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Flooding and mental health: Lessons for Ireland's adaptation and recovery planning

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Key Findings

- Flooding is consistently associated with increased post-traumatic stress, depressive, and anxiety symptoms, with effects that can persist for years.
- Greater flood severity, displacement, and property damage are linked to worse mental health outcomes.
- The international evidence base is dominated by cross-sectional studies on adult populations, limiting understanding of recovery trajectories and cumulative exposure, as well as of impacts on children.
- There is very limited quantitative evidence from Ireland, while qualitative Irish research highlights place disruption, uncertainty, and governance processes (including trust and communication) as key pathways shaping mental health and wellbeing.
- Case studies and workshops show that distress is shaped by anticipatory risk, the credibility and actionability of warnings, the administrative and financial burden of recovery, and trust in institutional response.
- Flood prevention and protection, effective early warning and communication, and coordinated, institutionally led recovery are key policy levers which may protect population mental health as flood risk increases.

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Executive Summary

Flooding is among the most significant climate-related risks facing Ireland, and climate change is increasing both the frequency and severity of flood events. Although this report focuses on flooding, the pathways identified here and the adaptation levers we discuss (prevention and protection, risk communication, and fair, coordinated recovery) are also relevant to other climate-related hazards and longer-term environmental change. While the physical and economic impacts of flooding are widely recognised, its mental health consequences remain largely absent from flood risk management and climate adaptation policy. This report addresses that gap by bringing together international quantitative evidence, with two comparative case studies, and direct testimony from people in flood-affected communities in Ireland, to identify what is known, what remains uncertain, and what can credibly be concluded for policy. We integrate three key components: 1) a systematic review of studies on flooding and mental health, 2) two comparative case studies (Northern Rivers, Australia, and Hull, England), and 3) two participatory workshops in Ireland (Midleton, Cork and Enniscorthy, Wexford) and written narratives submitted by flood-affected residents.

Across the systematic review, flooding was consistently associated with increased post-traumatic stress, depressive, and anxiety symptoms, with effects that can persist for years. Worse outcomes were linked to greater flood severity, displacement, property damage, and prolonged disruption to housing, livelihoods, and daily routines. However, the evidence base is limited: studies were mostly cross-sectional, mechanisms and recovery trajectories were rarely tested, and children and adolescents were underrepresented. In Ireland, there is extremely limited evidence directly examining the mental health impacts of flooding, limiting national estimates of burden and evidence on those who are most affected. The one study specifically on this topic in Ireland, by Batool and colleagues (2025)[i] found traumatic higher stress after flooding and heavy rains, especially when health or finances worsened.

The Irish workshops show how mental health harms can persist long after floodwaters recede. Participants described acute fear during events, followed by chronic anxiety and hypervigilance linked to anticipated recurrence. Many emphasised prolonged distress during recovery, shaped by financial strain and the practical burden of repairs and insurance claims. A strongly expressed theme was anger and demoralisation linked to perceived institutional inaction and poor communication from government, with loss of trust in institutions experienced as a substantial driver of ongoing distress.

Taken together, the evidence suggests a policy conclusion: mental health impacts are shaped not only by flood exposure, but by subsequent prevention and protection responses; the credibility and actionability of warnings; and the pace, coordination, and fairness of recovery. These are modifiable determinants. Policy action that reduces flood risk, improves warning and communication, and shortens and stabilises recovery is likely to reduce fear, uncertainty, and prolonged distress, alongside reducing physical and economic losses. Our research also points to a need to strengthen Ireland's evidence base and policy readiness through systematic monitoring of mental health after flood events; this would ideally involve longitudinal follow up that captures repeat exposure and recovery, research specifically on children and adolescents, and routine evaluation of prevention and recovery measures for their mental health impact.

