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Research paper

Cross-national analysis of the prevalence of prolonged grief disorder

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ABSTRACT

Background: Prolonged grief disorder (PGD) is now included as a diagnosis in international classification systems. Most research on PGD is based on Western populations, but first data from non-Western countries have recently become available. Little is still known about country-related effects on PGD's prevalence.
Objective: Determining possible causes of variations in the prevalence of PGD as defined by DSM-5-TR and ICD-11 within and between countries.
Methods: We retrieved data from 24 prevalence studies, the World Bank and the 2022 World Risk Report. Negative binomial regressions were used to explore methodological, loss-related and country context characteristics as predictors of PGD. The average rate of PGD was calculated using random effects models.
Results: The included studies comprised 34 samples from 16 countries (20,347 participants). Non-probability sampling and older mean age of the sample as well as lower country vulnerability were associated with higher PGD rates. The average PGD prevalence was 13 % (95 % CI [11, 22]), varying from 5 % (95 % CI [3, 11]) in probability to 16 % (95 % CI [13, 25]) in non-probability samples.
Limitations: Samples from Europe and North America were overrepresented. For about half of the countries, data were available from only one sample.
Conclusions: While confirming the importance of studies' methodological quality, the results show that PGD is of public health relevance around the world, but especially common in less vulnerabled countries with better access to daily necessities and healthcare services, highlighting sociocultural impacts on grief processing. Further investigations of cross-national differences are needed.

1. Introduction

The death of a loved person is one of the most common life events around the world. Most people are able to adapt to the loss, but some develop prolonged grief disorder (PGD). PGD is characterized by persistent, distressing and disabling yearning for or preoccupation with the deceased person, in addition to loss of meaning and identity disruption (Prigerson et al., 2021). PGD has been included as a new diagnosis in ICD-11 (WHO, 2018) and the text revision of DSM-5 (DSM-5-TR; APA, 2022).

1.1. Prevalence of prolonged grief disorder and associated factors

A meta-analysis reported a pooled prevalence of 9.8 % for PGD after mainly non-violent losses (Lundorff et al., 2017). A higher prevalence was associated with older age. The estimate was based on previous definitions of PGD and only four of the included studies used population-based random sampling approaches, which yielded lower PGD rates than studies using non-random sampling. In a representative German sample (N = 914), the prevalence of PGD according to DSM-5-TR was 3.3 % after loss, which was significantly lower than the rate of 4.2 % for PGD according to ICD-11 (Rosner et al., 2021). Other studies in community and clinical samples also reported lower PGD prevalence rates

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when using DSM-5-TR compared to ICD-11 criteria (Boelen and Lenferink, 2020; Haneveld et al., 2022; Lenferink et al., 2022).

Another meta-analysis based on previous definitions of PGD examined the prevalence of PGD after unnatural deaths such as disasters or homicides (Djelantik et al., 2020). It yielded a pooled prevalence of 49 %, indicating that this loss characteristic is an important risk factor. Predictors of a higher prevalence were the loss of the only child, a shorter time since the loss, and studies with conflict survivors based in low- and middle-income countries. In Lundorff et al.'s meta-analysis, in contrast, the PGD prevalence was higher for studies conducted in Western countries (e.g., Australia) than in Eastern countries (China and Japan). Besides establishing loss-related factors (e.g., unnatural deaths) and older age as risk factors for PGD, these meta-analyses suggest the potential relevance of country-level factors. However, little is known about exactly which variables could explain cross-country variations in PGD rates.

1.2. Cross-national prevalence differences

The vulnerability of countries to adversity and disturbances could be used to explore national differences in PGD rates. Previous studies using the vulnerability index, a measure that captures vulnerability to adverse effects of disasters by combining publicly available metrics (e.g., public infrastructure, gender equity) in one score for each country (Welle and Birkmann, 2015), found lower rates of several mental health problems such as posttraumatic stress disorder (Dückers et al., 2016) or substance abuse and affective disorders (Dückers and Brewin, 2016) in more vulnerable countries. Also, lower generalized anxiety disorder rates were shown for low-income countries (Ruscio et al., 2017), while other studies found lower suicide rates in more vulnerable countries across World Bank income groups (Dückers et al., 2019). Even though more vulnerable countries are not necessarily characterized by a higher exposure to potentially traumatic events such as violent loss (Dückers et al., 2016; see Benjet et al., 2016 for the prevalence of exposure), due to greater insecurity of access to basic necessities and lower availability of specialized healthcare capacity, living in such countries could foster compensatory cultural or social factors that might be relevant to PGD.

1.3. Objectives

With the overall aim to elucidate cross-national differences in the prevalence of PGD, the current study has three objectives: (1) to produce an overview of available PGD prevalence studies based on the new ICD-11 and DSM-5-TR criteria: (2) to test the association between PGD prevalence and methodological factors (diagnostic criteria, sampling approach, and sample size) and risk factors, including age, time since loss, unnatural death, country vulnerability, and natural hazard exposure context; and (3) to estimate the average prevalence of PGD across countries.

