (e.g., erotic or sexually explicit photos, videos, stories, etc.) (item 1), posting self-produced sexually arousing content of the same nature (item 2), sharing sexual fantasies with someone online, either in written form (item 3) or via audio or video communication (e.g., microphone or webcam) (item 4), sharing with someone online erotic or sexually explicit photos and/or videos depicting others (item 5), as well as self-produced material (item 6), using dating websites or applications for sexual purposes (item 7), engaging in masturbation while viewing sexually explicit photos or videos online (item 8), engaging in sexual activities with a partner while viewing sexually explicit photos and/or videos online (item 9), and engaging in live-streamed erotic activities, broadcasting them in real

time to one or more individuals via webcam (item 10). Responses were collected using a Likert-type scale with the following response options: 1 = "Never in the past year," 2 = "Almost never in the past year (about once every 5–6 months)," 3 = "About once every 2–3 months," 4 = "About once a month," 5 = "2–3 times a month," 6 = "1–2 times a week, " 7 = "3–4 times a week," 8 = "Almost every day," 9 = "Every day," and 10 = "More than once a day."

2.2.3. Motives to engage in OSAs

Twenty-four items assessing motives for engaging in OSAs were developed based on five of the seven categories of the classification outlined in the review by Castro-Calvo and colleagues (2018), specifically: "OSAs to satisfy sexual curiosity and for sexual education," "OSAs as a form of social relationship enhancement and/or as the consequence of social pressure," "OSAs to enhance online and offline sexuality," "OSAs as a form of anonymous fantasizing," and "OSAs as a form of mood management, enhancement, and/or emotional avoidance." Items reflecting the "Structural Characteristics of the Medium" category were not included, as these motives appear to be applicable to all types of OSAs and users (Castro-Calvo et al., 2018), making them less useful for distinguishing different profiles of OSA users. Similarly, the category "OSAs as a Form of Achieving Sexual Arousal and Pleasure" was excluded because the survey had already screened participants by asking whether they had ever used the Internet or digital technologies for sexual arousal or pleasure, making these motives almost common to all respondents and therefore uninformative for distinguishing different motivational profiles.

The respondents were asked to rate on a 7-point Likert scale from 1 (Not at all important to me) to 7 (Extremely important to me) how important each motivation is for their engagement in OSAs.

To identify the underlying factor structure of the 24 items assessing motives for engaging in OSAs, an Exploratory Factor Analysis (EFA) and a Confirmatory Factor Analysis (CFA) were conducted on two randomly split subsamples. Through an iterative process of item evaluation based on statistical and conceptual criteria, six items were removed, resulting in a refined set of 18 items. A subsequent CFA was conducted on the full sample to generate factor scores for subsequent analyses. This analysis further supported the stability and adequacy of the five-factor solution (CFI = .982, TLI = .978, RMSEA = .059, 90 % CI [.053, .066]). Full analytical details are reported in the Supplementary Material (S.2).

The final set of 18 items identified through EFA and CFA clustered into five distinct motivational dimensions for OSAs engagement, each showing satisfactory internal consistency. "Curiosity and Learning" (3 items) captures the drive to satisfy curiosity, acquire sexual knowledge, and explore unfamiliar practices (McDonald's ω = .87). "Social Pressure" (4 items) reflects motivations shaped by external social influences, such as the desire for social approval, conforming to peer norms, or compliance with pressure from others (McDonald's ω = .67). "Sexual/Romantic Encounters Facilitation" (3 items) pertains to the desire to initiate offline sexual or romantic connections, especially in absence of a partner (McDonald's ω = .86). "Coping/Escaping" (5 items) reflects using OSAs for mood regulation, stress relief, or to alleviate boredom and loneliness (McDonald's ω = .88). Finally, "Fantasy" (3 items) refers to engaging in OSAs to explore sexual fantasies or desires, not necessarily intended to be enacted offline, in a safe and imaginative space (McDonald's ω = .79).

2.2.4. Sex addiction

The Italian version of the Bergen-Yale Sex Addiction Scale (BYSAS; Soraci et al., 2023) was used to evaluate the risk of sex addiction based on the components model of addiction (Griffiths, 2005). This model encompasses six core criteria: salience (over-preoccupation with sex or wanting sex), mood modification (use of sex to modify mood state), tolerance (escalation in the amount of sex over time to maintain high levels of satisfaction), withdrawal (experience of negative emotional and physical symptoms when unable to engage in sex), conflict (significant impairment in significant areas of functioning such as relationships, work/study, health, and financial aspects as a consequence of sexual behavior), and relapse (recurrence of previous problematic sexual behaviors after a period of abstinence or control). The scale is composed of six items on a 5-point scale (0 = Very rarely; 4 = Very often), with higher scores indicating a greater risk of sex addiction. The internal consistency for this study was acceptable (Cronbach's α = .76).

2.2.5. Trait emotional intelligence

The Trait Emotional Intelligence Questionnaire – Short Form (TEIQue-SF, Petrides, 2009) was used to measure trait EI. It includes 30 items designed to assess global trait EI, rated on a 7-point scale (1 = Completely disagree; 7 = Completely agree). The global trait EI score was used in the present study. The measure showed good internal consistency (Cronbach's α = .88).

2.2.6. Satisfaction with life

The Italian version of the Satisfaction With Life Scale (SWLS, Di Fabio & Gori, 2016, 2020) was used to assess global cognitive judgments of one's life satisfaction. The scale consists of five items, rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating greater life satisfaction. In the current study, the SWLS showed good internal consistency (Cronbach's α = .83).

2.3. Data analysis

Preliminary analyses were conducted using SPSS (IBM Corp., 2017) and included descriptive statistics, chi-square tests to examine sex differences in the likelihood of engaging in various sexual behaviors over the past year (coded as dichotomous variables) and a multiple linear regression to examine whether participants' age differed based on engagement in these behaviors. Lastly, one-way analyses of variance (ANOVAs) and linear regressions were conducted to examine sex and age differences, respectively, in scores on sex addiction, trait EI and satisfaction with life.

