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CLINICAL RESEARCH ARTICLE

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Bidirectional relationships among complex PTSD, dissociation, and psychotic symptoms in two samples

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ABSTRACT

Background: Although trauma-related symptoms (e.g. complex PTSD and dissociative symptoms) and psychotic symptoms often co-occur, little is known about the complex relationships among these symptoms over time.

Objective: This study examined the bidirectional relationships among complex PTSD symptoms, dissociative symptoms, and positive symptoms of psychosis.

Methods: This study analyzed available longitudinal data from two convenience samples (Sample 1: $N = 214$, Chinese-speaking adults; Sample 2: $N = 301$, English-speaking adults). Participants in both samples completed validated measures of ICD-11 complex PTSD (that included measurement of 'classical' PTSD), dissociation, and positive symptoms of psychosis at baseline and follow-up, six months (Sample 1) or 12 months (Sample 2) apart. A cross-lagged panel model was used to examine the longitudinal relationship between trauma-related symptoms and psychotic symptoms in each sample.

Results: In Sample 1, baseline dissociative symptoms significantly predicted positive symptoms of psychosis at follow-up. In Sample 2, no significant longitudinal relationships between trauma-related and psychotic symptoms were observed. In both samples, baseline disturbances in self-organization (DSO) symptoms predicted 'classical' PTSD symptoms at follow-up.

Conclusion: This study made the first attempt to examine the longitudinal relationships among ICD-11 complex PTSD symptoms, dissociative symptoms, and psychotic symptoms. The inconsistent findings point to the importance of further research on the longitudinal relationships between trauma-related and psychotic symptoms. Moreover, our results indicate that addressing DSO symptoms may be important in the prevention and treatment of PTSD symptoms.

Relaciones bidireccionales entre el TEPT complejo, la disociación y los síntomas psicóticos en dos muestras

Antecedentes: Aunque los síntomas relacionados con el trauma (p. ej., TEPT complejo y síntomas disociativos) y los síntomas psicóticos a menudo coocurren, se sabe poco sobre las complejas relaciones entre estos síntomas a lo largo del tiempo.

Objetivo: Este estudio examinó las relaciones bidireccionales entre síntomas complejos de TEPT, síntomas disociativos y síntomas positivos de psicosis.

Métodos: Este estudio analizó los datos longitudinales disponibles de dos muestras por conveniencia (Muestra 1: $N = 214$, adultos de habla china; Muestra 2: $N = 301$, adultos de habla inglesa). Los participantes de ambas muestras completaron medidas validadas del TEPT complejo de la CIE-11 (que incluía la medición del TEPT «clásico»), disociación y síntomas positivos de psicosis al inicio y en el seguimiento, con seis meses (Muestra 1) o 12 meses (Muestra 2) de diferencia. Se utilizó un modelo de panel con rezago cruzado para examinar la relación longitudinal entre los síntomas relacionados con el trauma y los síntomas psicóticos en cada muestra.

Resultados: En la Muestra 1, los síntomas disociativos basales predijeron significativamente los síntomas positivos de psicosis en el seguimiento. En la Muestra 2, no se observaron relaciones longitudinales significativas entre los síntomas relacionados con el trauma y los síntomas psicóticos. En ambas muestras, los síntomas basales de alteraciones en la autoorganización

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HIGHLIGHTS

- Trauma-related symptoms and psychotic symptoms commonly co-occur.
- Baseline dissociative symptoms predicted positive symptoms of psychosis in the Chinese-speaking sample, but not in the English-speaking sample.
- Psychotic symptoms did not predict trauma-related symptoms in both samples.
- DSO symptoms predicted classical PTSD symptoms.

