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The Network Structure of ICD-11 Disorders Specifically Associated with Stress: Adjustment Disorder, Prolonged Grief Disorder, Posttraumatic Stress Disorder, and Complex Posttraumatic Stress Disorder

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Keywords
ICD-11 · Disorders specifically associated with stress · Network analysis · Comorbidity · Stress-based disorders

Abstract
Introduction: The ICD-11 includes a new grouping for "disorders specifically associated with stress" that contains revised descriptions of posttraumatic stress disorder (PTSD) and adjustment disorder (AjD) and new diagnoses in the form of complex PTSD (CPTSD) and prolonged grief disorder (PGD). These disorders are similar in that they each require a life event for the diagnosis; however, they have not yet been assessed together for validity within the same sample. We set out to test the distinctiveness of the four main ICD-11 stress disorders using a network analysis approach. ***Methods:*** A population-based, cross-sectional design. A nationally representative sample of adults from the Republic of Ireland aged 18 years and older (N = 1,020) completed standardized measures of PTSD, CPTSD, AjD, and PGD. A network analysis was conducted at the symptom level. Outcome measures included the International Trauma Questionnaire, the Inventory of Complicated Grief, and the International Adjustment Disorder Questionnaire. ***Results:*** Consistent with the taxonomic structure of the ICD-11, our results showed that although the four conditions clustered independently at the disorder level, the specific symptoms of PTSD, CPTSD, PGD, and AjD clustered together very strongly but more strongly than with symptoms of the other disorders. The majority (61%) of the variation in each symptom

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could be explained by its neighboring symptoms. The strongest transdiagnostically connecting symptom was "startle response." ***Discussion/Conclusion:*** Mental health professionals caring for people who have experienced a range of stressors and traumatic life events can be confident in diagnosing these conditions that have clear diagnostic boundaries. Interventions addressing stress-associated disorders should be based on diagnostic assessment to ensure close fit between symptoms and treatment.

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Introduction

Stressful and traumatic life events are common and are associated with several psychiatric diagnoses [1, 2]. The ICD-11 [3] includes a new grouping for "disorders specifically associated with stress" that contains revised descriptions of post-traumatic stress disorder (PTSD: PB40) and adjustment disorder (AjD: PB43) and new diagnoses in the form of complex PTSD (CPTSD: PB41) and prolonged grief disorder (PGD: PB42). These disorders are similar in that they each require the occurrence of a life event for the consideration of a diagnosis. In this study, we examine the network structure of PTSD, CPTSD, PGD, and AjD to evaluate the symptom connections within and across diagnostic boundaries. It is expected that there will be strong connections within diagnoses as well as between some symptoms which might identify as transdiagnostic symptoms. A brief description of these disorders is provided as follows.

PTSD and CPTSD are disorders that can occur following exposure to (a) traumatic event(s), which is defined as any extremely threatening or horrific event [4]. PTSD includes three symptom clusters of reexperiencing in the here and now, avoidance of traumatic reminders, and sense of current threat, while CPTSD includes six symptom clusters: three are shared with PTSD along with affective dysregulation, negative self-concept, and disturbed relationships, and the latter of which are collectively termed "disturbances in self-organization" (DSO) [5]. PGD may occur following the death of a person close to the bereaved and is characterized by persistent and pervasive longing or preoccupation for the deceased. Importantly, the grief response needs to have persisted for an atypically long time and exceed sociocultural norms. Finally, AjD can occur following a psychosocial stressor or multiple stressors (e.g., job loss and divorce) and is characterized by preoccupation with the stressor (e.g., excessive worrying) and failure to adapt to the stressor (e.g., inability to regain emotional equanimity) [6]. Studies have shown that these disorders, and the events that may precipitate them, are frequently observed in the general population [5–7] and are very common in clinical samples [8, 9].

Self-report measures for each of these disorders have been developed (and are freely available in multiple translations from https://www.traumameasuresglobal.com/) and have been widely used across different nations and different cohorts exposed to different kinds of stressors. Based on data derived from these measures, there is considerable evidence to support the construct validity of PTSD and CPTSD [9] and less but growing evidence to support the construct validity of AjD and PGD [6]. Evidence of validity, including the discriminant validity of each disorder, has mainly been derived from studies using latent variable modeling techniques; however, a growing number of studies have used the conceptually distinct approach of network analysis [10]. These studies have predominantly focused on PTSD and CPTSD and have found a network of symptom connections that correspond to the symptom clustering as outlined in ICD-11 [11–13].

