Personality and Individual Differences 236 (2025) 113025

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Positive, negative, and disorganized schizotypy have differential patterns of emotion expression and regulation

Kathryn C. Kemp [a,b], Laura M. Hernández [a], Alysia M. Berglund [a], Jessica A. Kaczorowski [c], Christopher J. Burgin [d], Neus Barrantes-Vidal [e], Thomas R. Kwapil [a,f,*]

[a] University of Illinois at Urbana-Champaign, United States
[b] The Ohio State University Wexner Medical Center, United States
[c] Cal Poly, San Luis Obispo, United States
[d] Tennessee Tech University, United States
[e] Universitat Autònoma de Barcelona, Spain
[f] University of North Carolina at Greensboro, United States

ARTICLE INFO

Keywords:
Schizotypy
Schizophrenia-spectrum
Affect
Emotional awareness
Emotion regulation

ABSTRACT

Positive, negative, and disorganized schizotypy are differentially associated with affective expression, including mean levels and temporal patterns. Extending these findings, we examined intensity, beliefs, and management of emotions in multidimensional schizotypy, as these features may explain differential patterns of affect. The present study examined the associations of positive, negative, and disorganized schizotypy, as measured by the Multidimensional Schizotypy Scale (MSS), with self-reported emotional intensity, awareness, and regulation strategies, and beliefs about the controllability of emotions in a sample of young adults (n = 1233). As hypothesized, disorganized schizotypy was robustly associated with multiple emotional difficulties, including diminished positive affect, emotional clarity, cognitive reappraisal, and beliefs about emotional controllability, as well as increased negative affect, general emotional intensity, and neuroticism. Negative schizotypy demonstrated diminished emotional engagement, including diminished positive affect, general emotional intensity, attention to emotions, and emotional clarity, and increased suppression. Positive schizotypy was associated with neuroticism and cognitive reappraisal. This study replicated findings regarding associations of multidimensional schizotypy and emotional expression, especially for negative and disorganized schizotypy. Furthermore, our study provides clarification regarding factors that may contribute to differential emotional expression in multidimensional schizotypy. Lastly, our results provide additional support for the construct validity of the MSS and three-factor model of schizotypy.

1. Introduction

Schizotypy is a multidimensional, unifying construct that represents the underlying vulnerability for schizophrenia-spectrum psychopathology across a broad range of subclinical and clinical expressions (Barrantes-Vidal & Kwapil, 2023). Thus, schizotypy offers a useful construct that captures the full range of subclinical expressions, psychosis prodrome, and schizophrenia-spectrum disorders (e.g., Grant et al., 2018). The heterogeneity of schizotypy can be captured in a multidimensional structure that includes positive, negative, and disorganized dimensions (Kwapil & Barrantes-Vidal, 2015). Positive schizotypy is characterized by odd perceptual experiences and unusual beliefs. Negative (deficit) schizotypy involves anhedonia, social disinterest, amotivation, and flattened affect. Disorganized schizotypy involves disruptions in the ability to organize and express thought, speech, behavior, and emotion. Examining these dimensions as distinct components of an overarching schizotypy construct provides unique information about the etiology, development, and expression of schizophrenia-spectrum psychopathology.

Disruptions in emotional intensity, or the strength level of positive or negative emotions that comprise positive affect (PA) and negative affect (NA), have long been associated with schizophrenia-spectrum disorders (e.g., Bleuler, 1910/1950; Wallace & Docherty, 2020). Differences in emotional intensity may be an important etiological factor for psychosis

* Corresponding author at: Department of Psychology, University of Illinois at Urbana-Champaign, 603 E. Daniel Street, Champaign, IL 61820, United States.
E-mail address: trkwapil@illinois.edu (T.R. Kwapil).

https://doi.org/10.1016/j.paid.2024.113025
Received 30 July 2024; Received in revised form 6 December 2024; Accepted 16 December 2024
Available online 21 December 2024

(Myin-Germeys & van Os, 2007; Riehle et al., 2024), especially given that particular symptom profiles exhibit differential patterns (e.g., Westermann et al., 2017). Relatedly, differential associations have been found in subclinical schizotypy (Horan et al., 2008), but were largely limited to examining schizotypy as a unitary construct or only considering positive and negative, but not disorganized, schizotypy. When examining all three dimensions in questionnaire, interview, and experience sampling methodology studies, disorganized schizotypy appears most strongly associated with elevated NA (Kwapil et al., 2020), neuroticism (Kwapil et al., 2018a), and mood disorders (Kemp et al., 2021), and with temporal dynamics of NA and stress reactivity (Kemp, Sperry, Hernández, Barrantes-Vidal, & Kwapil, 2023; Kemp, Sperry, Hernández, Barrantes-Vidal, & Kwapil, 2024; Rónai et al., 2023). Negative schizotypy is most strongly associated with diminished hedonic capacity, especially diminished PA (e.g., Horan et al., 2008; Kemp et al., 2018). Although positive schizotypy has been associated with NA in studies examining only positive and negative schizotypy (e.g., Lewandowski et al., 2006), these relationships appear better accounted for by disorganized schizotypy. That is, when disorganized schizotypy is examined, NA is no longer associated with positive schizotypy and is instead associated with disorganized schizotypy (e.g., Kemp et al., 2018; Kwapil et al., 2020). Notably, the associations for all three schizotypy dimensions emerge at the trait, state, and momentary levels, providing novel information about emotional expression in multidimensional schizotypy (e.g., Kemp et al., 2018; Kemp et al., 2023; Kwapil et al., 2020).