2. Method

2.1. Search strategy and selection criteria

A systematic keywords-based search was undertaken using PubMed, Web of Science, and PsycINFO for studies on the prevalence of PGD in bereaved adults. The database was searched on November 23th, 2023 using the following search terms: (a) 'prolonged grief' or 'complicated grief' or 'disturbed grief' or 'pgd' or 'grief disorder' AND (b) 'ICD-11' or 'ICD11' or 'DSM-5-TR' or 'DSM-5' or 'DSM5' AND (c) 'prevalence' or 'rate' or 'incidence' or 'occurrence' or 'symptoms' in the title or abstract (see also Table A in the Supplement). We included prevalence studies with bereaved adults that assessed PGD on the basis of ICD-11 or DSM-5-TR diagnostic criteria. We did not apply restrictions regarding date of publication, type of measure, or sampling method. Only English language papers in peer-reviewed journals were considered. We excluded "gray literature" (e.g., conference abstracts, dissertations) and reviews as well as studies focusing on children and adolescents, treatment-seeking samples, or asylum seekers and refugees. As we aimed to focus on PGD prevalence estimates based on the general population of specific countries, we excluded treatment-seeking and refugee populations with assumed higher prevalence rates and/or equivocal country allocation (e.g., Djelantik et al., 2020; Haneveld et al., 2022). We further excluded studies that investigated PGD prevalence according to other diagnostic criteria for prolonged grief (see e.g., Boelen and Lenferink, 2020) and that used cutoff scores of self-report measures of PGD symptoms rather than applying DSM-5-TR or ICD-11 diagnostic rules to such measures to arrive the respective diagnostic status (i.e. matching individual items to symptoms, dichotomizing symptoms in present/absent, and then following the rule; see e.g., Haneveld et al., 2022). The PGD criteria in DSM-5-TR and ICD-11 share a definition of relatively similar core symptoms but differ in the number and content of accompanying symptoms and the time criterion, which has resulted in differences in prevalence rates (e.g., Boelen and Lenferink, 2020; Rosner et al., 2021). As methodological factors, we therefore aimed at conducting a sensitivity analysis with regard to possible differences between the two criteria sets and between systematic variations of the number of required accessory symptoms within the ICD-11 PGD criteria (see Eisma et al., 2020) as methodological factors. The search and study selection process are described in the Supplement (Tables A–B and Fig. A).

2.2. Data extraction and data sources

Information extracted from each eligible study included: country in which the study was conducted, sample size, sampling method, mean age of bereaved participants, mean time since loss, number of unnatural deaths, diagnostic criteria used, number of bereaved participants meeting diagnostic criteria for PGD. The data-extraction was performed and double-checked independently by ML, ALM, and HC.

Country context data on country death rates were retrieved from the World Bank (2020), and exposure to natural hazards and country vulnerability were taken from the 2022 World Risk Report (Atwii et al., 2022). The exposure reflects exposure to earthquakes, cyclones, floods (coastal and riverine), droughts, sea-level rise and tsunamis. The vulnerability index summarized worldwide and publicly available data on 100 indicators into an overall score for 193 countries. The indicators are divided over three components: susceptibility (structural characteristics of a country to sustain harm: socio-economic development, social disparities, socio-economic deprivation, vulnerable populations due to violence, conflicts and disasters and due to diseases and pandemics), lack of coping capacities (a country's inability to diminish adverse effects of events: recent societal shocks, state and government, health care capacities), and lack of adaptive capacities (a country's conditions hindering long-term structural change: education, research, long-term health and deprivation effects, investment capacities) In principle, only indicators coming from scientifically recognized and publicly accessible sources are considered (for example World Bank, UNESCO, WHO). The score ranges from 0 to 100, with higher values representing higher vulnerability to adverse effects of disasters (Atwii et al., 2022). Country vulnerability cannot be seen apart from country wealth. A recent study corroborated the inverse association between country vulnerability and mental health *across* and *within* World Bank income groups: suicide prevalence was higher in less vulnerable (more wealthy) countries and this pattern consistently was found in high, upper-middle, lower-middle and low income countries (Dückers et al., 2019).

2.3. Analysis

Negative binomial regression analyses were used to estimate how PGD is associated with methodological characteristics and risk factors. Because the study populations in some cases are coming from the same

country, a multilevel model was applied. The methodological factors included a sensitivity analysis of systematically varying the number of additional symptoms of PGD according to ICD-11 (Eisma et al., 2020) by contrasting one versus at least two additional symptoms as well as of comparing the ICD-11 (i.e. at least one additional symptom) and DSM-5-TR rules. To estimate the average PGD prevalence across countries (Stata command metapreg), data from the prevalence studies were combined and presented using a random-effects model to estimate the proportion people with PGD and the corresponding 95 % confidence intervals (CIs). Results were stratified by sampling method: non-probability (i.e. non-probability sampling or convenience samples) and probability (i.e. quota or probability sampling, including register-based or representative samples). A likelihood-ratio test was used to compare the goodness of fit between the random-effects and fixed-effects model. All analyses were performed in Stata, version 16 for Windows.

2.4. Ethical approval

Ethical approval was not required for this study, which was based on aggregated population data extracted from scientific studies and freely accessible public reports.

3. Results

3.1. Study characteristics

Characteristics of the 24 included studies are displayed in Table 1. All studies were published between 2016 and 2023 (for references of these studies, see Table 2). A random sampling method was used for 33.3 % of the included samples. The studies comprised a total of 20,347 participants from 34 samples (N's ranging from 73 to 1771) located in 16 countries. Nineteen of these samples were from European countries (Denmark, France, Germany, Greece, Ireland, the Netherlands, Sweden, the United Kingdom), four from African countries (Ghana, Kenya, Nigeria, Togo), four from Asian countries (China, Israel, Turkey), and seven from the USA. The most vulnerable countries were Nigeria, Kenya, and Ghana, and the least vulnerable were Sweden, Denmark, and Ireland. The mean age of the included samples ranged from 29 to 72.5 years. The percentage of unnatural deaths in the included samples ranged from 2.7 to 100 and the losses occurred on average between 6 and 128.1 months ago. PGD prevalence was estimated on the sole basis of ICD-11 criteria in 26 samples (estimate range from 2 to 35.5 %) and on the sole basis of DSM-5-TR in two samples (range: 3.4–10.1 %). PGD estimates for both ICD-11 and DSM-5-TR criteria were reported for six

Table 1
Study details and outcome data by country.

