

A longitudinal study of stress-sensitivity trajectories and schizotypy: Retrospective and momentary daily-life assessments of stress appraisals

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ABSTRACT

Heightened stress-sensitivity is a vulnerability factor to the extended psychosis phenotype (i.e., schizotypy), but longitudinal studies on its development and association with schizotypy are lacking. This study examines the stability of stress-sensitivity as a trait and its trajectories over time, assessed both retrospectively and in daily life. Additionally, it explores whether individuals with varying stress-sensitivity trajectories exhibit different levels of positive and negative schizotypy. Stress-sensitivity was measured in non-clinical young adults at three time points (T3 $n = 102$, age = 23.5; T4 $n = 89$, age = 25; T5 $n = 168$, age = 28) both retrospectively with Perceived Stress Scale and momentarily with experience sampling methodology. Schizotypy dimensions were assessed at the final time point. Three longitudinal modeling techniques were used to assess and classify individuals' trajectories of stress over time. Stress-sensitivity exhibited overall stability over time across both retrospective and momentary measures, revealing two trajectory classes (high and low). Stability persisted in high stress-sensitivity classes, except for momentary situational stress. Individuals with persistently high stress-sensitivity over 4.5 years reported elevated positive and negative schizotypy. Retrospective measure revealed a large effect for positive and a medium effect for negative schizotypy, while no such associations for momentary assessments. Findings indicate that stress-sensitivity is a stable trait, even when assessed in young adults. Stability was more effectively captured through retrospective rather than momentary measures—consistent with the contextually-driven nature of momentary responses. These results align with stress-sensitivity role in the causal pathway of the extended psychosis phenotype. Understanding the characterization of stress-sensitivity may offer insight into risk, protection, and mechanisms in psychosis development.

1. Introduction

Psychosis can be seen as an extended phenotype that spans a continuum of symptom severity and impairment (Kwapil and Barrantes-Vidal, 2015; Kaymaz and van Os, 2010; van Os et al., 2009; Cowan et al., 2024). This extended psychosis phenotype, referred to as *schizotypy* (Claridge, 1997; Kwapil and Barrantes-Vidal, 2015; Barrantes-Vidal and Kwapil, 2023), reflects a phenotypic expression of vulnerability to schizophrenia-spectrum psychopathology (van Os et al., 2009), ranging

from subclinical expressions to full-blown psychosis (Kwapil and Barrantes-Vidal, 2015; Fonseca-Pedrero et al., 2021; Cowan et al., 2024). The schizotypy model proposes a shared etiology across the psychosis continuum (Barrantes-Vidal et al., 2015), with *stress-sensitivity* identified as a key causal factor influencing vulnerability throughout the spectrum (e.g., Vaessen et al., 2017; Muddle et al., 2022). Empirical evidence shows that heightened sensitivity to stress can increase the risk of psychosis and exacerbate psychotic symptoms at both subclinical and clinical levels (DeVylder et al., 2016; Kemp et al., 2024; Kemp et al.,

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2025; Georgiades et al., 2023).

Stress-sensitivity, defined as a trait rooted in inherited and/or acquired vulnerabilities, is characterized by a heightened responsiveness to stress, even at low levels of exposure (Hammen, 2015; Hankin et al., 2015; Stroud, 2020). This trait often overlaps with broader temperamental traits such as neuroticism (Eysenck, 1947), rumination (Nolen-Hoeksema and Morrow, 1991), harm avoidance (Cloninger et al., 1993), and negative affectivity (Watson et al., 1988), though it is increasingly recognized as a distinct construct (Lardinois et al., 2011; Wichers et al., 2009; Luo et al., 2023). This is supported by its inclusion in the National Institute of Mental Health's Research Domain Criteria (RDoC) (Clinton et al., 2022; Vaessen, 2018). Although traditional measurement tools, such as the Perceived Stress Scale (PSS; Cohen et al., 1983) and the Trier Social Stress Test (TSST; Kirschbaum et al., 1993), are still commonly used to assess stress-sensitivity, more recent methods, such as the experience sampling methodology (ESM) offer improved ecological validity by capturing real-time daily experiences (Myin-Germeys et al., 2018; Bogudzińska et al., 2024). However, evidence on the developmental trajectory of stress-sensitivity remains limited, with mixed findings on its stability, particularly in adolescents and young adults (Prado-Gascó et al., 2019; Humer et al., 2022; Spivey et al., 2020; Batabyal et al., 2021).

