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At-risk mental states and personality traits: A cluster analysis approach on a group of help-seeking young adults

Chiara Rossi[1] | Francesca De Salve[1] | Bruno Biagianti[2] | Cesare Cavalera[1] | Lara Malvini[3] | Simona Barbera[3] | Ilaria Pastelli[1] | Sofia Tagliabue[3] | Osmano Oasi[1] | Mauro Percudani[3]

[1]Department of Psychology, Catholic University of Milan, Milan, Italy

[2]Department of Psychology, University of Milano-Bicocca, Milan, Italy

[3]Department of Mental Health and Addiction Services, Niguarda Hospital, Milan, Italy

Correspondence
Chiara Rossi, Department of Psychology, Catholic University of Milan, Largo Agostino Gemelli, 1, 20123 Milano, Italy.
Email: chiara.rossi1@unicatt.it

Abstract

Introduction: Research on the relationship between personality and psychosis onset is growing, with the goal of preventing or intervening early in patients' vulnerability. The identification of individuals with at-risk mental states has enabled the development of early intervention strategies, such as Programma 2000, a youth mental health service that was implemented in Milan (Italy).

Aims: Focusing on the 18–25 age range—the time window with the highest incidence of psychotic onset—this study aims to identify the personality traits that may characterize the at-risk mental states and the social functioning of a group of help-seeking young adults.

Methods: The sample includes 169 people (48.5% males and 51.5% females). Data were collected during an initial assessment that comprised the Social and Occupational Functioning Assessment Scale, the Personality Inventory for DSM-5, the Checklist ERIraos and a clinical session.

Results: Results identified a three-cluster solution based on the Checklist scores: Cluster 1 'Not at psychotic risk'; Cluster 2 'At intermediate risk'; Cluster 3 'With psychotic onset'. The multivariate analysis of the variance of personality traits shows significant differences among the clusters in negative affect, detachment and disinhibition. Higher scores in these traits may distinguish individuals, not at psychotic risk from those at intermediate risk or with psychotic onset. Moreover, social functioning was found to be negatively associated with clusters of psychotic risk.

Conclusion: Findings from this study highlighted the need to evaluate personalized interventions targeting such personality traits that could prevent psychotic transition and promote psychological well-being.

KEYWORDS

At-risk mental states, personality traits, PID-5, psychosis, ultra-high risk

1 | INTRODUCTION

Over the last decades, psychiatry research has identified criteria for individuals at 'high risk' for developing psychotic illness. Since then, professionals have been able to implement preventive clinical strategies of different natures, aimed at lowering the risk of transition to psychosis among young people.

Because individuals with 'At-Risk Mental States' (ARMS) are more likely to experience a psychotic onset, early detection and intervention have been a priority for mental health clinicians. To promote early diagnosis, the Personal Assessment and Crisis Evaluation (PACE) clinic in Melbourne, Australia (1994), developed the Ultra High-Risk (UHR) diagnostic category. The UHR criteria include specific characteristics—states and traits risk factors—such as a family history of schizophrenia, schizotypal personality disorder, the presence of emerging attenuated positive symptoms and impairments in social and occupational functioning (Yung et al., 2007).

Premorbid personality disorders (PDs) may represent a risk factor for psychotic transition, especially in the developmental stage between adolescence and young adulthood (Cuesta et al., 2002). Particularly, dysfunctional personality traits are known to increase the risk for a variety of psychopathological conditions that can lead to full-blown psychotic disorders (Heikkilä et al., 2004). Three different models can explain the relationship between personality and psychotic disorders (Widiger, 2011): (a) personality might modify the phenotypic expression of the disorder; (b) the interplay between etiological and genetic factors contributes to the generation of a clinical spectrum, where personality and psychotic disorders lie on a continuum (Debanné et al., 2015); (c) personality and psychotic disorders may have a causal (etiological and possibly bidirectional) relationship, through which individual patterns of thinking, feeling, behaving and relating to others contribute to the onset of a mental disorder—that is, a severe or chronic psychotic disorder may itself contribute to major changes in personality.