While there is evidence to support the construct validity of each of these stress-related disorders, no study has yet evaluated these four disorders together in the same sample. Given that PTSD, CPTSD, PGD, and AjD are conceptually similar in that they are all persistent maladaptive reactions to life stressors and that they likely share similar etiological factors such as memory alterations [14], it is highly probable that the symptoms reflecting these disorders interact in important ways. Network analysis is an ideal method to explore symptom connections within and across diagnostic boundaries. Network analysis provides a visual representation of symptom interaction within and between disorders and can illustrate which symptoms are more central than others, which, if prioritized in therapy, this will enable rapid response to treatment. This analytical strategy is rooted in the network approach to psychopathology [15] that specifies mental disorders as networks of directly and indirectly interacting symptoms. Opposing the traditional latent variable view of psychopathology, this approach does not assume the presence of a latent disorder that explains symptom covariation. Rather, symptoms are supposed to directly influence one another, within but also across disorder boundaries, explaining the presence of comorbidity. This approach seems to be of particular relevance for ICD-11's disorders specifically associated with stress as these disorders share similar features but also should form distinguishable disorders. Investigating symptom covariance within and across disor-

der boundaries may add to a network psychometric validation of the disorders at stake [16].

In this study, we set out to examine the network structure of PTSD, CPTSD, PGD, and AjD. Assuming the ICD-11's diagnostic classification has conceptual integrity, we hypothesized the existence of a network of positively related symptoms where the symptoms within a given disorder clustered more strongly to one another than to symptoms of other disorders. However, recognizing that diagnostic boundaries are rarely perfect demarcations between conditions [17] and following the network approach, we hypothesized that some symptoms would evidence transdiagnostic features. We aimed to identify which, if any, symptoms act as "bridges" between the disorders.

Methods

Participants

This study utilized data from a nationally representative sample of adults aged 18 years and older from the Republic of Ireland (N = 1,020). Participants were drawn from existing online, nationally representative panels. Participants in this sample were selected using quota sampling procedures to construct a dataset that represented the Irish adult population based on sex, age, and geographical distribution. The data were collected by an Ireland-based survey company, Qualtrics, and participants were remunerated by Qualtrics for their time. Participants were contacted via email, text, or in-app notification and to avoid selection bias, were provided with minimal information about the study at this first contact. If participants followed the provided link to the Qualtrics platform to complete the survey, they were provided with a detailed information sheet about the nature of the study and asked to provide their consent prior to participating. The data were collected in February 2019, and the median time of completion of the survey was 22 min.

All participants indicated exposure to at least one stressful life event; 87.7% (n = 895) indicated exposure to at least one traumatic event, and 81.4% (n = 830) indicated a bereavement (details on the measurement of these events in outlined in the next section). In total, 73.5% (n = 750) of individuals experienced a stressor, a trauma, and a bereavement and therefore had complete data on measures of PTSD, CPTSD, PGD, and AjD. To include only those participants who fulfilled the A criteria of all disorders and could thus possibly suffer from any of the four disorders, all analyses were based on responses from these participants. The mean age of this sample was 45.42 years (Mdn = 45.00, SD = 14.69, range 18–87), and 51.1% were female. Ireland is comprised of four regional provinces, and 53.1% of participants resided in Leinster (east of the country including the capital city of Dublin), 27.2% resided in Munster (south of the country), 14.4% resided in Connaught (west of the country), and 5.3% resided in Ulster (north of the country, not including Northern Ireland). Most participants were in a committed relationship (70.5%) and had children (62.9%). Secondary school completion was the highest educational attainment for 39.2% of the sample, 37.9% completed an undergraduate degree, 15.5% completed a postgraduate degree, and 7.5% did not complete secondary school. Nearly half of participants were in full-time employment (44.3%); 18.3% were in part-time employment; 29.6% were retired, homemaking, or a student; and 7.9% were unemployed.

Measures

Trauma Exposure

The *International Trauma Exposure Measure* [4] includes descriptions of 21 events that reflect the ICD-11's description of a traumatic event as an "extremely threatening or horrific event." Participants are asked to indicate if they experienced each event during three developmental periods: 0–12 years, 13–18 years, and older than 18 years. Lifetime exposure was indicated if the event occurred in any one of these periods. Participants were also asked to identify their most distressing traumatic event, if they were exposed to multiple traumatic events.

PTSD and CPTSD

The *International Trauma Questionnaire* (ITQ) [5] is an 18-item measure that respondents complete in relation to their most distressing traumatic event. Six items measure the PTSD symptoms of "reexperiencing in the here and now," "avoidance," and "sense of current threat" and are answered in terms of how bothersome the symptoms have been in the past month. Six items measure the DSO symptoms of "affective dysregulation," "negative self-concept" (NSC), and "disturbed relationships" and are answered in terms of how respondents typically feel, think about themselves, and relate to others. The PTSD and DSO symptoms are accompanied by three items measuring functional impairment in the domains of social, occupation, and other important areas of life. All items are answered using a five-point Likert scale that ranges from 0 (not at all) to 4 (extremely). The internal reliability of the PTSD (α = 0.89), DSO (α = 0.91), and total (α = 0.92) scale scores in this sample were excellent.