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(DSO, por sus siglas en inglés) predijeron los síntomas "clásicos" de TEPT en el seguimiento. **Conclusiones:** Este estudio fue el primer intento de examinar las relaciones longitudinales entre los síntomas de TEPT complejo de la CIE-11, los síntomas disociativos y los síntomas psicóticos. Los hallazgos inconsistentes señalan la importancia de realizar más investigaciones sobre las relaciones longitudinales entre los síntomas relacionados con el trauma y los síntomas psicóticos. Además, nuestros resultados indican que abordar los síntomas disociativos puede ser importante en la prevención y el tratamiento de los síntomas de TEPT.

Traumatic and stressful events could overwhelm one's ability to process and integrate such experiences, and trauma often involves both biophysiological and psychological effects (Giller, 1999; Van der Kolk, 2014). Among different psychiatric conditions, post-traumatic stress disorder (PTSD) and dissociation are commonly regarded as two major trauma-and stress-related conditions (Herman, 1992; Van der Hart et al., 2006). PTSD has been listed as an official trauma disorder since 1980 in DSM, and the ICD-11 has now recognized that chronic trauma could lead to complex PTSD. In the ICD-11 formulation, complex PTSD involves 'classical' PTSD symptoms (i.e. re-experience, avoidance, and sense of current threat) as well as disturbances in self-organization (DSO) symptoms (i.e. affective dysregulation, negative self-concept, and disturbances in relationships). Additionally, dissociation, which refers to failures in the process of integrating one's biopsychosocial experiences (e.g. emotions, memories), has long been conceptualized as a response to trauma and stress (Loewenstein, 2018; McHugh & Egan, 2023), although dissociative experiences may sometimes occur without trauma. While both PTSD and dissociation are commonly associated with trauma, recent studies suggested that they are related but different constructs (Fung et al., 2024; Hyland et al., 2023).

The prevalence, validity, and associated consequences of (complex) PTSD and dissociation have been revealed in many studies (e.g. Fung, Lam, et al., 2023; Hyland et al., 2021; Kate et al., 2020; Ross et al., 2002). One important research theme has particularly focused on the close relationship between trauma-related symptoms/disorders and psychotic symptoms. For example, a meta-analysis reported that dissociation has moderate relationships with major positive symptoms of psychosis ($r = .437$) across clinical and nonclinical samples (Longden et al., 2020). While comorbid PTSD and dissociation are common in patients with psychotic disorders (Seow et al., 2016; Wu et al., 2022), patients with PTSD/dissociation also commonly report psychotic symptoms or Schneiderian first-rank symptoms (Ross & Ellason, 2005; Shinn et al., 2020). Psychotic symptoms are not only related to schizophrenia spectrum disorders, but they are also closely associated with post-traumatic and dissociative disorders (Renard et al., 2017). More importantly, systematic reviews have found that PTSD and dissociative symptoms may mediate the relationship between trauma and psychotic symptoms, although the evidence is primarily based on cross-sectional data (Bloomfield et al., 2021). Given the close relationship between trauma-related symptoms/disorders and psychotic symptoms (Krüger & Fletcher, 2024; Moskowitz et al., 2017), and considering that severely dissociative patients may report even more psychotic symptoms than patients with schizophrenia (Ross & Ellason, 2005), it has been proposed that some psychotic symptoms – positive symptoms (e.g. hallucinations) in particular – may be traumatic in origin and dissociative in nature (Moskowitz et al., 2022). For example, hallucinations or delusions, in some cases, could be explained by dissociative processes, where an individual perceives that some psychological experiences do not belong to him/her (e.g. when experiencing depersonalization or dissociative intrusions) (Fung, Wong, et al., 2023). The pathways from PTSD and dissociation to psychotic symptoms could be complex and require further research. One possibility is that individuals with high levels of trait dissociation might be more susceptible to dissociating or disconnecting their experiences; as a result, they may be more likely to perceive their experiences (e.g. visuals, voices, thoughts) as not originating from themselves, leading to the occurrence of psychotic experiences (Fung & Geng, 2024).

