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Reducing the sense of separation: Investigating the temporal association of continuum beliefs and interconnected explanations with stigma and advocacy for individuals with anxiety disorders and schizophrenia

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ABSTRACT

Background and aims: Social stigma has been adversely affecting various aspects of life for people with mental illness across different cultural contexts, highlighting an urgent need to reduce this stigma. It has been theorized that a sense of separation is a key component of stigmatization, and addressing this component is considered a feasible way to reduce social stigma. This study aimed to investigate the temporal relationship between continuum belief and interconnected explanations—constructs thought to address the sense of separation—and their impact on stigma and collective action for people with anxiety disorders and schizophrenia and their mechanism. Continuum belief views mental illness as existing on a spectrum of severity, rather than as a binary state of normality versus mental disorder. Interconnected explanation refers to the perception that individuals see themselves as contributing factors to the welfare of those with mental illness.

Methods: Valid responses were collected from 377 participants who reported that they did not have a history of clinical diagnosis of mental illness (57 % women; mean age = 21.55 years, SD = 5.15) from a public university in Hong Kong at baseline. A total of 308 (82 %) and 305 (81 %) valid responses were collected from the same group of participants at 1-month and 2-month follow-up assessments, respectively.

Results: Perceived similarity did not mediate the relationship between continuum belief and stigma or collective action, both concurrently and prospectively, after controlling for interconnected explanation, interconnected accountability, and previous contact experiences. However, interconnected accountability significantly mediated the relationship between interconnected explanation and both the intention to participate in and actual participation in collective action, but not stigma, for people with anxiety disorders and people with schizophrenia, both concurrently and prospectively.

Conclusion: This study provides evidence supporting the potential of interconnected explanation in promoting collective action for people with mental illness. It also offers insights into how continuum belief might be utilized for stigma reduction and advocacy promotion.

Public stigma occurs when socially dominant groups hold negative societal beliefs (i.e., negative stereotypes), harbor negative attitudes (i.e., prejudice), and engage in negative actions (i.e., discrimination) against people with mental illness (Corrigan and Watson, 2002). According to social dominance theory, members of dominant groups tend to enjoy a disproportionate share of societal benefits, such as social power, while members of subordinate groups are more likely to experience disadvantages and hardships (Sidanius and Pratto, 2001). Given that people with mental illness are often deprived of rights due to their experiences, we consider those who contribute to this marginalization by holding stigma against them as 'socially dominant groups.' These individuals are most often people without the diagnosis of mental illness, who, through their attitudes and actions, perpetuate stigma against those with mental health challenges. Public stigma can manifest both interpersonally and structurally, and it has been found to negatively affect various aspects of life for people with mental illness, such as job and housing loss, poor recovery outcomes and processes, and reluctance to seek help. These factors ultimately exacerbate mental health issues (Corrigan and Kleinlein, 2005; Reavley et al., 2017; Yu et al., 2021, 2023a; Yu et al., 2021a,b; Yu et al., 2023b). The detrimental effects of stigma highlight the urgent need to mitigate its impact.

As stigma is an entrenched problem that has been prevailing widely

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in society across cultures (Seeman et al., 2016; Yu and Mak, 2022), promoting collective action among socially dominant groups is crucial for addressing this social problem and building a more inclusive environment for people with mental illness. Collective action refers to actions jointly taken by a group of people in pursuit of their common goals and interests to improve social conditions (Wright et al., 1990). Recently, collective action has been further categorized into private and public forms (Chan and Mak, 2021), recognizing that societal structures may restrict certain types of collective action. Public forms involve macro-level activities, such as large-scale protests and demonstrations within communities (Chan and Mak, 2021; Corrigan, 2004). In contrast, private forms occur at the micro-level and focus on fostering social awareness and positive change within personal social circles, such as addressing microaggressions or correcting stigmatizing language used by others (Chan and Mak, 2021).

The present study aimed to investigate the relative temporal association of continuum belief and interconnected explanation with stigma and collective action as they were proposed to be able to reduce stigma by targeting on the sense of separation – an important element in stigmatization process (Link and Phelan, 2001). We will mainly focus on the private form of collective action as the place where the present study conducted currently does not favor large scale of collective action due to various reasons (Chan and Mak, 2021; Ho, 2007).

1. Continuum belief of mental illness on mental illness stigma and collective action through perceived similarity

While various theories of stigma were proposed (e.g., Corrigan and Watson, 2002; Corrigan et al., 2009; Rüsch et al., 2005), a widely accepted one describes it as consisting of five interconnected elements: labeling, stereotyping, separation, status loss, and discrimination, all occurring within a context of societal power imbalance (Link and Phelan, 2001). Specifically, labeling involves identifying someone with a mental illness diagnosis, which is then linked to negative traits like poor decision-making and violence by dominant social groups. These stereotypes create a divide, reinforcing a sense of separation and unrelatedness. This separation and the associated negative traits justify dehumanizing behaviors, leading to discrimination and a loss of status for those with mental illness.

Considering the significant role of separation in fueling stigmatization, researchers have sought to reduce stigma by fostering a connection between the socially dominant groups and people with mental illness. One widely used method is the application of continuum beliefs to achieve stigma reduction (e.g., Corrigan et al., 2017; Schomerus et al., 2016). Continuum belief views mental illness on a spectrum of severity, rather than a binary view of normality versus mental disorder, which isolates people with mental illness from the rest of the society. Given that everyone might encounter mental health challenges at some point in their lives, the experience of mental illness is seen as common and a response to a combination of factors including genetics, biology, psychosocial stressors, cultural contexts, and environmental conditions (Peter et al., 2021). While the symptoms being experienced by people with mental illness can be also experienced by people of socially dominant groups to a certain extent, the continuum belief could promote a sense of similarity of socially dominant groups with people who have mental illness (Violeau et al., 2020). Such continuum belief and the perceived similarity counteract the separation inherent in stigmatization and, in turn, reduces stigma.

Recent research has provided empirical evidence supporting perceived similarity as a mechanism underlying the effect of continuum belief on mental illness stigma. For instance, Violeau et al. (2020) conducted a short experiment (~2 min) to investigate the effect of continuum belief on stigma against people with schizophrenia. The experiment included three conditions: continuum belief, categorical belief (a binary view of schizophrenia, which is the opposite of continuum belief), and a neutral condition. The results showed that, compared to the categorical belief and neutral conditions, people in the continuum belief condition reported sharing higher levels of similarity with people with schizophrenia. This perceived similarity, in turn, was associated with lower stereotypical thoughts regarding people with schizophrenia (Violeau et al., 2020). Another experimental study using a vignette also found a positive association between continuum belief about depression and perceived similarity with people with depression (Buckwitz et al., 2022). In this study, participants were assigned to either the categorical condition or the continuum belief condition. Participants were first asked to read some information depicting mental health and mental illness in either a continuum manner or a binary manner. Then, participants were asked to read a vignette of a person experiencing symptoms of major depressive disorder, followed by writing three similarities and differences between themselves and that person with depression. The results showed that people in the continuum belief condition described significantly more similarities with a person with depression (Buckwitz et al., 2022). The perceived similarities were found to be negatively associated with negative stereotypes and social distance against a person with depression (Buckwitz et al., 2022). Consistent results were observed in a more recent cross-sectional study, which found that perceived similarity was associated with higher continuum belief, and both were associated with lower social distance against people with schizophrenia (Buckwitz et al., 2023). However, this study proposed an alternative mediational relationship, suggesting that perceived similarity mediated the association between continuum belief and social distance (Buckwitz et al., 2023).