Key Observations

1. Put a stepped-care model in place through primary care and community services: universal information and practical support for all affected residents, with targeted follow-up for higher-risk groups, clear referral routes into specialist care, and training for staff and community providers delivering psychosocial supports so they can respond appropriately to extreme weather-related distress (e.g. through trauma-informed approaches). Activate within a week of a major flood, with targeted outreach for higher risk groups and basic training for frontline staff within 3 weeks. This stepped-care offer should include brief, evidence-informed supports for sleep disruption, worry and rumination, intrusive memories, and anger and frustration, delivered alongside practical assistance and linked to community and family resources.
2. In flood prone areas, each Community Healthcare Organisation would benefit from having a primary care continuity plan in place within the next 6 months, including a locally coordinated "buddy system" for short-term staffing cover when services close, rapid workforce wellbeing support (available within 7 days of a major flood), and annual training for primary care staff and first responders on flood recovery, care that is trauma-informed, and post-traumatic stress.
3. Set up integrated, locally accessible recovery hubs after major floods, where people can get practical help (forms, insurance, grants, builders, housing) alongside psychosocial support in the same place. This would directly target the prolonged uncertainty and administrative burden that can be a key driver of distress.
4. The provision of flood-risk reduction infrastructure is a public health intervention. Preventing flooding, clearly communicating timelines, and implementation of interim protection measures would reduce anticipatory fear and chronic anxiety linked to expected repeat flooding. For previously flood-affected areas and those at high risk of flooding, publish clear delivery timelines and interim risk reduction measures within 6 months, and update progress publicly at least quarterly.
5. Treat displacement and service disruption as high-risk flags: ensure rapid access to stable temporary accommodation and practical supports for displaced households (including renters), and put continuity plans in place for primary care, medication access, and community health services (e.g., alternative consultation spaces or mobile provision) when usual services close. A clear continuity of service plan should be in place and communicated to community members within 72 hours of major disruption.
6. Support children's recovery after flooding by prioritising a rapid return to safe, predictable routines and learning: provide age-appropriate information, practical supports to restore schooling (attendance, transport, temporary timetable flexibility, catch-up learning), and proactive outreach to families. Embed child and adolescent stepped care mental health and recovery supports within schools and local child and family services after floods. This return-to-school and embedding of stepped care within schools should take place within one week of the flooding event.
7. Design early warning and risk communication to support coping and action. Warnings should be timely, actionable, and paired with clear information on what to do and what supports are available, with attention to people who may not receive or be able to use standard digital warnings. Update and test local warning and guidance materials at least every two years for the most flood-affected areas. The Health Sectoral Adaptation Plan also points to adapting HSE severe weather planning guidance and developing an integrated severe and extreme

weather communications plan, providing a clear policy route for strengthening flood-related risk communication.

8. Establish a dedicated flooding office within the local government to coordinate multi-agency responses, including mental health supports. This office should lead clear, ongoing local engagement (with trusted intermediaries where needed) and publish transparent decisions, responsibilities, timelines, and eligibility rules for recovery and protection measures.
9. Build in routine post-flood monitoring. Within 6 weeks of each major flood, the HSE should implement a short, standard assessment of mental health and wellbeing for affected residents, linked to objective exposure and disruption indicators and logged through the National Incident Management System. Within 12 months, they should publish a brief public summary of impacts and service lessons, share it locally with affected communities, and update post-flood care and recovery plans accordingly, evaluating supports as they are delivered. Where feasible, include indicators of functioning and economic impact (e.g., days off work or school, return to work, and health and social care utilisation) to support estimates of indirect costs and to inform appraisal of prevention and recovery measures.
10. Prioritise perinatal supports after flooding, including continuity models in maternity care and early identification of distress in pregnancy and postpartum. Provide proactive outreach within 2 weeks of a flood for flood-affected pregnant and postpartum women already known to services and ensure a clear screening and referral pathway is active within 4 weeks. Continuity in care may buffer depression and anxiety in flood-exposed pregnant women.
11. Where flooding will still be a substantial risk even if planned flood defences were built, the relevant bodies should be transparent about this with those affected so that they can plan accordingly.

These observations are based on evidence from the review, case studies, and workshops, and are intended as practical actions to support recovery. However, the evidence base, particularly for interventions, is limited and often based on small studies rather than robust evaluations. We therefore present these as best available, theory-informed observations that should be implemented alongside monitoring and evaluation. We have provided observations for timelines, but again, these exact timelines are not specifically evidence based.

Implementation of coordination, recovery hubs, accommodation pathways, and local engagement should be led locally by local county and city councils, as the lead agency for coordinating the local response to flooding and severe weather under the Major Emergency Management Framework. Nationally, prevention and protection delivery and timelines should be implemented by the Office of Public Works. The HSE and Department of Health should lead stepped care supports, training, and monitoring. The Department of Education, NEPS, Tusla, and HSE child and family services should lead the child-focused actions. The insurance sector can reduce distress by reducing administrative burden, by participating in recovery hubs, agreeing a standard claims information pack and a clear claims decision timeline, and using consistent plain language communications about claims steps and documentation. Implementation requires joint ownership: OPW for prevention and protection delivery; the relevant county or city council for local coordination and recovery; and the HSE for health and psychosocial supports, monitoring, and stepped care pathways.

Introduction

Climate change is a threat to health and wellbeing, affecting our fundamental right to survive and thrive.[ii],[iii],[iv],[v] Climate change results in more frequent and severe extreme climatic events (e.g., floods, heatwaves), as well as in chronic environmental changes (e.g., rising sea levels, changed growing seasons), damaging the natural and social systems on which physical and mental health depend[vi]. In this report, mental health and wellbeing refers to both mental health symptoms (e.g. post-traumatic stress, depression, anxiety, distress, and sleep problems) as well as positive functioning and quality of life (e.g. life satisfaction, sense of safety and control, and social connection). Examining mental health in the context of climate change is essential because climatic changes can precipitate or worsen psychopathology and reduce wellbeing for individuals, while also disrupting social relationships and community functioning[vii]; these harms, in turn, weaken preparedness and adaptation, amplifying future risk.[viii] Indeed, risks are rising faster than many systems are adapting.[vi,ix] In this report we focus on the mental health effects of one acute climatic change: flooding. Flooding is particularly important in this context because it is one of the most common and damaging climate related hazards globally, and it can generate a cascade of exposures that are relevant to mental health: threat to life and safety, loss of home and possessions, prolonged disruption to daily functioning, financial strain, and uncertainty about recurrence.[x,xi] It is often treated as an acute event, but the mental health impacts can extend well beyond the immediate crisis.[xii,xiii]