However, current literature on the relationship between trauma-related symptoms and psychotic symptoms is primarily based on cross-sectional findings (Buswell et al., 2021; Longden et al., 2020). More longitudinal studies are needed to examine whether PTSD and dissociative symptoms could predict psychotic symptoms over time. Such data are important to inform the understanding and prevention of psychotic symptoms. Furthermore, while it is proposed that trauma-related symptoms may lead to psychotic symptoms (Moskowitz et al., 2022), the experience of having psychotic symptoms could also be traumatic and therefore might lead to post-traumatic stress too (Buswell et al., 2021). Besides, the additional criteria for complex PTSD, such as emotion dysregulation and unstable self-esteem, may

contribute to the development and maintenance of delusions and hallucinations (e.g. Freeman & Garety, 2003; Murphy et al., 2018; Smith et al., 2006), as well as dissociation (Černis et al., 2021; Lam & Fung, 2024). For example, when traumatized individuals do not have the skills or resources (e.g. emotion regulation capacity) to manage the painful memories and emotions, these experiences may become too intrusive to the point that they dissociate or experience psychotic symptoms (as they are overwhelmed). Yet, there is also a lack of longitudinal studies to consider the complex relationships between various facets of trauma-related phenomena and psychotic symptoms, which warrants empirical investigation, as well as replication of findings.

The present study aimed to examine the bidirectional relationship between trauma-related symptoms and psychotic symptoms. For trauma-related symptoms, we focused on dissociative symptoms and complex PTSD symptoms. To our knowledge, this is the first study which has aimed to examine the longitudinal relationship between psychotic symptoms and PTSD based on the ICD-11 formulation. The recent study showed that complex PTSD was associated with psychotic symptoms in a traumatized sample from the United Kingdom and South Korea, but this study was based on cross-sectional data (Mason et al., 2023). For psychotic symptoms, we focused on positive symptoms because different types of psychotic symptoms may involve different etiological mechanisms and have different correlates; and positive symptoms may be particularly related to trauma (Bailey et al., 2018). We hypothesized that trauma-related symptoms and psychotic symptoms would predict each other over time. The research question was tested in two separate longitudinal samples, one international English-speaking and one Chinese-speaking, to validate our findings across samples.

1. Methods

1.1. Participants

To answer the research questions, we analyzed available longitudinal data from two separate survey projects.

Sample 1 included participants from a survey project which aimed to examine the psychosocial experiences of Chinese-speaking adults. The project obtained ethical approval at the Hong Kong Baptist University. In 2023, potential participants were recruited using social media advertising (i.e. Facebook and Instagram). The recruitment poster was mainly circulated in Hong Kong and Taiwan, because people in these two regions can read and write traditional Chinese. The poster stated that the survey project aimed to invite Chinese-speaking adults to help fill out a set of questionnaires related to health and psychological experiences. Participants had to be aged 18 or above, able to read and write Chinese, and agree to provide informed consent. Only participants who self-reported having a diagnosed reading disorder, dementia or intellectual disabilities were excluded. At baseline, a total of 220 participants provided valid responses, but only 214 of them provided a valid email address for follow-up survey. After about six months (average number of days = 163.19; SD = 13.19), 98 participants provided follow-up data (retention rate = 45.79%).

The ages of the 214 participants ranged from 18 to 73 (M = 32.38; SD = 14.23); 79.9% were female; 69.2% had an undergraduate degree; and 27.1% reported using psychiatric services in the past 12 months. Most participants lived in Taiwan (69.2%) and Hong Kong (27.1%).