Prolonged Grief Disorder

The *Inventory of Complicated Grief-Revised* (ICG-R) [18] first asks respondents, "at any time in your life, has someone close to you died (e.g., a partner, parent, child, friend)?" If a respondent answers "*Yes*," they are asked to indicate how long ago the death occurred (less than 6 months ago, 6–12 months ago, 1–5 years ago, or more than 5 years ago) and to answer seven questions measuring PGD symptoms over the past month. There is one question measuring functional impairment associated with these symptoms. A five-point Likert scale is used for all items. We included all participants who reported any bereavement. The internal reliability of the scale scores in this sample was excellent (α = 0.89).

Adjustment Disorder

The *International Adjustment Disorder Questionnaire* (IADQ) [7] initially asks respondents to complete a psychosocial stressor checklist which includes descriptions of nine broad categories of stressful life events (e.g., "I am currently experiencing relationship problems [e.g., breakup, separation or divorce, conflict with family or friends, and intimacy problems"]). Participants are then asked to answer all subsequent questions in relation to one of their identified stressors. There are three items measuring the "preoccupation" symptoms and three items measuring the "failure to adapt" symptoms, and these items are answered in terms of how bothersome the symptoms have been in the past month. There are four additional questions to assess if these symptoms began within

Table 1. Means and standard deviations of relevant variables in the network

Variable	*M*	SD	Symptom
Re1	0.87	1.06	Upsetting dreams
Re2	1.03	1.11	Flashbacks
Av1	1.16	1.19	Internal avoidance
Av2	1.15	1.23	External avoidance
SoT1	1.40	1.35	Hypervigilance
SoT2	1.01	1.21	Startle response
AD1	1.52	1.12	Difficulty calming down
AD2	1.21	1.22	Feeling numb
NSC1	1.27	1.29	Feeling like a failure
NSC2	1.12	1.29	Worthlessness
DR1	1.38	1.34	Distant or cut off from others
DR2	1.25	1.30	Difficulties staying close with others
PGD1	1.13	1.11	Preoccupation with the deceased
PGD2	1.40	1.10	Longing and yearning for the deceased
PGD3	1.01	1.18	Feeling one has lost a part of oneself
PGD4	1.08	1.15	Difficulty accepting the death
PGD5	0.70	1.01	Difficulty moving on with life
PGD6	0.90	1.12	Bitterness over death
PGD7	0.54	1.01	Unfair to live when the deceased died
AjD1	1.47	1.23	Preoccupation – worry
AjD2	1.13	1.20	Preoccupation – thoughts
AjD3	1.35	1.30	Preoccupation – ruminating implications
AjD4	1.02	1.20	Difficulties to adapt
AjD5	1.15	1.26	Difficulties to relax
AjD6	1.22	1.30	Difficulties to achieve inner peace

Re, reexperiencing in the here and now; Av, avoidance; SoT, sense of current threat; AD, affective dysregulation; DR, disturbed relationships.

1 month of the stressful event and if these symptoms are associated with functional impairment. All items are answered on a five-point Likert scale that ranges from 0 (*not at all*) to 4 (*extremely*). The internal reliability of the preoccupation (α = 0.90), failure to adapt (α = 0.92), and total scale (α = 0.95) scores were excellent.

Analysis

In a symptom network, nodes represent symptoms and edges reflect pairwise relations between these symptoms, visualizing the multivariate interdependencies of symptoms. For our analysis, six PTSD symptoms, six DSO symptoms, seven PGD symptoms, and six AjD symptoms were included in the network estimation procedure. Please see online supplementary 1 (for all online suppl. material, see www.karger.com/doi/10.1159/000523825) for details regarding analysis.

Results

Descriptive statistics of the 25 symptoms are reported in Table 1. Figure 1 depicts the symptom network for the 25 symptoms. About half of all possible edges were estimated to be nonzero (47.3% of 300), and most identified associations were positive (89.4% of all nonzero edges). The strongest association found in the network emerged between the two symptoms of negative self-concept (part of the DSO cluster in CPTSD). All edges within each diagnostic category were positive, and all transdiagnostic edges connecting symptoms of the three disorders PTSD, DSO, and AjD were positive. In contrast, the only negative edges in the network were estimated between symptoms of PGD and symptoms of the other three disorders. The average connections were higher within the four conditions than between; PGD symptoms showed the lowest average connections to the other three conditions.