Some studies have investigated the relationship between personality and psychosis onset to prevent or intervene early on patients' vulnerabilities (Andersen & Bienvenu, 2011; Bolinskey et al., 2001; Chmielewski et al., 2014; Hunter et al., 2014; Ohi et al., 2016). The relationship between normal personality traits and psychosis has often been evaluated through the dimensions identified by the Five-Factor Model (FFM) (Hogan, 1996). A strong negative association has emerged between openness to experience and general psychopathology, predisposition to psychosis and psychotic traits (Chmielewski et al., 2014). Other studies have reported lower levels of extraversion, agreeableness and conscientiousness in schizophrenic patients compared to control groups (Andersen & Bienvenu, 2011). Other research groups have examined the relationship between personality traits and psychosis using the Alternative DSM-5 Model for Personality Disorders (Bastiaens et al., 2019; Meliante et al., 2021). Indeed, the alternative model for the classification of personality disorders (PD) in DSM-5 Section III comprises two major components: impairments in personality functioning (Criterion A) and maladaptive personality traits (Criterion B) (Zimmermann et al., 2015). Focusing on the latter, a recent meta-analysis (Boldrini et al., 2019) showed that UHR patients may present heterogeneous personality traits, including social withdrawal and affective flattening (common among schizotypal patients), interpersonal instability and emotional dysregulation (common among borderline patients). This heterogeneity suggests the presence of distinct personalities that differ in adaptive functioning, aetiological variables, comorbidity patterns and response to psychotherapeutic treatment. As a result, empirical subtyping of personality in UHR individuals could help to clarify the etiopathogenetic pathways that contribute to the onset of psychosis (van Os & Guloksuz, 2017), and improve the understanding of processes that underlie treatment efficacy (Hilsenroth et al., 2018).

Several studies confirm that consistently implementing early interventions reduces the transition to psychosis (Fusar-Poli et al., 2013; Nelson, 2014). Focusing on the 18–25 age range, the time window with the highest incidence of psychotic onset (Yung et al., 2007), the present study investigated the personality traits associated with psychosis onset, with the goals of (a) classifying and comparing patient groups according to different levels of psychotic risk; (b) identifying personality traits that may differentiate the eventual presence of psychotic risk from the psychotic onset and (c) exploring the association between the level of social and occupational functioning and psychotic risk. According to the literature (Drvaric et al., 2018; Meliante et al., 2021), the most influential personality traits for the risk of psychosis are expected to be detachment and disinhibition.

2 | MATERIALS AND METHODS

2.1 | Participants

From an initial sample of 200 individuals, 169 were included in the analysis. The sample consisted of young, help-seeking (82 males and 87 females) individuals who approached the Youth Mental Health Service for early intervention at Niguarda Hospital in Milan, Italy, during the years 2019 and 2020. At the time of their first admission to the centre, participants were aged 18–25, with an average of 20.22 years (SD = 2.11). The classification of at-risk mental states was made possible through cluster analysis, using the Checklist ERIraos scores (Maurer et al., 2018).

Participants were excluded from the study if (a) they had a diagnosis of intellectual disability or autism, (b) the personality assessment was incomplete and (c) they requested a one-time consultation for diagnostic purposes.

2.2 | Procedures

Informed consent was obtained from all the subjects involved in the research. The study complies with the Guidelines of the 1964 Declaration of Helsinki and its later amendment (World Medical Association, 2013) and was approved by the Ethical Committee of Niguarda Hospital in Milan (protocol 305-19 052 021). Data were

collected during the routine assessment of patients joining Programma 2000 (Cocchi et al., 2008; Meneghelli et al., 2010).

