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Childhood Adversity, Resilience, and Paranoia During the COVID-19 Outbreak. The Mediating Role of Irrational Beliefs and Affective Disturbance

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Abstract

Childhood adversity (CA) and resilience may impact on paranoia, but mechanisms underlying these associations are largely unknown. In this study, we investigated two potential candidates: irrational beliefs and affective disturbance. Moreover, we investigated the potential moderating role of COVID-19 perceived stress in these associations. A community sample ($N=419$, m age$=27.32$ years, $SD=8.98$; 88.10% females) completed self-report measures. Results indicated that paranoia was significantly associated with CA and resilience ($p<.05$), and both irrational beliefs and affective disturbance (i.e., depressive and anxiety symptoms) mediated the associations between CA and paranoia. Moreover, depressive and anxiety symptoms partially explained the mediating role of irrational beliefs. These predictive models explained up to 23.52% of variance in paranoia ($F(3,415)=42.536$, $p<.001$). Findings on resilience and paranoia replicated these results, and COVID-19 perceived stress moderated the association between resilience and ideas of persecution. Overall, these findings underscore the importance of irrational beliefs, depressive and anxiety symptoms in high CA or low resilience individuals experiencing paranoia.

Keywords Paranoia · COVID-19 · Childhood adversity · Resilience

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Psychosis has high disability and burden of disease (Charlson et al., 2018). While it encompasses various mental disorders and broad symptoms (i.e., positive and negative), evidence suggests clustering its symptoms together may hamper its treatment and explain low treatment response (Garety & Freeman, 2013). Consistent with this view, interventions targeting specific etiological factors are more effective (Mehl et al., 2015). Thus, the scientific community has shifted from a cluster-based approach to psychosis to a symptom-based one (e.g., Bentall et al., 2009; Freeman, 2007; Garety et al., 2001; Sanford & Woodward, 2017). In this attempt to identify risk factors within a symptom-based approach, research has generally focused on highly prevalent symptoms, such as delusional beliefs.

Supporting this view, distinct associations between specific symptoms and important risk factors, such as childhood adversity emerge (CA; Bendall et al., 2008; Mayo et al., 2017; see Supplementary Information (S1) for detailed definitions of key concepts). Indeed, while CA is not associated with negative symptoms, it is associated with positive symptoms, such as delusional beliefs, including paranoia (Bailey et al., 2018; Carmichael, 2019). Although underlying mechanisms for this association are largely unknown (Williams et al., 2018), cognitive factors may be of relevance (Bentall et al., 2014; Freeman et al., 2002; Garety et al., 2001). Supporting this view, data suggest they mediate the association between CA and paranoia (Sideli et al., 2020; Williams et al., 2018). However, interpreting existing findings is hampered in several important ways.

First, while a symptom-based approach (e.g., Bentall et al., 2009; Garety et al., 2001) may increase treatment specificity, the mediating role of cognitive factors in the association between CA and specific symptoms, including paranoia, remains underexplored. Moreover, existing studies report inconsistent findings. For example, some identify negative beliefs about self and others as mediators (Appiah-Kusi et al., 2017; Ashford et al., 2012; Carmichael, 2019; Hardy et al., 2016), while others do not (Fisher et al., 2012). Likewise, while most studies employ a cluster-based approach (Garety & Freeman, 2013), some studies favor a symptom-based approach, indicating that negative beliefs about self and others appear to mediate the association between CA and ideas of persecution, but not ideas of social reference (Hardy et al., 2016).

Second, despite their potential implications for treatment, evidence on the potential mediating role of cognitive factors in the association between CA and paranoia is scarce. Among various cognitive factors that may be of relevance (Fowler et al., 2006; Gibson et al., 2019), irrational beliefs (IBs) show encouraging results as they increase paranoia (Soflau & David, 2019b) and predict it beyond negative beliefs about self and others, (Șoflău & David, 2023). However, to date, their potential mediating role in the association between CA and paranoia has not been investigated.