All of these experimental and cross-sectional studies provided supporting evidence that perceived similarity could mediate the association between continuum belief and stigma (Buckwitz et al., 2022, 2023; Violeau et al., 2020). However, given that the experimental studies were one-off, and all the measures were administered at the same time point, the evidence mainly supported their concurrent, but not temporal association. While a handful of prospective studies on continuum belief are available in the literature, it is important to conduct empirical investigations on the predictability of continuum belief in relation to stigma. This would provide a more comprehensive understanding of the usefulness of the construct in stigma reduction.

While previous research has extensively investigated the potential of continuum belief in stigma reduction, empirical investigation into its potential for promoting collective action is limited. However, theoretically, it is reasonable to anticipate that continuum belief could promote collective action through increased perceived similarity. According to the Social Identity Model of Collective Action (SIMCA), group identification is one of the key predictors of collective action (Van Zomeren et al., 2008). People from socially dominant groups who feel they are similar to people with mental illness, by understanding the continuum nature of mental illness, would probably more easily identify with this group and become more willing to advocate for them. Given that there is limited evidence examining the association between the constructs, another objective of the present study is to explore whether continuum belief is conducive to a greater intention to advocate through perceived similarity.

1.1. Interconnected explanation on mental illness stigma through interconnected accountability

Interconnected explanation is another construct that has the potential to reduce stigma (Yu et al., 2022, 2023). Like continuum belief, previous research also proposed that interconnected explanation could reduce stigma by diminishing the sense of separation between socially dominant groups and people with mental illness (Yu et al., 2021a,b, 2023). Unlike continuum belief, which encourages individuals to feel similar to people with mental illness by highlighting common psychological experiences throughout one's lifespan, interconnected explanation emphasizes one's role in affecting people with mental illness. This perceived impact on people with mental illness instills a sense of moral

responsibility in socially dominant groups, obligating them to treat people with mental illness equally and to restore their deprived rights, as they are interdependent on one another. Interconnected explanation was defined as the perception where socially dominant groups see themselves as contributing factors to the welfare of people with mental illness, such as recovery (Yu et al., 2023b).

Interconnected explanation could be considered a manifestation of the understanding of interconnectedness of all phenomena in the world when people apply interconnectedness in interpreting their relationship with people with mental illness. Interconnectedness, extracted from ideas of Buddhist Psychology, refers to an awareness of the interdependent nature of all phenomena that are the result of various causes and conditions, implying that nothing exists in isolation (Yu et al., 2020, 2023). Interconnectedness emphasizes that the existence of any object, such as a piece of paper, depends on a multitude of factors, including sunshine, a logger, soil minerals, water, heat, and even oneself. The absence of any of these elements would make the production of paper impossible. This example explicates the idea that the existence of everything in the world depends on a variety of factors, all of which can potentially influence each other and coexist interdependently. In the context of mental illness stigma, this means that everyone has a certain influence over the welfare of people with mental illness, and vice versa. With an awareness that one has influence over the welfare of people with mental illness, a sense of responsibility is developed, which in turn facilitates advocacy and reduces stigmatizing perceptions against this group of people. Such a sense of responsibility refers to interconnected accountability which was defined as one's perceived moral responsibility for the welfare, such as recovery, of people with mental illness (Yu et al., 2023b).

Past studies have found support for the potential of interconnected explanation in reducing mental illness stigma and promoting the intention to advocate for people with mental illness through interconnected accountability (Yu et al., 2022, 2023). Specifically, a past experimental study found that highlighting how one may potentially affect the recovery of people with schizophrenia using a 20-min animation could increase the level of interconnected accountability among socially dominant groups towards people with schizophrenia (Yu et al., 2022). Interconnected accountability, in turn, predicted lower social distance and a greater willingness to advocate for people with schizophrenia in the two-week follow-up assessment (Yu et al., 2022). Moreover, a more recent study with 2-month prospective design also found support for the temporal relationship of interconnected explanations and stigma (Yu et al., 2023b). It was found that interconnected explanation at baseline could predict less social distance from people with mental illness at the 2-month follow-up assessment through higher interconnected accountability measured at the 1-month follow-up assessment (Yu et al., 2023b).

However, in our understanding, there is no study available that has investigated the relative effect between interconnected explanation and continuum belief, which are both theorized to reduce stigma by addressing the sense of separation (Buckwitz et al., 2022, 2023; Violeau et al., 2020) on stigma reduction and promotion of advocacy (Yu et al., 2022, 2023b). Therefore, the present study aims to fill these research gaps by comparing the indirect effects of interconnected explanations and continuum belief on stigma through interconnected accountability and perceived similarity, respectively.

1.2. The present study

While both continuum belief and interconnectedness can potentially reduce stigma by addressing the "separation" component in the stigmatization process, it is worthwhile to compare their relative effects on stigma reduction and advocacy promotion for people with mental illness. By doing so, we can determine which construct that addresses the sense of separation has a greater impact on reducing stigma. The present study attempted to answer this question using a 2-month prospective design. Specifically, we aimed to investigate the relative temporal associations of interconnected explanation and continuum belief with stigma and its underlying mechanisms. In addition to stigma, we also examined their relative temporal associations with the intention to engage in private collective action and actual participation in private forms of collective action. Given that stigma is a social issue that prevails widely across different aspects of societies (Corrigan, 2004), collective efforts are needed to address this entrenched problem of stigma. Meanwhile, the present study focuses on stigma and collective action advocating for people with two types of mental illness: anxiety disorder and schizophrenia. Anxiety disorder and schizophrenia represent a common form and a severe form of mental illness, respectively, which are stigmatized in societies to different extents. Covering both allows us to investigate the generalizability of the results to both common and severe forms of mental illness. If consistent results are observed across the two types of disorders, this would provide more solid evidence supporting the predictability of the constructs across stigma against people with different types of mental illness. To our knowledge, there is no study in the literature that has applied either continuum belief or interconnected explanation to stigma reduction for people with anxiety disorders. The present study could also contribute to filling this gap in literature. Since this study was exploratory in nature, we do not have specific hypotheses regarding which construct has a greater effect on stigma and advocacy.

2. Method

2.1. Participants

Responses were collected from 422 participants who self-reported that they did not have a history of clinical diagnosis of mental illness. These participants were initially recruited to participate in the study from a public university in Hong Kong at baseline. Responses from 45 participants were excluded because they did not pass the validation check, resulting in 377 valid responses collected from the baseline assessment (57 % women; mean age = 21.55 years, SD = 5.15). The validation check consisted of five questions. A sample question is, "Please choose 'Strongly Agree' for this question." Submissions that answered any of these five questions incorrectly were regarded as invalid. A total of 308 (82 %) and 305 (81 %) valid responses were collected from the same group of participants at 1-month and 2-month follow-up assessments, respectively. Most of the participants reported that they had received tertiary education or above; 82.2 % were undergraduate students, while 16.2 % were postgraduate students. Six participants (1.6 %) reported that they had education at the diploma level.

2.2. Procedure

The study participants were recruited from a public university of Hong Kong using convenience sampling via mass email. Eligibility criteria included being 18 years or older, not having a history of clinical diagnosis of mental illness, and the ability to understand written Chinese. After giving informed consent, participants were asked to complete three sets of online questionnaires listed in the measure section over two months using Qualtrics, an online survey platform. The questionnaires were sent immediately after consent (T1), one month after T1 (T2), and two months after T1 (T3). The recruitment period was from September 2024 through November 2024.