High stress-sensitivity has been implicated across all stages of the psychosis spectrum (Myin-Germeys et al., 2008; DeVlyder et al., 2016; Vaessen, 2018; Muddle et al., 2022). Elevated retrospective stress appraisals have been associated with psychotic symptoms, especially in individuals with early adversity (Xenaki et al., 2024; O'Brien et al., 2023). ESM studies have further demonstrated that heightened momentary stress reactivity is linked to more intense subclinical psychotic experiences (Myin-Germeys & van Os, 2007; Collip et al., 2008; Reininghaus et al., 2016; Rauschenberg et al., 2022; Klippel et al., 2022). These effects appear most pronounced in individuals with elevated positive schizotypy traits, such as hallucinatory experiences and paranoia (Grattan and Linscott, 2019; Klippel et al., 2022), whereas negative schizotypy features like affective and motivational deficits remain less explored (Barrantes-Vidal et al., 2013a). Longitudinal research integrating both retrospective and momentary stress appraisals is therefore essential for determining whether stress-sensitivity represents a stable trait or a fluctuating developmental process, and for identifying when heightened sensitivity emerges as a risk factor for schizotypy. Tracking individual trajectories over time allows longitudinal designs to clarify the stability, timing, and real-world manifestations of stress-sensitivity, thus advancing our understanding of developmental pathways to psychosis-spectrum outcomes.

Therefore, this study examined the stability and longitudinal trajectories of stress-sensitivity in non-clinically ascertained young adults using both retrospective (PSS) and momentary (ESM) assessments. We hypothesized that stress-sensitivity would remain stable over time, resulting in distinct high- and low-sensitivity trajectories across individuals—some consistently exhibiting elevated, and others lower, PSS scores or momentary stress levels. This expectation is consistent with previous research demonstrating individual differences in stress reactivity, often reflected in heightened negative affect in response to stressful situations (Farmer and Kashdan, 2015; Reininghaus et al., 2016). We further explored whether these trajectories were associated with expressions of positive and negative schizotypy. In line with previous research (Barrantes-Vidal et al., 2013a; Grattan and Linscott, 2019), we expected that persistent high stress-sensitivity would be associated with elevated positive—but not negative—schizotypy relative to lower sensitivity.

2. Methods

2.1. Participants and procedure

The data is part of the Barcelona Longitudinal Investigation of

Schizotypy Study (BLISS; Barrantes-Vidal et al., 2013a; Barrantes-Vidal et al., 2013b; Barrantes-Vidal and Kwapil, 2025), which investigates schizotypy characteristics and psychosis risk. Students from Universitat Autònoma de Barcelona (UAB) completed self-report, interview, and ESM measures across five time points, with a mean interval of 7.8 years between T1 and T5 (SD = 0.5).

At T1 (Barrantes-Vidal et al., 2013a, 2013b), valid data was obtained from 547 students (mean age = 20.6; SD = 4.1; 83 % women). A subset, oversampling those with schizotypy scores >1.0, was selected for longitudinal follow-up. This sample included participants with low to high schizotypy scores, suitable for examining stress-sensitivity stability. At T2, a sub-selected sample of 214 participants were assessed (mean age = 21.4; SD = 2.4; 78 % women), and at T3, due to funding constraints, 103 participants (mean age = 23.6; SD = 2.6; 62 % women) who retained a distribution of schizotypy scores were assessed. At T4, 89 participants were re-assessed (mean age = 24.8; SD = 2.7; 62 % women). At T5, 169 participants were reassessed (79 % of T2; mean age = 28.0; SD = 2.4; 81 % women). This study was approved by the Ethics Committee of the Universitat Autònoma de Barcelona (CEEAH), and participants provided written informed consent.

2.2. Measurement of stress-sensitivity

Stress-sensitivity measures were jointly administered at three time points: T3, T4, and T5 (mean interval between T3 and T5 was 4.6 years; SD = 0.5)—which constitute the focus of this study.