Moreover, affective factors may also have merit (see Sideli et al., 2020 for a review). Still, they are less likely to be a standalone mechanism in this association. Thus, an interplay between cognitive and affective factors may be more plausible. Supporting this view, previous work hint that these factors may link CA with delusions (Garety et al., 2001), such as paranoia, but few studies investigated these mechanisms concomitantly. For example, while Hardy and colleagues (2016) explored both negative beliefs and depression, they investigated them separately.

In addition, although identifying protective factors may have equally important implications, most prior work has focused on risk factors. Although scarce (Metel et al., 2020), emerging data suggest that resilience, a relatively stable trait (Markovitz et al., 2015) consisting of the ability to adapt/cope when facing adverse events (see Davydov et al., 2010), may be one such protective factor (Georgiades et al., 2015; Miller, 2020). Existing findings are rather mixed, as some fail to support its protective role (Ahmad & Barahmand, 2016; Marulanda & Addington, 2016; Metel et al., 2020), while others suggest it buffers against paranoia (Georgiades et al., 2015; Miller, 2020; Mongan et al., 2018). Granted there was an association between resilience and paranoia, underlying mechanisms would require further investigation, considering that, to date, they are unclear (see Metel et al., 2020).

Finally, in line with the general diathesis-stress model (Garety et al., 2001), relevant activating events may precede the manifestation of CA, as a psychosocial vulnerability (Walker & Diforio, 1997). However, research investigating mechanisms underlying the association between CA and paranoia (see Sideli et al., 2020; Williams et al., 2018) did not account for such activating events (e.g., recent stress; Lincoln et al., 2009; Wright et al., 2020), or reported inconsistent results (Lataster et al., 2012; Morgan et al., 2014; Sideli et al., 2020). One such activating event triggering vulnerability factors for paranoia (Freeman et al., 2020) is one of the most important recent stressors, the COVID-19 outbreak (Serafini et al., 2020). Although paranoia increased during the outbreak (Fischer et al., 2020; Suthaharan et al., 2021), this hypothesis requires further investigation.

Aims of the Study

We aimed (1) to test associations between CA, IBs, affective disturbance (i.e., depressive and anxiety symptoms), COVID-19 perceived stress, resilience, and paranoia; (2) to test the potential mediating role of IBs and affective disturbance (i.e., depressive and anxiety symptoms) for associations of CA and resilience with paranoia; (3) to explore the moderating role of COVID-19 stress in these associations.

Method

Participants

We recruited a community sample (i.e., without inclusion/ exclusion criteria related to symptoms severity), as part of a larger project investigating associations between CA and psychopathology (Oltean & Șoflău, 2022). The recruiting approach was based on the continuum model of psychosis (van Os et al., 2009). The model implies that symptoms manifested in individuals with psychotic disorders can be assessed and detected in non-clinical populations. Moreover, clinical paranoid delusions represent the severe end of a phenomenon also present in the general population (van Os et al., 2009). These assumptions that have received considerable support suggest that clinical and non-clinical psychotic symptoms may share similar risk and protective

factors (see DeRosse & Karlsgodt 2015). Thus, data from community samples may advance our understanding of the etiology of paranoia and other psychotic symptoms.

An a priori sample size estimation indicated 186 participants would be needed to provide adequate power (≥0.80), for a small effect size (Erdfelder et al., 1996), but, posting online adds on social platforms, we were able to reach a relatively large and diverse audience, and recruited more (N=419). Data collection started on March, 16, 2020, the release date of the emergency state Decree in Romania, and continued throughout it. All participants (m age=27.32 years, SD=8.98; 88.10% females) were adults (i.e., aged over 18) and provided an online consent. Most of them resided in urban areas (80.67%) in Romania (91.89%) and graduated at least high school (98.81%). Procedures contributing to this study complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Compensation (i.e., a brief psychoeducational material and/ or course credit) was granted upon request.

Measures

Childhood Adversity We assessed CA using The Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1997). CTQ exhibited adequate convergent and discriminant validity in previous studies (Bernstein et al., 1997) and good internal consistency in our study (Cronbach's α=0.85). The self-report retrospective measure consists of twenty-eight items rated on a five-point Likert scale. Individual scores pertaining to different types of CA are summed to obtain a total score. Higher scores indicate higher levels of CA.