To ensure adequate cell sizes and minimize estimation issues due to sparse data, the original frequency variables for autoerotism, sexual intercourse, and OSAs were recoded into three categories: Low or no frequency, Medium-low frequency, and Medium-high frequency. These variables served as LCA indicators. For autoerotism and sexual intercourse, response options were grouped as follows: 1 = Low or no frequency (up to once every 5–6 months), 2 = Medium-low frequency (from once every 2–3 months to 2–3 times per month), and 3 = Medium-high frequency (from 1 to 2 times per week to more than once per day). For the 10 OSAs items, the coding was slightly different: 1 = Never in the past year, 2 = Medium-low frequency (about once every 5–6 months to once a month), and 3 = Medium-high frequency (2–3 times per month or more). This recoding strategy was based on the empirical distribution of responses and aimed to ensure both interpretability and adequate estimation (for further details, see Supplementary Material S.3). Frequencies and proportions of participants in each recoded response category are reported in Table 2.

Sociodemographic categorical variables were dummy coded prior to their inclusion as covariates in the latent class model. LCA covariates and distal outcomes, along with their coding, are detailed in Supplementary Material (Table S4 and Table S5).

An exploratory LCA was conducted using MPlus v. 8 (Muthén & Muthén, 1998–2017) to identify subgroups of OSA users based on their frequency of engagement in autoerotism, sexual intercourse and OSAs over the past year. Models with one to six classes were estimated. For each model, replication of the best log-likelihood was verified to avoid local maxima. Model fit was assessed using Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC) and sample-size-adjusted BIC (SABIC), with lower values indicating better fit. BIC was prioritized when indices diverged (Nylund et al., 2007), and its values were plotted

to identify an "elbow" or point of diminishing returns. Entropy values ≥ .80 were interpreted as indicating high classification accuracy. The Voung-Lo–Mendell–Rubin adjusted likelihood test (VLMR-LRT), and the bootstrap likelihood ratio test (BLRT) were conducted to compare consecutive class models (e.g., two vs. three classes), checking that the loglikelihood of the null model (k-1) was equal to the loglikelihood value of the model with one fewer class.

Sociodemographic characteristics and motives for engaging in OSAs were included as covariates via the R3STEP procedure (Asparouhov & Muthén, 2014). This approach estimates multinomial logistic regressions while fixing the latent class solution and correcting for classification error, thereby preventing shifts in the class structure. Covariates included age, sex, gender, education, occupational status, living status, religiosity, sexual orientation, relationship status, number of lifetime sexual partners without interest in developing romantic relationships, and motives for engaging in OSAs (Curiosity and learning, Social pressure, Sexual/Romantic Encounters Facilitation motives, Coping/Escaping motives and Fantasy). Regarding motives, factor scores derived from the CFA conducted on the full sample were extracted and included as continuous covariates in the latent class models. EFA and CFA analyses on motives are detailed in the Supplementary Material.

Risk of sex addiction (BYSAS), trait EI (TEIQue-SF) and satisfaction with life (SWLS) were modeled as distal outcomes of the latent classes using the automatic Bolck, Croon, and Hagenaars (BCH) method (Bakk et al., 2013), as implemented by Asparouhov and Muthén (2021) in Mplus. This procedure applies class-specific weights derived from posterior classification probabilities to adjust for measurement error in class assignment, yielding unbiased estimates of distal outcome means across classes. Pairwise post hoc comparisons were then conducted to test significant differences in the distal outcomes across classes (Asparouhov & Muthén, 2021).

3. Results

3.1. Preliminary analysis

The present sample comprised 639 respondents (61.7 % females), aged from 18 to 77 (M = 31.2, SD = 10.4). All sociodemographic characteristics are presented in Table 1.

As shown in Table 2, most participants reported engaging in solitary and autoerotic sexual activities over the past year, with high engagement in online searches for sexually explicit material (SEM) (93.6 %) and engaging in autoerotism (93.1 %), including while viewing photos or videos online (87.5 %). Around half of the sample reported medium-to-high frequency of these behaviors. 83.3 % engaged in in-person sexual intercourse over the past year, with half reporting a frequency of one to two times per week to daily. Over half of the participants (56.2 %) shared sexual fantasies in written form, and a smaller proportion (22.7 %) did so via microphone or webcam. 41.9 % disclosed sharing self-produced SEM (e.g., photos, videos), and 15.6 % reported sharing explicit content depicting others. Using dating websites or apps for sexual purposes was reported by 26.3 % of participants, while 24.3 % engaged in sex with a partner while viewing sexual content online. Less frequent activities included posting self-produced SEM (11.0 %) and live-streaming erotic activities (8.5 %).

Males reported significantly higher engagement than females in searching online for SEM (98 % vs. 90.9 %, $p < .001$), sharing erotic photos or videos of others (22.9 % vs. 11.2 %, $p < .001$), using dating apps for sexual purposes (33.9 % vs. 21.6 %, $p = .001$), engaging in masturbation while viewing SEM online (94.7 % vs. 83.0 %, $p < .001$), participating in live-streamed erotic activities (11.4 % vs. 6.6 %, $p = .033$), and general autoerotic behavior (at least once every 5–6 months, 98 % vs. 90.1 %, $p < .001$). In contrast, a significantly higher proportion of females (60.9 %) compared to males (48.6 %) reported sharing sexual fantasies in written form ($p = .002$), sharing self-produced erotic photos or videos (45.7 % vs. 35.9 %, $p = .015$), and having had sexual intercourse at least once every 5–6 months in the past year (87.3 % vs 76.7 %, $p < .001$).