Beliefs and management of emotion may be related to differential emotional experiences, intensity, and temporal patterns. For example, individual differences in emotional awareness and intensity are associated with well-being and management of emotions (Berking & Wupperman, 2012; Boden & Thompson, 2015). Emotional awareness involves beliefs about emotional experiences and ability to identify emotions, and includes *attention to emotion* and *emotional clarity* (Boden & Thompson, 2017). Attention to emotion describes monitoring and valuing emotions, whereas emotional clarity involves the extent to which one can understand and describe them (e.g., Gohm & Clore, 2000; Thompson et al., 2009). Emotional awareness has been differentiated from other emotional experiences, such as intensity and lability (Coffey et al., 2003; Gohm & Clore, 2000). Other beliefs about emotions include controllability beliefs (Pallant, 2000), or perceptions that emotional experiences are malleable or within one's control to change. Furthermore, emotional awareness and controllability beliefs are distinct from, albeit related to, implementation of emotion regulation (e.g., Boden & Thompson, 2015; Salovey et al., 1995), or specific strategies for managing emotions. Two widely discussed emotion regulation strategies include cognitive reappraisal (reevaluating an emotion-inducing situation to change its impact; Gross, 2002) and suppression (inhibiting emotional responses; Werner & Gross, 2010). Whereas reappraisal tends to be an adaptive strategy (Dawel et al., 2023; Gross & John, 2003), suppression tends to be less effective (Fernandes & Tone, 2021; Werner & Gross, 2010). Therefore, examining beliefs and regulation of emotions should provide additional information about emotional expression in multidimensional schizotypy.

Evidence suggests that, overall, people high in schizotypy tend to experience impaired emotional awareness (Giakoumaki, 2016; Li, Fung, et al., 2019a) and employ less adaptive emotion regulation strategies (e.g., Henry et al., 2009). However, evaluating these responses separately in the schizotypy dimensions is essential. Regarding emotional awareness, Berenbaum et al. (2006) reported positive schizotypy was directly associated with emotional clarity, whereas negative schizotypy was inversely associated with attention to emotions. Participants high in negative schizotypy exhibit diminished attention to PA specifically, whereas those high in positive schizotypy exhibit elevated attention to NA (Lai et al., 2022; Martin et al., 2011). Lai et al. found that individuals high in positive schizotypy demonstrated less emotional clarity than a negative schizotypy group. However, Li, Karcher, et al. (2019b) found that both high positive and negative schizotypy scorers demonstrated less attention to positive emotions, more attention to negative emotions, and diminished emotional clarity. Regarding emotion regulation, both positive and negative schizotypy exhibit greater levels of emotional suppression (Gunn & Donahue, 2022; Guo et al., 2022; Li, Karcher, et al., 2019b). Negative schizotypy is associated with reduced cognitive reappraisal, yet one study found positive schizotypy was directly associated with cognitive reappraisal after accounting for other schizotypy dimensions (Gunn & Donahue, 2022). Although these studies provided useful information about emotional awareness and regulation in multidimensional schizotypy, they often employed measures that do not comprehensively assess positive, negative, and disorganized schizotypy. Kerns (2006) evaluated emotional awareness in schizotypy by creating a positive, negative, and disorganized dimensional factor structure using several schizotypy questionnaires. Disorganized, but not positive, schizotypy was associated with low emotional clarity and increased affect intensity, attention to, and influence of emotions. Negative schizotypy was associated with diminished emotional clarity, intensity, and attention to emotions.

The present study expands upon affective research by examining associations of positive, negative, and disorganized schizotypy with intensity, beliefs, and management of emotions. Our first aim is to replicate associations of schizotypy with emotional intensity reported in previous studies, particularly Kemp et al. (2018). Our second aim is to examine unique associations of multidimensional schizotypy with beliefs and management of emotions. Study hypotheses, methods, and data analysis plan were pre-registered at Open Science Framework (https://osf.io/gb4rw/).

The three schizotypy dimensions are hypothesized to have unique associations with different aspects of emotional intensity. We hypothesized that positive schizotypy will be associated with neuroticism, negative schizotypy will be inversely associated with general emotional intensity and PA, and disorganized schizotypy will be directly associated with neuroticism, general emotional intensity, and NA, but inversely associated with PA. The schizotypy dimensions are likewise expected to exhibit differential patterns of beliefs and management of emotions. Negative schizotypy is hypothesized to be inversely associated with attention to emotions and emotional clarity, and directly associated with emotional suppression. Disorganized schizotypy is hypothesized to be associated with attention to emotions, but inversely with emotional clarity, emotional controllability beliefs, and tendency to engage in cognitive reappraisal.

2. Method

2.1. Participants

Participants ($n = 1271$) were drawn from five samples collected in four studies. As specified in the pre-registration, this is the first time the data are used for these analyses. Furthermore, none of the analyses were conducted prior to pre-registration. Participants were recruited from two university subject pools, and anyone ≥18 years old was eligible. Participants ($n = 38$) endorsing >3 items on an infrequency measure were omitted from analyses. The Supplementary materials provide details and demographic information for the full sample and subsamples.

2.2. Measures

Supplementary Text 1 contains detailed descriptions of each measure. The Multidimensional Schizotypy Scale (MSS; Kwapil, Gross, Silvia, et al., 2018b) examines positive, negative, and disorganized schizotypy. An infrequency questionnaire (Chapman & Chapman, 1983) was intermixed to screen out invalid respondents.