The most central symptom in the entire network was PGD3 (*I feel as if a part of me died*). The most central symptom for AjD was AjD5 (*difficulty relaxing*), for PTSD was AV1 (*internal avoidance*), and for CPTSD was NSC2 (*worthlessness*) (see Fig. 2). The strongest bridge symptoms were sense of current threat 2 (*startle response*), AjD6 (*difficulties to achieve inner peace*), PGD5 (*difficulty to move on with one's life*), and AjD1 (*difficulty calming down*). The correlation between the standard deviation of the nodes with strength and expected influence was low ($r < 0.26$), ruling out a possible bias [19]. The mean pre-

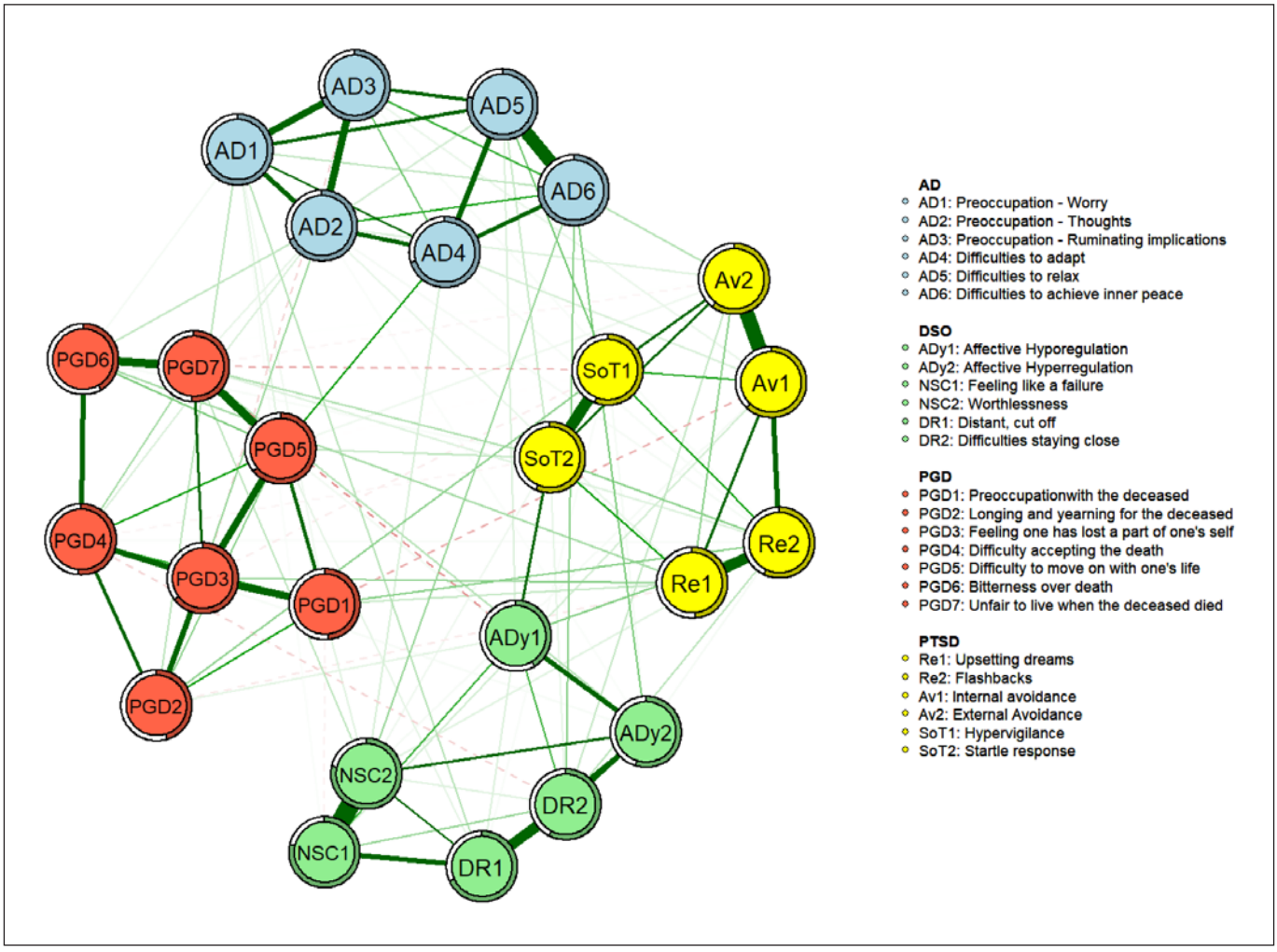

Fig. 1. Symptom network of ICD-11 disorders specifically associated with stress.

dictability (illustrated by the percentage of shaded area in the pie around the nodes in Fig. 1) of the full network was 0.61, indicating that, on average, 61% of the variation of each symptom could be explained by its neighboring symptoms. The nodes with the highest predictability were NSC1 (*feeling like a failure*) and NSC2 (*worthlessness*), and the node with the lowest predictability was affective dysregulation 1 (*difficulty calming down*).