Younger participants were more likely to share sexual fantasies in written form ($\beta = -.15$, $p = .002$), share self-produced erotic photos/videos ($\beta = -.15$, $p = .002$), and engage in autoerotism while watching online photos/videos ($\beta = -.14$, $p = .002$). Older age was associated with in-person sexual intercourse ($\beta = .12$, $p = .002$), general autoerotic activity ($\beta = .09$, $p = .043$), and having sex with a partner while viewing photos/videos online ($\beta = .10$, $p = .014$).

Finally, participants showed low problematic sexual behavior, moderately high trait EI, and moderate life satisfaction (see Table 1). ANOVA indicated a significant sex difference in sex addiction $F(1, 637) = 55.24$, $p < .001$, $\eta^2_p = .080$, with males ($M = 9.77$, $SD = 4.94$) reporting significantly higher scores than females ($M = 7.01$, $SD = 4.31$). No significant sex differences emerged for trait EI ($p = .848$) or life satisfaction ($p = .111$). Older age was associated with higher trait EI ($\beta = .22$, $p < .001$) and satisfaction with life ($\beta = .12$, $p = .003$), but no significant

Table 1
Sociodemographic characteristics of the sample, scores related to Motives to engage in OSAs, BYSAS, TEIQue-SF and SWLS.

Characteristics	N = 639
Age (Years) *mean (SD) [range]*	31.2 (10.4) [18–77]
Sex *N (%)*	
Females	394 (61.7)
Males	245 (38.3)
Gender identity *N (%)*	
Cisgender	626 (98.0)
TGNC	9 (1.4)
Prefer not to say	4 (.6)
Sexual Orientation *N (%)*	
Heterosexual	512 (80.1)
Gay/Lesbian/Bi+	107 (16.7)
Unspecified	20 (3.2)
Level of education *N (%)*	
Upper secondary or lower	240 (37.6)
Higher	399 (62.4)
Occupational status *N (%)*	
Engaged in paid work or training	402 (62.9)
Student/Unemployed/Retired	237 (37.1)
Religious or spiritual belief	
Religious/spiritual	252 (39.4)
Non-religious (atheist/agnostic)	387 (60.6)
Living status *N (%)*	
Living alone	161 (25.2)
Living with the family of origin	182 (28.5)
Living with their own family	209 (32.7)
Living with housemates	87 (13.6)
Current relationship status *N (%)*	
In a monogamous relationship	393 (61.5)
In a CNM relationship	18 (2.8)
In a NCNM relationship	17 (2.7)
In a dating	69 (10.8)
Not dating anyone	142 (22.2)
Lifetime sexual partners without interest in an emotional/romantic relationship *N (%)*	
0	206 (32.2)
1-4	247 (38.7)
5-9	97 (15.2)
More than 10	89 (13.9)
Motives to engage in OSAs *mean (SD)[range]* [a]	
Curiosity and learning	.02 (.81) [-1.44 – 2.12]
Social pressure	.10 (.53) [-.60 – 2.24]
Sexual/Romantic Encounters Facilitation	.13 (.67) [-.72 – 2.16]
Coping/Escaping	.04 (.74) [-1.19 – 2.17]
Fantasy	.03 (.69) [-1.16 – 2.10]
BYSAS *mean (SD) [range]*	8.07 (4.75) [0–24]
TEIQue-SF *mean (SD) [range]*	4.85 (.71) [2.60–6.53]
SWLS *mean (SD) [range]*	22.02 (5.44) [5–35]

TGNC, Transgender or gender-nonconforming; CNM, consensual Non-monogamous; NCNM, Non-consensual non-monogamous; OSAs, Online Sexual Activities; BYSAS, Bergen-Yale Sex Addiction Scale; TEIQue-SF, Trait Emotional Intelligence –Short Form (global score); SWLS, Satisfaction With Life Scale.
[a] Standardized factor scores.

Table 2
Descriptive statistics for sexual activities used as LCA indicators.

Sexual activities	Low or no frequency	Medium-low frequency	Medium-high frequency
Autoerotism	44 (6.9)	247 (38.7)	348 (54.5)
Sexual intercourse	107 (16.7)	231 (36.2)	301 (47.1)

	No frequency	Medium-low frequency	Medium-high frequency
Searching SEM online	41 (6.4)	245 (38.3)	353 (55.2)
Posting self-produced SEM online	569 (89.0)	54 (8.5)	16 (2.5)
Sharing sexual fantasies (written)	280 (43.8)	236 (36.9)	123 (19.2)
Sharing sexual fantasies (microphone/webcam)	494 (77.3)	113 (17.7)	32 (5.0)
Sharing sexually explicit photos/videos of others	539 (84.4)	80 (12.5)	20 (3.1)
Sharing self-produced sexually explicit photos/videos	371 (58.1)	204 (31.9)	64 (10.0)
Using dating website/app for sexual purposes	471 (73.7)	107 (16.7)	61 (9.5)
Autoerotism while watching photos/video online	80 (12.5)	236 (36.9)	323 (50.5)
Sex with a partner while viewing photos/videos online	484 (75.7)	132 (20.7)	23 (3.6)
Engaging in live-streamed erotic activities	585 (91.5)	42 (6.6)	12 (1.9)

SEM, sexually explicit material.

relationship was found with problematic sexual behavior ($p = .111$).

3.2. LCA model specification

The IC-based fit statistics, entropy, VLMR-LRT and BLRT tests, latent classes counts and proportions based on estimated posterior probabilities and average class probabilities for most likely class membership by latent class are presented in Table 3.

