



Is problematic sexuality a marker for the onset of mental disorders? A cross-sectional study on psychotic-like experiences and sexual behaviour in a non-clinical sample

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ABSTRACT

Impairments in sexual functioning or behaviour may increase the risk of developing mental disorders, including in young people with early psychosis. The aim of this cross-sectional study was to examine the relationship between psychotic-like experiences (PLEs) and sexual functioning and dysfunctional sexual behaviour.

We collected a convenience sample of 582 subjects. Of them, 197 experienced clinically relevant PLEs (having a cut-off score of ≥ 6 in the Prodromal Questionnaire 16-item). In addition, they completed a specific self-reported psychometric protocol assessing sexual function, hypersexual behaviour, problematic pornography use, depression and PLEs.

The PQ-16 Absence/Presence score correlated significantly with hypersexuality, problematic pornography use, and difficulties in reaching orgasm. The PQ-16 Intensity score correlated significantly with hypersexuality, problematic pornography use, difficulties in reaching orgasm, orgasm dissatisfaction, and achieving and/or maintaining an erection or lubrication. When comparing subjects experiencing significant PLEs with control subjects while covarying age and depression, the former exhibited more hypersexuality and problematic pornography use, and poorer sexual function related to difficulties in orgasm attainment. The difference in hypersexuality was maintained when the analysis was limited to the female subgroups or the male subgroups, while the difference in problematic pornography use was confirmed only in the female subgroups.

Both dysfunctional sexual behaviour and sexual dysfunction are associated with the severity of PLEs. Sexological aspects related to behaviour differentiate more individuals with relevant PLEs from the control group, compared to functional aspects. Screening for sexual health problems could be valuable among individuals with PLEs.

1. Introduction

Sexual health, considered not only as the absence of sexual disorder or dysfunction but also as a state of positive health, is an essential part of human health (World Health Organization, 2020). Sexual health can positively affect health-related aspects, such as physical and mental health, subjective well-being and cognitive functioning (Allen, 2018; Anderson, 2013; Brody, 2010; Forbes et al., 2017; Smith et al., 2020; Vasconcelos et al., 2022). Poor sexual health is common among the general population, with an estimated lifelong prevalence of sexual

dysfunctions of 31% in men and 41% in women (Ramírez-Santos et al., 2024). Sexual problems are often associated with marked personal distress, low self-esteem, and decreased quality of life (Forbes and Schniering, 2013; R. D. Hayes et al., 2008; Lewis et al., 2010; McCabe and Althof, 2014). Despite this, low sexual function is still not sufficiently considered as an indicator of psychological functioning.

Among people with mental problems, including those with psychotic disorders, sexual dysfunctions are more frequent than in the general population (Bourdeau et al., 2012; Jannini et al., 2022a,b). The prevalence of sexual dysfunctions in individuals with schizophrenia-spectrum

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disorders is 56.4% (Korchia et al., 2023). The most common sexual dysfunctions in male patients with mental disorders are erectile dysfunction, loss of libido, and ejaculation dysfunction, while in women are orgasm dysfunction, alteration of vaginal lubrication and amenorrhea (Ciocca et al., 2015; Korchia et al., 2023). A major cause of sexual impairment is related to the patients' long-term drug treatment, which affects sexuality negatively through different mechanisms, including prolactin dyscrasia, histamine-mediated sedation, and serotonin-induced sexual demotivation (Nunes et al., 2012; Park et al., 2012). However, the presence of dysfunctions is not only related to the adverse effects of drugs, but could also be a consequence of the disease itself and related to symptom severity (Howes et al., 2007; Malik et al., 2011). In some cases, sexual difficulties can be related to psychosocial issues such as lower self-esteem, fewer relationships, and negative symptoms (e.g., anhedonia, avolition or abulia) (McCann, 2010). However, sexual dysfunctions and dysfunctional sexual behaviour were recently considered as pivotal indicators in both people with poor mental health and in patients experiencing a first episode of psychosis or full-blown schizophrenia, similarly to a canary in a coalmine (Ciocca et al., 2015). As psychotic experiences are thought to exist in a continuum from normal experiences to full-blown psychosis (Lindgren and Therman, 2024), it is crucial to study the relationship between sexuality and psychotic-like experiences (PLEs) in non-clinical samples. Additionally, non-clinical populations rule out the confounding effects of drug regimens, providing better insights into the phenomena under investigation.