The study was conducted in line with Programma 2000, a youth mental health service for early intervention implemented at Niguarda Hospital in Milan, Italy. This project integrates the management of chronic psychotic disorders with preventative services that promote health and recovery. Patients access this service via spontaneous help-seeking or through institutionally mediated paths (e.g. primary care, district-based mental health services, school counselling and emergency rooms). The metropolitan area served by the program includes about 350 000 inhabitants. Programma 2000 offers a personalized and customizable intervention package that includes individual psycho-educational and motivational sessions, cognitive-behavioural psychotherapy, psychoeducation, family support and therapeutic group activities (e.g. anxiety management, assertive and problem-solving training, etc.) (Cocchi et al., 2008; Meneghelli et al., 2010). Personality assessment represents a critical element in customizing and personalizing the intervention package.

3 | MEASURES

Besides the collection of socio-demographic data, Programma 2000 assessments include the PID-5, the Checklist ERIraos and the SOFAS.

3.1 | Personality inventory for DSM-5

The Personality Inventory for DSM-5 (or PID-5) is a self-report questionnaire. It was developed to assess Criteria B (Pathological Personality Traits) in Section III of the DSM-5 to adopt a dimensional and inferential-contextual approach. The PID-5 is composed of 220 items with a Likert scale from 0 (very false/often false) to 3 (very true/often True) and assesses 25 personality traits linked in five main personality traits labelled detachment, disinhibition, negative affect, antagonism and psychoticism. For the current study, the scoring was conducted following the indications of Krueger et al. (2012), and the main domains were determined by calculating the average of the corresponding scores. In the current study, McDonald's Omega (Nájera Catalán, 2019) for the five domain scales were 0.8 (Negative affectivity), 0.8 (Detachment), 0.8 (Antagonism), 0.6 (Disinhibition) and 0.8 (Psychoticism).

3.2 | Early recognition inventory-retrospective assessment onset of schizophrenia (checklist)

The Checklist ERIraos, developed by Maurer et al., 2006, is a semi-structured interview useful for identifying early signs of mental illness. The clinician must have a thorough knowledge of the psychopathological areas to use the tool. It aims to identify the perceived psychopathological changes and the family history of the subject. The Checklist consists of 17 items and combines the nonspecific distress symptoms that may accompany the prodromes of schizophrenia, such as social withdrawal and depression, loss of sense of reality, persecutory ideas and hallucinations that suggest an increased risk of the transition to psychosis (Meneghelli et al., 2014). A score ≥6 requires a referral to the Early Intervention Center for further investigation while a score ≥ 12 identifies the presence of a psychotic onset. The internal consistency of the Checklist score of the current study, analysed through the Omega's value, was considered good ($\Omega = 0.8$).

3.3 | Social and occupational functioning assessment

The Social and occupational functioning assessment (SOFAS) scale originated from the need to revise the Global Assessment of Functioning Scale (GAF) (Aas, 2010). It mainly focuses on the individual's level of social and occupational functioning and is not directly influenced by the severity of the psychological symptoms (Morosini et al., 2000). The SOFAS is a clinician-report instrument that evaluates functioning at the time of assessment; however, in some contexts, it can be used to assess past functioning. While the SOFAS scale normally generates a quantitative score, considering the level of social and occupational functioning along an ideal continuum ranging from excellent to severely impaired, we chose to stratify SOFAS scores using three cut-offs (Morosini et al., 2000). The first level included the lowest scores (from 0 to 50) indicating compromised functioning, the second (from 51 to 74) a moderate level of functioning and the last one (>75) a good level of functioning.

3.4 | Data analysis

Analyses were performed using SPSS 25.0 statistical software.

Skewness and kurtosis analyses were used to evaluate the normality of the distribution of the sample. All the variables resulted within the acceptable range between -2 and $+2$ (Podsakoff et al., 2003).