#	Country	Source (authors, year of publication)	Sample (N, mean age, sampling approach[a])	Loss characteristics (mean months since loss, % unnatural deaths)	PGD diagnostic criteria	PGD prevalence (%)	Vulnerability score (0–100)[b]
1	China	Killikelly et al., 2020	325, 33.1, N-P	55.2, 10.4	ICD-11	12.7	12.75
2	China	Zhou et al., 2020	1030, 59.9, N-P	112.9, 49.8	ICD-11	35.5	12.75
3	Denmark	Lundorff et al., 2021	777, 70.4, P	6.0, 2.7	ICD-11	18.9	5.85
4	Denmark	O'Connor et al., 2019	206, 72.5, P	6.0, NA	ICD-11	5.8	5.85
5	France	Kokou-Kpolou et al., 2020	73, 53.6, N-P	27.2, 65.7	ICD-11	26.0	16.5
1	Germany	Killikelly et al., 2020	214, 38.7, N-P	47.7 (52.5), 27.5	ICD-11	7.3	7.74
6	Germany	Rosner et al., 2021	914, 54.3, P	105.1 (115.2), 42.7	ICD-11 [DSM-5-TR][c]	4.2 [3.3][c]	7.74
7	Germany	Treml et al., 2022	1371, 54.6, P	128.1 (138.1), 16.6	DSM-5-TR	3.4	7.74
8	Ghana	Ben-Ezra et al., 2020	500, 29.0, P	NA, NA	ICD-11	2.6	27.33
9	Greece	Killikelly et al., 2023	202, NA, N-P	NA, NA	ICD-11	6.9	8.87
10	Ireland	Hyland et al., 2023	1011, NA, N-P	NA- NA	ICD-11	9.6	6.61
11	Ireland	Killikelly et al., 2021	830, 32.8, P	NA, NA	ICD-11	4.1	6.61
12	Israel	Killikelly et al., 2019	544, 40.6, P	NA, NA	ICD-11	2.0	24.52
8	Kenya	Ben-Ezra et al., 2020	1018, 32.2, P	NA, NA	ICD-11	3.4	59.27
13	Netherlands	Boelen et al., 2018	512, 53.8, N-P	28.6 (26.3), 13.3	ICD-11	18.0	7.41
14	Netherlands	Boelen et al., 2019	551, 41.8, N-P	42.4 (46.2), 17.2	ICD-11	19.2	7.41
15	Netherlands	Boelen et al., 2020	855, 43.8, N-P	46.5 (43.7), 20.0	ICD-11 [DSM-5-TR][c]	19.8 [17.8][c]	7.41
16	Netherlands	Boelen et al., 2022	306, 47.4, N-P	17.8 (3.4), 90.8	DSM-5-TR	10.1	7.41
17	Netherlands	Eisma and Lenferink, 2023	288, 52.8, N-P	33.0, 25.0	ICD-11 [DSM-5-TR][c]	28.0 [32.0][c]	7.41
18	Netherlands	Lenferink et al., 2022	278, 52.7, N-P	24.7 (17.5), 25.1	ICD-11 [DSM-5-TR][c]	34.0 [32.0][c]	7.41
18	Netherlands	Lenferink et al., 2022	270, 51.9, N-P	48.8 (72.7), 100	ICD-11 [DSM-5-TR][c]	33.0 [33.0][c]	7.41
8	Nigeria	Ben-Ezra et al., 2020	1006, 30.2, P	NA, NA	ICD-11	4.6	63.06
19	Sweden	Lenferink et al., 2023	248, 46.9, N-P	57.9 (31.9), NA	ICD-11 [DSM-5-TR][c]	32.0 [29.0][c]	4.06
5	Togo	Kokou-Kpolou et al., 2020	162, 56.0, N-P	112.6 (94.7), 17.2	ICD-11	17.3	24.73
9	Turkey	Killikelly et al., 2023	343, NA, N-P	NA, NA	ICD-11	3.2	29.58
10	UK	Hyland et al., 2023	1012, NA, N-P	NA, NA	ICD-11	14.4	12.97
20	UK	Shevlin et al., 2023	1771, NA, P	NA, NA	ICD-11	2.4	12.97
21	USA	Bonanno et al., 2020	282, 55.3, N-P	24.9 (0.6), NA	ICD-11	11.7	13.05
22	USA	Cozza et al., 2020	1732, 47.3, N-P	61.2 (32.4), 86.8	ICD-11	12.8	13.05
9	USA	Killikelly et al., 2023	848, NA, N-P	NA, NA	ICD-11	2.8	13.05
23	USA	Maciejewski et al., 2016	268, 61.8, N-P	NA, NA	ICD-11	12.7	13.05
24	USA	Singer et al., 2021	151, 34.8, N-P	5.1, NA	ICD-11	9.2	13.05
24	USA	Singer et al., 2021	147, 37.5, N-P	5.4, NA	ICD-11	8.1	13.05
24	USA	Singer et al., 2021	302, 37.3, N-P	5.7, NA	ICD-11	8.4	13.05
	Total	–	34 samples, 70.6 % used non-probability sampling	–	94.1 % used ICD-11 diagnostic criteria	16 countries, N = 20.347	16 countries

Note: PGD = prolonged grief disorder. NA = not available.
[a] N-P = non-probability sampling, P = probability sampling.
[b] World Risk Report 2022.
[c] The PGD prevalence estimate on the basis of the DSM-5-TR reported in this study was not contained in the analysis.

Table 2
References of the included studies.