Resilience We evaluated resilience using The Brief Resilience Scale (Smith et al., 2008). BRS has good psychometric properties (Smith et al., 2008) and had good internal consistency in our sample too (Cronbach's α=0.88). This self-report measure includes six items (three positive and three negative statements), with scores ranging from 1 (strongly disagree) to 5 (strongly agree). BRS scores are computed by adding all scores after reverse coding responses for the three negatively worded statements. Higher BRS scores suggest increased resilience.

Irrational Beliefs We assessed rational and IBs related to paranoia using The Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS; Soflau & David 2019a). The scale displayed good internal consistency in previous studies (e.g., Soflau & David 2019a), and in this study (Cronbach's α=0.86). It has sixteen items, eight for each of its subscales (i.e., social rejection and vulnerability). For each statement, participants express their level of agreement on a Likert point scale from 1 ("strongly agree") to 4 ("strongly disagree"). Rational items are reverse coded, and total scores are computed by summing all items, with lower scores reflecting higher levels of paranoia-specific irrationality.

Depressive and Anxiety Symptoms We evaluated depressive and anxiety symptoms using two subscales of the Depression Anxiety Stress Scales-21 (DASS-21; Lovibond & Lovibond, 1995). It has good psychometric properties (Antony et al., 1998)

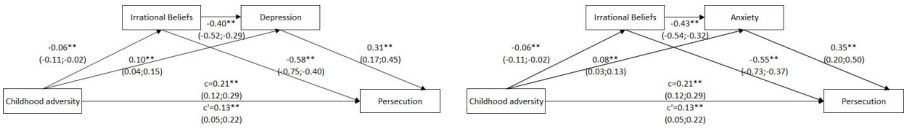

Fig. 1 Irrational beliefs and affective disturbance as mediators between CA and ideas of persecution
Note: $^{**}p<.01$; c = Total effect; c' = Direct effect

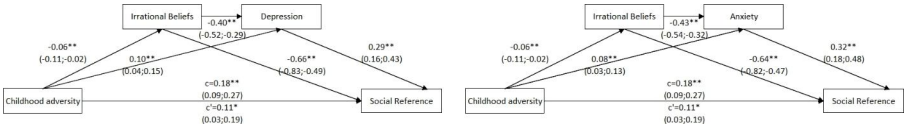

Fig. 2 Irrational beliefs and affective disturbance as mediators between CA and ideas of social reference
Note: $^{*}p<.05$; $^{**}p<.01$; c = Total effect; c' = Direct effect

and displayed good internal consistency in our study (Cronbach's $\alpha=0.84$ for the depression subscale; Cronbach's $\alpha=0.82$ for the anxiety subscale). Each subscale contains seven items and scores are computed by summing the scores corresponding to each subscale. The higher the score, the higher the levels of depression/ anxiety.

COVID-19 Perceived Stress We measured COVID-19 perceived stress using The Impact of Event Scale-Revised (IES-R; Weiss, 2004). It has good psychometric properties (Creamer et al., 2003), and exhibited good internal consistency in this study (Cronbach's $\alpha=0.90$). IES-R contains twenty-two items that were tailored to the pandemic context. A total score is computed by summing all items rated on a five-point scale (0 - "not at all" to 4 - "extremely"). Higher scores indicate higher COVID-19 perceived stress.

Paranoia We assessed paranoia on a continuum, using the two subscales (i.e., ideas of social reference; ideas of persecution) of The Green Paranoia Thoughts Scale (*G-PTS;* Green et al., 2008). Both scales displayed good psychometric properties in clinical and non-clinical samples (Green et al., 2008), as well as in our sample (Cronbach's $\alpha=0.94$ for ideas of social reference and Cronbach's $\alpha=0.97$ for ideas of persecution). Each G-PTS subscale has sixteen items rated on a 5-point scale. A sum is computed for each subscale. Higher scores indicate higher tendencies toward paranoid ideation.