We included measures assessing different features of emotional intensity (e.g., trait versus state level). The Positive and Negative Affect Schedule (Watson et al., 1988) examines PA and NA in the last week.

The Affect Intensity Measure (Larsen, 1985) examines general emotional intensity, without distinguishing positive and negative emotions. The NEO-FFI Neuroticism subscale (McCrae & Costa, 2010) measures trait-level negative emotional intensity.

We included measures assessing different emotional beliefs. We administered the Trait Meta-Mood Scale's (TMMS; Salovey et al., 1995) Attention to Emotions and Emotional Clarity subscales to capture tendencies to monitor, value, and understand one's emotions, respectively. Two scales examined emotional controllability beliefs. The Perceived Control of Internal States Scale (Pallant, 2000) assesses *personal* beliefs about one's ability to control/change thoughts and emotions (i.e., personal controllability beliefs). Implicit Theory of Emotions (Tamir et al., 2007) assesses *general* controllability beliefs about the malleability of emotion (i.e., not one's own abilities to change emotions).

To examine emotion regulation, we included the Emotion Regulation Questionnaire (Gross & John, 2003), which assesses cognitive reappraisal and expressive suppression.

2.3. Procedures

Participants were recruited through university subject pools (Supplementary Text 3). Questionnaires were administered using Qualtrics online survey system. The project was approved by the university IRB (#23525; 11/1/2022) and complied with APA ethical standards and WMA's Code of Ethics. All procedures were performed in compliance with relevant laws and institutional guidelines. Participants provided informed consent. The MSS, NEO-FFI Neuroticism, and TMMS were administered in all studies. The remaining scales were administered in a subset of the studies with usable data available for 531 to 823 participants (details in Supplementary Text 3). Participants received course credit.

2.4. Statistical analyses

Bivariate correlations were calculated for all measures using Pearson's *r* correlations. Following our pre-registration, we computed a series of linear regression analyses in which the MSS schizotypy dimensions were entered as simultaneous predictors of each emotion-related measure to test our hypotheses. This allowed us to examine the unique prediction of positive, negative, and disorganized schizotypy. We reported the standardized regression coefficient (β), change in R^2, and effect size f^2 for each predictor. Following Cohen (1992), f^2 values above 0.15 are medium effect sizes, and above 0.35 are large effect sizes. Given the large sample and number of analyses, alpha was set to 0.001 to minimize Type I error and avoid interpreting miniscule effects as statistically significant.

3. Results

3.1. Descriptive statistics

Descriptive statistics for each measure are presented in Table 1. Bivariate correlations among all measures are presented in Table 2. The measures exhibited fair (0.74) to excellent (0.94) reliability.

3.2. Association of MSS and emotional intensity

Table 3 presents the associations of the MSS positive, negative, and disorganized schizotypy subscales with each emotion-related measure in terms of bivariate correlations and linear regressions in which all three schizotypy subscales were entered as simultaneous predictors. This allows us to compare bivariate associations and each MSS subscales' unique prediction of our emotion-related measures over-and-above the other two subscales.

Positive, negative, and disorganized schizotypy demonstrated unique, hypothesized patterns of associations. As predicted, disorganized schizotypy exhibited the most robust associations. Disorganized schizotypy was associated with neuroticism (medium effect size), general emotional intensity (small effect size), and NA (small effect size). Disorganized schizotypy was associated with diminished emotional clarity (medium effect size), personal (medium effect size) and general (small effect size) controllability beliefs, PA (small effect size), and tendency to engage in cognitive reappraisal (small effect size), as hypothesized. In contrast to hypotheses, disorganized schizotypy was associated with diminished attention to emotions in bivariate, but not regression, analyses. Thus, disorganized schizotypy was broadly associated with elevated NA and diminished PA, clarity, controllability beliefs, and emotion regulation abilities.

Negative schizotypy was associated with a wide array of outcome measures, but often in contrast to disorganized schizotypy. As hypothesized, negative schizotypy had inverse associations with attention to emotions (medium effect size), emotional clarity (small effect size), general emotional intensity (medium effect size), and PA (small effect size). Negative schizotypy was also associated with emotional suppression (small effect size). Consistent with our operationalization of negative schizotypy, it was unassociated with neuroticism or NA.

Consistent with previous findings (Kemp et al., 2018; Kwapil et al., 2020), positive schizotypy demonstrated several bivariate associations, but these effects were generally better accounted for by disorganized schizotypy in the regression analyses. As hypothesized, positive schizotypy was uniquely associated with neuroticism (small effect size). The zero-order associations of positive schizotypy with emotional clarity, affect intensity, personal controllability beliefs, NA, and emotional

Table 1
Descriptive statistics.

Measure	*n*	Mean	S.D.	Range	Possible range	Coefficient alpha
Multidimensional Schizotypy Scale	1233					
Positive schizotypy		4.55	4.94	0–25	0–26	0.89
Negative schizotypy		3.14	3.86	0–24	0–26	0.86
Disorganized schizotypy		5.26	6.30	0–25	0–25	0.94
NEO-FFI neuroticism	1233	39.39	7.85	13–60	12–60	0.82
Trait Meta Mood Scale	1233					
TMMS attention to emotions		50.20	7.28	17–65	13–65	0.85
TMMS emotional clarity		37.22	6.99	14–55	11–55	0.85
Affect intensity measure	823	3.69	0.52	1.53–5.53	1–6	0.89
Implicit Theories of Emotion Scale	780	3.36	0.77	1.25–5	1–5	0.76
Perceived Control Of Internal States Scale	780	58.06	11.24	21–88	18–90	0.91
Positive and negative affect schedule	531					
PANAS positive affect		30.90	7.23	12–50	10–50	0.86
PANAS negative affect		24.21	7.68	10–48	10–50	0.84
Emotion Regulation Questionnaire	532					
ERQ reappraisal		29.44	6.09	6–42	6–42	0.85
ERQ suppression		15.42	4.84	4–28	4–28	0.74

Table 2
Bivariate correlations of schizotypy and emotion related scales.