#	Country	Source
1	China, Germany	Killikelly C, Zhou N, Merzhvynska M, Stelzer EM, Dotschung T, Rohner S, Sun LH, Maercker A. Development of the international prolonged grief disorder scale for the ICD-11: Measurement of core symptoms and culture items adapted for Chinese and German-speaking samples. J Affect Disord. 2020; 277: 568–576. doi:https://doi.org/10.1016/j.jad.2020.08.057
2	China	Zhou N, Wen J, Stelzer EM, Killikelly C, Yu W, Xu X, Shi G, Luo H, Wang J, Maercker A. Prevalence and associated factors of prolonged grief disorder in Chinese parents bereaved by losing their only child. Psychiatry Res. 2020; 284: 112766. doi:https://doi.org/10.1016/j.psychres.2020.112766
3	Denmark	Lundorff M, Johannsen M, O'Connor M. Time elapsed since loss or grief persistency? Prevalence and predictors of ICD-11 prolonged grief disorder using different applications of the duration criterion. J Affect Disord. 2021; 279: 89–97. doi:https://doi.org/10.1016/j.jad.2020.09.116
4	Denmark	O'Connor M, Lasgaard M, Larsen L, Johannsen M, Lundorff M, Farver-Vestergaard I, Boelen PA. Comparison of proposed diagnostic criteria for pathological grief using a sample of elderly bereaved spouses in Denmark: Perspectives on future bereavement research. J Affect Disord. 2019; 251: 52–59. doi:https://doi.org/10.1016/j.jad.2019.01.056
5	France, Togo	Kokou-Kpolou CK, Cénat JM, Noorishad PG, Park S, Bacqué MF. A comparison of prevalence and risk factor profiles of prolonged grief disorder among French and Togolese bereaved adults. Soc Psychiatry Psychiatr Epidemiol. 2020, 55(6): 757–764. doi:https://doi.org/10.1007/s00127-020-01840-w
6	Germany	Rosner R, Comtesse H, Vogel A, Doering BK. Prevalence of prolonged grief disorder. J Affect Disord. 2021; 287: 301–307. doi:https://doi.org/10.1016/j.jad.2021.03.058
7	Germany	Treml J, Brähler E, Kersting A. Prevalence, factor structure and correlates of DSM-5-TR criteria for prolonged grief disorder. Front Psychiatry. 2022; 13: 880380. doi:https://doi.org/10.3389/fpsyt.2022.880380
8	Ghana, Kenya, Nigeria	Ben-Ezra M, Hyland P, Karatzias T, Maercker A, Hamama-Raz Y, Lavenda O, Mahat-Shamir M, Shevlin M. A cross-country psychiatric screening of ICD-11 disorders specifically associated with stress in Kenya, Nigeria and Ghana. Eur J Psychotraumatol. 2020; 11 (1):1720972. doi:https://doi.org/10.1080/20008198.2020.1720972
9	Greece, Turkey, USA	Killikelly C, Kagialis A, Henneman S, Coronado H, Demanarig D, Farahani H, Özdoğru AA, Yalçın B, Yockey A, Gosnell CL, Jia F, Maisel M, Stelzer E, Wilson D, Anderson J, Charles K, Cummings JP, Faas C, Knapp B, Koneczny B, Koch C, Bauer LM, Cuccolo C, Edlund JE, Heermans GF, McGillivray S, Shane-Simpson C, Staples A, Zheng Z, Zlokovich MS, Irgens MS. Measurement and assessment of grief in a large international sample. J Affect Disord. 2023; 327: 306–314. doi:https://doi.org/10.1016/j.jad.2023.01.095
10	Ireland, UK	Hyland P, Redican E, Karatzias T, Shevlin M. The International Grief Questionnaire (ICQ): A new measure of ICD-11 prolonged grief disorder. J Trauma Stress; 2023; 1–13. doi:https://doi.org/10.1002/jts.22986
11	Ireland	Killikelly C, Merzhvynska M, Zhou N, Stelzer EM, Hyland P, Rocha J, Ben-Ezra M, Maercker A. Examination of the new ICD-11 prolonged grief disorder guidelines across five international samples. Clin Psychol Eur. 2021; 3(1): e4159. doi:10.32872/cpe.4159
12	Israel	Killikelly C, Lorenz L, Bauer S, Mahat-Shamir M, Ben-Ezra M, Maercker A. Prolonged grief disorder: Its co-occurrence with adjustment disorder and post-traumatic stress disorder in a bereaved Israeli general-population sample. J Affect Disord. 2019; 249: 307–314. doi:https://doi.org/10.1016/j.jad.2019.02.014
13	Netherlands	Boelen PA, Lenferink LIM, Nickerson A, Smid GE. Evaluation of the factor structure, prevalence, and validity of disturbed grief in DSM-5 and ICD-11. J Affect Disord. 2018; 240: 79–87. doi:https://doi.org/10.1016/j.jad.2018.07.041
14	Netherlands	Boelen PA, Lenferink LIM, Smid GE. Further evaluation of the factor structure, prevalence, and concurrent validity of DSM-5 criteria for Persistent Complex Bereavement Disorder and ICD-11 criteria for Prolonged Grief Disorder. Psychiatry Res. 2019; 273: 206–210. doi:https://doi.org/10.1016/j.psychres.2019.01.006
15	Netherlands	Boelen PA, Lenferink LIM. Comparison of six proposed diagnostic criteria sets for disturbed grief. Psychiatry Res. 2020; 285: 112786. doi:https://doi.org/10.1016/j.psychres.2020.112786
16	Netherlands	Boelen PA, Lenferink LI. Prolonged grief disorder in DSM-5-TR: Early predictors and longitudinal measurement invariance. Aust N Z J Psychiatry. 2022; 56(6): 667–674. doi:https://doi.org/10.1177/00048674211025728
17	Netherlands	Eisma MC, Lenferink LIM. Co-occurrence of approach and avoidance in prolonged grief: a latent class analysis. Eur J Psychotraumatol. 2023; 14(2): 2190544. doi:https://doi.org/10.1080/20008066.2023.2190544
18	Netherlands	Lenferink LIM, Eisma MC, Smid GE, de Keijser J, Boelen PA. Valid measurement of DSM-5 persistent complex bereavement disorder and DSM-5-TR and ICD-11 prolonged grief disorder: The Traumatic Grief Inventory-Self Report Plus (TGI-SR+). Compr Psychiatry. 2022; 112: 152281. doi:https://doi.org/10.1016/j.comppsych.2021.152281
19	Sweden	Lenferink LIM, van Dijk I, Eisma MC, Eklund R, Boelen PA, Sveen J. Psychometric evaluation of the Swedish Traumatic Grief Inventory Self-Report Plus (TGI-SR+) in bereaved parents. Clin Psychol Psychother. 2023; 1–10. doi:https://doi.org/10.1002/cpp.2922
20	UK	Shevlin M, Redican E, Hyland P, Murphy J, Karatzias T, McBride O, Bennett K, Butter S, Hartman TK, Vallières F, Bentall RP. Symptoms and levels of ICD-11 Prolonged Grief Disorder in a representative community sample of UK adults. Soc Psychiatry Psychiatr Epidemiol. 2023; 58(10): 1535–1547. doi:https://doi.org/10.1007/s00127-023-02469-1
21	USA	Bonanno GA, Malgaroli M. Trajectories of grief: Comparing symptoms from the DSM-5 and ICD-11 diagnoses. Depress Anxiety. 2020; 37(1): 17–25. doi:https://doi.org/10.1002/da.22902
22	USA	Cozza SJ, Shear MK, Reynolds CF, Fisher JE, Zhou J, Maercker A, Simon N, Mauro C, Skritskaya N, Zisook S, Lebowitz B, Bloom CG, Fullerton CS, Ursano RJ. Optimizing the clinical utility of four proposed criteria for a persistent and impairing grief disorder by emphasizing core, rather than associated symptoms. Psychol Med. 2020; 50(3): 438–445. doi:https://doi.org/10.1017/S0033291719000254
23	USA	Maciejewski PK, Maercker A, Boelen PA, Prigerson HG. "Prolonged grief disorder" and "persistent complex bereavement disorder", but not "complicated grief", are one and the same diagnostic entity: an analysis of data from the Yale Bereavement Study. World Psychiatry. 2016; 15(3): 266–275. doi:https://doi.org/10.1002/wps.20348
24	USA	Singer J, McLean E, Kahler J, Papa A. An evaluation of common risk factors for prolonged grief disorder using the international classification of diseases-11 criteria. Aging Ment Health. 2021; 26(11): 2202–2207. doi:https://doi.org/10.1080/13607863.2021.1998359