Data Analysis

We performed Pearson (r) correlations to test associations between variables and conducted a series of serial (sequential) mediation analyses, using bootstrapping procedures (5000 bootstrap samples; Hayes, 2017) in order to test the potential mediating role of IBs and affective disturbance (depressive and anxiety symptoms; Figs. 1, 2, 3 and 4 depict all tested theoretical models). In order to test whether COVID-19

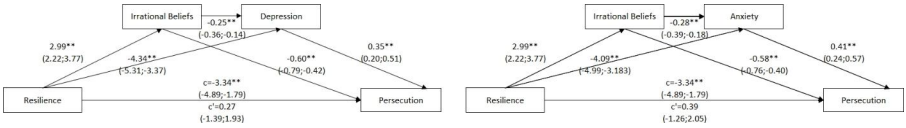

Fig. 3 Irrational beliefs and affective disturbance as mediators between resilience and ideas of persecution
Note: $^{**}p < .01$; c = Total effect; c' = Direct effect

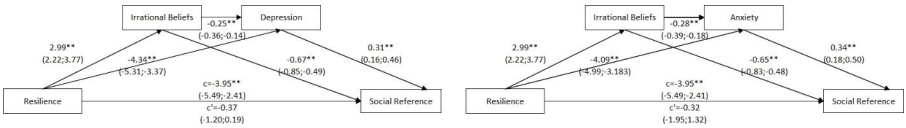

Fig. 4 Irrational beliefs and affective disturbance as mediators between resilience and ideas of social reference
Note: $^{**}p < .01$; c = Total effect; c' = Direct effect

Table 1 Correlation matrix

	CTQ	RIBS	IES-R	DASS-D	DASS-A	GPTS-P	GPTS-SR
CTQ	1						
RIBS	-0.128^{**}	1					
IES-R	0.087	-0.183^{**}	1				
DASS-D	0.196^{**}	-0.338^{**}	0.723^{**}	1			
DASS-A	0.186^{**}	-0.372^{**}	0.687^{**}	0.888^{**}	1		
GPTS-P	0.222^{**}	-0.387^{**}	0.253^{**}	0.332^{**}	0.354^{**}	1	
GPTS-SR	0.196^{**}	-0.424^{**}	0.267^{**}	0.332^{**}	0.349^{**}	0.770^{**}	1
BRS	−0.068	0.350^{**}	-0.410^{**}	-0.468^{**}	-0.478^{**}	-0.203^{**}	-0.240^{**}

Note: CTQ = Childhood Trauma Questionnaire (Bernstein et al., 1997); RIBS = Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS; Soflau & David, 2019a); IES-R = The Impact of Event Scale-Revised adapted for COVID-19 (Weiss & Marmar, 1996); DASS-D = Depression Subscale of Depression Anxiety Stress Scales-21 (Lovibond & Lovibond, 1995); DASS-A = Anxiety Subscale of Depression Anxiety Stress Scales-21 (Lovibond & Lovibond, 1995); GPTS- P = Persecution subscale of Green Paranoia Thoughts Scale (Green et al., 2008); GPTS-SR = Social Reference subscale of Green Paranoia Thoughts Scale (Green et al., 2008); BRS = Brief Resilience Scale (Smith et al., 2008)

perceived stress moderated the associations between CA and resilience, on the one side, and paranoia, on the other, we employed moderation analyses.

Results

Pearson Correlations

CA and resilience were associated with paranoia (both ideas of persecution and of social reference; see Table 1). We also found associations between CA, resilience, affective disturbance and IBs. IBs were associated with paranoia (Table 1).

Mediation Analyses

Both IBs and depressive symptoms partially mediated the relationship between CA and ideas of persecution (see Table 2; Fig. 1). Moreover, depressive symptoms partially explained the mediating role of IBs (Table 2). Together, these variables predicted 21.51% of variance in ideas of persecution ($F(3,415)=37.909$, $p<.001$). Also, the second serial mediation model showed that both IBs and anxiety symptoms partially mediated the association between CA and ideas of persecution (see Table 1; Fig. 1). Moreover, anxiety symptoms partially mediated the mediating role of IBs (see Table 1). This model predicted 22.11% of variance in ideas of persecution ($F(3,415)=39.267$, $p<.001$).