Sample 2 included participants from an international survey project. The project, which obtained ethical approval at the Chinese University of Hong Kong, aimed to examine trauma-related mental health problems among individuals with self-reported depressive emotions. Potential participants were recruited in 2021–2022 using social media advertising (i.e. Facebook and Instagram). The recruitment poster was circulated in countries where English is commonly spoken (e.g. United States, United Kingdom, Canada). It was stated in the recruitment poster that this online survey aimed to investigate the life experiences and needs of people who had ever experienced any depressive moods. The included participants had to be aged 18 or above, able to read and write English, have access to the Internet, agree to provided informed consent and participate, and endorse the item 'Have you ever suffered from any depressive emotions?'. Participants were excluded if they self-reported: (1) immediate need for professional help; (2) had a diagnosed reading disorder, dementia or intellectual disabilities; and (3) recurrent suicidal ideation, suicidal attempts or homicidal plans in the past 2 weeks. Initially, 468 participants provided valid responses to the survey. Of all participants, 301 participants provided an email so that we could invite them to complete a follow-up survey. A total of 152 participants completed a follow-up survey after one year (retention rate = 50.50%) (average number of days = 402.4; SD = 16.24). Part of the data unrelated to the research questions in this paper has been reported elsewhere (Fung, Chau, et al., 2023).

Of the 301 participants, their ages ranged from 18 to 62 (M = 26.14; SD = 8.73). Most of them were female (92.0%); 18.6% were married, and 32.9% were full-time employed as reported at baseline; 43.5% had an undergraduate degree. Participants came from 15 different countries/regions, including: 24.6% from Canada, 21.3% from the United Kingdom, 15.6% from Singapore, 15.9% from the United States, and 8.0% from New Zealand. Of all the participants,

39.2% reported a clinical diagnosis of major depressive disorder; 20.3% reported PTSD; 0.3% reported schizophrenia; and 2.0% reported bipolar disorder.

1.2. Measures

Participants in both samples completed the same validated self-report measures of complex PTSD, dissociative symptoms, and positive symptoms of psychosis at both the baseline and follow-up assessments, in their respective languages. In addition to the measures described below, the online surveys also included attention checking items (e.g. 3 + 4 = ?) to ensure the validity of the responses.

Complex PTSD symptoms, including classical PTSD and disturbances in self-organization (DSO) symptoms, were assessed using the International Trauma Questionnaire (ITQ). The ITQ is an 18-item well-validated measure for assessing complex PTSD symptoms based on the ICD-11 formulation (Cloitre et al., 2018, 2021). The ITQ has been validated in the Chinese populations (Ho et al., 2019). The current study used the PTSD and DSO subscale scores for analysis. Both subscale scores had satisfactory internal consistency in Sample 1 (baseline: PTSD subscale α = 0.89, DSO subscale $\alpha = 0.91$, six-month follow-up: PTSD subscale $\alpha = 0.89$, DSO subscale $\alpha = 0.90$) and Sample 2 (baseline: PTSD subscale $\alpha = 0.84$, DSO subscale $\alpha = 0.82$, one-year follow-up: PTSD subscale α = 0.82, DSO subscale $\alpha = 0.85$).

Dissociative symptoms were assessed using the Multiscale Dissociation Inventory (MDI). The MDI, which is a 30-item measure, is a normed scale and it comprehensively assesses different facets of dissociation (Briere, 2002; Briere et al., 2005). The Chinese version of the MDI has also been validated and used in previous studies (Fung & Cheung, 2024). The total score was used in this study. Internal consistency was excellent in both samples (Sample 1: baseline $\alpha = 0.96$, six-month follow-up $\alpha = 0.97$; Sample 2: baseline $\alpha = 0.96$, one-year follow-up $\alpha = 0.95$).

Positive symptoms of psychosis were assessed using the Positive Symptoms (Frequency) Subscale of the Community Assessment of Psychic Experiences (CAPE-P). The CAPE, which has 42 items, is a commonly-used, reliable and valid measure of psychotic experiences (Konings et al., 2006; Mark & Toulopoulou, 2016). The original English version of the CAPE-P has 20 items. However, a previous validation study suggested that a 4-item CAPE-P should be used in the Chinese context due to its better psychometric properties (Mark & Toulopoulou, 2017). Therefore, the 20-item CAPE-P was used in the English-speaking sample (baseline: $\alpha = 0.90$, one-year follow-up: α = 0.89) while the 4-item CAPE-P was used in the Chinese-speaking sample (baseline: $\alpha = 0.71$, six-month follow-up: $\alpha = 0.61$).