To maximize retention, reminders through email were sent to participants on Day 3 and Day 5 after the invitation to complete the 1-month and 2-month assessment. Participants who did not complete the questionnaires after Day 7 were considered missing at the respective time point. Participants were given HK$50 (HK$7.8 = US$1) for completion of questionnaires at each time point as compensation for their efforts in participation. If they finished all the assessments across

time points, they were provided an additional HK$50. In other words, people who have completed all the questionnaires of this study could get up to.

HK$200 (~US$ 25.6) in total. Before data collection, this study was approved by Institutional Review Board of the corresponding author's university. The study was not pre-registered.

2.3. Measures

Tables 1 and 2 present the descriptive information, including the mean, standard deviations, and internal consistency, for all the variables of interest. All the questionnaires were administered in Chinese.

Interconnected Explanation (schizophrenia). The three items of interconnected explanation used in Yu et al. (2022, 2023) were adapted to assess the extent to which participants consider themselves a factor affecting the welfares of people with schizophrenia. The items, for example, were modified from "I am one of the factors that affect the recovery of people with schizophrenia" to "I am one of the factors that affect the welfare of people with schizophrenia." In general, "recovery" was replaced with "welfare" because "recovery" could convey a variety of meanings (e.g., recovery as an outcome or recovery as a process; Bellack, 2006), such that different people could have interpreted the term in different ways, potentially confounding the results. Items were rated on an 11-point Likert scale from −5 (*totally not agree*) to 5 (*totally agree*). A higher score of the items suggests a higher extent of interconnected explanation.

Interconnected Accountability (schizophrenia). The interconnected accountability scale with two items from Yu et al. (2022, 2023) were modified to measure participants' level of perceived responsibility over the welfare of people with schizophrenia on a 11-point Likert scale from −5 (*extremely disagree*) to 5 (*extremely agree*). Similar to interconnected explanation, "recovery" was replaced with "welfare" in the items. A sample item includes "I think I should be held accountable for the welfare of people with schizophrenia". Higher scale scores suggest higher levels of interconnected accountability.

Continuum belief (schizophrenia). The 3-item Continuity with Normal dimension of Belief about Illness Scale (Norman et al., 2008) was used to measure continuum beliefs of schizophrenia on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). A higher score indicates higher levels of continuum beliefs.

Perceived similarity (schizophrenia). The Scale of Perceived Similarities with Schizophrenia (SPSS), developed by Violeau et al. (2020), was used to measure participants' level of perceived similarity with people with schizophrenia on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The original scale consists of two factors: "sharing similarity" and "being similar." Although in the original study the factors were analyzed separately, their contents were similar and difficult to interpret distinctly. Therefore, in the present study, we conducted an exploratory factor analysis on this scale again, which suggested a unidimensional factor structure (See Supplementary Document 1. for the results). Therefore, only the composite scores of the scales were used, with higher scores indicating higher levels of perceived similarity.

Stigma (schizophrenia). The Attribution Questionnaire (AQ-9; Corrigan et al., 2011) was used to assess public stigma toward people with schizophrenia on a 9-point Likert scale (9 = *very much*). This is a short version of the AQ-27 (Corrigan et al., 2003). It assesses nine dimensions of stigma, including blame, anger, pity, help, dangerousness, fear, avoidance, segregation, and coercion, with each dimension measured by one item. A composite score of the scale was used in the analyses, with higher scores indicating higher levels of stigma. The items are presented in response to a short description of a man with schizophrenia named Harry (e.g., "I would feel pity for Harry"). The vignette of Harry was only used in AQ9 but not the other questionnaires.

Private form of collective action intention (schizophrenia). The Private Collective Action subscale from the Collective Action Scale

Table 1
Zero-order correlation of all the variables of interest specific to people with anxiety disorder.

	Cronbach's alpha	Mean	Skewness	Kurtosis	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. T1IE	.89	−.54	−.31	−.56	–																
2. T1CB	.84	4.12	−.91	1.64	.05	–															
3. T1PS	.93	2.94	−.15	−.46	.18**	.43**	–														
4. T2PS	.93	3.01	−.16	−.30	.08	.36**	.62**	–													
5. T1IA	.85	−.05	−.60	−.09	.55**	.03	.15**	.07	–												
6. T2IA	.93	.07	−.39	−.07	.44**	.03	.13*	.11	.55**	–											
7. T1AQ	.69	3.47	.16	-.59	−.04	−.12*	−.08	−.14*	−.05	−.07	–										
8. T2AQ	.77	3.43	.50	−.05	−.09	−.11*	−.04	−.17**	−.16**	−.16**	.53**	–									
9. T3AQ	.78	3.40	.30	.06	−.05	−.21**	−.06	−.19**	−.08	−.20**	.52**	.71**	–								
10. T1Intention	.75	3.56	−.50	.61	.20**	.21**	.16**	.10	.39**	.38**	−.12*	−.26**	−.10	–							
11. T2Intention	.81	3.53	−.74	.62	.17**	.18**	.09	.16**	.25**	.47**	−.14*	−.22**	−.23**	.51**	–						
12. T3Intention	.88	3.50	−.75	.79	.19**	.14*	.10	.14*	.34**	.51**	−.17**	−.19**	−.18**	.57**	.65**	–					
13. T1AP	.87	2.34	.36	−.99	.19**	.11*	.19**	.13*	.26**	.31**	−.008	−.04	−.02	.43**	.37**	.39**	–				
14. T2AP	.84	2.35	.33	−.91	.20**	.14*	.11	.12*	.19**	.34**	−.08	−.13*	−.18**	.35**	.52**	.41**	.53**	–			
15. T3AP	.90	2.46	.26	−.94	.21**	.05	.13*	.12*	.27**	.39**	−.003	−.08	−.04	.32**	.40**	.49**	.48**	.59**	–		
16. T1CQuantity	.74	1.84	1.28	.72	.23**	.18**	.30**	.25**	.13*	.19**	−.04	−.09	−.12*	.17**	.13*	.21**	.29**	.29**	.32**	–	
17. T1CQuality	.86	2.27	1.05	.80	.28**	.18**	.27**	.28**	.20**	.20**	−.13*	−.08	−.19**	17**	.18**	.17**	.37**	.31**	.27**	.63**	–

Note. **p < .01, *p < .05. T1, T2, T3 = baseline assessment, 1-month follow-up assessment, and 2-month follow-up assessment, respectively. IE = Interconnected explanation; CB= Continuum belief; PS = Perceived similarity; IA = Interconnected accountability; Intention = Collective action intention; AP = Actual participation in collective action; CQuantity = Quantity of contact; T1CQuality = Quality of contact.

Table 2
Zero-order correlation of all the variables of interest specific to people with schizophrenia.