The community detection procedure found the same solution in each of the 10,000 bootstrap iterations, and this solution was identical to the disorder categories, placing each symptom in one cluster with all other symptoms of the respective condition. The stability analyses of the network supported the accuracy of the estimated network (see online suppl. materials), and all CS coefficients were >0.59.

Discussion

The introduction of the disorders specifically associated with stress in ICD-11 provides an opportunity to explore and respond to the needs of people with distinct patterns of symptoms as a result of a defined stressor. There has been evidence to suggest that different stressors can produce a range of different disorders specifically associated with stress or different patterns of prominent symptoms within individual conditions [12]. This study set out to test the distinctiveness of the four main ICD-11 disorders associated with stress using a network psychometric approach in a representative sample of adults from the general population. Consistent with the taxonomic structure of the ICD-11, our results showed that the specific symptoms of PTSD, CPTSD, PGD, and AjD clustered together

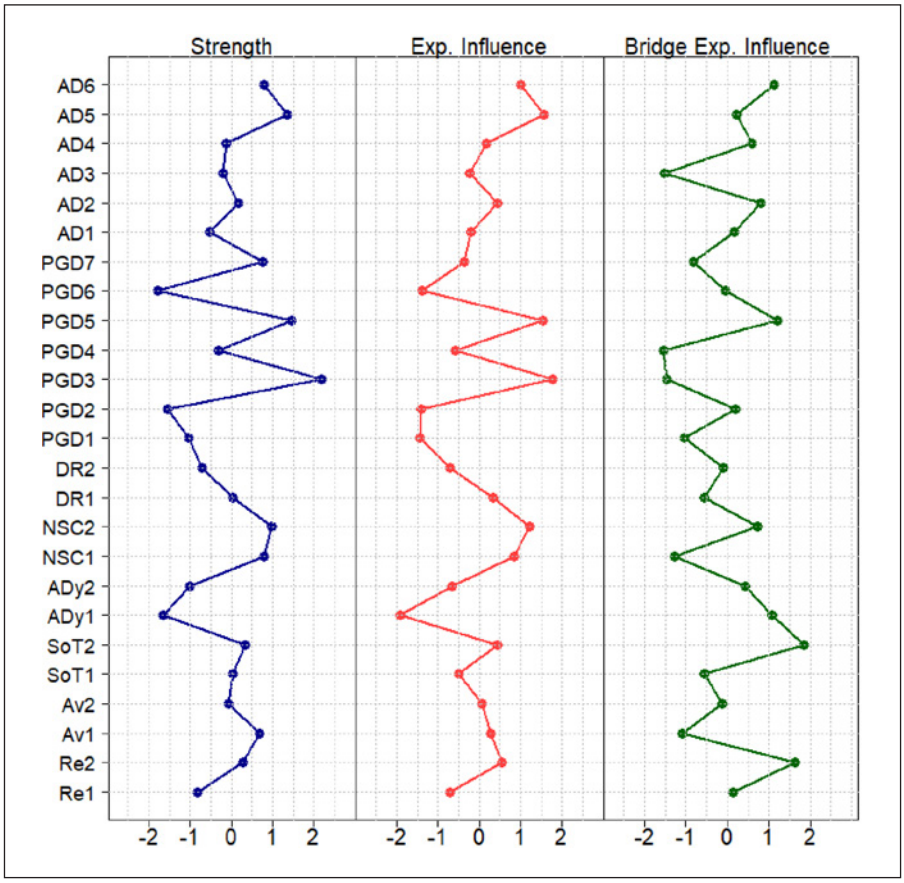

Fig. 2. Centrality estimates.

very strongly and more strongly than with symptoms of the other disorders. Interventions addressing stress-associated disorders should thus be based on profound diagnostic assessment to ensure close fit between symptoms and treatment. The majority (61%) of the variation in each symptom could be explained by its neighboring symptoms. As expected, most of the connections were positive; however, and notably, several PGD symptoms were negatively associated with the PTSD, CPTSD, and AjD symptoms. The strongest transdiagnostically connecting symptom was "startle response," putting the reaction to an inner sense of ongoing exposure to stressors or reminders of a stressor at the heart of stress-associated comorbidity.

The large amount of explained variability within the network substantiates the common ground on which stress-related disorders develop in individuals. This is the first network analytical study including all ICD-11 stress-associated disorders; however, the symptom covariation is similar to previous results in PTSD and DSO [17] and PGD networks [18]. Despite the strong overall connectivity, we found clear communities of symptoms representing the four diagnostic categories, advocating the distinction and network psychometric validity of the specific disorders within the umbrella group. While symptoms were connected across all diagnostic categories, they clustered together in communities only with other symptoms from their respective disorder. We repeated this community analysis 10,000 times to ensure robust results and found the same solution every single time.