PLEs are defined as subclinical psychotic experiences by non-clinical populations in the absence of a psychotic illness (Kelleher and Cannon, 2011). The occurrence of PLEs is considered to be a risk factor for future psychosis. In this regard, two different systematic reviews and meta-analyses showed that the risk of developing clinical psychosis was 3.5/4 times higher in people with previous subthreshold self-reported psychotic experiences (Healy et al., 2019; Kaymaz et al., 2012).

Although much evidence exists on the relationship between dysfunctional sexual behaviour or sexual dysfunction and psychotic disorders (Bourdeau et al., 2012; A. Brown et al., 2010; A. P. Brown et al., 2011; Raja and Azzoni, 2003), very few studies focused on the associations with psychosis risk (Fotinos et al., 2024; Marques et al., 2012). Some evidence was found in individuals at ultra-high risk for psychosis (UHR), suggesting that sexual dysfunction is more marked in those subjects who subsequently developed psychosis than in those who did not, and the severity of sexual dysfunction is correlated with the severity of psychotic symptoms (Marques et al., 2012).

Starting from this background, we hypothesized that people who exhibit relevant PLEs also show more impaired sexual function or dysfunctional sexual behavior than people who do not. Hence, this study aimed to analyze the sexual functioning and sexual behaviour of individuals who report significant PLEs.

2. Methods

2.1. Recruitment

Through an online platform, a convenience sample of subjects between 18 and 35 years old was recruited, using a snowball methodology. It was decided to include participants up to 35 years of age, consistent with the existing literature on psychosis risk (Pelizza et al., 2019; Salazar de Pablo et al., 2021). Given the focus on psychosis risk and in individuals who were not receiving pharmacological treatment, all subjects reporting any psychiatric diagnosis with current psychotropic drug use or a history of hospitalization for psychiatric reasons and/or retention in care within psychiatric services were excluded. Recruited subjects completed a sociodemographic chart and five psychometric tests to assess PLEs, hypersexual behaviour, compulsive use of pornography, depression and sexual function. All participants were informed about the research and did not receive any financial remuneration for their

participation in this study. All participants gave their informed consent. The entire protocol was anonymous, was approved by the ethical committee of Sapienza University of Rome (ID: blinded for revision) and adhered to the ethical guidelines stated in the Declaration of Helsinki.

2.2. Measures

2.2.1. Psychotic prodromes

The Prodromal Questionnaire (PQ-16) is a self-report screening questionnaire specifically developed to assess PLEs and identify individuals who are potentially at risk for developing psychosis (Azzali et al., 2018; de Jong et al., 2018; Ising et al., 2012). It assesses several symptomatic areas, including hallucinations and perceptual aberrations, negative symptoms, and delusions and unusual thought content. Each item investigates a specific PLEs with two parallel response scales. The absence/presence scale assesses the presence of PLEs on a binary response scale (true/false). The intensity scale measures the degree of distress provided by each symptom on a 4-point Likert scale. The PQ-16 provides a symptom total score for the Absence/Presence scale, calculated as the simple sum of each binary item, and a distress total score for the intensity scale, calculated as the sum of all individual distress scores. In adults, a cut-off score of ≥ 6 on the total symptom score predicts CAARMS UHR/psychosis diagnosis with high sensitivity (87%) and high specificity (87%) (Azzali et al., 2018).

2.2.2. Hypersexual behaviour

The Italian version of the Hypersexual Behaviour Inventory (HBI) was used to measure hypersexual behaviour (Ciocca et al., 2020). The HBI is a self-report instrument with 19 items on a 5-point Likert scale. The HBI consists of three subscales and one total index. The HBI coping subscale assesses sexual behaviour as a coping strategy in response to emotional distress. The HBI control subscale assesses the ability to self-control sexuality-related behaviour. The HBI consequences subscale assesses the negative repercussions caused by sexual thoughts, impulses, and behaviour. A HBI total score is also calculated by summing the scores of all items of the scale, providing a comprehensive assessment of hypersexual symptomatology. Higher scores indicate a greater tendency towards hypersexual behaviour (Reid et al., 2011).