Flooding is an outcome of climate change that is particularly relevant in Ireland where climate change is expected to increase both the likelihood and intensity of flooding events[xiv,xv,xvi]. Changes to flooding as a result of climate changes are driven by three interacting shifts: heavier short-duration rainfall, higher sea levels (and storm surge), and altered catchment conditions that raise runoff (e.g., saturated soils, thaw and land-use change). More intense downpours resulting from climatic changes increase pluvial (surface water) flooding in towns and cities where drainage capacity is exceeded, prolonged wet spells and extreme storms raise fluvial (river) flood risk, and sea-level rise amplifies the likelihood and strength of coastal flooding and tidal locking at river mouths. Compound and cascading events - such as experiencing a storm surge plus heavy rain, or back-to-back storms - are becoming more common in many countries,[xvii] including Ireland,[xviii] increasing both peak water levels and the duration of inundation.

Flooding is a priority risk in Ireland because of our long, indented coastline, with more than 650,000 residents living within 1km of the coast,[xix] many towns built on tidal estuaries (e.g., Cork, Galway, Dublin), and river systems with slow-draining, peat-dominated catchments that saturate quickly. Observations show Ireland is ~0.7 °C warmer and ~7% wetter (1991–2020 vs 1961–1990), conditions that increase pluvial and fluvial flood likelihood during heavy rain and prolonged wet spells.[xx] The sea level around Ireland has risen by ~2–3 mm/yr since the 1990s, compounding coastal and estuarine flooding and contributing to tidal locking during storms.[xxi] Atlantic storms bring prolonged rain and surge, and when high tides coincide with heavy rainfall, tidal locking can back water up through rivers and drains, worsening urban flooding. Karst landscapes in the west of Ireland may experience persistent groundwater flooding (e.g., turloughs), while outdated drainage infrastructure in older urban areas increase the risk of overflow during downpours.[xxii,xxiii] Modelling by the Economic and Social Research Institute suggests that - under moderate warming scenarios - the annual damage from coastal flooding alone could reach around €2 billion by 2050, and up to €7 billion by 2100 in the absence of adaptation.[xxiv] National assessments and flood plans from the Office of Public Works and the Environmental Protection Agency identify flooding as a leading climate hazard with likely substantive social, economic, health, and heritage impacts.[xxv,xxvi,xxvii] Indeed, the National

Climate Change Risk Assessment highlights that flooding and other climate hazards can cascade from other sectors into the health system, including through damage to healthcare infrastructure and disruption to essential services on which health and social care depend.[xvi] One of the health outcomes which this flooding or the threat of flooding is likely to impact is mental health.

Climate change and extreme weather events are established and increasing contributors to mental health problems at the population level, with considerable evidence linking climate hazards to increased anxiety, depression, post-traumatic stress, sleep disturbance, substance harms, and suicide risk.[xxviii,xxix] There is good evidence to suggest that flooding leads to psychopathology - including increased rates of depression, anxiety, and post-traumatic stress - among flood-exposed populations, with prevalence of PTSD in flood survivors being particularly high.[x,xxx,xxxi] Research from the UK finds that adverse mental health effects persist for at least three years, and are seen not only in households directly flooded, but also among those whose lives were significantly disrupted by flooding.[xii,xiii] In line with a dose-response effect (e.g. where more exposure is associated with more symptoms), repeated flood exposure is associated with a higher burden of depression, anxiety, and PTSD, relative to single events.[xxxii] Flooding is not only a physical and economic shock. It can also create a substantial and lasting mental health burden, through direct trauma and through secondary stressors such as displacement, financial strain, uncertainty, and prolonged disruption to daily routines and services.[x] However, the evidence on the links between flooding and mental health is fragmented and has not been pulled together comprehensively: the most recent systematic reviews have been limited to evidence from specific countries (United States)[xxxiii] or disorders (PTSD),[xxxiv] or are outdated, with the most recent comprehensive review conducted in 2015.[x]