	Cronbach's alpha	Mean	Skewness	Kurtosis	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. T1IE	.90	−1.14	−.15	−1.00	–																
2. T1CB	.77	2.92	−.06	−.44	.15**	–															
3. T1PS	.91	1.77	.89	.07	.21**	.46**	–														
4. T2PS	.93	1.91	.72	−.21	.14*	.31**	.57**	–													
5. T1IA	.87	−.65	−.49	−.54	.56**	.15**	.15**	.15**	–												
6. T2IA	.92	−.35	−.37	−.47	.45**	.08	.14*	.19**	.57**	–											
7. T1AQ	.76	4.27	.28	.08	−.25**	−.18**	−.18**	−.15**	−.20**	−.17**	–										
8. T2AQ	.79	4.07	.15	−.01	−.21**	−.07	−.20**	−.18**	−.17**	−.13*	.63**	–									
9. T3AQ	.82	4.09	.19	−.12	−.19**	−.11	−.14*	−.22**	−.19**	−.19**	.66**	.75**	–								
10. T1Intention	.81	3.34	−.68	.35	.27**	.18**	.21**	.32**	.41**	.42**	−.32**	−.29**	−.25**	–							
11. T2Intention	.82	3.37	−.61	.51	.27**	.10	.17**	.25**	.36**	.45**	−.24**	−.24**	−.24**	.66**	–						
12. T3Intention	.88	3.46	−.59	.42	.28**	.15**	.19**	.23**	.40**	.52**	−.33**	−.35**	−.24**	.60**	.67**	–					
13. T1AP	.85	2.00	.86	−.24	.19**	.14**	.24**	.24**	.24**	.23**	−.13*	−.16**	−.12*	.42**	.39**	.38**	–				
14. T2AP	.84	2.15	.52	−.78	.20**	.08	.17**	.32**	.15**	.27**	−.13*	−.13*	−.13*	.35**	.40**	.39**	.50**	–			
15. T3AP	.89	2.23	.47	−.89	.25**	.15**	.25**	.27**	.34**	.38**	−.15**	−.13*	−.06	.39**	.42**	.52**	.44**	.52**	–		
16. T1CQuantity	.57	1.20	3.34	13.44	.12*	.08	.25**	.30**	.11*	.15*	−.09	−.13*	−.05	.06	.16**	.17**	.28**	.31**	.30**	–	
17. T1CQuality	.82	1.48	2.36	6.08	.22**	.11*	.24**	.23**	.13*	.19**	−.10	−.12*	−.13*	.12*	.11	.15**	.28**	.30**	.25**	.58**	–

Note. **p < .01, *p < .05. T1, T2, T3 = baseline assessment, 1-month follow-up assessment, and 2-month follow-up assessment, respectively. IE = Interconnected explanation; CB= Continuum belief; PS = Perceived similarity; IA = Interconnected accountability; Intention = Collective action intention; AP = Actual participation in collective action; CQuantity = Quantity of contact; CQuality = Quality of contact.

(Chan and Mak, 2021) was adapted in the present study to examine the intention to advocate for people with schizophrenia, using a 5-point Likert scale (1 = *not at all*, 5 = *very much*). A sample item includes "How willing would you be to participate in the following group actions related to people with ***schizohprenia***?" "Discuss mental health issues with family and/or friends to raise their awareness of the rights of people with ***schizophrenia***." A higher score suggests a greater intention to advocate for the target group.

Actual participation in private form of collective action (schizophrenia). The Private Collective Action subscale from the Collective Action Scale (Chan and Mak, 2021; Yu et al., 2024) was adapted in the present study to examine the frequency of participation in collective action regarding people with schizophrenia, using a 5-point Likert scale from 1 (*never*) to 5 (*frequently*). A sample item includes "In the past month, how often have you participated in the following group actions related to people with schizophrenia?" "Discuss mental health issues with family and/or friends to raise their awareness of the rights of people with schizophrenia" A higher score represents more participation in private forms of collective action in the past month.

Quality and quantity of contact (schizophrenia). Quantity and quality of contact were evaluated using an 8-item scale adapted by Méndez Fernández et al. (2022) on a 7-point Likert scale. The quantity of contact was assessed with four items addressing how much contact participants have had with people with schizophrenia in different situations (e.g., at the university), ranging from 1 (*none at all)* to 7 (*a great deal*). The quality of contact was measured by four items, including two items asking about the frequency of conversations with and visits to the homes of people with schizophrenia, and two items assessing the overall tone of these interactions (i.e., superficial or enjoyable), rated from 1 (*not at all*) to 7 (*very often*). A higher score indicates higher quality and quantity of contact with people with schizophrenia.

In addition to measures specific to people with schizophrenia, we also employed a separate set of questionnaires capturing the same variables specific to people with anxiety. To make the measures comparable across the two types of disorders, the content of the items is largely the same, except that the target group was changed from "people with schizophrenia" to "people with anxiety disorder." For example, the item for interconnected explanation, "I am one of the factors that affect the welfare of people with schizophrenia," was changed to "I am one of the factors that affect the welfare of people with anxiety disorder." There is an exception for AQ9. Since AQ9 is a vignette-based questionnaire, we also slightly changed its description of symptoms. Specifically, the description of Harry was changed from "Harry is a 30-year-old single man with schizophrenia. Sometimes he hears voices and becomes upset. He lives alone in an apartment and works as a clerk at a large law firm. He has been hospitalized six times because of his illness." to "Harry is a 30-year-old single man with anxiety disorder. He always feels nervous and disturbed. He lives alone in an apartment and works as a clerk at a large law firm. He has been hospitalized six times because of his illness." We would like to highlight that this vignette was only used in measure of AQ-9 but not in the other questionnaires.

2.4. Data analysis

First, we examined data distribution by analyzing skewness and kurtosis. Following the guidelines proposed by Kline (2016), we considered a skewness value of less than 3 and a kurtosis value of less than 10 as showing no indications of non-normality. Then, independent t-tests (for continuous variables) and chi-square tests (for categorical variables) were first conducted to examine the differences between retained and dropped-out participants at T2 and T3 regarding their baseline levels of the variables of interest (i.e., interconnected explanation, continuum belief, interconnected accountability, perceived similarity, stigma, and collective action-related variables) and their demographic characteristics (i.e., age, gender, education levels). This is to examine whether attrition could potentially affect the results.

Path analyses were performed to investigate the mediating role of interconnected accountability and perceived similarity in the association of interconnected explanation and continuum belief with mental illness stigma against people with anxiety disorder and people with schizophrenia, as well as collective action to advocate (intention and actual participation) for these two groups of people, using Mplus version 8.9. Each path model includes one dependent variable, resulting in 6 models in total (i.e., 3 dependent variables x anxiety or schizophrenia). Each model consists of two parts: a concurrent part and a prospective part (Fig. 1).

In the concurrent part, interconnected explanation and continuum belief measured at baseline (T1) were structured as independent variables (IVs); interconnected accountability and perceived similarity at T1 were structured as mediators, while either stigma or private form of collective action-related variables at T1 were entered as dependent variables. A direct path from T1 IV to the T1 DV was also structured.

The prospective part of the models examined four indirect paths. Specifically, the first and second indirect paths included T1 IVs (i.e., interconnected explanation and continuum belief) to T2 DVs (i.e., stigma or collective action-related variables) through T2 mediators (i.e., interconnected accountability and perceived similarity). The third and fourth indirect paths included IVs to T3 DVs through T2 mediators. In the prospective part, mediators and DVs measured at previous time points were also controlled. Given that contact could potentially impact one's levels of stigma and advocacy for socially marginalized groups, the previous quantities and qualities of contact at T1 were controlled in all mediators and DVs.