Likewise, both IBs and depressive symptoms partially mediated the association between CA and ideas of social reference (see Table 1; Fig. 2). Depressive symptoms partially explained the mediator role of IBs (see Table 1). This model predicted 23.26% of variance in ideas of social reference ($F(3,415)=41.933$, $p<.001$). The second mediation model explaining the link between CA and ideas of social reference showed that both IBs and anxiety symptoms partially mediated this association (see Table 1; Fig. 2). Moreover, anxiety symptoms partially explained the mediating role of IBs (Table 1). This latter model predicted 23.52% of variance in ideas of social reference ($F(3,415)=42.536$, $p<.001$).

The mediation analyses for associations between resilience and paranoia yielded similar results. IBs and depressive symptoms completely mediated the relationship between resilience and ideas of persecution, and depressive symptoms partially explained the mediating role of IBs (see Table 1; Fig. 3). This model predicted 19.54% of variance in ideas of persecution ($F(3,415)=33.596$, $p<.001$). Moreover, the next model showed that the association between resilience and ideas of persecution was sequentially mediated by IBs and anxiety symptoms, the latter partially mediating the mediation effect of IBs (Table 1). This model predicted 20.14% of variance in ideas of persecution ($F(3,415)=34.889$, $p<.001$).

Likewise, IBs and depressive symptoms mediated the relationship between resilience and ideas of social reference. Moreover, depressive symptoms partially explained the mediator role of IBs (see Table 1; Fig. 4). This model predicted 22.06% of variance in ideas of social reference ($F(3,415)=39.154$, $p<.001$). The last mediation model explaining the association between resilience and ideas of social reference showed that IBs and anxiety symptoms completely mediated this association. Moreover, anxiety symptoms partially explained the mediating role of IBs (see Table 1; Fig. 4). This last model explained 22.27% of variance in ideas of social reference ($F(3,415)=39.622$, $p<.001$).

Moderation Analyses

COVID-19 perceived stress did not moderate the associations between CA and paranoia (see Table 3). In contrast, it moderated the association between resilience and ideas of persecution. We found significant associations among individuals with medium (b = -1.892; $SE=0.849$; t = -2.228; 95% CI[-3.561;-0.223]) and high levels of COVID-19 perceived stress (b = -3.607; $SE=1.131$; t = -3.188; 95% CI[-5.831;-

Table 2 Summary of indirect effects (IE) in serial mediation models

Outcome	Predictor	IE specification	Unstandardized IE	95% BCI	Partially standardized IE	95% BCI
GPTS-P	CTQ	Total IE	0.072	[0.030;0.121]	0.005	[0.002;0.008]
		CTQ -> RIBS -> GPTS-P	0.036	[0.008;0.068]	0.002	[0.001;0.004]
		CTQ -> DASS-D -> GPTS-P	0.029	[0.008;0.058]	0.002	[0.001;0.004]
		CTQ -> RIBS -> DASS-D -> GPTS-P	0.007	[0.001;0.017]	0.001	[0.0001;0.001]
GPTS-P	CTQ	Total IE	0.072	[0.029;0.121]	0.005	[0.002;0.008]
		CTQ -> RIBS -> GPTS-P	0.034	[0.007;0.067]	0.002	[0.001;0.004]
		CTQ -> DASS-A -> GPTS-P	0.029	[0.006;0.060]	0.002	[0.0004;0.004]
		CTQ -> RIBS -> DASS-A -> GPTS-P	0.009	[0.002;0.020]	0.001	[0.0001;0.001]
GPTS-SR	CTQ	Total IE	0.076	[0.031;0.125]	0.005	[0.002;0.008]
		CTQ -> RIBS -> GPTS-SR	0.041	[0.007;0.076]	0.003	[0.001;0.005]
		CTQ -> DASS-D -> GPTS-SR	0.028	[0.008;0.055]	0.002	[0.001;0.004]
		CTQ -> RIBS -> DASS-D -> GPTS-SR	0.007	[0.001;0.016]	0.001	[0.0001;0.001]
GPTS-SR	CTQ	Total IE	0.075	[0.029;0.124]	0.005	[0.002;0.008]
		CTQ -> RIBS -> GPTS-SR	0.040	[0.009;0.075]	0.003	[0.001;0.005]
		CTQ -> DASS-A -> GPTS-SR	0.027	[0.006;0.052]	0.002	[0.0004;0.003]
		CTQ -> RIBS -> DASS-A -> GPTS-SR	0.001	[0.0001;0.001]	0.001	[0.0001;0.001]
GPTS-P	BRS	Total IE	-3.615	[-4.761;-2.354]	-0.234	[-0.299;-1.704]
		BRS -> RIBS -> GPTS-P	-1.812	[-2.543;-1.159]	-0.117	[-0.163;-0.071]
		BRS -> DASS-D -> GPTS-P	-1.536	[-2.385;-0.793]	-0.099	[-0.152;-0.053]
		BRS -> RIBS -> DASS-D -> GPTS-P	-0.267	[-0.512;-0.098]	-0.017	[-0.033;-0.007]
GPTS-P	BRS	Total IE	-3.736	[-4.942;-2.636]	-0.242	[-0.309;-0.177]
		BRS -> RIBS -> GPTS-P	-1.736	[-2.473;-1.112]	-0.112	[-0.159;-0.073]
		BRS -> DASS-A -> GPTS-P	-1.657	[-2.544;-0.888]	-0.107	[-0.161;-0.059]
		BRS -> RIBS -> DASS-A -> GPTS-P	-0.343	[-0.639;-0.142]	-0.022	[-0.040;-0.009]