In short: flooding is among the most frequent and costly climate-related hazards, and its mental health impacts appear to persist long after waters recede. The case for action is strong in Ireland. National assessments already recognise flooding and extreme precipitation as major climate risks,[xvi,xxxv,xxxvi] with knock-on effects for health and mental health, and recent policy reviews have highlighted the need for clearer indicators and monitoring of adaptation outcomes.[xxxvii],[xxxviii] Yet flood risk planning and appraisal still tends to prioritise tangible losses, which can leave mental health impacts under-counted in decision making and under-planned for in preparedness and recovery.[xxxvii,xxxix] While the evidence base on this topic is sizable, gaining a clear picture of the link between flooding and mental health is difficult because of differences in study designs, outcomes, exposure types (coastal, fluvial, pluvial, groundwater), time horizons, and population subgroups. This report will address that gap by bringing together international evidence with Irish lived experience and stakeholder input, focusing on the modifiable features of prevention, protection, communication, and recovery that are most likely to reduce distress and support long-term wellbeing after flooding. In this report, we will bring together three strands of evidence:

1. A systematic review on the mental health impacts of flooding in high-income countries,
2. Two case studies on flooding impacts from locations with similarity to Ireland (UK, Australia), and
3. Qualitative evidence from workshops with flood-affected residents in Cork and Wexford.

Systematic review

First, we conducted a pre-registered systematic review focused on the effects of flooding on mental health in high-income countries, to provide guidance for the Irish context. Below, we describe the methods and results of the systematic review. To identify policy and practice levers, we focus closely on variables that may mediate or moderate the association between flooding and mental health, and on evaluations of interventions meant to interrupt this relationship. Following this, we also incorporate some additional Ireland-specific literature that did not meet the inclusion and exclusion criteria for our review, but which is of relevance for this report.

Methods

This systematic review was pre-registered on PROSPERO (CRD420251154757).[xl] We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines in conducting and reporting this review.[xli] See Appendix A for search strategy and selection criteria.

Results

This review includes 102 quantitative studies examining flooding and mental health in high-income countries. All 102 included studies were published since 1980, with 47 studies (45.6%) being published in the last 5 years (2020-2025), suggesting that flooding and mental health is a topic of increasing interest to researchers. The majority of studies used a cross-sectional study design (*n* = 77, 75.5%), with cohort studies the second most common study design (12.7%), and less than 4% each of studies with longitudinal, case control, mixed methods, randomised controlled trial, and quasi experimental designs.

Where were studies conducted?

This review focuses on studies conducted in high-income countries. The biggest share of studies examined flooding that occurred in the United States (*n* = 37,36.3%). This was followed by the United Kingdom (*n* = 17, 16.7%), Australia (*n* = 14, 13.7%, and Canada (*n* = 9, 8%) - including three that investigated the same flood.[cx,cxi,cxii] Germany and Japan were the location of six and five studies, respectively, and three studies investigated effects of the same flooding incident in Poland. Two studies occurred in Spain. Of the remaining studies, nine were each conducted in a different country (Ireland , Italy, France, Greece, Belgium, Croatia, Netherlands, South Korea, and Trinidad) while one study used data from flooding that had occurred across multiple countries in Europe (Germany, Spain, Sweden, Poland, Türkiye, the Czech Republic, and the United Kingdom). Note that below, we do not include the specific references for each group of studies – only when we refer to a specific individual study or where it is particularly pertinent – as all studies included in this review are cited above. See Appendix B for more details on the study locations.

What types of flooding were studied?

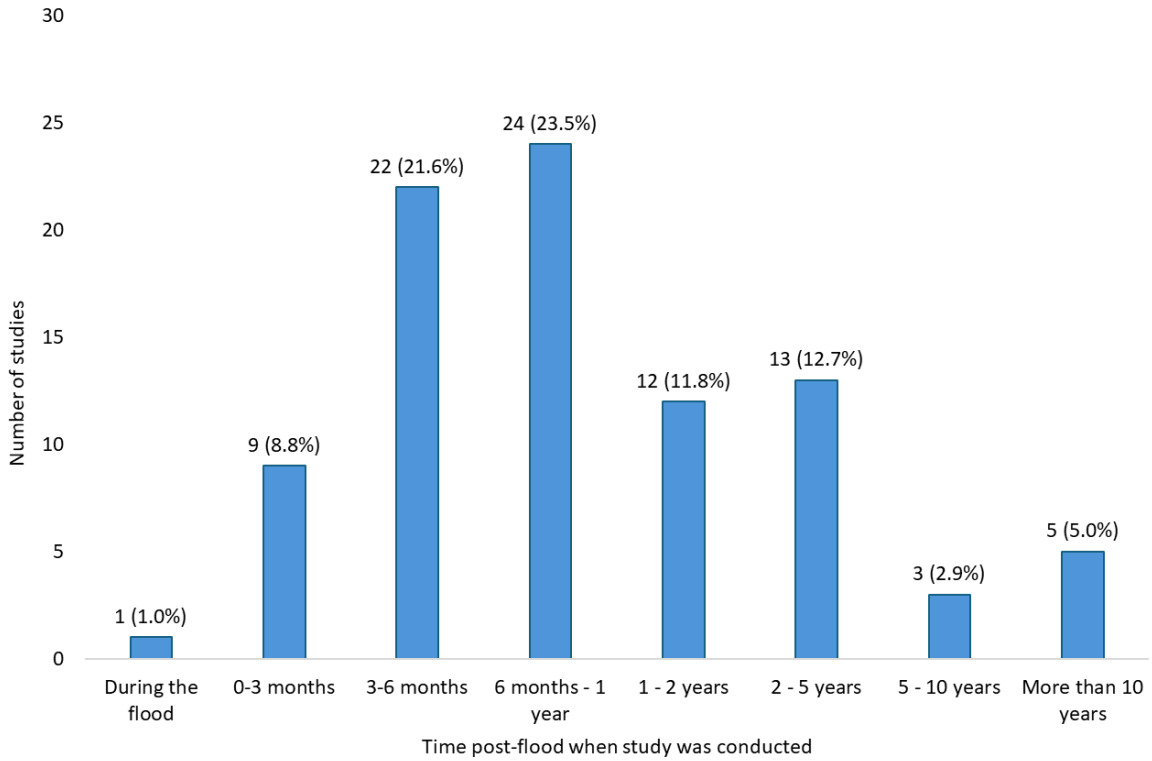
Many studies (*n* = 36, 35.3%) did not specify the type of flooding they examined. Of those that did, the most common types were flash (*n* = 17, 16.7%) and river flooding (*n* = 15, 14.7%). The effects of flooding caused by storm surge and hurricanes/typhoons/cyclones were both investigated by eight studies each. Five studies were concerned with flooding that was caused by heavy rainfall. Nine studies assessed the impact of multiple types of flooding, including river and flash, storm surge and flash,[lxx,cv] tidal and flash,[lxxxiii] and river and coastal flooding.[xiii] In their study conducted in Ireland, Batool et al. (2025)[i] examined the mental health impact of being exposed to both fluvial (river and