2.2.1. Retrospective assessment

The 14-item Perceived Stress Scale (PSS) is a well-validated self-report measure assessing individual differences in stress appraisal over the past month (Cohen et al., 1983). The response format consists of a 5-point Likert-type scale (0 = Never to 4 = Very often) with item example “In the last month, how often have you...” and “felt nervous and stressed?”, and a total score is provided. The PSS captures general stress experiences rather than specific life events, making it a useful proxy for trait stress-sensitivity.

2.2.2. Momentary assessment

ESM was used to measure subjective and contextualized stress appraisals in daily life. Participants were randomly signaled eight times a day over 7 days on personal digital assistants or smartphones to complete brief questionnaires assessing their current experience (e.g., affect, thoughts). A detailed description of the ESM procedure and validation data can be found in Barrantes-Vidal et al. (2013a). Items were answered on a 7-point scale (“not at all” to “very much”). Four items assessed stress appraisals: one for situational stress (“Right now, my current situation is stressful”), two for social stress when participants were not alone (“Right now, I feel close to these people” [reversed] and “Right now, I prefer to be alone”), and one for social stress when alone (“Right now, I am alone because people do not want to be with me”). Participants completed an average of 39.3 (SD = 9.7) usable questionnaires at T3, 39.7 (SD = 8.2) at T4, and 39.8 (SD = 7.4) at T5.

2.3. Measurement of schizotypy

Schizotypy dimensions were assessed at T5 of BLISS (but not at the other two timepoints of this study) using the short forms of the Wisconsin Schizotypy Scales (WSS-S; Winterstein et al., 2011), yielding positive and negative schizotypy factor scores (Barrantes-Vidal et al., 2013a; Barrantes-Vidal et al., 2013b).

2.4. Data analysis

2.4.1. Latent growth curve modeling

The trajectory of PSS over time (T3, T4, T5) was analyzed using latent growth curve modeling (LGCM), which estimates two latent

variables: a) the intercept (average score across all individuals) and b) the slope (average change over time) (Wigman et al., 2011). This method was used to examine individuals' trajectories in sensitivity to stress over time. Analyses were conducted in R Version 3.6.3 (R Core Team, 2013) using the *Laavan* package for structural equation modeling (Rosseel, 2012) and the *Amelia* (Honaker et al., 2011) and *MICE* (van Buuren and Groothuis-Oudshoorn, 2011) packages for multiple imputations, a preferred method for handling missing data (Lee and Shi, 2021). We imputed 50 data sets, following van Buuren's (2018) recommendation, and estimated the growth model using Rubin's rule (Rubin and Schenker, 1986). Model fit was assessed using the Tucker Lewis Index (TLI), the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR), with chi-square test statistics. Further details on model estimation and R script are available in the supplementary materials (Appendix S1).

2.4.2. Linear mixed-effects modeling

The longitudinal analysis of ESM scores was conducted using a linear mixed-effects model (LMM; Laird and Ware, 1982), an extension of linear models that accounts for both fixed and random effects, specifically for repeated measures data (Liu et al., 2012). The LMM is recommended for analyzing linear trends over time with multilevel longitudinal data (Bauer, 2003; Puspongoro et al., 2017). A two-level LMM was applied, where repeated measurements were nested within individuals. Thus, all time points within individuals were used for the analysis. Analyses were conducted in R Version 3.6.3 (R Core Team, 2013) using the *lme4* package (Bates et al., 2015), the *lmerTest* package (Kuznetsova et al., 2017) for *p* values, and the *optimx* package (Nash and Varadhan, 2011) to optimize the model. We estimated the model using linear mixed effects, with momentary stress predicted by *Time* (T3, T4, and T5), to test for differences in mean momentary stress across time points. All ESM items were analyzed separately. The model included correlated random intercepts and slopes. Details of the R script using LMM can be found in Appendix S1.

2.4.3. Latent class analysis

We conducted latent class analysis (LCA) to categorize individuals into classes (or clusters) with similar stress-sensitivity trajectories, as measured by PSS and ESM. Analyses were performed using the *Lcmm* function in the R package (Proust-Lima et al., 2017). We estimated a latent class model assuming a linear trajectory for the latent process, including correlated random intercept and slope. Variable *Time* was used as a predictor and *Stress* as an outcome. By estimating the model fit indices, we further identified the number of classes with each latent class representing the individuals' stress trajectory. The number of classes was determined based on model fit indices, including the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Sample-size Adjusted BIC (SABIC), with the model showing the lowest fit indices selected. Details of the R script for LCA can be found in Appendix S1.