Table 2 (continued)

Outcome	Predictor	IE specification	Unstandardized IE	95% BCI	Partially standardized IE	95% BCI
GPTS-SR	BRS	Total IE	-3.579	[-4.726;-2.512]	-0.232	[-0.303;-0.166]
		BRS -> RIBS -> GPTS-SR	-1.999	[-2.671;-1.331]	-0.130	[-0.177;-0.088]
		BRS -> DASS-D -> GPTS-SR	-1.346	[-2.155;-0.636]	-0.087	[-0.138;-0.042]
		BRS -> RIBS -> DASS-D -> GPTS-SR	-0.233	[-0.452;-0.083]	-0.015	[-0.029;-0.006]
GPTS-SR	BRS	Total IE	-3.631	[-4.717;-2.568]	-0.235	[-0.300;-0.170]
		BRS -> RIBS -> GPTS-SR	-1.944	[-2.702;-1.270]	-0.126	[-0.172;-0.084]
		BRS -> DASS-A -> GPTS-SR	-1.399	[-2.130;-0.664]	-0.091	[-0.136;-0.043]
		BRS -> RIBS -> DASS-A -> GPTS-SR	-0.289	[-0.546;-0.105]	-0.019	[-0.035;-0.007]

Note: CTQ = Childhood Trauma Questionnaire (Bernstein et al., 1997); RIBS = Paranoia Rational and Irrational Beliefs Scale (Paranoia-RIBS; Soflau & David, 2019a); DASS-D = Depression Subscale of Depression Anxiety Stress Scales-21 (Lovibond & Lovibond, 1995); DASS-A = Anxiety Subscale of Depression Anxiety Stress Scales-21 (Lovibond & Lovibond, 1995); GPTS- P = Persecution subscale of Green Paranoia Thoughts Scale (Green et al., 2008); GPTS-SR = Social Reference subscale of Green Paranoia Thoughts Scale (Green et al., 2008); BRS = Brief Resilience Scale (Smith et al., 2008)

BCI – 95% Confidence Interval of the indirect effect derived from 5000 bootstrapped samples

Total IE = Total indirect effect of the two mediator variables included in each model (RIBS and DASS-D/DASS-A)

1.383]), and no association among those with low levels of perceived stress (b = -0.076; SE = 1.207; t = -0.063; 95% CI[-2.448;2.297]; see Table 3). Perceived stress did not moderate the association between resilience and ideas of social reference (see Table 3).

Discussion

We found significant associations between higher levels of CA and paranoia. These results are consistent with the growing body of literature indicating CA is a risk factor for positive psychotic symptoms, including paranoia (Bailey et al., 2018). Likewise, adding to the limited evidence suggesting resilience may be a potential protective factor (Patel & Goodman, 2007), we found associations between increased resilience and lower levels of paranoia.