2.2.3. Pornography use

The Italian version of Brief Pornography Scale (BPS) was used to assess problematic pornography use severity in the past 6 months with five items (Bóthe et al., 2024). Participants indicate their answers on a three-point Likert scale, with total scores ranging between 0 and 10. Scoring ≥ 4 points on the BPS indicates being at risk of problematic pornography use (Kraus et al., 2020).

2.2.4. Sexual functioning

The Italian version of the Arizona Sexual Experience Scale (ASEX) was used to assess sexual functioning (Ballester-Arnal et al., 2025; Jannini et al., 2022a,b). This scale is designed to measure the core elements of sexual function: sexual desire, arousal, penile erection/vaginal lubrication, ability to reach orgasm, and satisfaction from orgasm. It measures them using a six-point Likert scale. The male and female versions differ on the third question, which corresponds to penile erection/vaginal lubrication. The ASEX was designed to be self- or clinician-administered, and it is for use in heterosexual or homosexual populations, regardless of the availability of a sexual partner. Questions addressing the frequency/preference of sexual activity were considered unrelated to sexual dysfunction. The ASEX was designed to enhance the overall accuracy in measuring sexual dysfunction by minimizing patient non-compliance with rating and allowing for rapid quantification and detection of the presence of sexual dysfunction. Sexual dysfunction is defined as having either a score of 5 or more at any item or a total score of at least 17 (McGahuey et al., 2000).

2.2.5. Depression

The Brief Symptom Inventory (BSI) was used to address depression symptomatology (Derogatis, 1975). The instrument consists of 53 items rated on a 5-point Likert scale (0–4) and requires respondents to refer their answers to experiences occurring during the past week. The items are organized into nine primary symptom dimensions: Somatization, Obsessive–Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism. For each dimension, the final score is obtained by calculating the mean of the corresponding items. These synthetic indices are the General Severity Index (GSI), the Positive Symptom Distress Index, and the Positive Symptom Total (Adawi et al., 2019).

2.3. Statistical analysis

Continuous variables were represented statistically as means and standard deviations. Dichotomous variables were represented as absolute frequencies and percentages. Each alpha error lower than 5% indicated statistical significance. After verifying the distribution of continuous variables using the Shapiro-Wilk test, we used Spearman's rank correlation analysis to test the correlation between PQ Absence/Presence score or PQ Intensity score with sexual behaviour and sexual function indices, as normality assumption was not met. Then, a comparison analysis was performed between subjects who reported clinically significant PLEs (i.e., having a cut-off score of 6 or more on the PQ-16 Absence/Presence score) and control subjects (i.e., having a cut-off score of 5 or less on the PQ-16 Absence/Presence score) (Azzali et al., 2018). After verifying the homoscedasticity of the groups using the Levene test, differences between groups were analysed using the Mann-Whitney *U* test, while the effect size was calculated using the rank-biserial correlation. Since sexuality is influenced by age and depression, the differences in sexual function and sexual behaviour between groups that were significant in the Mann-Whitney test were then tested using ANCOVA, covarying for age (Baldwin, 2001; R. Hayes and Dennerstein, 2005; Helgason et al., 1996). An a priori power analysis was conducted to determine the required sample size for each of the planned statistical analyses. Statistical power was set at 0.80 (two-tailed), with an alpha level of 0.05, an assumed effect size of 0.30, and an allocation ratio of 0.30. The estimated minimum sample sizes were 82 participants for the correlation analyses, 494 for the independent-samples *t*-tests, and 90 for the ANCOVA. To ensure adequate power across all planned analyses, the largest estimated requirement ($N = 494$) was adopted as the minimum target sample size. Power Analysis was performed using the program G Power 3.1.9.7 (Faul et al., 2007). Data analysis was performed using the program JASP 0.16.3 (Love et al., 2019).

3. Results

3.1. Demographic and psychometric characteristics of the sample

630 people responded to the survey. All participants who reported currently taking psychotropic medication and/or who had previous psychiatric hospitalization or retention in care within mental healthcare services were excluded. The final sample consisted of 582 individuals, of whom 404 were females assigned at birth and 178 were males assigned at birth. The mean age was 24.5 ± 3.2 years. Sociodemographic and psychometric characteristics of the total sample are shown in Table 1.