2.4.4. T-tests for independent samples

Independent samples t-tests were used to compare levels of positive and negative schizotypy between low and high stress-sensitivity groups.

3. Results

A total of 102 participants completed the PSS at T3 (mean age = 23.5; SD = 2.6; 63 % women), 89 at T4 (mean age = 24.9; SD = 2.7; 62 % women), and 168 at T5 (mean age = 28.0; SD = 2.4; 81 % women). Cronbach's alpha showed good reliability for the PSS at each time point (T3 = 0.84; T4 = 0.89; T5 = 0.86). For the ESM situational and social stress items, 89 participants completed these at T3 (mean age = 23.4; SD = 2.5; 67 % women), 84 at T4 (mean age = 24.7; SD = 2.6; 63 % women), and 159 at T5 (mean age = 27.9; SD = 2.3; 79 % women).

Descriptive data for the measures used in the study at each timepoint are provided in Table 1.

3.1. Examining stress-sensitivity trajectories with PSS

The chosen unconstrained growth model fit the data well ($\chi^2=3.12$; $p = 0.077$; robust TLI = 1.000; CFI = 0.968; RMSEA = 0.107; and SRMR = 0.042). Although RMSEA was slightly less favorable, most fit indices indicated a good model fit.

LGCM revealed a positive and significantly different-from-zero mean latent intercept (Table 2). However, neither the mean latent slope nor its variance was significant, suggesting no overall change in perceived stress over time. LCA identified the model with two classes as having the lowest AIC, BIC, and SABIC (Table S1). High average class probabilities (0.88 for class 1 and 0.85 for class 2) indicated satisfactory participant classification. As shown in Table 3, the first class with the highest percentage of participants (67 %; $M = 15.78$; $SD = 0.93$) resulted in the lower overall mean compared to the second class (33 %; $M = 26.67$; $SD = 0.60$), thus class 1 was labeled *low stress-sensitivity class* and class 2, *high stress-sensitivity class*. Across all three time points, the high stress-sensitivity class had higher mean values compared to the low stress-sensitivity class. The effect of time (slope) for the high stress-sensitivity class showed no significant change, while the positive slope in low stress-sensitivity class indicated a slight but significant increase in stress over time (Table 3; Fig. 1a).

3.2. Examining stress-sensitivity trajectories with ESM

3.2.1. ESM situational stress

LMM showed no significant differences in mean situational stress across the three time points (Table 2). The fixed slope was also not significant, indicating no overall change in situational stress over time. LCA identified the model with two classes as having the lowest AIC, BIC, and SABIC values (Table S1). High average class probabilities (0.98 for class 1 and 0.94 for class 2) indicated satisfactory participant classification. Class 1, comprising the majority of participants (93 %; $M = 2.04$; $SD = 0.16$), showed a lower overall mean compared to class 2 (7 %; $M = 3.62$; $SD = 0.67$); therefore, classes were again labeled as low (class 1) and high (class 2) stress-sensitivity groups. At T3 and T4, the high stress-sensitivity class had lower means than the low stress-sensitivity class, while at T5, the high stress-sensitivity class showed a higher mean (Table S1). The effect of time (slope) was significant for both classes: positive for the high stress-sensitivity class, indicating increased sensitivity over time, and negative for the low stress-sensitivity class, indicating a decrease in stress-sensitivity over time (Table 3; Fig. 1b).

3.2.2. ESM social stress

LMM indicated no significant differences in mean social stress scores across the three time points (Table 2). For all items, the estimated fixed intercepts were positive and significantly different from zero, while the slopes were not significant, indicating no overall change in social stress over time. In the LCA, the goodness-of-fit statistics suggested a one-class model for the items "Right now, I am alone because people do not want to be with me" and "Right now, I prefer to be alone," whereas for "Right now, I feel close to this person (these people) (reversed)," a two-class model was identified (Table S1). High average class probabilities (0.96 for class 1 and 0.85 for class 2) indicated satisfactory participant classification.