In addition, both IBs and affective disturbance (i.e., depressive and anxiety symptoms) partially mediated the relationship between CA and paranoia. Thus, higher levels of CA predicted increased IBs that further predicted increased paranoia. Moreover, we found that higher affective disturbance partially explained the associations between increased IBs and paranoia. This pattern of results is consistent with multifactorial mechanisms explaining paranoia's etiology (e.g., Freeman et al., 2002) and

Table 3 The moderator role of COVID-19 related perceived stress

Outcome	Model	*b*	*SE*	*t*	*LLCI*	*ULCI*
GPTS-P	Constant	28.637	0.717	39.927	27.227	30.047
	CTQ	0.181	0.043	4.161	0.095	0.266
	IES-R	4.824	1.022	4.718	2.814	6.833
	CTQ*IES-R	0.071	0.049	1.455	-0.025	0.168
GPTS-SR	Constant	38.477	0.717	53.664	37.067	39.886
	CTQ	0.154	0.043	3.556	0.069	0.240
	IES-R	5.153	1.022	5.042	3.144	7.162
	CTQ*IES-R	0.074	0.049	1.514	-0.022	0.171
GPTS-P	Constant	15.888	6.610	2.403	2.894	28.881
	BRS	1.639	1.845	0.888	-1.988	5.266
	IES-R	11.357	3.349	3.390	4.772	17.941
	BRS*IES-R	-2.219	1.010	-2.197	-4.204	-0.234
GPTS-SR	Constant	31.505	6.560	4.802	18.609	44.401
	BRS	-0.124	1.831	-0.068	-3.724	3.475
	IES-R	9.107	3.324	2.739	2.572	15.641
	BRS*IES-R	-1.515	1.002	-1.511	-3.485	0.455

Note: CTQ = Childhood Trauma Questionnaire (Bernstein et al., 1997); IES-R = The Impact of Event Scale-Revised adapted for COVID-19 (Weiss & Marmar, 1996); GPTS- P = Persecution subscale of Green Paranoia Thoughts Scale (Green et al., 2008); GPTS-SR = Social Reference subscale of Green Paranoia Thoughts Scale (Green et al., 2008); BRS = Brief Resilience Scale (Smith et al., 2008)

suggest that IBs may partially explain the associations between CA and paranoia both directly and through their association with depressive and anxiety symptoms. These findings lend support to existing work suggesting both cognitive and affective factors may underlie the link between CA and paranoia (Garety et al., 2001) and are in line with some prior studies (e.g., Metel et al., 2020), while apparently contrasting others (see Sideli et al., 2020). For example, Gibson and colleagues (2019) found support for the mediating role of affective disturbance, but not cognitive factors. One possible explanation is that the predictive value of each potential mediator may have been influenced by including multiple factors. Another explanation stems from work indicating that IBs predict paranoia beyond other cognitive and affective factors (Șoflău & David, 2023), which may suggest that some cognitive factors, such as IBs, may be more relevant in predicting paranoia than others (e.g., negative beliefs about self and others).

We found that low levels of IBs and affective disturbance completely accounted for associations between resilience and paranoia. Lower affective disturbance only partially explained the associations between low levels of IBs and decreased paranoia. Thus, shared associations with low levels of IBs and affective disturbance may explain the relationships between high levels of resilience and low levels of paranoia. Moreover, increased IBs may be linked to higher paranoia both directly and through increased affective disturbance. Interpreting these results is difficult in light of extremely limited previous findings. Still, in line with some prior studies (Georgiades et al., 2015; Mongan et al., 2018), we found an association between high resilience and low paranoia. In addition, prior work reported similar associations between resilience and psychotic symptoms (Metel et al., 2020), suggesting a serial mediation would be plausible. Still, they reported a positive association between these variables

and did not test the potential mediating role of cognitive factors and depressive symptoms (Metel et al., 2020).

Contrary to our expectations and contrasting previous findings (e.g., McLaughlin et al., 2010), we found that COVID-19 perceived stress did not moderate the associations between CA and paranoia. One possible explanation is related to the nature of recent stressful events. While prior work focused on multiple stressors (e.g., related to social life, and work/school; Goldstein et al., 2020), we focused exclusively on COVID-19 perceived stress. Although it may be linked with multiple symptoms (Salari et al., 2020), it is possible that it may be less relevant as a standalone stressor for paranoia. In addition, while we focused on perceived stress in the "last seven days", others used an extended time frame (e.g., "last year"; McLaughlin et al., 2010).