	NegSz	DisSz	NEO-N	TMMSAE	TMMSEC	AIM	ITE	PCOIS	PANASPA	PANASNA	ERQ-R	ERQ-S
Multidimensional Schizotypy Scale												
Positive Schizotypy (PosSz)	0.23*	***0.52****	**0.36***	−0.02	**−0.31***	0.15*	−0.07	−0.21*	−0.13	**0.31***	0.04	0.18*
Negative Schizotypy (NegSz)		**0.36***	0.18*	**−0.41***	**−0.30***	**−0.34***	−0.06	−0.23*	**−0.30***	0.18*	−0.14	**0.40***
Disorganized Schizotypy (DisSz)			***0.53****	−0.12*	***−0.50****	0.17*	−0.18*	**−0.48***	**−0.33***	**0.43***	−0.17*	0.19*
NEO-FFI Neuroticism (NEO-N)				0.06	***−0.51****	**0.34***	−0.20*	***−0.64****	**−0.40***	***0.63****	−0.17*	0.15*
Trait Meta Mood Scale												
Attention to Emotions (TMMS-AE)					0.24*	**0.38***	−0.01	0.08	0.14*	−0.03	0.17*	**−0.43***
Emotional Clarity (TMMS-EC)						−0.09	0.19*	***0.55****	**0.33***	**−0.48***	**0.30***	−0.27*
Affect Intensity Measure (AIM)							−0.08	−0.25*	0.12	0.23*	0.01	−0.29*
Implicit Theories of Emotion Scale (ITE)								**0.32***	0.18*	−0.16*	0.26*	−0.07
Perceived Control Of Internal States (PCOIS)									**0.45***	***−0.50****	**0.48***	−0.12
Positive and Negative Affect Schedule												
Positive Affect (PANAS-PA)										−0.27*	**0.30***	−0.17*
Negative Affect (PANAS-NA)											−0.21*	0.21*
Emotion Regulation Questionnaire												
Reappraisal (ERQ-R)												−0.04
Suppression (ERQ-S)												

Medium effect sizes in bold, large effect sizes in bold and italics.
* $p < .001$.

Table 3
Linear regressions examining prediction by the Multidimensional Schizotypy Scale subscales.

	MSS positive schizotypy				MSS negative schizotypy				MSS disorganized schizotypy				
Criteria:	*r*	β	ΔR^2	f^2	*r*	β	ΔR^2	f^2	*r*	β	ΔR^2	f^2	Total R^2
NEO-FFI Neuroticism	**0.36***	0.11*	0.008	0.01	0.18*	−0.02	0.000	***0.**00	***0.53****	**0.48***	**0.156**	**0.22**	***0.29****
Trait Meta Mood Scale													
Attention to Emotions	0.02	0.09	0.006	0.01	**−0.41***	**−0.42***	**0.155**	**0.19**	−0.12*	−0.02	0.000	0.00	**0.17***
Emotional Clarity	**−0.31***	−0.06	0.003	0.00	**−0.30***	−0.13*	0.015	0.02	***−0.50****	**−0.43***	**0.121**	**0.17**	***0.27****
Affect Intensity Measure	0.15*	0.12	0.009	0.01	**−0.34***	**−0.45***	**0.182**	**0.23**	0.17*	0.25*	0.041	0.05	**0.22***
Implicit Theories Emot.	−0.07	0.05	0.002	0.00	−0.06	0.01	0.000	0.00	−0.18*	−0.21*	0.028	0.03	0.03*
PCOISS	−0.21*	0.09	0.005	0.01	−0.23*	−0.06	0.003	0.01	**−0.48***	**−0.50***	**0.157**	**0.21**	**0.23***
PANAS													
Positive affect	−0.13	0.13	0.011	0.01	**−0.30***	−0.22*	0.041	0.05	**−0.33***	−0.33*	0.065	0.08	**0.15***
Negative affect	**0.31***	0.07	0.003	0.00	0.18*	0.03	0.001	0.00	**0.43***	0.37*	0.084	0.10	***0.19****
ERQ													
Cognitive Reappraisal	0.04	0.24*	0.036	0.04	−0.14	−0.11	0.010	0.01	−0.17*	−0.28*	0.047	0.05	0.07*
Expressive Suppression	0.18*	0.05	0.002	0.00	**0.40***	0.37*	0.118	0.14	0.19*	0.03	0.001	0.00	**0.16***

Note: medium effect sizes in bold, large effect sizes in bold and italics.
Each row represents a separate regression analysis in which the three MSS subscales were entered simultaneously as predictors to examine their unique prediction of each of the questionnaire measures. In addition, the bivariate correlation (*r*) is included. Note that ΔR^2 and f^2 were computed for each predictor by rerunning the analyses with the specific MSS predictor entered at the second step, over and above the other two MSS subscales. MSS = Multidimensional Schizotypy Scale; PCOISS = Perceived Controllability of Internal States Scale; PANAS = Positive and Negative Affect Schedule; ERQ = Emotion Regulation Questionnaire.
* $p < .001$.

suppression were better accounted for by other schizotypy dimensions in the regression analyses. The association of positive schizotypy with cognitive reappraisal in the regression analysis (compared to the nonsignificant zero-order relation) suggests a suppression effect reflecting the inverse association of disorganized schizotypy with reappraisal.