Since LCA did not reveal distinct trajectories for the first two items, only the results for "Right now, I feel close to this person (these people) (reversed)" are described (Table 3). In the selected model, class 1, comprising the majority of participants (89 %; $M = 2.29$; $SD = 0.02$), showed a lower overall mean compared to class 2 (11 %; $M = 3.75$; $SD = 0.15$). Thus, classes were again labeled as low (class 1) and high (class 2) stress-sensitivity groups. Across all three time points, the high stress-sensitivity class showed higher means than the low stress-sensitivity

Table 1
Descriptive data of the stress-sensitivity proxy measures at each time point.

	Time 3					Time 4					Time 5				
	N	M	SD	Range	ESM beeps ^a	N	M	SD	Range	ESM beeps ^a	N	M	SD	Range	ESM beeps ^a
PSS	102					89					168				
		19.97	7.43	6–40	–		19.35	8.80	5–40	–		20.23	7.57	5–43	–
ESM Situational stress	89					84					159				
My current situation is stressful		2.25	1.69	1–7	3493		2.32	1.78	1–7	3334		2.03	1.5	1–7	6098
ESM Social stress	89					84					159				
I am alone because people do not want to be with me		1.13	0.55	1–6	1577		1.14	0.58	1–7	1427		1.07	0.49	1–7	2520
I feel close to this person (these people) _r		2.30	1.74	1–7	1916		2.44	1.76	1–7	1906		2.38	1.77	1–7	3578
I prefer to be alone		1.81	1.51	1–7	1916		1.89	1.52	1–7	1905		1.81	1.56	1–7	3578

Note 1. PSS = Perceived Stress Scale, ESM = Experience Sampling Methodology, M = Mean, SD=Standard Deviation, r = reversed.

^a ESM beeps is the number of responses obtained by ESM.

Table 2
Analysis of the longitudinal stress-sensitivity trajectories for each stress measure.

	Mean intercept	Mean slope
PSS (LGCM)	19.75***	0.16**
ESM situational stress (LMM)		
My current situation is stressful	2.53***	–0.09*
ESM social stress (LMM)		
I am alone because people do not want to be with me	1.21***	–0.03
I feel close to this person (these people) _r	2.40***	0.005
I prefer to be alone	1.87***	–0.003

Note 1. Absence of an overall change in stress-sensitivity trajectories over time is indicated by non-significant slopes; PSS=Perceived Stress Scale, ESM = Experience Sampling Methodology, _r = reversed; LGCM = Latent Growth Curve Modeling; LMM = Linear Mixed Model.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

class (Table 3). The effect of time (slope) for both classes was not significant, indicating stability of social stress across time for both groups (Table 3; Fig. 1c).

Table 3
Descriptive data of the classes for each stress-sensitivity measure.

	N (%)	Intercept	Slope	Overall mean scores	Mean (CI) across three time points		
					Time 3	Time 4	Time 5
PSS perceived stress							
Class 1 (low ss)	126 (67 %)	13.91***	0.93*	15.78 (SD = 0.93)	14.85 (13.28,16.42)	15.78 (14.52,17.04)	16.72 (15.16,18.27)
Class 2 (high ss)	61 (33 %)	27.87***	–0.60	26.67 (SD =0.60)	27.2 7 (25.20, 29.34)	26.67 (25.12, 28.23)	26.08 (24.02,28.14)
ESM situational stress							
Class 1 (low ss)	162 (93 %)	2.66***	–0.15**	2.04 (SD =0.155)	2.95 (3.07, 4.17)	3.62 (3.07, 4.17)	1.89 (1.78, 2.00)
Class 2 (high ss)	12 (7 %)	0.96	0.66***	3.62 (SD =0.665)	2.12 (1.96, 2.44)	2.04 (1.89, 2.20)	4.28 (3.73, 4.84)
ESM social stress							
Class 1 (low ss)	154 (89 %)	2.29***	–0.02	2.22 (SD =0.017)	2.24 (2.05, 2.43)	2.22 (2.08,2.35)	2.20 (2.04, 2.37)
Class 2 (high ss)	20 (11 %)	3.20*** ^y	0.14	3.75 (SD =0.137)	3.62 (2.74, 4.49)	3.75 (3.17, 4.33)	3.90 (3.44, 4.34)

Note 1. ESM Social Stress item (I feel close to this person/these people; reversed).