lake) and coastal/tidal flooding. Of the four remaining studies, three investigated the same incident of flooding caused by an ice jam,[cx,cxi,cxii] while one examined coastal flooding.[cxxiv]

How and when were participants exposed to flooding?

We classified flooding exposure as direct (i.e., experiencing flood-related damage to self, place of residence, or other property; being displaced), indirect (i.e., having one's life disrupted by flooding without direct exposure; for example, through losing access to certain services or feeling threatened by the flooding), or both (where a study disaggregated their participants by exposure type). Among included studies, the majority (*n* = 62, 60.7%) assessed the impact of direct exposure on participants' mental health. 24 studies (23.5%) examined the impact of both direct and indirect flooding exposure and conducted their analysis accordingly. The remaining studies either did not specify the kind of flooding exposure (*n* = 13, 12.7%) or were unclear in how they described exposure (*n* = 3, 2.9%) (i.e., most or all participants reported living within a flood-exposed area, but the extent of their personal exposure was not specified[xci,cviii] or participants reported having applied for emergency financial relief as a result of the flood[cxxi]). No studies included participants who had been only indirectly exposed to flooding. Figure 2 presents the number and proportion of studies that were conducted within different time periods following flood events.

***Figure 2*. Time elapsed between flood event and when studies were conducted**



Note: 13 studies did not specify how much time elapsed since the flood event. Where studies collected data at multiple time points or from participants experiencing different floods at different times (*n* = 35), their categorisation is based on the time point of data collection that was furthest from the flood event.

Who was the target population?

Study sample sizes ranged from 33[cviii] to 110,843.[lxxvii] Most studies (*n* = 72, 70.6%) were concerned with the effect of flooding on the general adult population. Some studies focused on specific adult

groups. For example, 15 studies included only adult women participants, with 14 of those focusing on women who were pregnant or recently postpartum during the flooding. Many of these publications drew from larger datasets, such as the Queensland Flood Study 2011 (Australia), the Iowa Flood Study (United States), and the All Our Families study (Canada). The remaining study focused on adult women was on women with hypertension.[xlix] Additional adult populations of interest were farmers[cviii,cxxxix] and older adults (aged 60+ years).[xcix] Nine studies (8.8%) included both adult and children/adolescent participants (aged 10-24 years old). Finally, three studies were concerned only with child and adolescent populations,[lii,lxvi,xcviii] two of which focused specifically on students.[lxvi,xcviii]

What mental health outcomes were studied?

This section summarises the mental health outcomes assessed in included studies and how they were linked with flood exposure. Most studies (*n* = 62, 60.8%) examined more than one mental health outcome. The most commonly assessed outcomes were post-traumatic stress symptoms, including acute stress disorder and post-traumatic stress disorder (PTSD) (*n* = 57, 55.9%), followed by depression (*n* = 50, 49.0%), and anxiety (*n* = 43, 42.2%). Eighteen studies (17.6%) examined distress (including weather-specific distress[xlvii]) and 12 (11.8%) assessed general stress. Twelve (11.8%) studies assessed the effect of flooding on positive mental health outcomes, including wellbeing (*n* = 7, 6.9%), life satisfaction (*n* = 4, 3.9%), and optimism (*n* = 1, 1.0%) to examine whether flooding led to worsened wellbeing. A wider range of outcomes were each assessed in a smaller number of studies, including worry (including worry about future flooding), suicidal ideation, anger, somatisation, and sleep problems.