4. Discussion

Schizophrenia-spectrum psychopathology has often been characterized by emotional disturbances (Bleuler, 1910/1950; Kring & Elis, 2013; Upthegrove et al., 2017), and these disturbances have been observed across the full continuum from subclinical schizotypy to clinical disorders (e.g., Kemp et al., 2018; Wallace & Docherty, 2020). Furthermore, emotional disruptions may play a role in the etiology and expression of these disorders (e.g., Myin-Germeys & van Os, 2007), highlighting the

utility of examining these experiences in non-disordered schizotypy. Examining emotional beliefs and regulation appears promising for clarifying emotion-related deficits in multidimensional schizotypy. The present study builds upon a body of work examining emotional experiences in multidimensional schizotypy and is the first to examine associations of positive, negative, and disorganized schizotypy with beliefs and regulation of emotion using the MSS. We replicated results from prior studies (e.g., Kemp et al., 2018) regarding differentially expressed emotional intensity in multidimensional schizotypy, and found hypothesized associations of self-reported beliefs and regulation of emotion with the schizotypy dimensions.

As expected, disorganized schizotypy was most robustly associated with several emotional disturbances. Disorganized schizotypy appears generally characterized by a tendency to experience emotions strongly, as evidenced by its associations with neuroticism, affect intensity, NA, and stress reactivity (Kemp, Sperry, Hernández, Barrantes-Vidal, & Kwapil, 2023; Kemp, Sperry, Hernández, Barrantes-Vidal, & Kwapil, 2024; Rónai et al., 2023). Yet, disorganized schizotypy is also associated with diminished PA. These findings may reflect disorganized schizotypy's unique proneness to mood psychopathology (e.g., depression) and are consistent with findings from questionnaire (Kemp et al., 2018; Kwapil et al., 2018a), interview (Hernández et al., 2023), and experience sampling studies (Kwapil et al., 2020).

It may be that features characterizing disorganized schizotypy, namely difficulties with organization of internal experiences and execution of responses, are reflected in observed emotional disturbances. For example, disorganized schizotypy was associated with diminished emotional clarity, suggesting difficulty with making sense of and labeling one's emotions. Emotional clarity has been conceptualized as a "cognitive-emotional prerequisite" to complex problem-solving (Otto & Lantermann, 2005), which may include employing adaptive strategies (such as reappraisal) to respond to emotion-inducing events. It is not surprising that disorganized schizotypy was also inversely associated with cognitive reappraisal, especially given that this strategy requires complex organization of thoughts to change emotions – namely, identifying an event as emotionally significant, understanding one's associated thoughts, and identifying alternative thoughts. Similarly, difficulties understanding or regulating emotions likely contribute to diminished perceptions that emotions are controllable, which reinforces diminished clarity and reappraisal. Thus, people high in disorganized schizotypy may be particularly susceptible to emotional difficulties due to the far-reaching impact of cognitive and behavioral difficulties that characterize this dimension.

One surprising finding was disorganized schizotypy's lack of association with attention to emotions. We hypothesized this dimension would be directly associated with attention to emotions given Kerns' (2006) findings. Furthermore, emotional intensity (which is elevated in disorganized schizotypy) is generally associated with greater attention to emotions (Gohm & Clore, 2002; Thompson et al., 2009). However, attending to emotions requires cognitive engagement that may be disrupted in disorganized schizotypy. Furthermore, experiencing intense NA coupled with diminished emotional clarity and disordered thought in disorganized schizotypy may result in difficulty understanding the value of emotions, which is a component of attention to emotions.

Disrupted emotional experiences in disorganized schizotypy may reflect core aspects of the dimension in terms of organizing, monitoring, and regulating emotions. Furthermore, elevated NA may reflect the consequences of difficulties regulating emotions and organizing and regulating thoughts, communication, and behavior (Kwapil et al., 2020). Hernández et al. (in press) demonstrated that disorganized schizotypy is associated with momentary difficulties in all these domains in daily life, as well as with difficulties communicating and completing tasks in the moment. Undoubtedly, this cascade of emotional, cognitive, and behavioral challenges makes navigating social, occupational, and daily-life responsibilities especially challenging, and may further exacerbate the effects of positive and negative schizotypy.

Negative schizotypy is conceptualized as the deficit dimension. This conceptualization aligns with our hypothesized findings that negative schizotypy was associated with diminished PA and general emotional intensity, and also with diminished emotional awareness and increased suppression. That is, people high in negative schizotypy rarely experience strong emotional reactions; when they do, these emotions are likely to be ignored, devalued, or suppressed. These findings are consistent with affective dynamics studies linking negative symptoms of schizophrenia with overregulation of emotions (Westermann et al., 2017) and deficits in maintaining or increasing PA (Strauss et al., 2020). Such devaluing or inhibiting of responses likely contributes to diminished anticipatory pleasure and avolition that characterizes negative schizotypy, as emotions may not be experienced sufficiently to promote goal-directed behavior. Thus, negative schizotypy is associated with a complex pattern of diminished attention to and experience of emotions. Although anhedonia is often viewed as a transdiagnostic construct, anhedonia characteristic of negative schizotypy involves trait-like diminution of affect and is unassociated with NA – unlike anhedonia in mood psychopathology that tends to be episodic and associated with NA. Unfortunately, many measures of negative schizotypy are saturated by unrelated constructs such as neuroticism, NA, depression, and social anxiety.