Importantly, our findings also illustrate that mental disorders are not independent entities. Psychopathological conditions may reinforce each other on a symptom level and across disorders. Interestingly and in contrast to our expectations, some of the associations between PGD symptoms and the other conditions were negative. Taking a closer look at these associations, they appear plausible. For example, "internal avoidance" was negatively associated with "preoccupation with the deceased"; constantly being preoccupied with the loss of a lost loved one could be described as the opposite end of a dimension from preoccupation to internal avoidance. PGD is characterized theoretically as involving yearning for the de-

ceased [20], which is supported by evidence in PGD of distinct neural processes in reward-processing networks [21], as well behavioral evidence of approach tendencies [22, 23]. This evidence of a disturbed approach or reward processes in PGD is consistent with the observed network findings in this study, which suggest that the association of PGD symptoms may function somewhat distinctly relative to the other stressor-related disorders. However, these negative associations were small, and the stability analyses indicated that their presence should be interpreted with care.

The symptom with the strongest connections across categories was "startle response." This symptom showed a particularly strong connection to the DSO symptom "affective hyporegulation," which can be explained by a common deficit in regulating inner experiences. "Startle response" might be a sign of ongoing, potentially subconscious, occupation with the stressors including an ongoing physiological stress reaction that manifests in strong reactions to minor triggers. Responding, psychologically and (psycho)somatically, to the triggering events is common across all stress-related disorders and could explain the central position of "startle response" in connecting disorders. The second strongest connection of symptoms across disorders was between the AjD symptom "difficulties to adapt" and the PGD symptom "difficulty moving on with life," reflecting similar problems of adaptation after burdensome life events. Overall, our findings suggest that the large amount of explained variability within the network and the strong communities of different disorders support the umbrella category of disorders specifically associated with stress that was introduced in ICD-11.

Further work is required to explore the unique features of these conditions and their applicability in different cultural contexts. ICD-11 has been developed with clinical utility and global applicability in mind [24], also including middle- to low-income countries, and therefore, it is important to explore the distinctiveness of these conditions in various cultural and socioeconomic contexts. Mental health professionals who care for people who have experienced a range of stressors and traumatic life events are encouraged to pay attention to the type of stressor and the phenomenology of symptoms to make an ICD-11 disorder specifically associated with stress diagnosis. There is now greater specificity to PTSD and CPTSD in ICD-11 for those exposed to traumatic life events, whereas there is the alternative and better-defined diagnosis of AjD for those exposed to stress. The introduction of PGD in ICD-11 is the result of a perceived clinical need while recognizing that people with this pattern of symptoms might require specialized care [25], which is different from what is offered to those with PTSD or CPTSD.

Although caution should be exercised in the interpretation of the concept of centrality in network analysis [26], central symptoms may provide guidance in the selection of therapeutic targets in order to improve treatment response rapidity. These results have important implications for the treatment of specific conditions. As an example, Karatzias and Cloitre [27] propose that through the use of the flexible delivery of modular treatment components, the symptoms of CPTSD can be targeted and organized in therapy according to the severity or prominence of a symptom cluster alongside a patient's preferences about which problems are most troublesome. The analysis reported in this paper has identified individual central symptoms for each of the conditions. "Feeling one has lost a part of one's self" was the most central PGD symptom, contrasting previous results (i.e., intense feelings of sorrow and inability to experience joy or satisfaction [28]). Nevertheless, it should also be noted that previous studies in the area focused on the symptom networks of one disorder, whereas the present on four different conditions. For ICD-11 AjD, "difficulties to relax" was the most central symptom, and no previous study has been published on the network structure of the revised AjD as of yet. Indeed, treatments for AjD include modules focusing on relaxation [29]. "Internal avoidance," the most central PTSD symptom in our network, is considered a core aspect of PTSD by theoretical models [30], maintaining other symptoms. Finally, "worthlessness" is repeatedly identified as most central symptom in CPTSD networks in relevant studies [11, 31], supporting its clinical importance as a problem that an effective therapy should address. Prioritizing these symptoms in treatment may lead to faster recovery; however, the centrality hypothesis has received conflicting empirical support so far [32] and requires further investigation.