By specifying these indirect paths, we were able to examine the consistency of indirect effects over time, providing more robust evidence for the mediating relationship. Specifically, the indirect effect of the T1 IV on the T1 DV through the T1 mediator offers concurrent or cross-sectional evidence for the mediating association. The indirect effect of the T1 IV on the T2 DV through the T2 mediator provides partial temporal evidence, as the association between the T2 mediator and the T2 DV is concurrent. The indirect effect of the T1 IV on the T3 DV through the T2 mediator offers full temporal evidence, as each variable has a one-time lag in between. We consider the evidence from the indirect path of T1 IV to T3 DV through T2 mediator to be the most stringent.

The model fit was assessed based on the goodness-of-fit indices, including the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean squared residual (SRMR). The following fit criteria were used: CFI $\geq$.95, TLI $\geq$.95, RMSEA $\leq$.06 and SRMR $\leq$.08 for good fit, and CFI $\geq$.90, TLI $\geq$.90, RMSEA $\leq$.10 and SRMR $\leq$.10 for acceptable fit (Hu and Bentler, 1999; Weston and Gore, 2006). All the missing data were handled by full maximum likelihood estimation.

3. Results

The results of the skewness and kurtosis analyses showed that none of the variables analyzed, except for the quality of contact with people with schizophrenia, had skewness greater than 3 and kurtosis greater than 10, indicating no deviations from normality (see Tables 1 and 2). Results of independent t-tests and chi-square tested also showed no difference between dropped-out and retained participants on the baseline score of all the variables of interest and demographic information. This provided evidence to suggest that attrition should not affect the results of subsequent analyses.

3.1. Preliminary analyses – intercorrelations among variables of interest

Table 1 shows the intercorrelations among the variables of interest in the study. Across variables specific to people with anxiety disorders and people with schizophrenia, interconnected explanation (IE) shared significantly moderate-to-strong correlations with interconnected accountability (IA) measured across T1 and T2 (rs = .44 to .56). The correlations of interconnected explanations with perceived similarity (PS) across samples over time ranged from nonsignificant to significantly weak (rs = .08 to .21). On the other hand, the correlations between continuum beliefs (CB) and PS across people with the two types of disorders over time were significant, ranging from moderate to moderate-to-strong (rs = .31 to .46). The correlations between CB and IA were mostly not significant regarding the two types of mental disorders.

Regarding the zero-order correlations between the proposed mediators and the outcomes (i.e., stigma, collective action intention, and actual participation), IA shared significantly moderate-to-strong correlations with collective action intention (rs = .25 to .52), weak-to-moderate correlations with actual participation in collective action (rs = .15 to .39), and close-to-zero to weak correlations with stigma (rs = −.05 to −.20) across both types of disorders over time. On the other hand, the pattern of correlations of PS with the outcome variables seems to differ across the two types of disorders. Specifically, for people with anxiety disorders, the correlations of PS with stigma (rs = −.04 to −.19), collective action intention (rs = .09 to .16), and actual participation in collective action (rs = .11 to .19) ranged from close-to-zero to weak. For variables specific to people with schizophrenia, PS had significantly weak to moderate correlations with collective action intention (rs = .17 to .32) and actual participation across time points (rs = .17 to .32). However, it had close-to-zero to weak correlations with stigma (rs = −.14 to −.22).

3.2. Mediation analyses – variables specific to people with anxiety disorders

Table 3 shows the goodness-of-fit indices for all the models tested. In

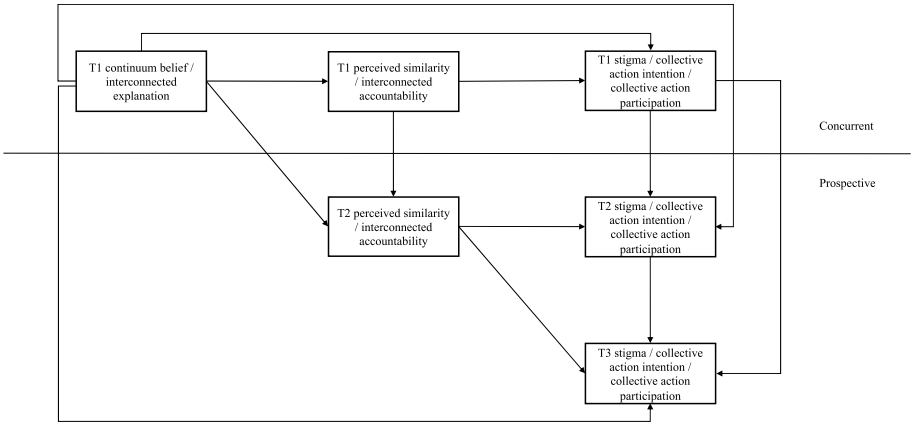

Fig. 1. Proposed mediati model.

Table 3
Goodness-of-fit indices for all the models tested.

Model	$\chi 2$	*df*	*p*	TLI	CFI	RMSEA	SRMR	AIC
Anxiety								
Stigma	19.113	10	.039	.948	.989	.049	.023	6978.737
Intention	30.244	10	.0008	.898	.979	.073	.037	6481.329
Participation	19.668	10	.033	.946	.989	.051	.025	7167.094
Schizophrenia								
Stigma	11.774	10	.301	.991	.998	.022	.018	6987.483
Intention	36.753	10	.0001	.873	.974	.084	.047	6426.409
Participation	24.94	10	.006	.913	.982	.063	.025	7017.526

general, most of the models showed satisfactory fit, except the schizophrenia-specific model that includes intention showing TLI = .87.

Table 4 shows the results of concurrent and prospective parts of the mediation models. Regarding the model specific to people with anxiety disorder, in the concurrent part, T1 CB about anxiety was significantly associated with T1 PS ($\widehat{\beta} = .38, p < .001$, 95 % CI [.30, .47]), but not with T1IA ($\widehat{\beta} = -.004, p = .93$, 95 % CI [-.09, .08]), after controlling for T1 IE and previous contact experiences. T1 PS, however, was not significantly associated with any T1 outcome variables after controlling for T1 IE, T1 IA, T1 CB, and T1 previous contact experience. Therefore, the indirect effects of CB regarding anxiety disorder on outcome variables through T1 PS were not significant. In other words, the proposed mediational associations for CB were not supported.

On the other hand, at the concurrent level, after controlling for the T1 CB and previous contact experience, T1 IE remained significantly associated with T1 PS ($\widehat{\beta} = .11, p = .02$, 95 % CI [.02, .20]) and T1 IA ($\widehat{\beta} = .55, p < .001$, 95 % CI [.47, .62]). T1 IA, in turn, was significantly associated with a higher intention to advocate for people with anxiety disorder ($\widehat{\beta} = .40, p < .001$, 95 % CI [.30, .51]) and greater frequency of participation in private form of collective action ($\widehat{\beta} = .20, p < .001$, 95 % CI [.09, .31]). No significant association between IA and stigma was observed ($\widehat{\beta} =$ -.03, $p = .64$, 95 % CI [-.15, .09]). Only the indirect effects of IE on intention to advocate ($\widehat{\beta} = .22, p < .001$, 95 % CI [.15, .29]) and actual participation in collective action ($\widehat{\beta} = .11, p < .001$, 95 % CI [.05, .17]) were significant.