Model comparison tests showed that the two-, three-, and four-class solutions were supported by both VLMR-LRT and BLRT. While BLRT also favored the five- and six-class models, non-significant VLMR-LRT *p*-values indicate limited improvement in model fit beyond four classes. Additionally, the presence of very small classes (i.e., less than 8 % of the sample) in these higher-class solutions further suggests they are less appropriate for the data. Across all models, the IC values tend to decrease as additional latent classes are introduced. However, the most pronounced decline in BIC values occurs up to the three-class solution, while further increases in model complexity (i.e. more classes) yielded only marginal improvements (see Fig. 1). Although the 4-class solution showed a slightly lower BIC, the three primary profiles it produced mirrored those already identified in the three-class model. The additional class predominantly reflected a lower-intensity version of the solitary profile, without introducing a qualitatively distinct pattern of behavior. To balance model fit, interpretability, and parsimony, the three-class solution was therefore retained as the most appropriate.

3.3. Interpretation of the latent classes

As shown in Table 4, Class 1 (n = 204, 32 % of the total sample) is

Table 3
Information Criteria, Entropy, Likelihood Ratio Tests, Latent classes counts and proportions based on estimated posterior probabilities and Average class probabilities for most likely class membership by latent class.

N. of classes	1-class	2-class	3-class	4-class	5-class	6-class
N. of free parameters	24	49	74	99	124	149
Loglikelihood	−5761.528	−5329.610	−5069.566	−4961.578	−4875.830	−4815.606
AIC	11571.056	10757.219	10287.133	10121.155	9999.659	9929.213
BIC	11678.093	10975.754	10617.166	10562.686	10552.687	10593.739
SABIC	11601.895	10820.183	10382.221	10248.368	10158.996	10120.674
Entropy		.89	.88	.87	.87	.88
VLMR-LRT *p*-value		<.0001	<.0001	.0004	1.0000	.7668
BLRT *p*-value		<.0001	<.0001	<.0001	<.0001	<.0001

Classes n, %	Average Latent Class Probabilities for Most Likely Latent Class Membership by Latent Class					
Two-class model	1	2				
1, n = 329.4, 52 %	.972	.028				
2, n = 309.6, 48 %	.027	.973				
Three-class model	1	2	3			
1, n = 203.6, 32 %	.939	.021	.040			
2, n = 289.3, 45 %	.021	.962	.018			
3, n = 146.1, 23 %	.042	.016	.942			
Four-class model	1	2	3	4		
1, n = 133.2, 21 %	.934	.018	.048	.000		
2, n = 140.8, 22 %	.014	.933	.012	.041		
3, n = 201.1, 31 %	.039	.005	.933	.023		
4, n = 164.0, 26 %	.000	.057	.016	.926		
Five-class model	1	2	3	4	5	
1, n = 162.0, 25 %	.911	.000	.004	.062	.023	
2, n = 43.5, 7 %	.000	.973	.021	.006	.000	
3, n = 127.1, 20 %	.000	.027	.909	.012	.052	
4, n = 134.9, 21 %	.037	.001	.029	.925	.008	
5, n = 171.4, 27 %	.018	.001	.038	.003	.940	
Six-class model	1	2	3	4	5	6
1, n = 42.9, 7 %	.979	.000	.000	.000	.021	.000
2, n = 103.6, 16 %	.001	.911	.029	.009	.021	.029
3, n = 155.3, 24 %	.000	.030	.934	.022	.001	.013
4, n = 171.1, 27 %	.001	.003	.018	.939	.038	.001
5, n = 121.4, 19 %	.027	.023	.000	.050	.900	.000
6, n = 44.7, 7 %	.000	.043	.039	.000	.001	.917

AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SABIC = Sample-Size-Adjusted BIC; VLMR-LRT = Voung-Lo–Mendell–Rubin adjusted likelihood test; BLRT = Bootstrap Likelihood Ratio Test.

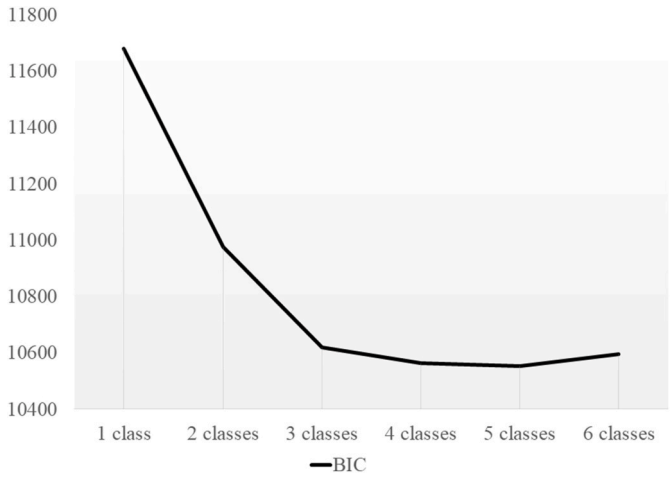

Fig. 1. The elbow plot of Bayesian Information Criterion (BIC) values for the one-to six-class solutions.

characterized by medium-to-high frequencies of solitary sexual behaviors such as searching for SEM online (96.5 %) and engaging in autoerotic behavior, both in general (82.0 %) and while viewing explicit content online (91.9 %). In contrast, partnered OSAs are infrequent, except for the sharing of sexual fantasies in written form, reported at medium-to-low frequency by 36.8 % of the class. Sexual intercourse is evenly distributed across frequency levels, indicating no dominant pattern.

Class 2 (n = 294, 45 % of the total sample) is distinguished by higher engagement in in-person sexual intercourse, with nearly half reporting high-frequency activity. This class also shows moderate involvement in solitary behaviors and in partnered OSAs, mainly at medium-to-low frequencies. Specifically, 36 % share written sexual fantasies at medium-to-low and 11 % at medium-to-high frequency. Additionally, 31 % share self-produced photos or videos, and 17 % engage in sexual activity with a partner while viewing explicit content online, both at medium-to-low frequency.