3.2. Correlation analysis

The results of this research showed a significant correlation between the PQ Absence/Presence scale and hypersexual behaviour in the indices of HBI Coping, HBI Control, HBI Consequences, and HBI total score (Table 2). PQ Absence/Presence also correlates with the compulsive pornography use score BPS. As for the correlations between PQ

Table 1

Sociodemographic and psychometric characteristics of the sample.

	N	%
Gender identity		
Female	404	69,4
Male	170	29,2
Non-binary gender	4	0,7
Other	2	0,3
Gender fluid	2	0,3
Sexual orientation		
Heterosexual	472	81,1
Bisexual	80	13,8
Homosexual	16	2,7
Other	10	1,7
Asexual	4	0,7
	Mean	SD
PQ Absence/Presence	4418	3151
PQ Intensity	4404	4850
BPS	1548	2255
HBI	28,716	9703
HBI Coping	12,095	4724
HBI Control	8534	3652
HBI Consequences	6811	2624
ASEX	14,407	3674
ASEX Desire	3069	0,976
ASEX Arousal	3000	0,876
ASEX Erection/Lubrication	2619	1016
ASEX Orgasm attainment	3163	1154
ASEX Orgasm satisfaction	2557	1086

Note. PQ: Prodromal Questionnaire; BPS: Brief Pornography Scale; HBI: Hypersexual Behaviour Inventory; ASEX: Arizona Sexual Experience Scale.

Table 2

Spearman's rank correlation analysis.

	PQ Absence/Presence symptoms	PQ Intensity
BPS	$\rho_s = 0.178$; $p < .001$	$\rho_s = 0.147$; $p < .001$
HBI Control	$\rho_s = 0.244$; $p < .001$	$\rho_s = 0.295$; $p < .001$
HBI Consequences	$\rho_s = 0.232$; $p < .001$	$\rho_s = 0.235$; $p < .001$
HBI Coping	$\rho_s = 0.232$; $p < .001$	$\rho_s = 0.239$; $p < .001$
HBI	$\rho_s = 0.282$; $p < .001$	$\rho_s = 0.309$; $p < .001$
ASEX Desire	$\rho_s = -0.066$; $p = .112$	$\rho_s = -0.011$; $p = .785$
ASEX Arousal	$\rho_s = 0.038$; $p = .354$	$\rho_s = -0.024$; $p = .568$
ASEX Erection/Lubrication	$\rho_s = 0.067$; $p = .109$	$\rho_s = 0.122$; $p = 0,003$
ASEX Orgasm attainment	$\rho_s = 0.106$; $p = .010$	$\rho_s = 0.162$; $p < .001$
ASEX Orgasm satisfaction	$\rho_s = 0.035$; $p = .405$	$\rho_s = 0.100$; $p = .016$
ASEX	$\rho_s = 0.039$; $p = .350$	$\rho_s = 0.120$; $p = .004$

Note. PQ: Prodromal Questionnaire; BPS: Brief Pornography Scale; HBI: Hypersexual Behaviour Inventory; ASEX: Arizona Sexual Experience Scale.

Absence/Presence and sexual function, only the correlation with the index ASEX Orgasm attainment was found to be statistically significant.

Furthermore, PQ Intensity score correlated significantly with all measures of hypersexual behaviour. PQ Intensity score also correlated significantly with the BPS index related to compulsive pornography use. As for the correlations between PQ Intensity and the ASEX sexual function indices, significant correlations were found with the indices of ASEX Erection/Lubrication, Orgasm attainment, Orgasm satisfaction and the total score.

3.3. Group comparison analysis

Based on the PQ cut-off score of 6 or more positive symptoms on the PQ Absence/Presence score (Azzali et al., 2018), 197 subjects (149 females and 48 males) were identified as individuals who experienced clinically relevant PLEs (PQ subgroup). The remaining participants were

assigned to the control group (nPQ subgroup). Results are shown in Table 3. The PQ subgroup reported significantly higher levels of compulsive pornography use in BPS total score, as well as higher levels of hypersexual behaviour in the overall HBI index and in the subscales of Control, Coping, and Consequences in comparison with the nPQ subgroup. The PQ subgroup also reported poorer sexual functioning in terms of Orgasm attainment and Erection/Lubrication compared to the nPQ subgroup.