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

3.3. Differences in schizotypy based on stress-sensitivity trajectories

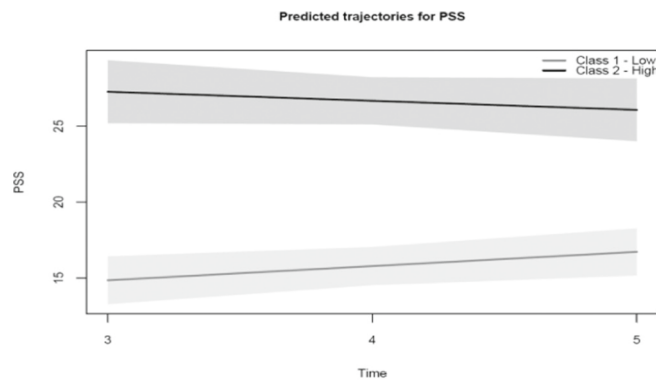
Schizotypy factor scores were available for a total of $n = 168$ at T5 (Positive schizotypy: mean = -0.70 , SD = 0.42 , range = -1.17 – 2.44 ; Negative schizotypy: mean = -0.08 , SD = 0.96 , range = -1.06 – 5.02). Participants categorized into high versus low persistent stress-sensitivity trajectories, as measured by PSS, showed significant differences in positive ($t = -2.81$, $p = 0.006$, Cohen’s $d = 0.50$) and negative schizotypy ($t = -2.05$, $p = 0.044$, Cohen’s $d = 0.36$). Specifically, the high PSS group reported higher levels of both positive and negative schizotypy compared to the low PSS group (Table 4).

In contrast, participants grouped by high versus low ESM situational and social stress trajectories showed no significant differences in positive (ESM situational stress: $t = -1.41$, $p = 0.181$; ESM social stress: $t = -1.75$, $p = 0.091$) or negative (ESM situational stress: $t = -1.08$, $p = 0.296$; ESM social stress: $t = -1.81$, $p = 0.079$) schizotypy (Table 4).

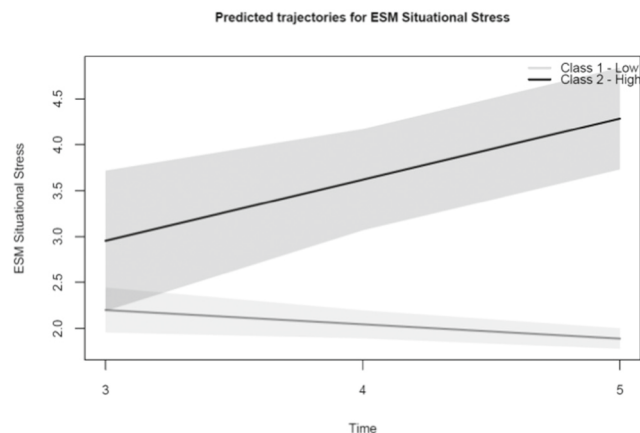
4. Discussion

To our knowledge, this is the first longitudinal study to map stress-sensitivity trajectories—combining retrospective (PSS) and momentary (ESM) stress appraisals—and their association to schizotypy in nonclinical young adults. The main findings indicated an overall pattern of stability in stress-sensitivity over young adulthood across both retrospective and momentary stress appraisals, with latent class analysis identifying two distinct trajectories—high and low sensitivity—for all measures. The high stress-sensitivity group showed stability in

a) PSS perceived stress



b) ESM situational stress



c) ESM social stress

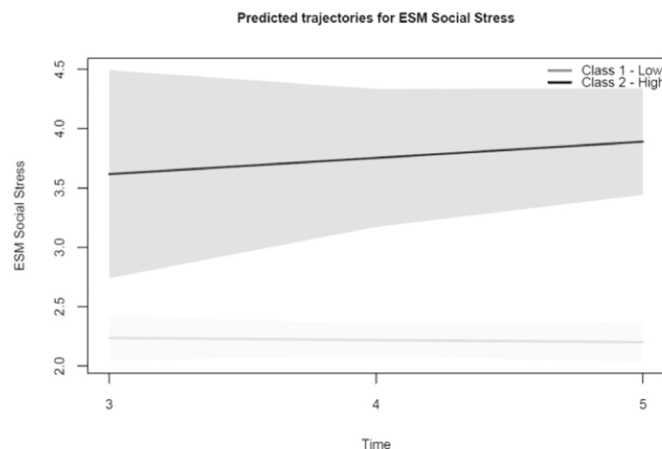


Fig. 1. Developmental trajectories for low (class1) and high (class2) stress-sensitivity. a) PSS perceived stress; b) ESM situational stress; c) ESM social stress.