samples. In case of two estimates reported for one sample, only the prevalence scores according to ICD-11 were included in the following analyses due to the high correlation between the DSM-5-TR and ICD-11 estimates (Spearman's rho = 0.75; p = .08), and twice only a DSM-5-TR estimate was available, resulting in 34 independent PGD estimates.

3.2. Analysis

Distributional information for the variables and their correlations are shown in Table 3. Correlations (Spearman's rho) between PGD and the other variables were mostly weak to medium (p > .05).

The results of the negative binomial regression analyses for associations of PGD prevalence with methodological and risk factors are presented in Supplementary Tables C1 to C9. Starting with the methodological factors, a sensitivity analysis showed that PGD diagnostic criteria had no significant effect on the estimated prevalence, both with regard to one versus at least two additional ICD-11 symptoms (e.g., Haneveld et al., 2022) and the other ICD-11 versus DSM-5-TR criteria (see Table C1). PGD prevalence was lower in probability samples compared to non-probability samples (p < .001, Table C2). Sample size had no effect (Table C3). Of the risk factors, older age predicted higher PGD prevalence (p < .01, Table C4), while lower country vulnerability was significantly associated with higher PGD prevalence (p < .05, Table C9). The other risk factors, including time since loss (Table C5), unnatural death (Table C6), country death rate (Table C7), and exposure to natural hazards (Table D8), had no effect on PGD prevalence.

Fig. 1 shows the results of the pooled regression of PGD prevalence, stratified by sampling method. The overall prevalence of PGD was 13 % (95 % CI [11, 22]). The average prevalence varied from 5 % (95 % CI [3, 11]) in probability to 16 % (95 % CI [13, 25]) in non-probability samples.

4. Discussion

This study is the first examination of possible predictors of the cross-country variation in PGD rates and of the average prevalence of PGD according to DSM-5-TR and ICD-11 diagnostic criteria. The data was based on 34 samples from 16 countries with a total of 20,347 participants. An overall PGD prevalence of about 13 % was found across countries, resulting in 16 % in non-probability and 5 % in probability samples. This indicates a strikingly similar prevalence to the 9.8 % PGD prevalence reported by Lundorff et al. (2017) after mainly non-violent loss, although our study was based on different definitions of PGD and included a larger percentage of samples from Southern regions. However, our study included fewer samples based on probability sampling approaches (i.e. 33.3 % probability samples) than the meta-analysis (about 50 % probability samples).

Regarding possible methodological influences on PGD rates, the current study found no differences in PGD prevalence between DSM-5-TR and ICD-11. Also, we found no difference between studies that used the common ICD additional symptom threshold (i.e. at least one additional symptom, WHO, 2018) or a stricter cutoff (i.e. at least two additional symptoms; Ben-Ezra et al., 2020; Kokou-Kpolou et al., 2020; Maciejewski et al., 2016; O'Connor et al., 2019). This contrasts research on the ICD-11 diagnostic algorithm for PGD that, among other suggestions, proposed increasing the additional symptom threshold could prevent inflated false positive cases and increase agreement with other diagnostic proposals for PGD (e.g., Rosner et al., 2021). However, other studies suggested extending the ICD-11 time criterion might increase the agreement between the classification systems (Haneveld et al., 2022; Lundorff et al., 2021). Further, it is in contrast to previous studies reporting lower PGD rates when using DSM-5-TR compared to ICD-11 criteria (Boelen and Lenferink, 2020; Haneveld et al., 2022; Lenferink et al., 2022; Rosner et al., 2021). Despite these differences, previous studies showed that both criteria sets had rather high diagnostic agreements (Boelen and Lenferink, 2020; Lenferink et al., 2022; Rosner et al., 2021; but see Haneveld et al., 2022) and thus seemed to differentiate persons with severe and impairing grief symptoms from persons without PGD. Thus, our findings seem to support that results on prevalence and risk factors of PGD might be generalizable across classification systems. Moreover, we found that sampling method but not sample size had a serious impact on PGD prevalence. Our results showed that studies with probability sampling methods resulted in much lower prevalence estimates. This points to a risk of overestimation of PGD prevalence in non-probability samples, indicating that future meta-analyses on PGD prevalence should not ignore this source of bias.

In terms of known risk factors of PGD, older age predicted higher PGD prevalence in our study. This is in line with the meta-analysis by Lundorff et al. (2017), in which older age emerged as a risk factor for PGD. Several factors might decrease the ability to cope with bereavement and could therefore contribute to this effect. For example, a higher event rate, reduced general health, or increased loneliness have been observed for bereaved older individuals (e.g., Reiland et al., 2021; Utz et al., 2014). The known loss-related factors time since loss and unnatural death were not associated with PGD prevalence in this study. The fact that we tested associations at the country and not individual level might explain this. These factors varied mostly within country groups, while mean age displayed between-country variability. We found that PGD prevalence was higher in less vulnerable countries, characterized by higher average age of populations but lower susceptibility and more capabilities to cope with or adapt to disasters and other major challenges (Atwii et al., 2022). This finding confirms the potential relevance of country-level factors identified in two previous meta-analyses on PGD prevalence (Djelantik et al., 2020; Lundorff et al., 2017). Moreover, it elucidates for the first time a variable explaining cross-country differences in PGD rates: the vulnerability index. The other country-level factors of exposure to natural hazards and country death rate were not associated with PGD rates. This result is in line with findings on a paradox in global mental health, namely the finding of higher rates of several mental health problems in less vulnerable countries (e.g., Dückers et al., 2016, 2019; Dückers and Brewin, 2016). In principle, less vulnerable countries are better equipped with professionals and

Table 3
Distributional information and correlations.