Quantitative measurement tools

This section provides an overview of the quantitative measurement tools most frequently used to assess the three most common mental health outcomes of flooding examined in our included studies (post-traumatic stress, depression, and anxiety). Beyond these three most common mental health outcomes, a broad range of other measurement tools were used to assess the other mental health and wellbeing outcomes.

To assess levels of PTSD or posttraumatic stress symptoms among respondents, the most used tools were different versions of the Post-traumatic stress disorder Checklist (PCL), which were used by a total of 23 studies. Among these, the most frequent was the PCL-6 - an abbreviated, six-item version - which was employed by 11 studies. The PCL-Civilian version (PCL-C) was used by five studies, the PTSD Checklist for DSM-5 (PCL-5) was used by four studies, and the PCL-Specific (PCL-S), which is used to assess PTSD symptoms related to a specific event, was used by two studies. The second most frequently used tool to assess PTSD resulting from flooding was the Impact of Event-Revised (IES-R). This was used by 12 studies, including the one conducted in Ireland[i]. All other measurement tools for PTSD were used infrequently, with most only being used in one study each.

Among the studies that assessed levels of depression in response to flooding, the largest proportion (*n* = 18, 36.0%) employed the Patient Health Questionnaire (PHQ) as their measurement tool. Similar to the PCL, different versions of the PHQ were used. Fifteen studies used the PHQ-2, a two-item measure asking participants how often they have had "little interest or pleasure in doing things" and have felt "down, depressed or hopeless" in the past two weeks. The remaining three studies using the PHQ used the nine-item version (PHQ-9), which asks about a wider range of depressive symptoms, including thoughts of self-harm and suicide. The second most common measurement tool

used to assess depression was the Center for Epidemiological Studies Depression Scale (CES-D), which was used by five studies. Three studies each used the Beck Depression Inventory and The Inventory of Depression and Anxiety Symptoms. The remainder of studies that assessed depression used a variety of additional measurement tools.

Of the 43 studies that investigated levels of anxiety among flood-exposed individuals, a substantial portion (*n* = 15, 34.8%) used the Generalised Anxiety Disorder Assessment (GAD). Like the PHQ, the most common version of the GAD that was used was the 2-item GAD-2, which was used by 12 studies. The longer, seven-item version (GAD-7) was used by three studies. Similar to both PTSD and depression, a collection of additional measurement tools were used to assess anxiety, with each only being used once or twice.

How was flooding associated with mental health?

Across studies, flood exposure was generally associated with worse mental health outcomes, particularly for post-traumatic stress, depression, and anxiety. Among studies that compared outcomes by exposure group (unexposed, indirectly exposed, directly exposed), results consistently pointed towards higher levels or prevalence of post-traumatic stress, depression, and/or anxiety among people directly exposed to flooding compared with those indirectly exposed or unexposed. Indirect exposure was also associated with worse outcomes than no exposure,[xxxii,xcv] suggesting a graded relationship in which direct exposure is associated with the greatest burden.

Repeat and displacement-related exposures were linked with worse outcomes. In their cross-sectional analysis of the English National Study of Flooding and Health, French and colleagues [xxxii] found that exposure to repeated floods was associated with higher prevalence of post-traumatic stress, anxiety, and depression compared to exposure to a single flood. Heanoy and colleagues[cix] found that displaced people reported higher levels of all three outcomes compared with those not displaced, and Kreuger and colleagues[lii] reported higher levels of depression and anxiety among children and adolescents who were forced to evacuate compared with those who were not.

Across studies that tested associations using correlational or predictive models, the overall pattern was similar: flood exposure was almost invariably associated with higher odds or increased likelihood of post-traumatic stress, depression, and or anxiety. Longitudinal and pre-post analyses pointed in the same direction, with post-traumatic stress,[cxxiii] depression[lvii,lxiii,lxxvi,cxxiii], and anxiety[lvii, cxxiii] worse or more prevalent after flooding. The exceptions were Ruisecki and colleagues[lx] and Jayaraman and colleagues[lix], where flood exposure was associated with lower odds of depression[lx] and post-traumatic stress[lix], although neither association was statistically significant. Four additional studies also were not consistent with the overall pattern. Hetherington and colleagues[cxiv] reported lower prevalence of anxiety and depression among flood exposed participants compared with those unexposed; Hetherington and colleagues[cxiii] and Sugg and colleagues[li] reported lower prevalence of anxiety and depression after flooding compared with before; and Norris and Murrell[xlv] reported lower mean anxiety among participants with prior flood experience than those without. However, these studies either did not report statistical significance[xlv,cxiii,cxiv] or found the differences to be non-significant[li].