In the prospective part, T1 CB significantly predicted higher T2 PS ($\widehat{\beta} = .12, p = .02$, 95 % CI [.02, .22]) but not T2 IA ($\widehat{\beta} = -.005, p = .91$, 95 % CI [-.10, .09]). T2 PS, however, could not predict any outcome variables at both T2 and T3. Despite this, it is worthy to note that the direct effect of CB on T3 stigma was significant ($\widehat{\beta} = -.11, p = .007$, 95 % CI [-.20, −.03]), after controlling for the stigma measured at previous time points and other variables of interest.

On the other hand, T1 IE significantly predicted T2 IA ($\widehat{\beta} = .18, p = .001$, 95 % CI [.07, .29]) but not T2 PS ($\widehat{\beta} = -.03, p = .48$, 95 % CI [-.12, .06]). T2 IA, consistent with the concurrent part, was predictive of higher intention to advocate and actual participation in collective action at both T2 (intention: $\widehat{\beta} = .34, p < .001$, 95 % CI [.23, .45]; participation: $\widehat{\beta} = .17, p = .002$, 95 % CI [.07, .28]) and T3 (intention: $\widehat{\beta} = .23, p < .001$, 95 % CI [.12, .33]; participation: $\widehat{\beta} = .17, p = .001$, 95 % CI [.07, .28]). It was significantly associated with stigma at T2 ($\widehat{\beta} = -.12, p = .03$, 95 % CI [-.22, −.01] but not T3 ($\widehat{\beta} = -.04, p = .35$, 95 % CI [-.13, .05]). The indirect effects of T1 IE on T2 intention to advocate ($\widehat{\beta} = .06, p = .004$, 95 % CI [.02, .10]), on T3 intention to advocate ($\widehat{\beta} = .04, p = .01$, 95 % CI [.01, .07), on T2 actual participation in collective action ($\widehat{\beta} = .03, p = .02$, 95 % CI [.004, .06]), and on T3 actual participation in collective action ($\widehat{\beta} = .03, p = .02$, 95 % CI [.004, .06]) through T2 IA were significant. The indirect effect of T1 IE on T2 stigma through T2 IA, however, was not significant ($\widehat{\beta} =$ -.02, $p = .07$, 95 % CI [-.04, .002]).

3.3. Mediation analyses – variables specific to people with schizophrenia

Regarding the model specific to people with schizophrenia, in the concurrent part, T1 CB about schizophrenia was significantly associated with T1 PS ($\widehat{\beta} = .42, p < .001$, 95 % CI [.34, .50]), but not with T1 IA ($\widehat{\beta} = .06, p = .15$, 95 % CI [-.02, .15]), after controlling for T1IE and previous contact experiences. T1 perceived similarity was significantly associated with T1 intention to advocate for people with schizophrenia ($\widehat{\beta} = .12, p = .03$, 95 % CI [.01, .23]) and T1 actual participation in collective action for people with schizophrenia ($\widehat{\beta} = .13, p = .02$, 95 % CI [.02, .24]) but not T1 stigma ($\widehat{\beta} = -.08, p = .16$, 95 % CI [-.19, .03]). The indirect effect of T1 CB on T1 intention to advocate ($\widehat{\beta} = .05, p = .03$, 95 % CI [.005, .10]) and T1 actual participation in collective action ($\widehat{\beta} = .06, p = .02$, 95 % CI [.007, .10]) through T1 perceived similarity was significant.

Besides, T1 IE was significantly associated with both T1 PS ($\widehat{\beta} = .11, p = .01$, 95 % CI [.02, .20]) and T1 IA ($\widehat{\beta} = .55, p < .001$, 95 % CI [.48, .63]). Consistent with the results of the model specific to people with anxiety, IA, in turn, was significantly associated with a higher T1 intention to advocate for people with schizophrenia ($\widehat{\beta} = .37, p < .001$, 95 % CI [.26, .47]) and T1 greater frequency of participation in collective action ($\widehat{\beta} = .18, p = .002$, 95 % CI [.07, .29]) for people with schizophrenia. No significant association between T1 IA and T1 stigma ($\widehat{\beta} = -.07, p = .24$, 95 % CI [-.19, .05]) was observed. The indirect effects of T1 IE on T1 intention to advocate ($\widehat{\beta} = .20, p < .001$, 95 % CI [.14, .27]) and T1 actual participation in private form of collective action ($\widehat{\beta} = .10, p = .002$, 95 % CI [.04, .16]), were significant.

In the prospective part, T1 CB could not significantly predict T2 PS ($\widehat{\beta} = .07, p = .22$, 95 % CI [-.04, .17]) and T2 IA ($\widehat{\beta} = -.01, p = .82$, 95 % CI [-.10, .08]). Given the non-significant association between CB and the mediators, the proposed mediation is not possible.

On the other hand, T1 IE significantly predicted T2 IA ($\widehat{\beta} = .16, p = .007$, 95 % CI [.04, .27]) but not T2 PS ($\widehat{\beta} = .02, p = .75$, 95 % CI [-.08, .11]). T2 IA was predictive of higher T2 intention to advocate ($\widehat{\beta} = .21, p < .001$, 95 % CI [.11, .31]), T3 intention to advocate ($\widehat{\beta} = .26, p < .001$, 95 % CI [.16, .36]), and T3 actual participation in collective action ($\widehat{\beta} = .23, p < .001$, 95 % CI [.12, .33]), but not actual participation in collective action at T2 ($\widehat{\beta} = .10, p = .06$, 95 % CI [-.002, .21]). Consistently, it was also not predictive of stigma at subsequent time points (T2: $\widehat{\beta} = -.002, p = .97$, 95 % CI [-.10, .10]; T3: $\widehat{\beta} = -.03, p = .47$, 95 % CI [-.12, .05]). The indirect effects of T1 IE on T2 intention to advocate ($\widehat{\beta} = .03, p = .02$, 95 % CI [.005, .06]), T3 intention to advocate ($\widehat{\beta} = .04, p = .01$, 95 % CI [.009, .08]), and T3 actual participation in collective action ($\widehat{\beta} = .04, p = .02$, 95 % CI [.005, .07]) through T2 IA were significant.

4. Discussion

The present study examined the temporal relationships among interconnected explanations, continuum beliefs, stigma, and private

Table 4
Standardized result of mediation analyses.