As hypothesized, positive schizotypy was generally unassociated with emotional intensity and beliefs about emotion. This follows recent work examining positive, negative, and disorganized schizotypy across different methods and timescales, in which disorganized schizotypy appeared to better account for positive schizotypy's associations with emotional dysregulation (Kemp et al., 2021, 2018; Kerns, 2006; Kwapil et al., 2020). Interestingly, however, positive schizotypy was associated with cognitive reappraisal when accounting for negative and disorganized schizotypy, consistent with Gunn and Donahue (2022). This may reflect suppression due to removing shared variance between positive and disorganized schizotypy (which are moderately correlated), and disorganized schizotypy's inverse association with reappraisal. We are cognizant of concerns raised by Hoyle et al. (2023) in interpreting partialed variables, yet these partialed variables can reveal core characteristics of each dimension. Accounting for shared variance resulting in reappraisal difficulties may reveal unique features of positive schizotypy that are related to cognitive reappraisal, such as this dimension's ideational nature that can manifest as magical ideas and delusional beliefs. For example, positive schizotypy is characterized by openness to experience and willingness to consider new or unfamiliar ideas (Blain et al., 2020; Kemp et al., 2020), perhaps reflecting willingness to consider alternative ways of thinking or unusual thought content to manage emotions. People high in positive schizotypy may consider whether an emotionally significant event had a special meaning or may reevaluate initially distressing perceptual aberrations as unobtrusive or even comforting spiritual experiences.

4.1. Limitations

The present study employed a non-clinically ascertained, college student sample. This resulted in a relatively young and disproportionately female composition. However, this sample offers several advantages for examining schizotypy, as participants are just entering the age of greatest risk for related disorders, and prior studies indicate that college student samples exhibit schizotypic psychopathology.

This study provides evidence of differential patterns of emotional experiences in positive, negative, and disorganized schizotypy. However, there is evidence emotional experiences occur across meaningful temporal sequences (e.g., Thompson et al., 2011). The cross-sectional design of this study did not allow for examination of such sequences. However, ambulatory assessment methods employ repeated-measures designs and time-series analyses that can address these issues. For example, Kemp et al. (2023) and Li et al. (2022) employed these methods to examine temporal dynamics of repeated reports of affect in

daily life. We support further use of such methods to better understand how particular emotional experiences, beliefs, and regulation strategies unfold over time in daily life. For example, one could examine whether emotional controllability beliefs at one timepoint impact subsequent engagement of emotion regulation or changes in emotional intensity, providing information about these emotional processes in multidimensional schizotypy.

This study examines emotional experiences, beliefs, and management of emotions based on our multidimensional model of schizotypy. We certainly welcome researchers who put forth alternative models of schizotypy to explore hypothesized associations with emotional experiences. Furthermore, given the complexity of emotion, future research would benefit from inclusion of other related constructs not examined in this study (e.g., emotional salience, alexithymia).

4.2. Conclusions

In summary, a series of studies have consistently demonstrated that emotional disruptions are predominantly centered in disorganized schizotypy and negative schizotypy, albeit in a contrasting manner. These differential patterns of emotion support the multidimensional model of schizotypy and may suggest different etiological pathways for schizophrenia-spectrum disorders.

CRediT authorship contribution statement

Kathryn C. Kemp: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Laura M. Hernández:** Writing – review & editing, Investigation, Data curation. **Alysia M. Berglund:** Writing – review & editing. **Jessica A. Kaczorowski:** Investigation, Data curation. **Christopher J. Burgin:** Investigation, Data curation. **Neus Barrantes-Vidal:** Methodology, Conceptualization. **Thomas R. Kwapil:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2024.113025.

Data availability

Data are posted on our Open Science Framework page. This is the same page as our preregistration.

References

Barrantes-Vidal, N., & Kwapil, T. R. (2023). Conceptualization and assessment of multidimensional schizotypy. In S. Cheli, & P. H. Lysaker (Eds.), *A dimensional approach to schizotypy: Conceptualization and treatment* (pp. 81–95). Springer International Publishing.

Berenbaum, H., Boden, M. T., Baker, J., Dizen, M., Thompson, R. J., & Abramowitz, A. (2006). Emotional correlates of the different dimensions of schizotypal personality disorder. *Journal of Abnormal Psychology, 115*(2), 359–368.

Berking, M., & Wupperman, P. (2012). Emotion regulation and mental health: Recent findings, current challenges, and future directions. *Current Opinion in Psychiatry, 25*(2), 128.

Blain, S. D., Longenecker, J. M., Grazioplene, R. G., Klimes-Dougan, B., & DeYoung, C. G. (2020). Apophenia as the disposition to false positives: A unifying framework for openness and psychoticism. *Journal of Abnormal Psychology, 129*(3), 279–292.

Bleuler, E. (1910). *Dementia praecox or the group of schizophrenias* (p. 548). International Universities Press.

Boden, M. T., & Thompson, R. J. (2015). Facets of emotional awareness and associations with emotion regulation and depression. *Emotion, 15*(3), 399–410.

Boden, M. T., & Thompson, R. J. (2017). Meta-analysis of the association between emotional clarity and attention to emotions. *Emotion Review, 9*(1), 79–85.