Note 1. Trajectories show mean scores of a) PSS, b) ESM situational stress, c) ESM social stress across the three time points.

retrospective perceived stress and momentary social stress, but an increase in momentary situational stress. In contrast, the low stress-sensitivity group exhibited stability in momentary social stress, alongside an increase in retrospective perceived stress and a decrease in momentary situational stress over time. Finally, high persistent stress-sensitivity group (based on retrospective measure) exhibited significantly higher levels of both positive and negative schizotypy than the low stress-sensitivity group, whereas no differences were found in

relation to momentary stress-sensitivity trajectories.

It is noteworthy that this sample was compromised of young adults, a group likely to encounter developmental challenges as they transition to adulthood (such as starting a professional career, achieving financial and household autonomy), and thus, may experience elevated and fluctuating levels of stressful life events. Despite these potential life challenges, stress-sensitivity appraisals remained stable, supporting its characterization as a trait. These findings underscore that stress-sensitivity, as an individual trait, exhibits similar patterns of trait behavior traditionally corresponding to the Big Five personality model, although to differing degrees (Luo et al., 2023). For instance, unlike the broader negative affectivity encompassed by neuroticism (Uliaszek et al., 2010; Epel et al., 2018), stress-sensitivity specifically captures heightened stress appraisal and response, thus offering more precise insights into stress-related processes.

As expected in a nonclinical sample, the proportion of individuals classified into high stress-sensitivity classes was relatively low: 33 % when using the retrospective PSS measure and only 7 % and 11 % for momentary ESM situational and social stress, respectively. High stress-sensitivity individuals generally showed stable stress appraisals over time, whereas greater variability was observed among low stress-sensitivity groups, particularly for PSS and ESM situational stress. Notably, no stability emerged in the high stress-sensitivity group for ESM situational stress—possibly due to the small sample size (7 %) and the context-dependent nature of the item “My current situation is stressful,” which captures immediate stress reactivity rather than trait-like patterns. This underscores a potential challenge of momentary assessments in capturing stable individual differences and highlights the importance of employing multiple methods when assessing stress-sensitivity (Vize et al., 2024; Dogan et al., 2022).

In terms of schizotypy dimensions, only PSS-based stress-sensitivity trajectories were associated with positive and negative schizotypy. This likely reflects PSS’s stronger capacity to capture trait-like aspects of stress-sensitivity, considering ESM (with fewer individuals observed in the high stress-sensitivity group) may have captured more transient, context-dependent fluctuations. Notably, individuals that persistently showed high stress-sensitivity over 4.5 years (from T3 to T5) reported higher levels of both positive and negative schizotypy at the last time point assessment (T5) than those in low the stress-sensitivity trajectory group. This finding provides longitudinal support for the link between persistent stress-sensitivity and the emergence of subclinical psychotic-like experiences (Grattan and Linscott, 2019; Muddle et al., 2022). Previous daily-life studies using ESM have primarily found associations between stress-sensitivity and positive schizotypy dimensions (Barrantes-Vidal et al., 2013a; Chun et al., 2017). However, a recent ESM study also found that daily-life stress preceded increases in anhedonia in non-clinical, high-risk and first-episode individuals (Gerritsen et al., 2019). Other studies employing stress-inducing tasks (Soliman et al., 2011; Grant and Hennig, 2020) or retrospective self-report measures of stress (Horan et al., 2007) have also supported the association between stress and negative schizotypy in non-clinical populations. In particular, Horan et al. (2007) found that increased stress appraisals, measured with the same self-report as the one used in the present study (PSS), were associated to social anhedonia. Our findings suggest that although individuals high in negative schizotypy may not exhibit heightened reactivity to momentary stressors—potentially due to emotional disengagement and social withdrawal—they nevertheless tend to perceive the world as more stressful. Furthermore, two critical aspects may be considered: (1) the association was stronger for positive (Cohen’s $d = 0.50$) than for negative schizotypy (Cohen’s $d = 0.36$), (2) few studies have examined the negative dimension of schizotypy in relation to stress-sensitivity, with most research focusing on the positive dimension. As one of the first to explore both, this study highlights the need for further research to clarify how stress-sensitivity relates to specific dimensions within the extended psychosis phenotype.