	Distributional information				Correlations						
	N	Mean	Min-Max	IQR	PGD	AGE	TSL	UD	DR	EXP	VUL
Prolonged grief disorder prevalence (PGD)	34	13.06	2.00–35.50	14.70	1						
Age (AGE)	28	47.25	28.96–72.50	17.03	0.41	1					
Time since loss (TSL; months)	19	51.93	6.00–128.10	36.30	−0.19	−0.19	1				
Unnatural death (UD; percentage of sample)	15	37.88	2.70–100	49.15	0.37	−0.08	0.31	1			
Country death rate (CDR)	34	8.95	5.00–14.00	2.00	−0.19	−0.08	−0.62*	0.03	1		
Natural disaster exposure (EXP; 0–100)	34	13.61	0.07–64.59	38.14	0.21	−0.23	0.31	0.32	−0.55	1	
Country vulnerability (VUL; 0–100)	34	14.73	4.06–63.06	5.64	−0.28	−0.04	0.63*	0.37	−0.52	0.34	1

Note. N = Number of cases, Min-Max = Minimum and maximum value, IQR = Inter-Quartile Range. (Source: Country Death Rate: World Bank 2020; Natural disaster exposure: World Risk Report 2022; Vulnerability score: World Risk Report 2022).

* p < .05.

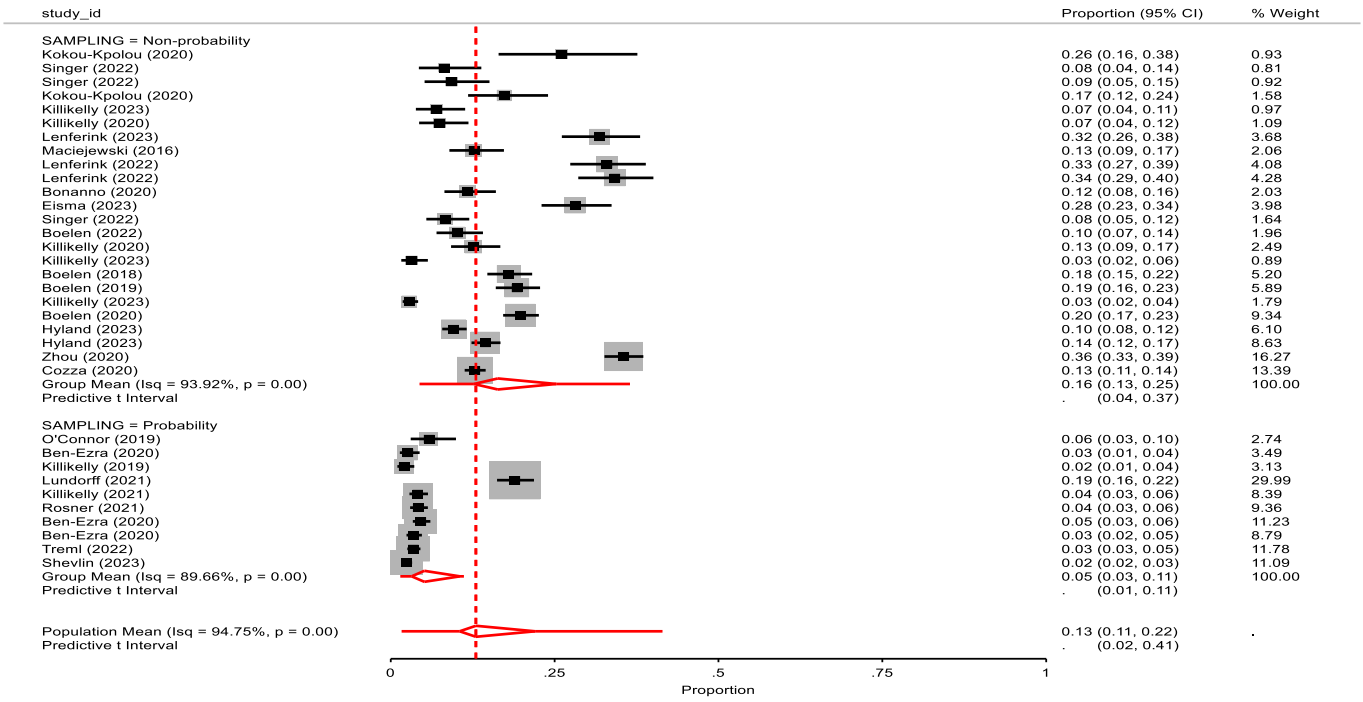

Fig. 1. Proportion of PGD prevalence in non-probability and probability samples.

resources enabling the screening for and treatment of mental disorders. Although large parts of the globe were not covered in this study, for example, no South America or Asia could be included, and samples from Europe and North America were overrepresented (16 out of 24 samples), our findings contribute to the growing global mental health knowledge base in general and our understanding of PGD in particular. It is important to further explore the implications of economic and sociocultural population context, that apparently matters, for clinical practice and public health.

Meaning attribution after loss is determined by sociocultural factors, in addition to event-related, individual and relational factors that may either facilitate or complicate the grieving process (Smid, 2020). Whether the loss of a loved one leads to loss of meaning characteristic of PGD may in part depend on an individual's assumptive world (Parkes, 2006). In vulnerable countries, loss and bereavement are more universal experiences, which might facilitate the integration of loss and bereavement in people's assumptive worlds. The loss of a loved one may then be less likely to cause a severe disruption of an individual's assumptive world, loss of meaning, and development of PGD. On a sociocultural level, country vulnerability may be associated with collectivism (Dückers et al., 2015) and religious belief (Sun et al., 2018) that may influence the experience of social support and the risk of PGD. Yet, these possible sociocultural explanations could not be examined directly in this study as data on cultural dimensions was not available for several of the included countries (see e.g., Hofstede, 2011), but future studies may further investigate this aspect. Also, cultural factors may be related less straightforward to PGD risk in the context of migration and acculturation. Following migration, cultural customs in the host country may be less helpful in dealing with the loss of loved ones, and such cultural incongruity may contribute to increased distress following the loss of a loved one (Smid et al., 2018).