The current study employed a two-step Cluster Analysis (CA). This method has previously been used in health-related studies to explore the relationship between at-risk mental states and personality traits (Amendola et al., 2020; Bastiaens et al., 2021). The CA, following the procedures outlined by Norusis (2011), was applied to the Checklist ERIraos scores to identify different mental states and the presence of a psychotic risk. The log-likelihood method was used to reveal natural groupings in the data set based on Schwarz's Bayesian information criterion (BIC). Once the cluster solution was derived, differences in PID-5 personality traits among the three ERIraos-based clusters were explored using MANOVAs with Bonferroni multiple comparison tests. One-way ANOVA with Tukey's Post-hoc was performed in case of significant effects. Partial eta-squared effect sizes were reported. Spearman correlations were conducted to investigate significant associations between ERIraos clusters and SOFAS categories. The significance level for all statistical tests was set a priori to $a = 0.05$.

4 | RESULTS

4.1 | Descriptive statistics

Characteristics of the sample are reported in Table 1.

4.2 | Cluster analysis

CA identified a three-factor solution with a silhouette measure of cohesion and separation of 0.7. The three subgroups were significantly different on Checklist ERIraos scores, providing a solid indicator for the validity of the solution. Based on the cluster means, the three groups have been labelled as follows: Cluster 1 'Not at psychotic risk' ($n = 46$; 27.2%; $M_{\text{check-list}} = 6.39$); Cluster 2 'At intermediate risk' ($n = 65$; 38.5%; $M_{\text{check-list}} = 16.09$); Cluster 3 'With psychotic onset ($n = 58$; 34.3%; $M_{\text{check-list}}$=29.29)'. The cluster distribution is shown in Figure 1. Specifically, the first cluster includes a male majority (58.7%) while the second and the third were composed mainly of females (respectively 55.4% and 55.2%). The first group gathers individuals reporting low scores in Checklist ERIraos ($M = 6.39$), hence not considered to be at psychotic risk or in need of early intervention. The 'At intermediate risk' group was so named due to the mean score of 16.09, indicating a moderate risk. These individuals were referred to the early intervention Centre for further investigation. The third group included patients who scored the highest on the Checklist ERIraos: in addition to high scores in the first part of the scale (which investigates non-specific distress), these subjects also showed high scores on the last items of the instrument (which examine the presence of positive symptoms). The group's mean score ($M = 29.29$) may be indicative of psychotic onset.

4.3 | Differences in personality domains

The multivariate analysis of variance (MANOVA) was conducted considering the three-cluster solution, sex and age as factors and the PID-5 domains as dependent variables. The assumption of the equality of covariance matrices was confirmed by the Box's test, $p = .2955$ (>.05), hence the covariance matrices are roughly equal as assumed by the MANOVA. To test the homogeneity of group variances, the Levene test was conducted. First, age was not significant. In addition, also the interaction between sex and cluster resulted not significant. Second, regarding sex, there was a significant effect only for the domain of antagonism (Wilks's $\Lambda = 0.863$, $\eta_{\text{partial}} = 0.137$; $p < .001$; F (1,163) = 12.946; $\eta_{\text{partial}} = .074$; $p < .001$). As shown in Table 2, males reported higher levels of antagonism than females.

Third, concerning personality traits, the MANOVA revealed a main effect of the ERIraos classification on the PID-5 domains of detachment, disinhibition and antagonism (Wilks's $\Lambda = .756$; $\eta_{\text{partial}} = 0.130$, $p < .001$) as shown in Figure 1.