Chapman, L. J., & Chapman, J. P. (1983). *Infrequency scale for personality measures* (p. 61820). Kwapil, UIUC Department of Psychology, Champaign, IL: Unpublished scale available from T.R.

Coffey, E., Berenbaum, H., & Kerns, J. (2003). Brief report. *Cognition and Emotion, 17*(4), 671–679.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155–159.

Dawel, A., Mewton, P., Gulliver, A., Farrer, L. M., Calear, A. L., Newman, E., & Cherbuin, N. (2023). For whom and what does cognitive reappraisal help? A prospect study. *Cognitive Therapy and Research*, 1–17.

Fernandes, M. A., & Tone, E. B. (2021). A systematic review and meta-analysis of the association between expressive suppression and positive affect. *Clinical Psychology Review, 88*, Article 102068.

Giakoumaki, S. G. (2016). Emotion processing deficits in the different dimensions of psychometric schizotypy. *Scandinavian Journal of Psychology, 57*(3), 256–270.

Gohm, C. L., & Clore, G. L. (2000). Individual differences in emotional experience: Mapping available scales to processes. *Personality and Social Psychology Bulletin, 26*(6), 679–697.

Gohm, C. L., & Clore, G. L. (2002). Four latent traits of emotional experience and their involvement in well-being, coping, and attributional style. *Cognition & Emotion, 16*(4), 495–518.

Grant, P., Green, M. J., & Mason, O. J. (2018). Models of schizotypy: The importance of conceptual clarity. *Schizophrenia Bulletin, 44*(suppl_2), S556–S563.

Gross, J. J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology, 39*(3), 281–291.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348–362.

Gunn, C. K., & Donahue, J. J. (2022). Intra- and interpersonal emotion regulation strategies and Schizotypic personality characteristics. *Journal of Psychopathology and Behavioral Assessment, 44*(4), 950–961.

Guo, X., Wang, Y., & Chan, R. C. K. (2022). Mediating role of emotion regulation in the relationship between schizotypy and empathy. *PsyCh Journal, 11*(3), 335–343.

Henry, J. D., Green, M. J., Restuccia, C., de Lucia, A., Rendell, P. G., McDonald, S., & Grisham, J. R. (2009). Emotion dysregulation and schizotypy. *Psychiatry Research, 166*(2), 116–124.

Hernández, L.M., Berglund, A.M., Kemp, K.C., Barrantes-Vidal, N., & Kwapil, T.R.. (in press). Association of multidimensional schizotypy with cognitive-behavioral disorganization in daily life: An experience sampling methodology study.Personality Disorders. Theory, Research, & Treatment.

Hernández, L. M., Kemp, K. C., Barrantes-Vidal, N., & Kwapil, T. R. (2023). Replication of the associations of positive, negative, and disorganized schizotypy with interview-assessed symptoms and impairment. *Personality Disorders: Theory, Research, and Treatment, 14*(5), 527–533.

Horan, W. P., Blanchard, J. J., Clark, L. A., & Green, M. F. (2008). Affective traits in schizophrenia and schizotypy. *Schizophrenia Bulletin, 34*(5), 856–874.

Hoyle, R. H., Lynam, D. R., Miller, J. D., & Pek, J. (2023). The questionable practice of partialing to refine scores on and inferences about measures of psychological constructs. *Annual Review of Clinical Psychology, 19*, 155–176.

Kemp, K. C., Gross, G. M., Barrantes-Vidal, N., & Kwapil, T. R. (2018). Association of positive, negative, and disorganized schizotypy dimensions with affective symptoms and experiences. *Psychiatry Research, 270*, 1143–1149.

Kemp, K. C., Burgin, C. J., Raulin, M. L., & Kwapil, T. R. (2020). Using multiple measures of openness to experience to capture positive, negative, and disorganized dimensions of schizotypy. *Personality Disorders: Theory, Research, and Treatment, 11*(4), 260–269.

Kemp, K. C., Bathery, A. J., Barrantes-Vidal, N., & Kwapil, T. R. (2021). Positive, negative, and disorganized schizotypy predict differential patterns of interview-rated schizophrenia-spectrum symptoms and impairment. *Assessment, 28*(1), 141–152.

Kemp, K. C., Sperry, S. H., Hernández, L., Barrantes-Vidal, N., & Kwapil, T. R. (2023). Affective dynamics in daily life are differentially expressed in positive, negative, and disorganized schizotypy. *Journal of Psychopathology and Clinical Science, 132*(1), 110–121.

Kemp, K.C., Sperry, S.H., Hernández, L.M., Barrantes-Vidal, N., & Kwapil, T.R. (2024). Association of positive, negative, and disorganized schizotypy with the temporal dynamics of schizotypic experiences in daily life. Schizophrenia Bulletin,sbae112. Advance online publication. https://doi.org/10.1093/schbul/sbae112.

Kerns, J. G. (2006). Schizotypy facets, cognitive control, and emotion. *Journal of Abnormal Psychology, 115*(3), 418–427.

Kring, A. M., & Elis, O. (2013). Emotion deficits in people with schizophrenia. *Annual Review of Clinical Psychology, 9*, 409–433.

Kwapil, T. R., & Barrantes-Vidal, N. (2015). Schizotypy: Looking back and moving forward. *Schizophrenia Bulletin, 41*(suppl_2), S366–S373.

Kwapil, T. R., Gross, G. M., Burgin, C. J., Raulin, M. L., Silvia, P. J., & Barrantes-Vidal, N. (2018a). Validity of the Multidimensional Schizotypy Scale: Associations with schizotypal traits and normal personality. *Personality Disorders: Theory, Research, and Treatment, 9*(5), 458–466.