Class 3 (n = 141, 23 % of the total sample) is marked by medium-to-high frequency of both solitary sexual behaviors and certain partnered activities, including in-person sexual intercourse (59 %) and online activities such as sharing written sexual fantasies (59 %) and self-produced photos or videos (35 %). Additionally, several less commonly practiced OSAs were reported at medium-to-low frequencies, including sharing fantasies via microphone or webcam (49 %), sharing explicit photos or videos of others (31 %) or of oneself (55 %), using dating apps for sexual purposes (31 %), engaging in sex with a partner while viewing explicit content online (40 %), and participating in live-streamed erotic activities (22 %).

Given these characteristics, Class 1, Class 2 and Class 3 were labeled "Solitary", "In-person" and "Highly engaged", respectively. Fig. 2 provides a visual summary of the class profiles based on the aggregated probabilities of medium–low and medium–high frequency responses for each indicator, while Table 4 reports the full set of conditional response probabilities across the three response categories, by class. Conditional response probability plots showing the distribution of categorical responses across latent classes are also available in Supplementary Material (S.4).

3.4. Associations between covariates and latent classes

Significant associations between latent classes and various sociodemographic variables and motives for engaging in OSAs were observed (see Table 5).

Female participants were significantly more likely to belong to the In-person class compared to both the Solitary and Highly engaged

Table 4
Conditional item response probabilities across latent classes.

	Class 1: Solitary	Class 2: In-person	Class 3: Highly engaged
Autoerotism			
Never or almost	.000	.152	.000
Medium-low frequency	.180	.654	.146
Medium-high frequency	.820	.194	.854
Sexual intercourse			
Never or almost	.310	.107	.089
Medium-low frequency	.320	.409	.326
Medium-high frequency	.370	.484	.585
Searching SEM online			
Never	.000	.137	.009
Medium-low frequency	.035	.774	.096
Medium-high frequency	.965	.089	.895
Posting self-produced SEM online			
Never	.985	.938	.664
Medium-low frequency	.010	.053	.250
Medium-high frequency	.005	.008	.086
Sharing sexual fantasies (written)			
Never	.607	.528	.025
Medium-low frequency	.368	.360	.390
Medium-high frequency	.024	.112	.586
Sharing sexual fantasies (microphone/webcam)			
Never	.955	.869	.331
Medium-low frequency	.045	.111	.491
Medium-high frequency	.000	.020	.179
Sharing sexually explicit photos/videos of others			
Never	.898	.933	.590
Medium-low frequency	.074	.067	.312
Medium-high frequency	.028	.000	.098
Sharing self-produced sexually explicit photos/videos			
Never	.833	.644	.103
Medium-low frequency	.167	.309	.552
Medium-high frequency	.000	.047	.346
Using dating website/app for sexual purposes			
Never	.772	.856	.452
Medium-low frequency	.162	.098	.313
Medium-high frequency	.066	.046	.235
Autoerotism while watching photos/video online			
Never	.019	.257	.014
Medium-low frequency	.062	.701	.141
Medium-high frequency	.919	.043	.845
Sex with a partner while viewing photos/videos online			
Never	.842	.821	.513
Medium-low frequency	.125	.168	.397
Medium-high frequency	.034	.011	.090
Engaging in live-streamed erotic activities			
Never	.991	.967	.708
Medium-low frequency	.009	.026	.224
Medium-high frequency	.000	.007	.069

SEM, sexually explicit material.

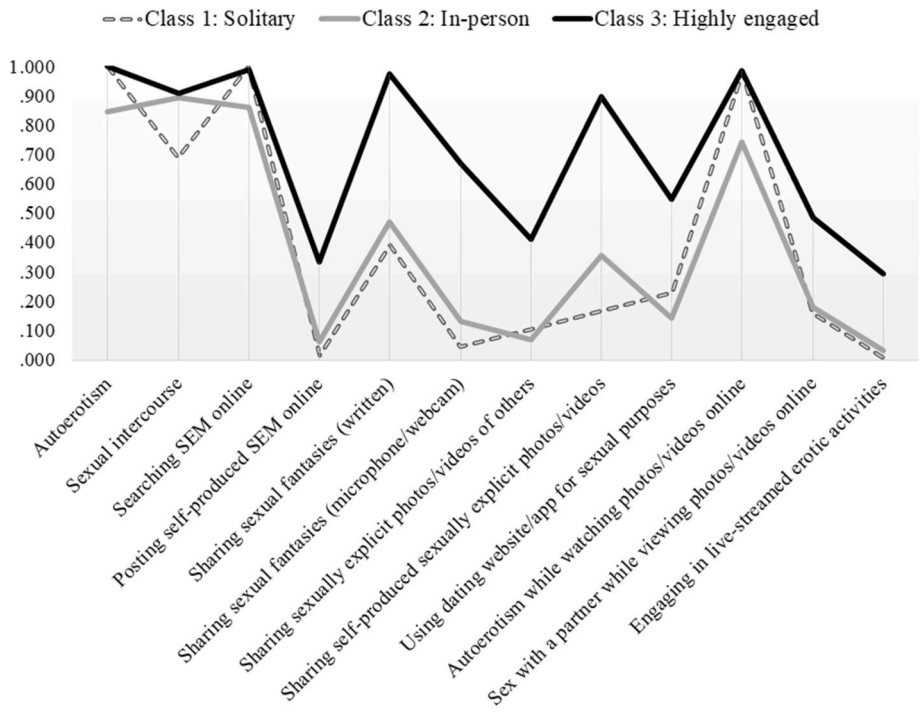

Fig. 2. Profile plot depicting the sum of the estimated probabilities of the medium-low and medium-high categories for each class.
Note: SEM, sexually explicit material.

classes, with an increase in odds exceeding about 17-fold and 10-fold, respectively. Living with one's own family (e.g., partner and/or sons/daughters) was associated with higher odds of being in the In-person or Solitary classes relative to the Highly Engaged class, while religiosity was associated with greater odds of belonging to the In-person rather than Solitary class. Individuals identifying as gay, lesbian, or bi+ were more likerly to be classified in the Highly Engaged class than the Solitary class.