1.3. Data analysis

The bidirectional relationship between trauma-related symptoms and psychotic symptoms was examined with a cross-lagged panel model in each sample separately. In each model, we regressed each symptom at follow-up on all symptoms at baseline. The bidirectional relationship between variables was examined with the respective cross-lagged coefficients, after controlling for the autoregressive effects of the symptoms across time points. For all the models, full information maximum likelihood estimation was used to account for attrition. Robust standard errors were used in all analyses to account for the non-normality of the key variables. Since all models were saturated and had perfect fit, the goodness-of-fit of the models could not be estimated. These analyses were conducted using the R package *lavaan* (Rosseel, 2012).

2. Results

The descriptive statistics and correlations between key variables are reported in Table 1, while the regression coefficients of the cross-lagged panel models are reported in Table 2.

2.1. Cross-lagged panel model for sample 1

All autoregressive coefficients were significant (βs = 0.42–0.78, *ps* < .001). DSO symptoms at baseline was associated with an increase in PTSD symptoms at six-month follow-up (B = 0.36, SE = 0.08, $\beta = 0.39$, $p < .001$). Also, dissociative symptoms at baseline was associated with an increase in positive symptoms of psychosis at six-month follow-up (B = 0.02, SE = 0.01, $p = .013$, $\beta = 0.26$). Other cross-lagged coefficients were not significant.

2.2. Cross-lagged panel model for Sample 2

All autoregressive coefficients were significant (βs = 0.37–0.70, *ps* < .001). Among the cross-lagged coefficients, only DSO symptoms at baseline was marginally associated with an increase in PTSD symptoms at one-year follow-up (B = 0.19, SE = 0.10, $\beta = 0.17$, $p = .053$). Positive symptoms of psychosis and all trauma-related symptoms (i.e. dissociative symptoms, PTSD symptoms and DSO symptoms) did not predict one another over time.

In both samples, the pattern of significance remained after controlling for age, gender, educational attainment, marital status, employment status and trauma exposure at baseline (Supplementary Table 1).

3. Discussion

Although the association between trauma-related symptoms and psychotic symptoms has been well-

Table 1. Descriptive statistics and correlation between key variables in Samples 1 (upper diagonal) and 2 (lower diagonal).

Sample 1/ Sample 2		ITQ-PTSD T1	ITQ-DSO T1	CAPE-P T1	MDI T1	ITQ-PTSD T2	ITQ-DSO T2	CAPE-P T2	MDI T2
	M (SD)	*r* (*p*-value)							
		10.34 (7.05)	12.31 (6.94)	5.86 (2.26)	56.15 (23.12)	9.77 (6.41)	11.95 (6.44)	5.74 (2.05)	54.87 (24.14)
ITQ-PTSD T1	14.49 (6.07)	/	0.58 (<.001)	0.44 (<.001)	0.51 (<.001)	0.70 (<.001)	0.48 (<.001)	0.43 (<.001)	0.44 (<.001)
ITQ-DSO T1	17.32 (5.12)	0.44 (<.001)	/	0.36 (<.001)	0.58 (<.001)	0.68 (<.001)	0.73 (<.001)	0.33 (.001)	0.53 (<.001)
CAPE-P T1	34.98 (10.92)	0.44 (<.001)	0.32 (<.001)	/	0.57 (<.001)	0.39 (<.001)	0.27 (.008)	0.75 (<.001)	0.49 (<.001)
MDI T1	73.72 (26.91)	0.59 (<.001)	0.55 (<.001)	0.63 (<.001)	/	0.52 (<.001)	0.44 (<.001)	0.60 (<.001)	0.83 (<.001)
ITQ-PTSD T2	12.68 (5.80)	0.50 (<.001)	0.38 (<.001)	0.36 (<.001)	0.40 (<.001)	/	0.69 (<.001)	0.40 (<.001)	0.57 (<.001)
ITQ-DSO T2	15.34 (6.01)	0.27 (<.001)	0.64 (<.001)	0.26 (.001)	0.33 (<.001)	0.52 (<.001)	/	0.31 (.002)	0.54 (<.001)
CAPE-P T2	31.79 (8.97)	0.31 (<.001)	0.27 (.001)	0.67 (<.001)	0.46 (<.001)	0.46 (<.001)	0.33 (<.001)	/	0.61 (<.001)
MDI T2	63.47 (22.82)	0.41 (<.001)	0.44 (<.001)	0.42 (<.001)	0.66 (<.001)	0.57 (<.001)	0.54 (<.001)	0.58 (<.001)	/