Still, we found that COVID-19 perceived stress moderated the association between resilience and paranoia. Consistent with resilience conceptualizations (i.e., adaptability/ coping with adversity; see Davydov et al., 2010), this may suggest that at increased levels of stress, the protective value of resilience may be more relevant. Notably, when perceived stress is higher, highly resilient individuals may experience lower levels of paranoia as compared to their less resilient counterparts.

Apparently contrasting prior work positing that resilience is synonymous with low vulnerability (see Davydov et al., 2010; e.g., Metel et al., 2020), we did not find an association for CA and resilience. Yet, these distinct findings may be explained by differences in sample size and measures. For example, Metel and colleagues (2020) conducted their study on a significantly larger sample, exhibiting increased statistical power. They assessed CA using a composite score having somewhat poor internal consistency (Cronbach's $\alpha = 0.57$; Metel et al., 2020), while our measure (i.e., the CTQ; Bernstein et al., 1997) displayed good internal consistency (Cronbach's $\alpha = 0.85$). Granted that our findings are replicated in future studies, they may suggest that risk and protective factors are not necessarily inversely correlated. Indeed, while a recent meta-analysis found a significant small negative association between CA and resilience (Watters et al., 2023), its findings provide indirect support for this claim. First, authors reported a potential publication bias (i.e., with studies missing on the right side of the distribution that may further decrease the overall effect size) which may suggest the association may be overestimated. Second, authors reported increased heterogeneity accorss studies, both in terms of effect size estimators and potential effect modifiers (Watters et al., 2023). The meta-analysis relied on a small number of studies which may had lead to reduced power to detect effect modifiers. Together, these data suggest that an acurrate estimation on CA and resilience in the general population is difficult at this point.

The present study has several limitations that should be noted. First, its cross-sectional nature does not warrant unidirectional links between variables. For example, while we hypothesized resilience is a stable trait (Markovitz et al., 2015), and expected IBs and affective disturbance may mediate the associations between resilience and paranoia, others have argued that resilience may diminish as a consequence of various cognitive factors and may in turn impact on these symptoms by increasing affective disturbance (e.g., depressive symptoms; Metel et al., 2020). Given that such alternative models cannot be ruled out and bidirectional pathways are plausible, research using longitudinal and experimental designs is needed. Moreover, future

experimental studies may address IBs (e.g., using cognitive restructuring techniques to reduce beliefs irrationality) among individuals with CA, in order to assess the direct and indirect impact on paranoia (i.e., through changes in affective disturbance over time). Another potential limitation is related to the retrospective and self-reported nature of CA assessment. Differences between retrospective and prospective CA measures have been reported (for a review, see Baldwin et al., 2019) and self-report measures may underestimate CA (Thabrew et al., 2012). Although in samples reporting psychotic symptoms, self-report measures are congruent with other reports (Cutajar et al., 2010; Fisher et al., 2011) and provide stronger validity in predicting psychotic symptoms (Beasley et al., 2021), we suggest that future research would benefit from employing multiple CA measures. Finally, another potential limitation is related to sample characteristics (i.e., mostly young women, without a formal diagnosis). Given that generalizing results may be hindered, investigating these models in clinical samples would be useful.

Despite these limitations, this study has several important contributions. Extending current knowledge on potential mechanisms underlying associations between CA and paranoia, our findings lend support for the interplay between IBs and affective disturbance as an underlying mechanism. Moreover, they indicated that a similar mechanism may underlie the association between resilience and paranoia. Consistent with prior findings (e.g., Soflau & David 2019b), our results suggest that IBs is a potentially relevant mechanism that may be targeted in psychological interventions addressing paranoia. Furthermore, this mechanism may be particularly relevant among high CA individuals or in less resilient individuals. Given that interventions focusing on specific etiological factors are more effective (Mehl et al., 2015), targeting IBs through interventions may increase their effectiveness.

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

Declarations

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical Standards We assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation, as well as the with the Helsinki Declaration of 1975, as revised in 2008.

Patient Consent Informed consent was obtained from all individual participants included in the study.

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