Participants who reported neither dating nor being in a romantic relationship of any type had nearly four times greater odds of being classified in the Solitary class compared to the Highly Engaged class. Furthermore, individuals in the Solitary class had significantly higher odds of not dating anyone compared to those in the In-person class. Individuals in a non-consensual non-monogamous relationship were significantly more likely to belong to the Highly Engaged class than the In-person class. Additionally, individuals reporting 5 to 9 or more than 10 lifetime sexual partners without emotional or romantic involvement were significantly more likely to be classified in the Highly Engaged class, compared to the In-person and Solitary classes.

Regarding motives to engage in OSAs, the most notable differences across classes emerged in Social pressure, Coping/Escaping, and Fantasy motives. Compared to the Solitary class, the In-person class rated Coping/Escaping and Fantasy motives as less important, but Social Pressure as more relevant. The In-person class also placed less importance on Fantasy motives than the Highly Engaged class, while the Solitary class rated Social Pressure motives as less important than the Highly Engaged class.

3.5. Risk of problematic sexual behavior, trait EI and satisfaction with life across the three latent classes

The Highly Engaged class reported the highest levels of problematic sexual behavior ($M = 10.98$, $SE = .40$), followed by the Solitary ($M = 9.08$, $SE = .33$) and In-person classes ($M = 5.89$, $SE = .26$), with all pairwise differences statistically significant ($p < .001$).

For trait EI, the In-person class ($M = 4.94$, $SE = .04$) scored significantly higher than the Highly Engaged class ($M = 4.72$, $SE = .06$), $\chi^2(1) = 8.33$, $p = .004$. No significant differences were found between the Solitary class ($M = 4.82$, $SE = .06$) and either of the other two classes.

A similar pattern was observed for satisfaction with life, with the In-person class reporting significantly higher scores ($M = 22.82$, $SE = .32$) than the Highly Engaged class ($M = 20.67$, $SE = .50$), $\chi^2(1) = 12.61$, $p < .001$. Differences involving the Solitary class ($M = 21.85$, $SE = .40$) were not significant.

4. Discussion

The present study aimed to identify distinct patterns of engagement in a broad and heterogeneous range of sexual activities, both online and in-person, by examining how sociodemographic factors and different motives for engaging in OSAs differentiate between latent classes. Furthermore, it explored whether individuals characterized by different sexual behavior patterns differ in problematic sexual behavior, trait EI, and satisfaction with life.

Through LCA three subgroups were identified: individuals predominantly engaging in solitary activities, with limited participation in interactive or partnered behaviors (Solitary class); individuals involved mainly in in-person sexual behaviors, accompanied by occasional engagement in solitary and partnered online behaviors at lower frequencies (In-person class); and a group characterized by consistent and frequent involvement across both solitary and partnered activities, including technologically mediated sexual interactions, suggesting a broader and more diversified pattern of sexual engagement (Highly engaged class). Notably, although all participants had engaged in at least one OSA-related activity in the past 12 months, the In-person class was the largest subgroup (45 %), indicating that minimal or occasional engagement represented the most common pattern in this sample.

Importantly, the findings highlight that these sexual behavior patterns are meaningfully differentiated by sociodemographic factors, relationship status, and underlying motives for engaging in OSAs. Sex emerged as a strong predictor, with female participants significantly more likely to belong to the In-person class. This suggests a preference for sexual experiences involving interpersonal connection and shared intimacy, preferably outside of technology-mediated contexts, as also

Table 5
Multinomial logistic regressions examining the associations between covariates and latent classes.

Class	In-person [a]	In-person [b]	Highly engaged [a]
	OR [95 %CI]	OR [95 %CI]	OR [95 %CI]
Age	1.01 [.97, 1.05]	1.03 [.99, 1.08]	.98 [.94, 1.03]
Female	**16.71 [8.99, 31.04]**	**10.00 [4.79, 20.90]**	1.67 [.86, 3.23]
TGNC	.26 [.04, 1.78]	1.06 [.09, 11.97]	.25 [.04, 1.50]
Unspecified Gender	2.13 [.38, 11.99]	.56 [.07, 4.72]	3.82 [.65, 22.59]
Higher education	.90 [.51, 1.56]	.69 [.35, 1.36]	1.31 [.66, 2.57]
Engaged in paid work or training	1.09 [.56, 2.13]	1.57 [.75, 3.29]	.70 [.35, 1.41]
Living with the family of origin	.94 [.41, 2.16]	1.23 [.48, 3.13]	.76 [.31, 1.86]
Living with their own family	1.31 [.52, 3.30]	**3.80 [1.29, 11.22]**	**.34 [.12, .99]**
Living with housemates	.49 [.18, 1.35]	.62 [.22, 1.76]	.79 [.28, 2.18]
Identifying with a religion	**2.39 [1.31, 4.36]**	1.95 [.98, 3.91]	1.22 [.61, 2.43]
Gay/Lesbian/Bi+	2.20 [.93, 5.18]	.61 [.26, 1.41]	**3.63 [1.55, 8.45]**
Unspecified Sexual orientation	1.06 [.19, 5.83]	.56 [.09, 3.49]	1.87 [.45, 7.76]
In a CNM relationship	.33 [.02, 6.66]	.13 [.00, 5.68]	2.53 [.45, 14.22]
In a NCNM relationship	.22 [.04, 1.25]	**.15 [.02, .95]**	1.42 [.26, 7.89]
In a dating	.93 [.34, 2.56]	1.67 [.57, 4.86]	.56 [.18, 1.73]
Not dating anyone	**.26 [.12, .55]**	1.01 [.41, 2.46]	**.26 [.11, .58]**
From 1 to 4 non-romantic sexual partners	1.54 [.83, 2.86]	.53 [.24, 1.17]	**2.90 [1.29, 6.53]**
From 5 to 9 non-romantic sexual partners	1.58 [.65, 3.86]	**.27 [.09, .84]**	**5.90 [1.87, 18.64]**
More than 10 non-romantic sexual partners	1.05 [.35, 3.16]	**.15 [.05, .49]**	**6.94 [2.09, 23.07]**
Curiosity and Learning motives	.96 [.61, 1.51]	1.09 [.65, 1.83]	.88 [.55, 1.42]
Social Pressure motives	**3.24 [1.34, 7.85]**	.72 [.32, 1.65]	**4.47 [1.67, 11.98]**
Sexual/Romantic Encounters Facilitation motives	1.13 [.56, 2.29]	1.09 [.51, 2.33]	1.04 [.45, 2.39]
Coping/Escaping motives	**.34 [.18, .64]**	.63 [.30, 1.32]	.53 [.28, 1.03]
Fantasy motives	**.30 [.15, .61]**	**.24 [.11, .52]**	1.24 [.61, 2.53]