Note. ITQ-PTSD: the PTSD subscores of the International Trauma Questionnaire, ITQ-DSO: the disturbances in self-organization subscores of the International Trauma Questionnaire, CAPE-P T1: Positive dimension score (frequency) of the Community Assessment of Psychic Experiences, MDI: total score of the Multiscale Dissociation Inventory. T1: baseline, T2: follow-up.

Table 2. Cross-lagged panel model for both samples.

Dependent variable	Independent variables	B (SE)	*p*-value	*β*
Sample 1 ($N = 214$):				
ITQ-PTSD T2	ITQ-PTSD T1	0.39 (0.08)	<.001	0.42
	ITQ-DSO T1	0.36 (0.08)	<.001	0.39
	CAPE-P T1	0.08 (0.17)	.657	0.03
	MDI T1	0.02 (0.02)	.427	0.05
ITQ-DSO T2	ITQ-PTSD T1	0.07 (0.09)	.430	0.08
	ITQ-DSO T1	0.64 (0.09)	<.001	0.69
	CAPE-P T1	−0.07 (0.24)	.781	−0.02
	MDI T1	0.01 (0.02)	.818	0.02
CAPE-P T2	ITQ-PTSD T1	0.03 (0.02)	.199	0.09
	ITQ-DSO T1	−0.03 (0.02)	.246	−0.09
	CAPE-P T1	0.55 (0.09)	<.001	0.60
	MDI T1	0.02 (0.01)	.013	0.26
MDI T2	ITQ-PTSD T1	0.01 (0.37)	.974	0.00
	ITQ-DSO T1	0.22 (0.33)	.507	0.06
	CAPE-P T1	0.18 (0.67)	.790	0.02
	MDI T1	0.81 (0.07)	<.001	0.78
Sample 2 ($N = 301$):				
ITQ-PTSD T2	ITQ-PTSD T1	0.36 (0.09)	<.001	0.37
	ITQ-DSO T1	0.19 (0.10)	.053	0.17
	CAPE-P T1	0.09 (0.06)	.129	0.17
	MDI T1	−0.00 (0.02)	.934	−0.01
ITQ-DSO T2	ITQ-PTSD T1	−0.01 (0.08)	.875	−0.01
	ITQ-DSO T1	0.75 (0.09)	<.001	0.65
	CAPE-P T1	0.07 (0.05)	.167	0.14
	MDI T1	−0.02 (0.02)	.343	−0.10
CAPE-P T2	ITQ-PTSD T1	−0.03 (0.08)	.707	−0.02
	ITQ-DSO T1	0.08 (0.09)	.377	0.04
	CAPE-P T1	0.62 (0.10)	<.001	0.70
	MDI T1	0.02 (0.03)	.597	0.04
MDI T2	ITQ-PTSD T1	0.07 (0.28)	.793	0.02
	ITQ-DSO T1	0.47 (0.28)	.094	0.11
	CAPE-P T1	0.02 (0.28)	.939	0.01
	MDI T1	0.49 (0.11)	<.001	0.58

Note. ITQ-PTSD: the PTSD subscore of the International Trauma Questionnaire, ITQ-DSO: the disturbances in self-organization subscore of the International Trauma Questionnaire, CAPE-P T1: Positive dimension score (frequency) of the Community Assessment of Psychic Experiences, MDI: total score of the Multiscale Dissociation Inventory. T1: baseline, T2: follow-up.