	Anxiety		Schizophrenia	
	Standardized beta	Indirect effect	Standardized beta	Indirect effect
Concurrent Part				
T1 IE →T1 PS	.11* (.02, .20)		.11* (.02, .20)	
T1 IE →T1 IA	.55*** (.47, .62)	–	.55*** (.48, .63)	–
T1 IA → T1 Intention	.40*** (.30, .51)	–	.37*** (.26, .47)	–
T1 IE → T1 Intention	−.06 (−.17, .05)	–	.02 (−.09, .13)	–
T1 IE → T1 IA → T1 Intention	–	.22*** (.15, .29)	–	.20*** (.14, .27)
T1 CB →T1 IA	−.004 (−.09, .08)		.06 (−.02, .15)	
T1 CB →T1 PS	.38*** (.30, .47)	–	.42*** (.34, .50)	–
T1 PS → T1 Intention	.006 (−.10, .11)	–	.12* (.01, .23)	–
T1 CB → T1 Intention	.18*** (.08, .28)	–	.07 (−.04, .17)	–
T1 CB → T1 PS → T1 Intention	–	.002 (−.04, .04)	–	.05* (.005, .10)
T1 IA → T1 AP	.20*** (.09, .31)	–	.18** (.07, .29)	–
T1 IE → T1 AP	−.03 (−.14, .08)	–	.005 (−.11, .12)	–
T1 IE → T1 IA → T1 AP	–	.11*** (.05, .17)	–	.10** (.04, .16)
T1 PS → T1 AP	.06 (−.04, .17)	–	.13* (.02, .24)	–
T1 CB → T1 AP	.01 (−.09, .12)	–	.02 (−.08, .13)	–
T1 CB → T1 PS → T1 AP	–	.02 (−.02, .07)	–	.06* (.007, .10)
T1 IA → T1 Stigma	−.03 (−.15, .09)	–	−.07 (−.19, .05)	–
T1 IE → T1 Stigma	.01 (−.11, .13)	–	−.18** (−.29, −.06)	–
T1 IE → T1 IA → T1 Stigma	–	−.02 (−.08, .05)	–	−.04 (−.10, .03)
T1 PS → T1 Stigma	−.02 (−.14, .09)	–	−.08 (−.19, .03)	–
T1 CB → T1 Stigma	−.09 (−.20, .02)	–	−.10 (−.21, .007)	–
T1 CB → T1 PS → T1 Stigma	–	−.009 (−.05, .04)	–	−.04 (−.08, .01)
Prospective Part				
T1 IE → T2 PS	−.03 (−.12, .06)		.02 (−.08, .11)	
T1 IE → T2 IA	.18** (.07, .29)	–	.16** (.04, .27)	–
T2 IA → T2 Intention	.34*** (.23, .45)	–	.21*** (.11, .31)	–
T1 IE → T2 Intention	−.06 (−.16, .04)	–	.04 (−.06, .13)	–
T1 IE → T2 IA → T2 Intention	–	.06** (.02, .10)	–	.03* (.005, .06)
T2 IA → T3 Intention	.23*** (.12, .33)	–	.26*** (.16, .36)	–
T1 IE → T3 Intention	−.03 (−.12, .06)	–	−.02 (−.11, .07)	–
T1 IE → T2 IA → T3 Intention	–	.04* (.01, .07)	–	.04* (.009, .08)
T1 CB → T2 IA	−.005 (−.10, .09)		−.01 (−.10, .08)	
T1 CB → T2 PS	.12* (.02, .22)	–	.07 (−.04, .17)	–
T2 PS → T2 Intention	.06 (−.04, .16)	–	.03 (−.07, .12)	–
T1 CB → T2 Intention	.09 (−.02, .19)	–	−.02 (−.11, .07)	–
T1 CB → T2 PS → T2 Intention	–	.007 (−.006, .02)	–	.002 (−.005, .009)
T2 PS → T3 Intention	.05 (−.04, .14)	–	.04 (−.05, .13)	–
T1 CB → T3 Intention	−.04 (−.13, .05)	–	−.01 (−.10, .07)	–
T1 CB → T2 PS → T3 Intention	–	.006 (−.006, .02)	–	.003 (−.005, .01)
T2 IA → T2 AP	.17** (.07, .28)	–	.10 (−.002, .21)	–
T1 IE → T2 AP	.02 (−.09, .12)	–	.04 (−.06, .14)	–
T1 IE → T2 IA → T2 AP	–	.03* (.004, .06)	–	.02 (−.004, .04)
T2 IA → T3 AP	.17** (.07, .28)	–	.23*** (.12, .33)	–
T1 IE → T3 AP	.01 (−.09, .11)	–	.02 (−.08, .12)	–
T1 IE → T2 IA → T3 AP	–	.03* (.004, .06)	–	.04* (.005, .07)
T2 PS → T2 AP	−.02 (−.12, .09)	–	.18*** (.08, .28)	–
T1 CB → T2 AP	.05 (−.06, .15)	–	−.07 (−.16, .03)	–
T1 CB → T2 PS → T2 AP	–	−.002 (−.01, .01)	–	.01 (−.008, .03)
T2 PS → T3 AP	.04 (−.05, .14)	–	.07 (−.04, .17)	–
T1 CB → T3 AP	−.08 (−.17, .02)	–	.03 (−.07, .12)	–
T1 CB → T2 PS → T3 AP	–	.005 (−.007, .02)	–	.004 (−.005, .01)
T2 IA → T2 Stigma	−.12* (−.22, −.01)	–	−.002 (−.10, .10)	–
T1 IE → T2 Stigma	.03 (−.08, .14)	–	−.03 (−.12, .07)	–
T1 IE → T2 IA → T2 Stigma	–	−.02 (−.04, .002)	–	.00 (−.02, .02)
T2 IA → T3 Stigma	−.04 (−.13, .05)	–	−.03 (−.12, .05)	–
T1 IE → T3 Stigma	.03 (−.06, .12)	–	.03 (−.06, .11)	–
T1 IE → T2 IA → T3 Stigma	–	−.008 (−.03, .009)	–	−.005 (−.02, .009)
T2 PS → T2 Stigma	−.07 (−.18, .03)	–	−.09 (−.18, .01)	–
T1 CB → T2 Stigma	−.04 (−.14, .07)	–	.05 (−.04, .14)	–
T1 CB → T2 PS → T2 Stigma	–	−.009 (−.02, .006)	–	−.006 (−.02, .005)
T2 PS → T3 Stigma	.01 (−.08, .10)	–	−.08* (−.16, −.003)	–
T1 CB → T3 Stigma	−.11** (−.20, −.03)	–	.03 (−.05, .10)	–
T1 CB → T2 PS → T3 Stigma	–	.002 (−.009, .01)	–	−.006 (−.02, .005)

Note. T1, T2, T3 = baseline assessment, 1-month follow-up assessment, and 2-month follow-up assessment, respectively. IE = Interconnected explanation; CB= Continuum belief; PS = Perceived similarity; IA = Interconnected accountability; Intention = Collective action intention; AP = Actual participation in collective action. ***$p < .001$, **$p < .01$; *$p < .05$.

forms of collective action for people with schizophrenia and people with anxiety disorders. The results indicated that interconnected explanations predicted a higher intention and actual participation in private forms of collective action, but not stigma, through interconnected accountability both concurrently and prospectively. This effect was consistent for variables specific to both people with anxiety disorders

and people with schizophrenia. Continuum belief did not show any significant temporal effects on either collective action intention, actual collective action participation, or stigma against individuals with anxiety and schizophrenia through perceived similarity.

However, it is noteworthy that continuum belief was predictive of lower stigma against people with anxiety disorder, but not schizophrenia, at T3, after controlling for other variables of interest. It was also associated with higher perceived similarity with people with anxiety disorder both concurrently and prospectively; it was associated with higher perceived similarity with individuals with schizophrenia only concurrently, but not prospectively. Overall, the results of the present study provided the evidence to partly support the theoretical assumption that reducing the sense of separation between socially dominant groups and people with mental illness and building a perceived connection between the two groups could be conducive to stigma reduction (Link and Phelan, 2001).

The findings of the present study were consistent with past research that showed a significant association among continuum belief, perceived similarity, and lower stigma, as reflected by the zero-order correlation at the concurrent level (Buckwitz et al., 2022, 2023; Peter et al., 2021; Violeau et al., 2020). The present study also added an additional piece of evidence that continuum belief and perceived similarity could be weakly associated with a higher intention to advocate for people with mental illness. This means that the more people view mental illness in a continuum manner (such as anxiety disorder and schizophrenia in the present study), the more they feel similar to people with mental illness, have less stigma, and show a greater intention to advocate for this group of people.