Flood severity, secondary stressors, and mental health

Twenty-two studies investigated specific flood-related variables and how they predicted worsening mental health. Greater water depth, more substantial and/or persistent damage to property, and

needing to evacuate or being displaced due to flooding were consistently associated with higher odds or increased likelihood of heightened post-traumatic stress, depression, and/or anxiety. Other predictors included prolonged disruption to services[lxi,cxiii,cxx] such as medical care,[lxi] experiencing financial difficulties (depression[lxi,cvi] and post-traumatic stress[lxi,cxxxii]), low social support (anxiety and depression)[cxx] and longer duration of flood consequences (post-traumatic stress, depression, and anxiety),[cxviii] including displacement.[lxxxix]

What variables impacted the relationship between flooding and mental health?

Only seven studies went beyond the basic flooding-mental health analyses to test a) the pathways through which flooding affects mental health (mediation) and or b) whose mental health is more or less affected by flooding (moderation). Mediation analyses look for the pathway that links flood exposure to later distress (e.g. flood exposure leads to loss of resources which leads to distress). Moderation analyses look for factors that change the strength of the link (e.g. flood exposure has a bigger impact when social support is low). Below, we take these seven studies one-by-one.

Smith and Freedy (2000)[lxiv] found that people who experienced more flood exposure reported greater loss of psychosocial resources (such as support, stability, a sense of control), and this loss helped explain higher psychological distress six months after the flood. Resource loss also helped explain why people with higher symptoms at six weeks tended to still have higher symptoms at six months.

Two studies focused on maternal depression following the same flood event. Brock et al. (2014)[lxvii] found that partner support mattered: mothers who received less informational support and emotional support from their intimate partners showed a poorer pattern of recovery in depression over time. Brock et al. (2015)[liii] tested a different pathway: they found that peritraumatic distress (strong distress during or immediately after the flood) accounted for the association between flood exposure and maternal depression. In other words, flood exposure was associated with higher depression. However, this link was no longer statistically clear once peritraumatic distress was taken into account.[liii]

Using data from the Queensland Flood Study conducted in Australia, Chen et al. (2020)[civ] examined whether coping style changed how objective hardship related to later outcomes. They found that coping strategies moderated the association between objective hardship and both subjective stress and PTSD-like symptoms. Higher emotion focused coping was associated with lower stress and fewer PTSD-like symptoms, while higher problem focused coping and higher dysfunctional coping were associated with higher stress and more PTSD-like symptoms. This suggests that 'more' coping is not necessarily better for mental health, but rather that the type of coping matters.

Felix et al. (2020)[liv] explored whether communication processes (topic avoidance and co-rumination) moderated the relationship between flood exposure and posttraumatic stress, depression, and anxiety among both parents and their children. Their results showed that both communication processes did not moderate the flood-posttraumatic stress association. The association between flooding and both child depression and anxiety was moderated by topic avoidance. Co-rumination moderated the flood-depression relationship for both parents and children, while only moderating the flood-anxiety relationship for children.

Another Queensland Flood Study paper examined intergenerational pathways. McLean and colleagues (2020)[cii] tested whether toddlers' stress biology (hypothalamic pituitary adrenal axis functioning, the body's main stress response system that regulates cortisol release) helped explain the link between perinatal maternal stress (among mothers pregnant or recently postpartum during the flood) and toddler anxiety at age four. They found that toddlers' cortisol awakening response at 16 months mediated the relationship between mothers' subjective prenatal stress and child anxiety symptoms at age 4 years. In practical terms, this strengthens the case for prioritising early mental health support for pregnant women after floods, not only for maternal outcomes but also for longer-term child development.

Finally, Murata et al (2023)[cxxvii] tested whether anxiety about floods helps explain how flood experience relates to subjective wellbeing. They found little evidence of a direct link between flood experience and wellbeing, but an indirect link via higher flood anxiety, which in turn related to lower wellbeing. This means that flood plans should aim to reduce people's ongoing worry about flooding, not only the physical damage. Practical measures that lower risk, and clear, trusted information about that risk, may improve wellbeing as well as protect safety.

What interventions have been implemented?

Only four studies in this review evaluated post-flood interventions for mental health outcomes. The interventions and findings were quite varied.