recognized in the literature (e.g. Longden et al., 2020; Moskowitz et al., 2017; Read et al., 2005), there is very little longitudinal evidence available (e.g. Strelchuk et al., 2022). In this study, we made the first attempt to examine the bidirectional relationship between positive symptoms of psychosis and trauma-related symptoms, which included dissociative symptoms and ICD-11 complex PTSD symptoms, over time. In particular, although the two samples were not matched and although direct cross-cultural comparison was not possible due to cultural heterogeneity (especially in Sample 2), we aimed to see whether the results could be replicated in the two distinct samples, as they had different language and socio-cultural backgrounds and different profiles in terms of their clinical status. While we found that dissociative symptoms predicted positive symptoms of psychosis at follow-up in Sample 1, the same result was not evident in Sample 2. Additionally, we found no evidence that positive symptoms of psychosis could predict trauma-related symptoms in our samples.

We found that baseline dissociative symptoms were associated with an increase in positive symptoms of psychosis in Sample 1. This finding provides initial

support for the idea that some psychotic symptoms might be explained by dissociative processes, or may even be dissociative in nature (Moskowitz et al., 2022). In fact, if certain specific psychotic symptoms can be conceptualized as a form of dissociation, that would have significant implications for treatment. For instance, trauma-focused treatments might be used to treat trauma-related psychotic symptoms (Brand et al., 2018). Previous outcome studies have shown that dissociation-focused treatment can effectively reduce dissociative patients' symptoms across different outcomes (e.g. depressive and post-traumatic symptoms) (Brand et al., 2009; Myrick et al., 2015; Ross et al., 2019).

In addition, psychotic symptoms in individuals with dissociative identity disorder (Ellason & Ross, 1997) can reduce significantly during trauma-informed psychotherapy. In a two-year follow-up during which 54 participants received trauma-focused psychotherapy, the percentage of participants meeting criteria for schizoaffective disorder on the Structured Clinical Interview for DSM-III-R dropped from 56.8% to 20.5%, which was significant at $p < .00001$, and positive symptoms on the Positive and Negative Syndrome Scale, dropped from an average score of 24.9–12.8, which was significant at $p < .0001$ (Ellason & Ross, 1997). Future studies should further evaluate whether psychotic symptoms are reduced after dissociation-informed interventions. However, as is true for other psychiatric phenomena, psychotic symptoms could be etiologically heterogeneous (Goldberg, 2011; Islam et al., 2018). The heterogeneity of psychotic symptoms could result in their varying associations with trauma and dissociation across studies. Given that the predictive role of dissociation for subsequent psychotic symptoms could not be replicated in the Sample 2, further studies are necessary before conclusions can be reached. In particular, future studies should replicate the results in matched samples across cultures.

Our current data did not show a statistically significant longitudinal relationship between PTSD symptoms and positive psychotic symptoms across samples. Specific demographic or clinical factors might be important moderators that should be further investigated in the future. For example, in one of the very few studies on the longitudinal relationship between trauma, PTSD symptoms and psychotic symptoms, Strelchuk et al. (2022) found that the mediating effects of PTSD symptoms were stronger between childhood trauma and adolescent psychotic symptoms than for adult psychotic symptoms. Additionally, different specific psychotic symptom clusters (e.g. hallucinations, delusions) might display a differential relationship with trauma-related symptoms. Our sample may have limited the power of the analysis, and more well-powered studies may be warranted in the future. Due to the limited sample size, we may not have enough variability within the samples to detect changes in trauma-related and psychotic symptoms over time. With larger samples, more well-powered studies could examine the relationships among trauma-related symptoms and psychotic symptoms at the individual symptom level.