Considering only female participants, the females of the PQ subsample (F-PQ, $n = 149$) reported significantly higher levels of compulsive pornography use in the BPS total score and higher levels of hypersexual behaviour in the overall HBI index and in the subscales of Control, Coping, and Consequences in comparison with females of the control group (F-nPQ, $n = 255$). As for sexual function, the F-PQ subgroup exhibited a greater difficulty in ASEX Orgasm attainment in comparison to the F-nPQ subgroup.

The males of the PQ subgroup (M-PQ $n = 48$) reported significantly higher levels of compulsive pornography use in the BPS total score and higher levels of hypersexual behaviour in the overall HBI index and in the subscales of Control, Coping, and Consequences in comparison with males of the PQ subgroup (M-nPQ, $n = 130$). Additionally, the M-PQ subgroup showed fewer Arousal difficulties than the M-nPQ.

The results of the ANCOVA, controlling for age and depressive symptoms, are presented in Table 4. After adjustment for these covariates, intergroup differences remained statistically significant for HBI

Table 3
Mann-Whitney U test between groups.

	W	p	Rank-Biserial Correlation
PQ (n = 197) vs nPQ (n = 385)			
HBI Coping	29660.000	<0.001	−0.218
HBI Control	27440.500	<0.001	−0.276
HBI Consequences	28118.000	<0.001	−0.259
HBI	26340.000	<0.001	−0.305
BPS	30588.000	<0.001	−0.193
ASEX Desire	40311.500	0.183	0.063
ASEX Arousal	39101.000	0.503	0.031
ASEX Erection/Lubrication	34287.500	0.047	−0.096
ASEX Orgasm attainment	19216.500	<0.001	−0.169
ASEX Orgasm satisfaction	31507.000	0.680	0.020
ASEX	38672.000	0.464	−0.037
F-PQ (n = 149) vs F-nPQ (n = 255)			
HBI Coping	15287.500	<0.001	−0.224
HBI Control	13563.000	<0.001	−0.312
HBI Consequences	13369.000	<0.001	−0.322
HBI	12936.500	<0.001	−0.344
BPS	14041.000	<0.001	−0.287
ASEX Desire	21122.000	0.191	0.072
ASEX Arousal	20173.500	0.660	0.024
ASEX Lubrication	18463.000	0.260	−0.063
ASEX Orgasm attainment	16847.500	0.010	−0.145
ASEX Orgasm satisfaction	20262.000	0.617	0.028
ASEX	19602.000	0.929	−0.005
M-PQ (n = 48) vs M-nPQ (n = 130)			
HBI Coping	2195.000	0.021	−0.230
HBI Control	2239.500	0.027	−0.215
HBI Consequences	2214.500	0.023	−0.224
HBI	2119.500	0.010	−0.257
BPS	2136.000	0.013	−0.248
ASEX Desire	3298.500	0.095	0.157
ASEX Arousal	3447.000	0.023	0.209
ASEX Erection	2736.000	0.666	−0.041
ASEX Orgasm attainment	2584.000	0.319	−0.094
ASEX Orgasm satisfaction	2977.500	0.635	0.044
ASEX	3007.500	0.584	0.055

Note. PQ: group with 6 or more PLEs; nPQ: control group; F-PQ: female group with 6 or more PLEs; F-nPQ: female control group; M-PQ: male group with 6 or more PLEs; M-nPQ: male control group.
Note. BPS: Brief Pornography Scale; HBI: Hypersexual Behaviour Inventory; ASEX: Arizona Sexual Experience Scale; PQ: Prodromal Questionnaire.
Note. Negative Rank-Biserial Correlation = higher scores in PQ group.

Table 4
ANCOVA analysis of significant differences in sexual function, covarying age and depression.