Psychoticism was found to be significant on the Levene test and was excluded from the analysis. Significant differences were found at alpha <0.01 between groups for negative affect [F (2,163) = 8.327; $\eta_{\text{partial}} = .093$], detachment [$F$ (2,163) = 12.362; $\eta_{\text{partial}} = .132$], disinhibition [$F$(2,163) = 11.157; $\eta_{\text{partial}} = .120$] and also for antagonism [F (2,163) = 3.475; $\eta_{\text{partial}} = .041$, $p = .033$]. Bonferroni's Post-hoc multiple comparisons revealed significant differences between the

TABLE 1 Descriptive statistics

Characteristic		Group	N (%)
Sex		Female	87 (51.5%)
		Male	82 (48.5%)
Age (years)	M (SD)	20.22 (2.11)	169 (100%)
	Min-max	16–25	
Education level		Primary school diploma	1 (0.6%)
		Middle school diploma	81 (47.9%)
		High school diploma	77 (45.6%)
		Graduated from University	10 (5.9%)
Work status		No worker	35 (21.7%)
		Worker	20 (12.4%)
		Student	114 (65.8%)
Substance abuse		No	125 (74%)
		Yes	39 (23%)
		Suspected	5 (3%)
Alcohol abuse		No	129 (76.3%)
		Yes	29 (17.2%)
		Suspected	11 (6.5%)
Familiarity for psychosis		No	82 (48.2%)
		Yes	87 (51.8%)