TGNC, Transgender or Gender non-conforming; CNM, consensual Non-monogamous; NCNM, Non-consensual non-monogamous.
Bold indicates statistically significant differences between latent classes.
[a] Reference class: Solitary.
[b] Reference class: Highly Engaged.

confirmed by literature (Bélanger Lejars et al., 2020; Byers & Shaughnessy, 2014). Individuals in the In-person class were also more likely to identify with a religious or spiritual belief system, and to be in a romantic relationship or dating (compared to the Solitary class). In contrast, they were significantly less likely to be in a non-consensual non-monogamous relationship (compared to the Highly Engaged class). Furthermore, individuals in the In-person class were more likely to live with their partners and/or children and tended to report a lower number of lifetime casual sexual partners, relative to the Highly Engaged class. These patterns suggest a profile oriented toward more traditional, relationally anchored forms of sexual behavior. This interpretation is reinforced by the generally low tendency among individuals in this class to engage in OSAs for exploring fantasies, desires, or imagined scenarios not intended to be realized offline. Furthermore, compared to the Solitary class, their engagement in OSAs appears more strongly influenced by external factors or perceived social expectations, rather than by intrinsic interest or personal motivation such as mood regulation or emotional escape. This motivational configuration may help explain the low levels of sex addiction observed in this group and is consistent with the CIUT (Kardefelt-Winther, 2014) and motivational models of addiction (e.g., Bolshinsky & Gelkopf, 2019; Cooper et al., 2016), all of which suggest that compulsive behavior is more likely to occur when the activity is used to cope with emotional distress or unmet psychological needs. From this perspective, the predominance of socially oriented rather than compensatory motives may function as a protective factor. The higher levels of trait EI and life satisfaction observed in this group further support the interpretation of a low-risk profile, in line with previous findings in the literature. Individuals with stronger emotional regulation skills are generally less likely to adopt compensatory strategies, such as excessive or problematic sexual activity (Lew-Starowicz et al., 2020). At the same time, higher trait EI may also foster relational well-being, which is closely linked to greater sexual and life satisfaction (Fávero et al., 2021; Fischer et al., 2022). This may result in a greater sense of relational fulfilment, reducing the need to seek interpersonal connection through technologically mediated sexual activities or casual sexual encounters.

The Solitary and Highly Engaged classes are undoubtedly the most involved in OSAs, though with distinct patterns. Consistent with prior research, male individuals were more likely to belong to both these groups, reflecting higher male engagement in both solitary and technologically mediated sexual behaviors (Petersen & Hyde, 2011; Shaughnessy et al., 2011).

The Solitary class is predominantly characterized by solitary practices. Unsurprisingly, compared to the Highly Engaged group, these individuals were less likely to report more than five lifetime casual sexual partners and more likely to be single or not currently dating, a pattern consistent with research linking autoerotic activity to the absence of a stable partner (Regnerus et al., 2017). They also placed less importance on Social Pressure motives, suggesting a lower sensitivity to external validation or normative social expectations, in line with their solitary sexual behavior.

Interestingly, individuals in the Solitary class had higher odds of living with their partner and/or children than those in the Highly Engaged class. While, at first glance, this may appear inconsistent with their limited interpersonal romantic or sexual involvement, it could reflect complex or transitional relational arrangements (e.g., recent breakups, co-parenting, or emotionally distant partnerships), where cohabitation continues despite the absence of active intimacy. In such contexts, solitary sexual behaviors may serve as a more accessible and less relationally demanding alternative, offering emotional regulation and personal space amid relational uncertainty or dissatisfaction.

In contrast to individuals in the Solitary class, those in the Highly Engaged class reported frequent involvement in both solitary and partnered sexual activities. Furthermore, this group exhibited moderate engagement in behaviors that were generally uncommon within the broader sample such as posting self-produced SEM, engaging in live-streamed erotic activities, using dating websites or apps for sexual purposes, or having sex with a partner while viewing sexually explicit photos or videos. Compared to the other two classes, individuals in the Highly Engaged class also had higher odds of having had more than ten casual sexual partners over their lifetime. This broader and more varied repertoire of sexual behaviors may reflect elevated levels of sexual disinhibition and a greater openness to novelty, an approach to sexuality that seems to naturally extend into digitally mediated contexts. Their higher likelihood of living alone, compared to the other classes, may facilitate greater autonomy and privacy, enabling easier access to sexual experiences without the constraints associated with cohabitation. Notably, individuals identifying as gay, lesbian, or bi+ were significantly more likely to be classified in the Highly Engaged class. This finding is consistent with existing literature highlighting the central role

of digital platforms in providing sexual minority individuals with safer and more accessible spaces to explore, express, and affirm their sexuality (Bőthe et al., 2019; Macapagal et al., 2020). At the same time, the existing literature adds that LGBTQ men are a population particularly vulnerable to the development and maintenance of hypersexual behavior (Bőthe et al., 2018).