4.1. Strengths and limitations

Strengths of this study are that we were able to test how a variety of factors was connected to and even seemed to influence PGD in different populations. This is the first PGD prevalence study to include studies from low-income countries from Southern regions that were not based on specific conflict survivors but the general population. Despite a changed composition of the country vulnerability index (in the World Risk Report 2022 the index comprises approximately four times as many indicators compared to previous versions), our study points at similar inverse association between prevalence and vulnerability. Besides this, several limitations need to be considered. First, the analysis of cross-national differences was based only on 16 countries. For about half of these countries, data from more than one sample was available. Moreover, the countries included did not cover large regions of the world as the majority of included samples was from Europe and North America but other regions were not covered at all (e.g., South America) as no corresponding studies could be identified. Therefore, many sociocultural contexts were not covered and the current findings should be interpreted with caution. Second, on a related note, possible explanations for the impact of country vulnerability were not investigated, for example, country-level differences in cultural dimensions (e.g., Hofstede, 2011) or individual-level differences in other important PGD risk factors such as the relationship to the deceased (e.g., Lundorff et al., 2017). This hampers the interpretation and future studies need to examine possible intermediating factors more directly. Third, the methodological quality of the current studies on PGD prevalence varied, limiting the generalizability of our findings. About half of the included studies assessed PGD on the basis of measures that were not specifically designed to capture PGD symptoms according to DSM-5-TR or ICD-11. Similarly, we excluded studies that used cutoff scores and did not apply DSM-5-TR or ICD-11 diagnostic rules to such measures. As PGD is a new disorder, few established measures with validated cutoff scores exists (see Killikelly et al., 2021; Lenferink et al., 2022), so the majority of primary studies applied diagnostic rules instead. Only about one third of the included studies used random sampling procedures to reduce the risk of selection bias.

Despite these limitations, the results of our study highlight sociocultural impacts on grief processing, suggesting that PGD is of public health relevance globally, but especially common in less vulnerable countries with better access to daily necessities and healthcare services.

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CRediT authorship contribution statement

Hannah Comtesse: Conceptualization, Data curation, Methodology, Validation, Writing – original draft, Writing – review & editing. **Geert E. Smid:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Anna-Maria Rummel:** Data curation, Methodology, Writing – review & editing. **Peter Spreeuwenberg:** Formal analysis, Methodology, Visualization. **Marie Lundorff:** Conceptualization, Data curation, Methodology, Writing – review & editing. **Michel L.A. Dückers:** Conceptualization, Formal analysis, Methodology, Supervision, Validation, Visualization, Writing – review & editing.

Declaration of competing interest

The authors have no conflicts of interest to declare.

Data availability

The dataset used for the analysis is available via https://www.synapse.org/#!Synapse:syn51445831/files/.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2024.01.094.

References

American Psychiatric Association (Ed.), 2022. Diagnostic and Statistical Manual of Mental Disorders (5th ed.- Text Revision). American Psychiatric Publishing.

Atwii, F., Sandvik, K.B., Kirch, L., Paragi, B., Radtke, K., Schneider, S., 2022. World Risk Report 2022. Bündnis Entwicklung Hilft (2022).

Ben-Ezra, M., Hyland, P., Karatzias, T., Maercker, A., Hamama-Raz, Y., Lavenda, O., Shevlin, M., 2020. A cross-country psychiatric screening of ICD-11 disorders specifically associated with stress in Kenya, Nigeria and Ghana. Eur. J. Psychotraumatol. 11 (1), 1720972 https://doi.org/10.1080/20008198.2020.1720972.

Benjet, C., Bromet, E., Karam, E.G., Kessler, R.C., McLaughlin, K.A., Ruscio, A.M., Koenen, K.C., 2016. The epidemiology of traumatic event exposure worldwide: results from the World Mental Health Survey Consortium. Psychol. Med. 46 (2), 327–343. https://doi.org/10.1017/S0033291715001981.

Boelen, P.A., Lenferink, L.I., 2020. Comparison of six proposed diagnostic criteria sets for disturbed grief. Psychiatry Res. 285, 112786 https://doi.org/10.1016/j.psychres.2020.112786.

Djelantik, A.M.J., Smid, G.E., Mroz, A., Kleber, R.J., Boelen, P.A., 2020. The prevalence of prolonged grief disorder in bereaved individuals following unnatural losses: systematic review and meta regression analysis. J. Affect. Disord. 265, 146–156. https://doi.org/10.1016/j.jad.2020.01.034.

Dückers, M.L., Brewin, C.R., 2016. A paradox in individual versus national mental health vulnerability: are higher resource levels associated with higher disorder prevalence? J. Trauma. Stress. 29 (6), 572–576. https://doi.org/10.1002/jts.22144.

Dückers, M., Frerks, G., Birkmann, J., 2015. Exploring the plexus of context and consequences: an empirical test of a theory of disaster vulnerability. Int. J. Disaster Risk Reduct. 13, 85–95. https://doi.org/10.1016/j.ijdrr.2015.04.002.

Dückers, M.L., Alisic, E., Brewin, C.R., 2016. A vulnerability paradox in the cross-national prevalence of post-traumatic stress disorder. Br. J. Psychiatry 209 (4), 300–305. https://doi.org/10.1192/bjp.bp.115.176628.

Dückers, M.L., Reifels, L., De Beurs, D.P., Brewin, C.R., 2019. The vulnerability paradox in global mental health and its applicability to suicide. Br. J. Psychiatry 215 (4), 588–593. https://doi.org/10.1192/bjp.2019.41.