Dependent variables	Covariate variables	F	P	Partial η^2
PQ (n = 197) vs nPQ (n = 385)				
ASEX Erection/ Lubrication	Depression	1.089	0.297	0.002
	Age	2.326	0.128	0.004
ASEX Orgasm attainment	Depression	4.752	0.030	0.008
	Age	8.246	0.004	0.014
HBI	Depression	5.667e ^{−4}	0.983	7.574e ^{−7}
	Age	8.572	0.004	0.015
BPS	Depression	15.365	<0.001	0.026
	Age	46.706	<0.001	0.075
	Depression	0.016	0.900	2.740e ^{−5}
	Age	6.481	0.011	0.011
	Depression	14,178	<0.001	0.024
	Age	0.396	0.530	6.840e ^{−4}
F-PQ (n = 149) vs F-nPQ (n = 255)				
ASEX Orgasm attainment	Depression	2.903	0.126	0.006
	Age	3.236	0.106	0.006
HBI	Depression	2.159	0.142	0.005
	Age	14.945	<0.001	0.034
BPS	Depression	31.675	<0.001	0.070
	Age	0.057	0.812	1.335e ^{−4}
	Depression	17.918	<0.001	0.041
	Age	7.433	0.007	0.017
	Depression	1.636	0.202	0.004
M-PQ (n = 48) vs M-nPQ (n = 130)				
ASEX Arousal	Depression	6.858	0.010	0.036
	Age	1.332	0.250	0.007
HBI	Depression	4.544	0.034	0.024
	Age	4.509	0.035	0.024
BPS	Depression	13.466	<0.001	0.069
	Age	0.415	0.520	0.002
	Depression	2.778	0.097	0.015
	Age	6.632	0.011	0.035
	Depression	0.328	0.567	0.002

Note. PQ: group with 6 or more PLEs; nPQ: control group; F-PQ: female group with 6 or more PLEs; F-nPQ: female control group; M-PQ: male group with 6 or more PLEs; M-nPQ: male control group.
Note. BPS: Brief Pornography Scale; HBI: Hypersexual Behaviour Inventory; ASEX: Arizona Sexual Experience Scale; PQ: Prodromal Questionnaire.

indices, BPS, and ASEX Orgasm attainment, whereas the difference in ASEX Erection/Lubrication was no longer significant. With respect to subgroup analyses, differences between the F-PQ and F-nPQ groups remained significant for HBI and BPS; however, the previously observed difference in ASEX Orgasm attainment was not retained after covariate adjustment. Similarly, comparisons between the M-PQ and M-nPQ groups indicated that differences persisted for HBI and ASEX Arousal, whereas the difference in BPS was no longer statistically significant.

4. Discussion

Our results revealed different associations between PLEs, dysfunctional sexual behaviors, and sexual functioning. A positive association was found between the number of PLEs and the severity of dysfunctional sexual behaviors, assessed as hypersexuality and compulsive pornography use. It is noteworthy that, concomitant with hypersexual symptoms, a significant correlation was observed among all indices, with the strongest associations persisting in the subscore of control. These findings suggested that, in addition to the use of sexual behaviour as a coping mechanism for psychopathological symptoms (Fontanesi et al., 2021; Limoncin et al., 2022), PLEs are also associated with a poor self-perception of the ability to regulate sexual impulses and the adverse consequences of engaging in such behaviours (Doroldi et al., 2024). The only index of sexual function in which an association with the number of PLEs was found significant was that relating to the ease of reaching orgasm: the more symptoms there were, the more difficult it was for subjects to reach orgasm. When examining the associations between

sexological variables and distress related to PLEs, the overall pattern closely mirrored that observed for the mere presence of symptoms; however, a positive association with difficulties in achieving and maintaining an erection or vaginal lubrication emerged exclusively in relation to distress and was not observed when considering the mere presence of symptoms. This divergent pattern of associations may suggest that distress related to PLEs constitutes a more salient indicator of psychological difficulties than the mere presence of the symptoms themselves. This is reflected in our research as a greater association with sexual dysfunction and dysfunctional sexual behaviour (Ciocca et al., 2023). In a UHR sample, the intensity of distress associated with attenuated psychotic symptoms, as well as distress associated with anxiety symptoms and substance use, was also found to predict transition to psychosis (Rapado-Castro et al., 2015). Instead, the presence of distress associated with psychotic experiences strengthens genetic associations not only with schizophrenia but also with bipolar disorder, attention-deficit/hyperactivity disorder, major depressive disorder, and autism spectrum disorder, probably indicating a profound vulnerability to severe psychopathology (Legge et al., 2019).