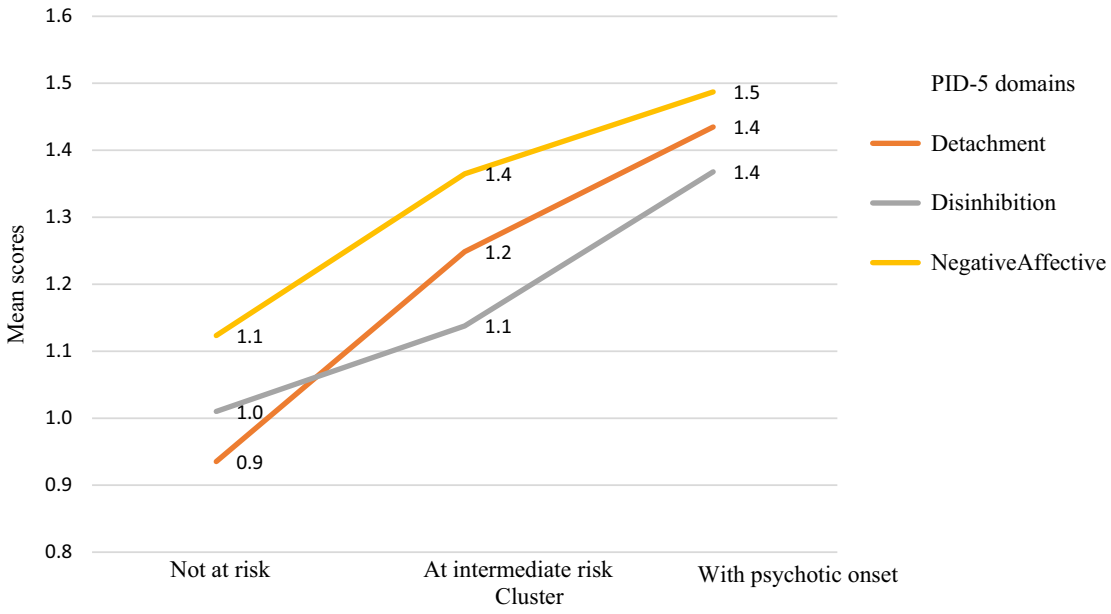

FIGURE 1 PID-5 domains distribution according to the cluster-solution

TABLE 2 Descriptive statistics and post-hoc

PID-5 domain	Cluster	*M*	SD	*N*	*p*-Value	Post-hoc
Negative Affect	1. Not at risk	1,12	0,37	46		
	2. At intermediate risk	1,36	0,39	65	$p = <.001$	(1) vs. (2) $p = .013$
	3. With psychotic onset	1,49	0,52	58		(1) vs. (3) $p = <.001$
	Total	1,34	0,45	169		
Detachment	1. Not at risk	0,94	0,49	46		
	2. At intermediate risk	1,25	0,48	65	$p = <.001$	(1) vs. (2) $p = .005$
	3. With psychotic onset	1,43	0,55	58		(1) vs. (3) $p = <.001$
	Total	1,23	0,54	169		
Antagonism	1. Not at risk	0,58	0,38	46		
	2. At intermediate risk	0,63	0,39	65	$p = .033$	
	3. With psychotic onset	0,75	0,44	58		
	Total	0,66	0,41	169		
Disinhibition	1. Not at risk	1,01	0,36	46		
	2. At intermediate risk	1,14	0,36	65	$p = <.001$	(1) vs. (3) $p < .001$
	3. With psychotic onset	1,37	0,43	58		(2) vs. (3) $p = .004$
	Total	1,18	0,41	169		

means among the clusters for the domains of negative affective, detachment and disinhibition.

Table 2 shows means and standard deviations for the PID-5 domains of each group, as well as the Post-hoc comparisons. Concerning negative affect and detachment domains, the 'Not at risk' group was significantly different from the 'At intermediate risk' and the 'With psychotic onset' groups. The 'With psychotic onset' group showed significantly higher disinhibition scores compared to the other two. In order to better understand the results obtained from the MANOVA for antagonism, a one-way ANOVA was implemented including cluster classification as a fixed factor and antagonism as the dependent variable. No significant difference were found [F (2,166) = 2.408; $\eta_{partial} = .28$, $p = .93$].

Finally, the dimension of social functioning was explored. As a whole, the sample presented a moderate level of social and occupational functioning ($M = 60.98$, SD = 12.95) with a minimum score of 20 and a maximum of 90. Spearman's correlation revealed a significant association between the three clusters and the SOFAS categories ($\rho = -.182$; $p = .018$).

5 | DISCUSSION

The present study aimed at identifying the personality traits that may characterize the onset of psychosis. To the best of our knowledge, three studies have used CA to define levels of psychotic risk (Gawęda et al., 2019; Valmaggia et al., 2013). In our study, three groups have been identified and labelled (1) 'Not at psychotic risk', (2) 'At intermediate risk' and (3) 'With psychotic onset'. This classification is in line with Yung et al. (2004) who have conceptualized psychosis along a continuum from the absence of psychotic risk to full-blown onset. Moreover, they identified characteristics typical of patients at high psychotic risk: age between 15 and 25 years, being a help-seeker and having experienced a significant decline (>30%) in social and work functioning in the last 12 months or a long-standing low functioning.

Sex did not have emerged as a risk factor for psychotic onset based on cluster classification, if not for antagonism, where males reported higher scores than females (Table 1), which is aligned with previous research (Blötner et al., 2021; Geniole et al., 2013). Collison et al. (2021) showed that differences in personality traits, in particular antagonism and social dominance, are associated with sex.

The MANOVA analysis conducted based on clusters identified three personality domains where the three groups significantly differed: negative affect, detachment and disinhibition, which have all been previously identified as general risk factors for psychopathology (Longenecker et al., 2020). According to several studies (Bastiaens et al., 2019; Meliante et al., 2021), the 'At intermediate risk' and 'With psychotic onset' groups reported higher scores for negative affect and detachment than the 'Not at psychotic risk' group.

Experiences of a wide range of negative emotions and associated behavioural manifestations are common in patients with at-risk mental states, likely due to dysfunctional emotion regulation that often already occurs in individuals at risk of psychosis (Freeman & Garety, 2003; Schultze-Lutter et al., 2015). These regulation difficulties are thought to originate from lower activation of the ventrolateral prefrontal cortex, which is associated with high negative affect, lower social functioning and high rates of psychotic symptoms (Van Der Velde et al., 2015).