Our study had a number of limitations. First, we have used a community sample, and these results may not generalize to treatment-seeking, clinical samples. Second, the cross-sectional nature of the sample does not allow for any causal inferences to be drawn, although it has been argued that cross-sectional networks are a useful first step for the initial testing of theories [33]. Third, we used self-report questionnaires for assessment, and clinician administered interviews might have provided more valid data. Fourth, we did not exclude participants who were bereaved within the last 6 months (n = 42), which is in contrast to ICD-11's diagnostic criteria. However, in a sensitivity analysis not reported here, no substantive

change occurred when excluding these participants. Finally, we have not explored associations between the symptom clusters of these disorders and other common comorbid conditions such as depression and general anxiety. Notwithstanding its limitations, this is the first study to explore the distinctiveness and network psychometric validity of the ICD-11 conditions specifically associated with stress. Our results suggest that these conditions can be reliably used by health care professionals in clinical practice to diagnose people who have been exposed to various stressors to plan their treatment and care. Although there are distinct pathways from stressors to unique disorders associated with stress, at the same time, our study identified key symptoms within and between these disorders that may provide insight for more targeted, effective interventions for those in need.

Statement of Ethics

This research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. This study protocol was reviewed and approved by the Social Research Ethics Committee at Maynooth University, Approval No. SRESC-2020-2402202. Written informed consent was obtained from participants prior to their participation.

Conflict of Interest Statement

None to declare.

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Author Contributions

Thanos Karatzias – conceptualization and writing original draft; Matthias Knefel – data analysis and writing; Andreas Maercker, Marylene Cloitre, Geoffrey Reed, Richard Bryant, Menachem Ben-Ezra, Evaldas Kazlauskas, and Sally Jowett – writing review and editing; Mark Shevlin and Philip Hyland – data curation and methodology.

Data Availability Statement

All data used in this work will be available upon request following a signed data access agreement following publication.

References

1 Maniglio R. The impact of child sexual abuse on health: a systematic review of reviews. Clin Psychol Rev. 2009 Nov 1;29(7):647–57.
2 Kilpatrick DG, Resnick HS, Milanak ME, Miller MW, Keyes KM, Friedman MJ. National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. J Trauma Stress. 2013 Oct;26(5):537–47.
3 World Health Organization. International statistical classification of diseases and related health problems: tabular list. World Health Organization; 2018.
4 Hyland P, Karatzias T, Shevlin M, McElroy E, Ben-Ezra M, Cloitre M, et al. Does requiring trauma exposure affect rates of ICD-11 PTSD and complex PTSD? Implications for DSM-5. Psychol Trauma. 2021;13(2):133–41.
5 Cloitre M, Shevlin M, Brewin CR, Bisson JI, Roberts NP, Maercker A, et al. The international trauma questionnaire: development of a self-report measure of ICD-11 PTSD and complex PTSD. Acta Psychiatr Scand. 2018 Dec;138(6):536–46.
6 Shevlin M, Hyland P, Ben-Ezra M, Karatzias T, Cloitre M, Vallières F, et al. Measuring ICD-11 adjustment disorder: the development and initial validation of the international adjustment disorder questionnaire. Acta Psychiatr Scand. 2020 Mar;141(3):265–74.
7 Karatzias T, Hyland P, Bradley A, Cloitre M, Roberts NP, Bisson JI, et al. Risk factors and comorbidity of ICD-11 PTSD and complex PTSD: findings from a trauma-exposed population based sample of adults in the United Kingdom. Depress Anxiety. 2019 Sep;36(9):887–94.
8 Hyland P, Shevlin M, Fyvie C, Karatzias T. Posttraumatic stress disorder and complex posttraumatic stress disorder in DSM-5 and ICD-11: clinical and behavioral correlates. J Trauma Stress. 2018 Apr;31(2):174–80.
9 Knefel M, Lueger-Schuster B. An evaluation of ICD-11 PTSD and complex PTSD criteria in a sample of adult survivors of childhood institutional abuse. Eur J Psychotraumatol. 2013 Dec 1;4(1):22608.
10 Borsboom D, Fried EI, Epskamp S, Waldorp LJ, van Borkulo CD, van der Maas HL, et al. False alarm? A comprehensive reanalysis of "evidence that psychopathology symptom networks have limited replicability" by Forbes, Wright, Markon, and Krueger (2017). J Abnorm Psycho. 2017 Oct;126(7):989–99.
11 Knefel M, Karatzias T, Ben-Ezra M, Cloitre M, Lueger-Schuster B, Maercker A. The replicability of ICD-11 complex post-traumatic stress disorder symptom networks in adults. Br J Psychiatry. 2019 Jun 1;214(6):361–8.
12 Karatzias T, Shevlin M, Hyland P, Ben-Ezra M, Cloitre M, Owkzarek M, et al. The network structure of ICD-11 complex post-traumatic stress disorder across different traumatic life events. World Psychiatry. 2020 Oct;19(3):400.
13 McElroy E, Shevlin M, Murphy S, Roberts B, Makhashvili N, Javakhishvili J, et al. ICD-11 PTSD and complex PTSD: structural validation using network analysis. World Psychiatry. 2019 Jun;18(2):236.
14 Maercker A, Brewin CR, Bryant RA, Cloitre M, Reed GM, van Ommeren M, et al. Proposals for mental disorders specifically associated with stress in the international classification of diseases-11. Lancet. 2013 May 11;381(9878):1683–5.
15 Borsboom D. A network theory of mental disorders. World Psychiatry. 2017;16(1):5–13.
16 Epskamp S, Maris G, Waldorp LJ, Borsboom D. Network psychometrics. In: Irwing P, Hughes D, Booth T, editors. The wiley handbook of psychometric testing. Hoboken, NJ: Wiley; 2018. p. 953–86.