Furthermore, specific subtypes of PLEs may show different patterns of association. In this respect, bizarre experiences and persecutory ideas were reported to be associated with distress, depression, and poor functioning, and also problematic sexuality (Armando et al., 2010; Origlia et al., 2025; Yung et al., 2009). Only 52% of UHR individuals find their attenuated psychotic symptoms distressing, with social difficulties and depressive symptoms being the most prominent sources of distress in this population (Rapado-Castro et al., 2015). Moreover, depression has been strongly associated with hypersexuality and an increased likelihood of developing erectile dysfunction and decreased vaginal lubrication in both clinical and non-clinical samples (Atlantis and Sullivan, 2012; Ciocca et al., 2021; Dubinskaya et al., 2021; Liu et al., 2018). In our study, individuals who experience more PLEs may feel significant distress related to difficulties with interpersonal relationships. We speculate that in those with significant PLEs, engaging in problematic pornography use may exacerbate social difficulties and make them experience more loneliness (Butler et al., 2018; Byrne and Morrison, 2010). Therefore, subjects who regularly use pornography may incorporate and internalise sexual scripts of misogyny and objectification, ultimately affecting relationship functioning, specifically their sexual and intimate interactions (Butler et al., 2018; Fontanesi et al., 2024; Marshall and Miller, 2023). The feeling of perceived isolation can be exacerbated by the difficulty in discussing the details of their PLEs with their partners or family, partly due to a paranoid style of thinking and social stigma (Barker et al., 2023; Waters et al., 2025).

The group comparison analyses revealed that individuals with more significant PLEs showed a higher prevalence of dysfunctional sexual behaviour in comparison to those who did not report significant PLEs adjusted for age and depression. In this case, the effect on hypersexual behaviour was moderate, while it was weak in terms of pornography use. These results confirm the greater prevalence of hypersexuality not only in individuals who have already experienced a psychotic episode but also in those who could be at risk of psychosis (Woolridge et al., 2025).

As for sexual function, individuals who reported more PLEs demonstrate poorer functionality only in the domain of orgasm attainment after verifying for age and depression. This result is partially consistent with those of other studies, which reported poorer sexual functioning in the UHR group compared to control groups, specifically in terms of orgasm (Marques et al., 2012). However, our findings also partially extended the results of other studies suggesting the presence of sexual dysfunction in patients even before the onset of psychotic illness (Aizenberg et al., 1995; Bitter et al., 2005). In our case, sexual function difficulties and, more importantly, dysfunctional sexual behaviour seemed to characterise not only the psychotic patients or UHR subjects but also those with significant PLEs. The presence of a significant effect of group membership, based on the number of PLE, on sexual function

and behaviour, after controlling for age and depressive symptoms, indicates that this effect cannot be attributed solely to differences in depressive symptomatology or age between groups. Rather, it appears to reflect characteristics specific to individuals experiencing a higher number of PLEs, who are presumably more vulnerable to psychosis, compared with those reporting fewer or no PLEs. In this regard, it is important to note that the effect of depression was a significant predictor of all differences between groups in terms of sexual behaviour, while the covariate age was often a significant predictor of differences in terms of function. The findings of this study suggested that the variables associated with dysfunctional sexual behaviour, rather than those related to sexual function, are those that most differentiate individuals who showed more PLEs from those who did not.