Kwapil, T. R., Gross, G. M., Silvia, P. J., Raulin, M. L., & Barrantes-Vidal, N. (2018b). Development and psychometric properties of the Multidimensional Schizotypy Scale: A new measure for assessing positive, negative, and disorganized schizotypy. *Schizophrenia Research, 193*, 209–217.

Kwapil, T. R., Kemp, K. C., Mielock, A., Sperry, S. H., Chun, C. A., Gross, G. M., & Barrantes-Vidal, N. (2020). Association of multidimensional schizotypy with psychotic-like experiences, affect, and social functioning in daily life: Comparable findings across samples and schizotypy measures. *Journal of Abnormal Psychology, 129*(5), 492–504.

Lai, J., Snyder, M. E., Vijayakumar, K. S. O. M., Bailey, D. H., & Martin, E. A. (2022). Shared and unique affective abnormalities in schizotypy dimensions. *PsyCh Journal, 11*(2), 149–162.

Larsen, R. J. (1985). Theory and measurement of affect intensity as an individual difference characteristic. https://psycnet-apa-org.proxy2.library.illinois.edu/record/1985-53121-001.

Lewandowski, K. E., Barrantes-Vidal, N., Nelson-Gray, R. O., Clancy, C., Kepley, H. O., & Kwapil, T. R. (2006). Anxiety and depression symptoms in psychometrically identified schizotypy. *Schizophrenia Research, 83*(2), 225–235.

Li, L. Y., Fung, C. K., Moore, M. M., & Martin, E. A. (2019a). Differential emotional abnormalities among schizotypy clusters. *Schizophrenia Research, 208*, 285–292.

Li, L. Y., Karcher, N. R., Kerns, J. G., Fung, C. K., & Martin, E. A. (2019b). The subjective-objective deficit paradox in schizotypy extends to emotion regulation and awareness. *Journal of Psychiatric Research, 111*, 160–168.

Li, L. Y., Schiffman, J., & Martin, E. A. (2022). Affect-dynamic signatures of psychosis risk across multiple time scales and contexts. *Clinical Psychological Science, 10*(5), 960–980.

Martin, E. A., Becker, T. M., Cicero, D. C., Docherty, A. R., & Kerns, J. G. (2011). Differential associations between schizotypy facets and emotion traits. *Psychiatry Research, 187*(1), 94–99.

McCrae, R. R., & Costa, P. T. (2010). *NEO inventories professional manual*. Psychological Assessment Resources.

Myin-Germeys, I., & van Os, J. (2007). Stress-reactivity in psychosis: Evidence for an affective pathway to psychosis. *Clinical Psychology Review, 27*(4), 409–424.

Otto, J. H., & Lantermann, E. D. (2005). Individual differences in emotional clarity and complex problem solving. *Imagination, Cognition and Personality, 25*(1), 3–24.

Pallant, J. F. (2000). Development and validation of a scale to measure perceived control of internal states. *Journal of Personality Assessment, 75*(2), 308–337.

Riehle, M., Straková, A., & Lincoln, T. M. (2024). Emotional experience of people with schizophrenia and people at risk for psychosis: A meta-analysis. *JAMA Psychiatry, 81*(1), 57–66.

Rónai, L., Hann, F., Kéri, S., & Polner, B. (2023). *Thoughts falling apart: Disorganized schizotypy specifically predicts both psychotic- and stress-reactivity in daily life*.

Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the trait Meta-mood scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, & health* (pp. 125–154). American Psychological Association.

Strauss, G. P., Esfahlani, F. Z., Granholm, E., Holden, J., Visser, K. F., Bartolomeo, L. A., & Sayama, H. (2020). Mathematically modeling anhedonia in schizophrenia: A stochastic dynamical systems approach. *Schizophrenia Bulletin, 46*(5), 1191–1201.

Tamir, M., John, O. P., Srivastava, S., & Gross, J. J. (2007). Implicit theories of emotion: Affective and social outcomes across a major life transition. *Journal of Personality and Social Psychology, 92*(4), 731–744.

Thompson, R. J., Dizén, M., & Berenbaum, H. (2009). The unique relations between emotional awareness and facets of affective instability. *Journal of Research in Personality, 43*(5), 875–879.

Thompson, R. J., Mata, J., Jaeggi, S. M., Buschkuehl, M., Jonides, J., & Gotlib, I. H. (2011). Concurrent and prospective relations between attention to emotion and affect intensity: An experience sampling study. *Emotion, 11*(6), 1489.

Upthegrove, R., Marwaha, S., & Birchwood, M. (2017). Depression and schizophrenia: Cause, consequence, or trans-diagnostic issue? *Schizophrenia Bulletin, 43*(2), 240–244.

Wallace, G. T., & Docherty, A. R. (2020). Emotion dysregulation and psychosis spectrum disorders. In T. P. Beauchaine, & S. E. Crowell (Eds.), *Oxford handbook of emotion dysregulation* (pp. 299–312). Oxford University Press.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.

Werner, K., & Gross, J. J. (2010). Emotion regulation and psychopathology: A conceptual framework. In *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 13–37). The Guilford Press.

Westermann, S., Grezellschak, S., Oravecz, Z., Moritz, S., Lüdtke, T., & Jansen, A. (2017). Untangling the complex relationships between symptoms of schizophrenia and emotion dynamics in daily life: Findings from an experience sampling pilot study. *Psychiatry Research, 257*, 514–518.