Despite the significant association, the evidence was largely limited to the concurrent level. The predictability of continuum belief and perceived similarity on the outcome variables at subsequent time points was not significant, except that continuum belief could predict lower stigma against people with anxiety disorders at a later time point. While the evidence available in the literature supporting the effect of continuum belief is largely concurrent (i.e., cross-sectional survey study and one-off short-term experiment), the present study might provide insight into future stigma reduction using continuum belief. For example, like contact intervention (Corrigan, 2011), continuous cultivation about the continuum belief to socially dominant groups may be critical for showing sustained effects, especially, for stigma against people with severe mental illness, such as schizophrenia. Future studies could also investigate the dosage and duration of continuum belief-based interventions needed to produce sustained effects on stigma reduction among socially dominant groups.

Additionally, the findings of the present study supported the idea that interconnected accountability could potentially be the mechanism underlying the effect of interconnected explanations on private forms of collective action, including both intention and actual participation. However, such mediating relationships could not be observed with stigma. This finding was consistent with a recent one-year longitudinal study that found interconnectedness, a general form of interconnected explanation not specific to the context of mental illness stigma, could consistently predict higher private forms of collective action for people with mental illness, but not vice versa, in a cross-lagged panel model (Yu et al., 2024). The finding was also consistent with an experimental study showing that a short cultivation of interconnected explanation was conducive to a higher intention to advocate for people with schizophrenia two weeks after the short cultivation (Yu et al., 2022). However, in contrast to previous research that found interconnected explanation could predict lower social distance, a form of stigma, prospectively through interconnected accountability (Yu et al., 2023a,b), the present study did not observe a significant temporal relationship between interconnected explanations and stigma. This may be due to the nature of stigma measured in the present study is different from that in the previous study (Yu et al., 2023a,b). Whereas the past study focused on social distance (Yu et al., 2023a,b), the present study focused on a composite score consisting of various forms of stigma, covering cognitive, attitudinal, and behavioral aspects. It is reasonable that people who are aware of their moral accountability for the welfare of people with mental illness are more motivated to accept (i.e., lower social distance) and advocate for this group of people; such moral responsibility may not be able to change their negative stereotypes and attitudes against this group. This provided an insight that, in future applications of interconnected explanation, it would be better to use it alongside psychoeducation, which has been shown to reduce negative stereotypes against people with mental illness (Corrigan et al., 2012), so that the intervention can cover both the promotion of advocacy and the reduction of stigma for people with mental illness. It is also noteworthy that, consistent with previous research focusing on interconnected explanation and interconnected accountability for recovery (Yu et al., 2022, 2023), we found that the mean levels of these two variables concerning the welfare of people with mental illness ranged from slightly disagree to neutral. Together with past studies (Yu et al., 2022, 2023), this suggested that people generally do not have a clear stance on whether they are accountable for the recovery or welfare of individuals with mental illness. This further highlights the need to emphasize the interdependent relationships between socially dominant groups and people with mental illness in stigma reduction or advocacy promotion programs to increase their effectiveness.

It is interesting to observe the differential direct effect of continuum belief on stigma between two types of mental illness. It was found that continuum belief was predictive of lower stigma against people with anxiety but not against people with schizophrenia, after controlling for other variables. This implies that continuum belief could have differential effects on different types of mental illness. This could be because the prevalence rate of anxiety symptoms is much higher than that of psychotic symptoms (WHO, 2022a,b), making it easier for people to understand the continuum nature of anxiety compared to schizophrenia. As a result, without direct cultivation of continuum belief, the effect of continuum belief on psychotic symptoms becomes more difficult to manifest. However, evidence regarding the effectiveness of continuum belief on stigma against people with anxiety disorders is limited. More studies are needed to replicate the results of the present study, and future research should focus on a wider range of types of mental illness.

The results of the present study suggest that interconnected explanations through interconnected accountability performed better than continuum belief through perceived similarity in promoting advocacy for people with anxiety disorders and schizophrenia. While the present study indicated that including interconnected explanations (an awareness of how one may play a role in the welfare of people with mental illness) could potentially be an appropriate strategy for promoting advocacy among socially dominant groups, we do not intend to downplay the importance of continuum belief in stigma reduction and advocacy promotion. Instead, this study with prospective design highlighted the need for stigma research to consider promoting continuous continuum belief-based interventions, rather than one-off interventions, for stigma reduction, as the effects may not be sustainable over time, especially for people with severe mental illness, such as schizophrenia.

It is possible that an interconnected explanation could be particularly effective in the cultural context of Hong Kong. The culture of Hong Kong is influenced by collectivist values, which emphasize the importance of family kinship and collective harmony (Tse and Ng, 2014; Mak and Chen, 2010; Yu et al., 2020). The focus of interconnectedness on interdependent relationships with people who have mental illness aligns well with Hong Kong's cultural values. Future studies could explore these findings in cultures with less collectivistic values to assess the potential of interconnected explanations compared to continuum. Meanwhile, in recent years, researchers have also investigated how one conceptualizes mental illness could influence stigma and found that such a concept could interact with continuum beliefs to affect stigma (Juergensen et al., 2024; Tse and Haslam, 2023). It would be worthwhile to investigate the interaction effects of interconnected explanation, continuum belief and

conceptualization of mental illness in future studies.

The present study has limitations that warrant attention. First, although the study's prospective design allows us to investigate the temporal associations among the variables of interest, the time interval between each measurement point was short. Future research could consider employing a longitudinal study with a longer duration to replicate the results and examine whether any changes in the pattern of results occur due to time effects. Additionally, our study could not establish causality. Future studies should examine the causal relationships between these variables through experiments with longer durations and multiple time points. Second, the sample recruited in the present study consists of college students, which may limit the generalizability of the findings. College students are generally younger, have higher levels of education, and may be more socially conscious compared to the overall population, which could confound the results. Furthermore, since the participants were recruited from a single site, the generalizability of these findings to larger, more diverse groups is further limited. Future research should consider replicating the model in a community with diverse backgrounds. Third, given that we need to make all the scales comparable between the two types of mental illness, we have modified the target group of each scale. The modified scales have not undergone a formal scale validation process. Psychometric studies are warranted to validate the scales in the future. Fourth, consistent with previous research (e.g., Corrigan et al., 2014), we used the vignette from AQ9 that describes a person named "Harry," which is a male-type name. This might introduce some gender bias. Future research could use a vignette that includes a gender-neutral name. Despite these limitations, this study provided temporal evidence regarding the relative effects of interconnected explanations and continuum belief on stigma and advocacy, as well as their mechanisms, extending the evidence of continuum belief in the literature, which is largely of concurrent nature. Additionally, it offers an alternative construct, interconnected explanation, that targets the separation component of the stigmatization process, promoting private forms of collective action for people with anxiety disorders and schizophrenia among socially dominant groups. These findings lay important groundwork for future stigma reduction strategies. By integrating these concepts, future interventions could enhance their effectiveness and better promote collective efforts to advocate for people with mental illness.

CRediT authorship contribution statement

Ben C.L. Yu: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Shirley X. Peng:** Writing – review & editing, Project administration, Methodology. **Sylvia Xiaohua Chen:** Writing – review & editing. **Jacky C.K. Ng:** Writing – review & editing, Formal analysis.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT in order to improve language proficiency. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of competing interest

None.

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Appendix A. Supplementary data

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