Similar results on the comparisons between the subgroups of subjects who reported significant PLEs and the control groups were maintained even when the sample was limited only to males or females. When the analysis was restricted to females, there was a moderately higher hypersexual behaviour, and a slightly higher compulsive pornography use in women who reported significant PLEs compared to the control group (Borgogna et al., 2022; Slavin et al., 2020). As for sexual function, females who reported significant PLEs did not exhibit greater difficulty in reaching orgasm compared to the control subjects after verifying for age and depression. This result aligns with another study's evidence (Marques et al., 2012), which reported no differences in vaginal responsiveness between UHR individuals and the control group. When the analysis was limited to the male subpopulation, there was a slightly higher hypersexuality behaviour in men who reported more PLEs compared to the control group. However, the male group of subjects that reported more PLEs not only did not show any worse sexual function than the control group after verifying for age and depression symptoms, but, contrary to our expectations, it showed slightly better arousal than the control group. This finding contrasts with previous literature reporting greater sexual arousal difficulties in UHR individuals compared to healthy controls (Marques et al., 2012; Sabry et al., 2017). The observation that male control subjects exhibited greater difficulties in sexual arousal than male PQ participants was unexpected and somewhat surprising. However, this result may be interpreted in light of recent evidence (Woolridge et al., 2025), suggesting that individuals experiencing a psychotic onset may report increased sexual drive, including a tendency to pursue more partners or partners they would not typically consider. In this context, the higher levels of arousal observed in the PQ group could also be related to the presence of sexual content within PLEs, which Thompson et al. (2010) reported in approximately 15% of UHR individuals, and may reflect a broader pattern of heightened or dysregulated sexual drive. Nevertheless, this finding should be interpreted with caution and requires replication in future studies with comparable designs to confirm its robustness.

Sexuality may represent a domain of functioning that warrants further investigation as a potential early indicator of psychotic risk, given its observed association in pharmacologically untreated populations with PLEs and related distress. Individuals who show significant PLEs exhibit a heightened compromise in their sexual function, manifesting in two distinct domains: behavioral (thereby impacting social relationships with hypersexual and problematic pornography use) and functional, particularly in reaching orgasm.

5. Limitation

The present study also had certain limitations.

The primary constraint pertains to the snowball sampling methods and the generalizability of our findings. The sample was predominantly made up of students and individuals from Italian cultural backgrounds, and about two-thirds of the sample are female. Furthermore, online surveys are prone to sampling bias due to the non-representative nature of participants and the lack of control over survey conditions. Additionally, self-reported data may introduce inaccuracies and social

desirability bias. Given the cross-sectional design of the study, it is not possible to infer causal relationships between the variables examined; future research employing longitudinal designs should aim to investigate and clarify the relationship between early sexological symptoms and the subsequent development of clinically manifest psychotic disorders. A further limitation of the present study relates to the set of covariates included in the ANCOVA models. While the inclusion of age and depressive symptoms represents a methodological strength, it does not fully address the potential influence of other relevant confounding factors. In particular, variables such as anxiety symptoms and substance use were not included in the analyses and may have affected the observed associations. Future studies should therefore consider incorporating a broader range of psychological and behavioural covariates in order to more comprehensively control for potential confounding effects and to strengthen the robustness of the findings.

6. Conclusion

Sexual function and sexual behaviour may be altered before the onset of a full-blown psychotic episode, and such changes could be associated with the distress related to subthreshold psychotic experiences. The greatest and most consistent differences between subjects experiencing PLEs and healthy controls were related to dysfunctional sexual behaviour, and this difference was not related only to age or depression symptomatology. Clinically, these findings suggest that systematic assessment of sexual functioning and sexual well-being may be usefully integrated into the evaluation of adolescents and young adults presenting with an At-Risk Mental State (ARMS), as part of a more comprehensive and person-centered assessment aimed at identifying areas of psychological vulnerability.

Disclosure of potential conflicts of interest

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript. 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 article.

Ethics approval and consent to participate

All participants were adequately informed about the aims of the study and provided written informed consent prior to participation. The research protocol was approved by the Ethics Committee of Sapienza University of Rome.

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CRediT authorship contribution statement

Davide Doroldi: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Visualization, Writing – original draft, Writing – review & editing. **Giulia Origlia:** Conceptualization, Methodology, Writing – review & editing. **Tessa Giannini:** Conceptualization, Methodology, Writing – review & editing. **Tommaso B. Jan-nini:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. **Tommaso Boldrini:** Conceptualization, Funding

acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. **Antonio Del Casale:** Conceptualization, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. **Gabriele Lo Buglio:** Funding acquisition, Methodology, Validation, Visualization, Writing – review & editing. **Grazia Spitoni:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. **Erika Limoncin:** Formal analysis, Methodology, Supervision, Writing – review & editing. **Lorenzo Pelizza:** Formal analysis, Methodology, Supervision, Writing – review & editing. **Giacomo Ciocca:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – review & editing.

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.

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