The elevated sex addiction risk in both the Solitary and Highly Engaged classes – highest in the latter – suggests distinct yet overlapping pathways to problematic sexual behavior. For individuals in the Solitary class, the predominant engagement in solitary sexual behaviors, often accompanied by coping/escape or fantasy-related motives (compared to the In-person class), may reflect compensatory strategies for managing distress or unmet intimacy needs (Das et al., 2009), increasing their vulnerability to the sex addiction. At the same time, their relatively preserved emotional self-regulation (as evidenced by the non-significant difference in trait EI relative to the In-person class) may mitigate the risk of compulsive sexual behavior.

By contrast, individuals in the Highly Engaged class reported lower levels of trait EI and life satisfaction compared to those in the In-person class, indicating a reduced capacity for effective emotional regulation and greater levels of psychological distress (Bhullar et al., 2012; Fischer et al., 2022; Lew-Starowicz et al., 2020). Within this group, the combination of a broader and more frequent engagement in various sexual behaviors, along with lower emotional regulation abilities and reduced well-being, might contribute to a greater susceptibility to developing addictive sexual patterns. This interpretation is consistent with research identifying trait EI as a protective factor against addictive behaviors (Biolcati et al., 2025). In sum, the Solitary class could represent a more avoidant, internally regulated mode of functioning, in which sexual behavior serves as a self-directed coping strategy that remains relatively contained. In contrast, the Highly Engaged profile might reflect a more emotionally dysregulated configuration, marked by both a greater susceptibility to external social influences and a heightened motivation to explore sexual fantasies and desires.

The three profiles identified in this study offer both empirical support and theoretical refinement of existing typologies of OSA users. The Solitary and Highly Engaged classes closely resemble Delmonico and Miller's (2003) solitary and compulsive user types, respectively, whereas the In-person class aligns more closely with the partnered use profile. Additionally, the Solitary and Highly Engaged profiles show strong conceptual parallels with the at-risk user subtypes proposed by Cooper and colleagues (1999), particularly the Stress-Reactive and Fantasy types. Notably, this study extends existing typologies by empirically identifying user profiles that differ not only in behavioral patterns, but also in their distinct motivational, dispositional, and psychosocial configurations, offering a more nuanced understanding of how digital environments intersect with individual vulnerabilities in shaping online sexual behavior.

Taken together, our findings highlight the importance of developing tailored prevention and intervention strategies that address the diverse emotional needs and motivations underlying individuals' engagement in technology-mediated sexual activities. For instance, individuals in the Highly Engaged class may benefit from interventions targeting the compensatory use of sexual behavior, as well as programs aimed at enhancing trait EI (Nelis et al., 2009). In contrast, those in the Solitary class may require support focused on unmet intimacy needs, self-directed coping, and potential social withdrawal.

4.1. Limitations

Some limitations should be acknowledged when interpreting the findings of this study. First, the data were collected through self-report measures, which may be subject to various forms of bias, including misinterpretation of items and social desirability effects. Additionally, while items on sexual activities and motives to engage in OSAs were developed based on existing literature, they have not undergone formal validation, which may limit the reliability and generalizability of the results. Second, the use of a snowball sampling strategy may have introduced sampling bias, potentially reducing the representativeness of the sample. In particular, given the online nature of recruitment, selection bias toward individuals who are more active or comfortable with Internet-based environments cannot be ruled out. Moreover, although all participants provided informed consent, a substantial proportion did not complete one or more sections essential to the analyses and were therefore excluded from the final sample. This raises the possibility of attrition bias which should be considered when interpreting the findings. Because of the reliance on a convenience sampling approach and the relatively low final sample size, the representativeness of the study sample in relation to the broader Italian adult population may be limited. Consequently, the generalizability and external validity of the findings may be reduced. Third, variables used as LCA indicators and covariates were recoded into a reduced number of categories to facilitate model convergence and address sparse cell sizes, an approach frequently adopted in latent class modeling (Weller et al., 2020). However, this process may have led to a loss of granularity, potentially obscuring subtle differences in participant responses and attenuating variability in the data. A three-level frequency categorization was adopted for the LCA indicators in order to better preserve behavioral variability and enable the identification of more nuanced engagement classes. Nevertheless, it should also be acknowledged that the thresholds used to define the three frequency categories for the LCA indicators may have influenced the resulting class structure. Fourth, although the use of LCA enabled a nuanced identification of patterns of sexual behavior, the number and characteristics of the latent classes may be specific to the present sample. Replicating the analysis in other samples and populations is crucial to assess the stability and generalizability of the class structure. Moreover, given the broad age range of participants, it is likely that OSA engagement varies across age cohorts, with potentially different latent patterns and prevalence rates. However, the relatively small sample size did not allow for subgroup LCA by age, representing a major limitation. Finally, future research may benefit from integrating this kind of person-centered approach with other relevant variables (e.g., quality of the relationship) to develop more comprehensive models.

5. Conclusions

The present study provided for a person-centered approach on sexual behavior in the digital era, moving beyond traditional typologies of OSA users by empirically identifying user profiles based on both online and offline activities, as well as their motivational and psychosocial correlates. By combining behavioral patterns with individual vulnerabilities and psychosocial outcomes, it offers a more differentiated understanding of how and for whom sexual behaviors, including OSAs, may become problematic. These findings advance the field of digital sexuality research by emphasizing the importance of studying OSAs alongside offline sexual behaviors, as they often coexist and interact within individuals' broader sexual lives. They also underscore the role of motivations and individual characteristics in shaping distinct patterns of sexual behavior – including those occurring in technology-mediated contexts – and psychosocial outcomes. These insights carry important practical implications, calling for tailored interventions aimed at promoting sexual well-being.

CRediT authorship contribution statement

Federica Ambrosini: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Zeynep Özal:** Writing – review & editing. **Giacomo Mancini:** Writing – review & editing, Supervision. **Roberta Biolcati:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT in order to improve the readability and language of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chbr.2025.100798.

Data availability

Data will be made available on request.

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