17 Kotov R, Krueger RF, Watson D, Achenbach TM, Althoff RR, Bagby RM, et al. The hierarchical taxonomy of psychopathology (HiTOP): a dimensional alternative to traditional nosologies. J Abnorm Psychol. 2017 May;126(4):454.
18 Prigerson HO, Jacobs SC. Traumatic grief as a distinct disorder: a rationale, consensus criteria, and a preliminary empirical test. In: Stroebe MS, Hansson RO, Stroebe W, Schut H, editors. Handbook of bereavement research: consequences, coping, and care. Washington, DC: American Psychological Association; 2001. p. 613–45.
19 Terluin B, de Boer MR, de Vet HC. Differences in connection strength between mental symptoms might be explained by differences in variance: reanalysis of network data did not confirm staging. PLoS One. 2016;11(11):e0155205.
20 Maccallum F, Bryant RA. A cognitive attachment model of prolonged grief: integrating attachments, memory, and identity. Clin Psychol Rev. 2013 Aug 1;33(6):713–27.
21 Bryant RA, Andrew E, Korgaonkar MS. Distinct neural mechanisms of emotional processing in prolonged grief disorder. Psychol Med. 2020 Jan;7:1–9.
22 Maccallum F, Bryant RA. An investigation of approach behaviour in prolonged grief. Behav Res Ther. 2019 Aug 1;119:103405.
23 Williams JL, Hardt MM, Henschel AV, Eddinger JR. Experiential avoidance moderates the association between motivational sensitivity and prolonged grief but not posttraumatic stress symptoms. Psychiatry Res. 2019 Mar 1;273:336–42.
24 Evans SC, Reed GM, Roberts MC, Esparza P, Watts AD, Correia JM, et al. Psychologists' perspectives on the diagnostic classification of mental disorders: results from the WHO-IUPsyS global survey. Int J Psychol. 2013 Jun;48(3):177–93.
25 Bryant RA, Kenny L, Joscelyne A, Rawson N, Maccallum F, Cahill C, et al. Treating prolonged grief disorder: a randomized clinical trial. JAMA Psychiatry. 2014 Dec 1;71(12):1332–9.
26 De Haan A, Landolt MA, Fried EI, Kleinke K, Alisic E, Bryant R, et al. Dysfunctional posttraumatic cognitions, posttraumatic stress and depression in children and adolescents exposed to trauma: a network analysis. J Child Psychol Psychiatry. 2020 Jan;61(1):77–87.
27 Karatzias T, Cloitre M. Treating adults with complex posttraumatic stress disorder using a modular approach to treatment: rationale, evidence, and directions for future research. J Trauma Stress. 2019 Dec;32(6):870–6.
28 Stelzer EM, Höltge J, Zhou N, Maercker A, Killikelly C. Cross-cultural generalizability of the ICD-11 PGD symptom network: identification of central symptoms and culturally specific items across German-speaking and Chinese bereaved. Compr Psychiatry. 2020 Nov 1;103:152211.
29 Kazlauskas E, Zelviene P, Lorenz L, Quero S, Maercker A. A scoping review of ICD-11 adjustment disorder research. Eur J Psychotraumatol. 2017 Dec 15;8(Suppl 7):1421819.
30 Brewin CR, Holmes EA. Psychological theories of posttraumatic stress disorder. Clin Psychol Rev. 2003 May 1;23(3):339–76.
31 Knefel M, Lueger-Schuster B, Bisson J, Karatzias T, Kazlauskas E, Roberts NP. A cross-cultural comparison of ICD-11 complex posttraumatic stress disorder symptom networks in Austria, the United Kingdom, and Lithuania. J Trauma Stress. 2020 Feb;33(1):41–51.
32 Elliott H, Jones PJ, Schmidt U. Central symptoms predict posttreatment outcomes and clinical impairment in anorexia nervosa: a network analysis. Clin Psychol Sci. 2020 Jan;8(1):139–54.
33 Rodebaugh TL, Tonge NA, Piccirillo ML, Fried E, Horenstein A, Morrison AS, et al. Does centrality in a cross-sectional network suggest intervention targets for social anxiety disorder? J Consult Clin Psychol. 2018 Oct;86(10):831.