Another interesting point to note is that, while less related to our primary research questions, DSO symptoms consistently predicted an increase in classical PTSD symptoms in both samples. That finding suggests that DSO symptoms may be an antecedent (but not a consequence) of classical PTSD symptoms, while this is not so for dissociation or psychosis. One symptom subset of complex PTSD, that is DSO symptoms, therefore, should receive more attention when understanding and treating classical PTSD symptoms. As this symptom-level analysis indicated that DSO symptoms predicted subsequent classical PTSD symptoms, and since this finding was very consistent across the two samples, prevention and management of PTSD symptoms should take DSO symptoms into consideration. Addressing DSO symptoms, such as emotional dysregulation and interpersonal difficulties, may be beneficial to the treatment of classical PTSD symptoms. With a larger sample, future studies should further examine whether DSO symptoms would increase vulnerability to the later development of classic PTSD.

While this study has the strengths of utilizing longitudinal data from two separate samples and employing well-validated screening measures, the results should be interpreted with caution. This study has several limitations. Most importantly, our samples were not representative of the clinical or general populations, and the two samples were not matched in demographics, trauma exposure and levels of psychopathology. Moreover, although the two samples had different language and socio-cultural backgrounds, direct cross-cultural comparison is not possible. It is partly because of the cultural heterogeneity, especially in Sample 2. Instead, this study aimed to see whether our results could be replicated in these two entirely different samples, with different language, clinical, and socio-cultural backgrounds. Second, the follow-up intervals in the two samples were not the same, so the confounding impact of the length of the follow-up interval on the longitudinal associations between variables is not certain. Third, we relied on self-report data; while online self-assessments are commonly used and can be valid in psychiatric research (Chan et al., 2017; Hyland & Shevlin, 2024), future studies should conduct diagnostic interviews in order to replicate our findings. Additionally, while the CAPE is a well-validated screening measure for psychotic symptoms, the 4-item CAPE-P had relatively lower reliability in our sample – it is also important to note that the two psychosis measures (15-item and 4-item versions of the CAPE-P) in this study may not be equivalent.

Not only the bidirectional relationship between post-traumatic and psychotic symptoms requires more research; the bidirectional relationship between trauma-related diagnoses (e.g. PTSD, borderline personality, and dissociative disorders) and psychotic diagnoses (e.g. schizophrenia, schizoaffective disorder) also requires further investigations.

3.1. Concluding remarks

The inconsistent results in this study point to the necessity for further research on the bidirectional relationship between trauma-related disorders and psychotic disorders, at both symptom and diagnosis levels. This line of research is important because it could inform our understanding and prevention of both types of conditions. For example, if future studies can provide robust evidence showing that dissociative symptoms can predict subsequent psychotic symptoms, that finding might warrant the implementation of trauma and dissociation-informed interventions for individuals experiencing psychotic symptoms. Additionally, there have been proposals suggesting that there may be trauma-related subtypes within psychotic disorders (e.g. dissociative schizophrenia or hysterical psychosis) (e.g. Moskowitz et al., 2022; Ross & Keyes, 2009; Van der Hart & Witztum, 2008), and these require more empirical investigations as well, given the potential implications for the revisions of future editions of the DSM and ICD.

Availability of data and material

The dataset generated and analyzed during the current study is available from the corresponding author (HWF) on reasonable request.

Author contributorship

HWF contributed to the conceptualization and study design. HWF collected the data. AKCC conducted data analysis. HWF and AKCC and prepared the first draft. SKKL, GWKH, and JYHW provided supervision. SKKL, GWKH, CAR, MYCW, EKSW, WTC, and JYHW provided guidance regarding the interpretation of the findings. All authors provided critical comments regarding the first draft and contributed to the revision of the manuscript. All authors read and approved the final manuscript.

Consent to participate

Online written informed consent was obtained from all participants before study participation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethics approval

The paper analyzed data from two survey projects, which obtained ethical approval from the institutional review board at the Hong Kong Baptist University (REC/22-23/0189) and the Chinese University of Hong Kong (SBRE-21-0247). All participants provided online written informed consent before they completed the survey.

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