Detachment is often associated with avoidance of social and emotional experiences, causing withdrawal from interpersonal interactions and restricted hedonic experiences (Rapado-Castro et al., 2015). In this study, detachment scores were significantly higher for the 'At intermediate risk' and 'With psychotic onset' groups, compared to the 'Not at risk' group, in line with research suggesting that detachment could serve as a premorbid indicator of negative symptoms (Meliante et al., 2021). Moreover, social withdrawal (one of the many implications of detachment) represents, along with depressive symptoms, a very common feature in the prodromal phase of psychosis (Yung & McGorry, 1996). Suspiciousness, another result of detachment, is also typical in some young people at psychotic risk, who tend to incur cognitive distortions, attributing their ideas and opinions about themselves to others (Freeman & Garety, 2014). This tendency, often driven by pervasive feelings of social inadequacy, can easily evolve into direct persecutory experiences that clinicians should consider during their practice (Freeman & Garety, 2014).

With respect to disinhibition, the group 'With psychotic onset' showed significantly higher scores than the 'Not at risk' and 'At intermediate-risk' groups—a finding that corroborates previous research showing high disinhibition in the help-seeking population with a vulnerability to psychosis and/or overt psychotic onset (Hazan et al., 2020; Yung et al., 2019).

In line with the literature, antagonism was found to be a personality domain that is not relevant to at-risk mental states (Fresán et al., 2015; van der Gaag et al., 2019). Similarly, psychoticism was not found to be a domain associated with identified clusters of psychotic risk, which replicated findings from Drvaric et al. (2018). Despite psychoticism being indexed by the PID-5 and the Checklist ERIraos Scale as a composite of Unusual Beliefs and Experiences, Eccentricity and Perceptual Dysregulation, no significant differences emerged between the three clusters. This is possibly because psychoticism is a transdiagnostic personality feature that does not significantly increase the risk for psychosis (Bastiaens et al., 2019).

Finally, the three levels of social functioning, as indexed by the SOFAS, were found to be negatively associated with clusters of psychotic risk, such that having lower social functioning was associated with increased psychotic risk. In a recent study conducted by Leijdesdorff et al. (2022), a similar relationship between social functioning and psychiatric symptoms in youth emerged, suggesting that social functioning could predict transdiagnostic psychiatric symptoms.

This study has several limitations. First, the sample size was small, and future studies with a larger sample size are recommended. Second, the cross-sectional nature of data collection limited the possibility of exploring whether personality traits predict the onset of psychosis. Third, the SOFAS (Morosini et al., 2000) used to investigate social functioning is a clinician-report instrument and does not rely on self-reports. Finally, the distinction of at-risk mental states was conducted through the Checklist ERIraos, which does not effectively detect the classification as required by the UHR criteria (Yung et al., 2005). Therefore, in light of these findings, the CAARMS (Yung et al., 2005) will be introduced into the Programma 2000 assessment strategy.

Despite its limitations, the present research suggests the involvement of personality traits in the development of psychosis-related psychopathology. Namely, higher levels of negative affect, disinhibition and detachment distinguish people who are more vulnerable to psychosis or who already have overt psychosis from those who are not at psychotic risk.

Given the high prevalence of personality disorders in ultra-high-risk patients (18% after 6 months, 22% after 1 year and 29% after 2 years to 36% after 3 years) compared to the relatively low rate of psychotic transition (Boldrini et al., 2019; Boldrini, Pontillo, et al., 2020a; Boldrini, Tanzilli, et al., 2020b; Fusar-Poli et al., 2016; Sevilla-Llewellyn-Jones et al., 2018), intervention programs for at-risk mental states patients should be supplements with personalized treatments that recognize, focus and treat maladaptive personality traits, to prevent transition to psychosis and promote psychological well-

being. Future research should investigate the relationship between psychopathological dimensions of personality and outcomes of early intervention programs for psychosis.

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CONFLICT OF INTEREST

The authors declared no potential conflict of interest with respect to the research, authorship and/or publication of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

INFORMED CONSENT

Informed consent was obtained from all the subjects involved in the study.

ORCID

Chiara Rossi https://orcid.org/0000-0002-3570-2710

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