Eisma, M.C., Rosner, R., Comtesse, H., 2020. ICD-11 prolonged grief disorder criteria: turning challenges into opportunities with multiverse analyses. Front. Psychol. 11, 752. https://doi.org/10.3389/fpsyt.2020.00752.

Haneveld, J., Rosner, R., Vogel, A., Kersting, A., Rief, W., Steil, R., Comtesse, H., 2022. Same name, same content? Evaluation of DSM-5-TR and ICD-11 prolonged grief criteria. J. Consult. Clin. Psychol. 90 (4), 303–313. https://doi.org/10.1037/ccp0000720.

Hofstede, G., 2011. Dimensionalizing cultures: the Hofstede model in context. Online Readings Psychol. Cult. 2 (1) https://doi.org/10.9707/2307-0919.1014.

Killikelly, C., Merzhvynska, M., Zhou, N., Stelzer, E.M., Hyland, P., Rocha, J., Maercker, A., 2021. Examination of the new ICD-11 prolonged grief disorder guidelines across five international samples. Clin. Psychol. Eur. 3 (1), e4159 https://doi.org/10.32872/cpe.4159.

Kokou-Kpolou, C.K., Cénat, J.M., Noorishad, P.G., Park, S., Bacqué, M.F., 2020. A comparison of prevalence and risk factor profiles of prolonged grief disorder among French and Togolese bereaved adults. Soc. Psychiatry Psychiatr. Epidemiol. 55 (6), 757–764. https://doi.org/10.1007/s00127-020-01840-w.

Lenferink, L.I., Eisma, M.C., Smid, G.E., de Keijser, J., Boelen, P.A., 2022. Valid measurement of DSM-5 persistent complex bereavement disorder and DSM-5-TR and ICD-11 prolonged grief disorder: the Traumatic Grief Inventory-Self Report Plus (TGI-SR+). Compr. Psychiatry 112, 152281. https://doi.org/10.1016/j.comppsych.2021.152281.

Lundorff, M., Holmgren, H., Zachariae, R., Farver-Vestergaard, I., O'Connor, M., 2017. Prevalence of prolonged grief disorder in adult bereavement: a systematic review and meta-analysis. J. Affect. Disord. 212, 138–149. https://doi.org/10.1016/j.jad.2017.01.030.

Lundorff, M., Johannsen, M., O'Connor, M., 2021. Time elapsed since loss or grief persistency? Prevalence and predictors of ICD-11 prolonged grief disorder using different applications of the duration criterion. J. Affect. Disord. 279, 89–97. https://doi.org/10.1016/j.jad.2020.09.116.

Maciejewski, P.K., Maercker, A., Boelen, P.A., Prigerson, H.G., 2016. "Prolonged grief disorder" and "persistent complex bereavement disorder", but not "complicated grief", are one and the same diagnostic entity: an analysis of data from the Yale Bereavement Study. World Psychiatry 15 (3), 266–275. https://doi.org/10.1002/wps.20348.

O'Connor, M., Lasgaard, M., Larsen, L., Johannsen, M., Lundorff, M., Farver-Vestergaard, I., Boelen, P.A., 2019. Comparison of proposed diagnostic criteria for pathological grief using a sample of elderly bereaved spouses in Denmark: perspectives on future bereavement research. J. Affect. Disord. 251, 52–59. https://doi.org/10.1016/j.jad.2019.01.056.

Parkes, C.M., 2006. Love and loss: The roots of grief and its complications. Routledge, London.

Prigerson, H.G., Boelen, P.A., Xu, J., Smith, K.V., Maciejewski, P.K., 2021. Validation of the new DSM-5-TR criteria for prolonged grief disorder and the PG-13-Revised (PG-13-R) scale. World Psychiatry 20 (1), 96–106. https://doi.org/10.1002/wps.20823.

Reiland, H., Banerjee, A., Claesges, S.A., Giuca, A.M., Hillard, C.J., Reynolds III, C.F., Goveas, J.S., 2021. The influence of depression on the relationship between loneliness and grief trajectories in bereaved older adults. Psychiatry Res. Commun. 1 (1), 100006 https://doi.org/10.1016/j.psycom.2021.100006.

Rosner, R., Comtesse, H., Vogel, A., Doering, B.K., 2021. Prevalence of prolonged grief disorder. J. Affect. Disord. 287, 301–307. https://doi.org/10.1016/j.jad.2021.03.058.

Ruscio, A.M., Hallion, L.S., Lim, C.C., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., Scott, K.M., 2017. Cross-sectional comparison of the epidemiology of DSM-5 generalized anxiety disorder across the globe. JAMA Psychiatry 74 (5), 465–475. https://doi.org/10.1001/jamapsychiatry.2017.0056.

Smid, G.E., 2020. A framework of meaning attribution following loss. Eur. J. Psychotraumatol. 11 (1), 1776563 https://doi.org/10.1080/20008198.2020.1776563.

Smid, G.E., Drogendijk, A.N., Knipscheer, J., Boelen, P.A., Kleber, R.J., 2018. Loss of loved ones or home due to a disaster: effects over time on distress in immigrant ethnic minorities. Transcult. Psychiatry 55 (5), 648–668. https://doi.org/10.1177/1363461518784355.

Sun, L., Deng, Y., Qi, W., 2018. Two impact pathways from religious belief to public disaster response: findings from a literature review. Int. J. Disaster Risk Reduct. 27, 588–595. https://doi.org/10.1016/j.ijdrr.2017.10.004.

Utz, R.L., Swenson, K.L., Caserta, M., Lund, D., DeVries, B., 2014. Feeling lonely versus being alone: loneliness and social support among recently bereaved persons. J. Gerontol. B Psychol. Sci. Soc. Sci. 69 (1), 85–94. https://doi.org/10.1093/geronb/gbt075.

Welle, T., Birkmann, J., 2015. The world risk index–an approach to assess risk and vulnerability on a global scale. J. Extreme Events 2 (01), 1550003. https://doi.org/10.1142/S2345737615500037.

World Health Organisation (WHO), 2018. ICD-11 International classification of diseases for mortality and morbidity statistics (11th revision). https://icd.who.int/browse11/l-m/en.