This study has important implications for prevention. Identifying

Table 4
Differences in schizotypy dimensions based on stress-sensitivity trajectories.

	Longitudinal trajectories of stress-sensitivity								
	PSS perceived stress			ESM situational stress			ESM social stress		
	Low	High	T-test	Low	High	T-test	Low	High	T-test
	M (SD)	M (SD)		M (SD)	M (SD)		M (SD)	M (SD)	
Positive schizotypy	−0.77 (0.33)	−0.56 (0.53)	−3.28*	−0.73 (0.34)	−0.41 (0.87)	−1.41**	−0.74 (0.31)	0.51 (0.71)	−1.75
Negative schizotypy	−0.20 (0.81)	0.16 (1.18)	−2.05*	−0.10 (0.85)	0.39 (1.73)	−1.08	−0.14 (0.84)	0.32 (1.34)	−1.81

PSS = Perceived Stress Scale, ESM = Experience Sampling Methodology.
* $p < 0.05$.
** $p < 0.01$.

individuals with heightened stress-sensitivity traits, particularly among young adults, could enable early interventions aimed at reducing the risk of psychosis. Cognitive-behavioral therapies that focus on social skills training, stress management, coping strategies, and cognitive restructuring have shown efficacy in reducing psychotic symptoms (Erzin and Gülöksüz, 2021). Additionally, fostering supportive environments can help individuals navigate stressors more effectively, reducing psychosis risk (Cojocaru et al., 2024).

Several limitations of this study must be acknowledged. First, the sample was predominantly female reflecting both the female-majority composition of the Psychology degree program at the Universitat Autònoma de Barcelona and broader trends in research participation. Women are generally more likely to participate in research, a tendency that has been linked to gender differences in willingness to engage in clinical research and online surveys (e.g., Becker, 2022); future research would benefit from using gender-balanced samples. Second, the sample size for the ESM data may have constrained the variability captured, particularly for certain social stress items. For example, distinct trajectories were detected for the ESM item “I feel close to this person (these people),” but not for “I am alone because people do not want to be with me” or “I prefer to be alone,” likely due to low mean scores and limited variance. Nonetheless, lower levels of stress exposure are expected in nonclinical, high-functioning samples compared to clinical or highly exposed populations (Andrews et al., 2009; Davis et al., 2022; Technow et al., 2015). Despite these limitations, the study has notable strengths. One major strength is the repeated assessment of stress-sensitivity across multiple time points, combining conventional psychometric measures with ecologically valid, real-life stress appraisals. Additionally, by studying a nonclinical sample of young adults oversampled for schizotypy, we ensured sufficient variance in stress-sensitivity while minimizing confounding effects related to clinical status or medication.

5. Conclusion

Our findings support the assumption that stress-sensitivity is a relatively stable trait, as measured through both retrospective and momentary daily-life prospective approaches. Stability was more consistent among individuals with high stress-sensitivity compared to those with low levels and was better captured using a measure of perceived stress than momentary daily-life appraisals of stressful situations. Moreover, persistent high stress-sensitivity trajectories were associated with increased levels of both positive and negative schizotypy, supporting the role of stress-sensitivity in the causal pathway of the extended psychosis phenotype.

CRediT authorship contribution statement

Alena Gizdic: Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Conceptualization, Writing – review & editing, Writing – original draft. **Pilar Torrecilla:** Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Conceptualization, Writing – review & editing, Writing – original draft.

Ginette Lafit: Supervision, Software. **Inez Myin-Germeys:** Supervision. **Thomas R. Kwapil:** Visualization, Validation, Supervision, Methodology, Investigation, Conceptualization, Writing – review & editing. **Neus Barrantes-Vidal:** Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization, Writing – review & editing.

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Declaration of competing interest

The authors declare that there are no conflicts of interest to be disclosed.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.schres.2025.09.013>.

Data availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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