1. *Paquin et al. (2022)[lxii] (brief writing intervention, perinatal women, United States)*
   Paquin et al. (2022)[lxii] compared the effects of four days of expressive writing (writing about flood experiences and coping) and neutral writing (writing about day-to-day routines) with a no writing control group (*N* = 1090). Neither writing intervention improved posttraumatic stress, depression, or anxiety at two months. Results also suggested expressive writing may be unhelpful for some participants. This intervention evaluation suggests that brief, exposure-focused writing exercises should not be used as standalone support after flooding, particularly without additional psychosocial support.
2. *Kildea et al. (2018)[cii] (continuity of maternity care, pregnant women, Australia)*
   Kildea et al. (2018)[cii] compared midwifery group practice (continuity of care across pregnancy, birth, and postnatal care) with standard hospital care among women pregnant during a flash flood (*n* = 126). At six weeks postpartum, higher flood-related stress and hardship were linked to higher depression and anxiety among women receiving standard care, but not among women in midwifery group practice. This suggests that continuity models in maternity care may help to buffer mental health risks after flooding.
3. *Daniel & Michaela (2021)[cxx] (financial support and supportive counselling, adults, Germany)*
   Daniel & Michaela (2021)[cxx] examined whether receiving financial support and supportive counselling focused on coping with flood experiences affected levels of depression and anxiety in the past 12 months (*n* = 286). Financial support (used by 83.4%) was associated with lower depression and anxiety. Supportive counselling (used by 37.6%) was associated with lower symptoms only among people who reported barriers to accessing other assistance. Among those without such barriers, supportive counselling was not associated with better outcomes. This suggests that practical financial support is a core part of mental health recovery, and that counselling may be most useful when targeted to people with unmet needs and access barriers.
4. *Müller et al. (2024)[cxxii] (mindfulness digital app, adults, Germany)*

Müller and colleagues (2024)[cxxii] evaluated a six-week app-based mindfulness intervention using a waitlist control design (*n* = 146). Participants who took part in this digital intervention showed improvements in positive outcomes (e.g. self-compassion and life satisfaction) and reductions in negative outcomes (e.g. perceived stress and pathological symptoms). This suggests that app-based support can help reach people when services are disrupted after floods, but it is important to check who is able and willing to use it, as it may not be useful to much of the flood-affected population.

What is the evidence base in Ireland?

Our review included one study conducted in Ireland.[i] Employing a cross-sectional study design, Batool et al. (2025)[i] investigated the association between experiencing a range of extreme weather events - including fluvial (river and lake) and coastal/tidal flooding - on the severity of psychological distress among the general adult population in Ireland. They assessed psychological distress using the Impact of Event Scale - Revised (IES-R), a commonly used measure consisting of 22 items. Items represent the three main symptom clusters of PTSD (intrusion, avoidance, and hyperarousal), with participants rating each item statement according to their most recent experience of an extreme weather event. Of the 456 total participants in their study, the largest proportion (*n* = 82, 23.2%) reported their most recent extreme weather event being fluvial flooding, while coastal/tidal flooding was the most recently experienced extreme weather event by 45 (12.7%) participants. Participants across both types of flooding exposure reported similar levels of psychological distress, with mean scores that were higher than those reported by participants who had experienced all other types of extreme weather events (which in their study consisted of drought/extreme heat, flooding [coastal/tidal surge], flooding [river/lake], heavy rainfall, heavy snowfall/extreme cold, landslide/bog movement or burst, poor air quality, storm/gale, wildfire, and 'other'). Outside of extreme weather events, only poor air quality was associated with higher levels of psychological distress. Batool and colleagues (p. 13)[i] indicated that "flooding emerged as a particularly potent [extreme weather event] associated with significant mental health challenges."

Aside from this one quantitative study which met the inclusion criteria for our review, Irish evidence directly linking specific extreme weather events to mental health outcomes is still thin, with most work having qualitative designs, analysing specific aspects of governance/adaptation, or using national or administrative datasets which are not focused specifically on flooding. In Northern Ireland, qualitative case study evidence from British Red Cross work and related reports describes sustained anxiety, fear when it rains, sleep disruption, distress, and feelings of loss of control following flooding in Greater Belfast and rural areas.[xliii,xliv,xlv] These impacts are reported to persist well beyond the acute event and, in some cases, to become chronic where flooding is repeated or anticipated, particularly in contexts where people feel poorly supported or uncertain about future protection measures.[xlvi,xlvii,xlviii] In the Republic of Ireland, qualitative evidence similarly points to mental health-relevant 'intangible' losses: Phillips et al. (2022)[xlix] found that coastal erosion and storm-driven beach loss in Courtown (County Wexford) undermined wellbeing and evoked solastalgia-like distress (sadness, worry, powerlessness), and Clarke and colleagues' (2014)[l] flood case studies in Clontarf (Dublin) and Skibbereen (County Cork) emphasise how place attachment and contested or stalled adaptation can prolong insecurity and threaten people's sense of safety and identity. By contrast, time-series analyses of routine psychiatric admissions in Ireland found no clinically meaningful links between day-to-day weather variability and admissions for psychosis, depression, or mania, suggesting that the mental health burden is more likely to arise through

disruptive extreme events, cumulative exposures, and social processes than through ordinary daily meteorological fluctuation.[li,lii]

Alongside event-linked impacts, Irish research and consultation data show broader climate-related distress and behavioural pathways that matter for mental health and wellbeing. Mixed-methods studies after major storms highlight shifts in risk perception and worry: following ex-Hurricane Ophelia in County Cork, people reported increased concern about future hurricane-type storms and emphasised the stress created by service disruption (in particular, electricity outages),[liii] while research on Storm Emma shows that perceived severity, likelihood, and coping confidence shape worry and preparedness, even where clinical mental health outcomes are not measured.[liv] At a population level, the Climate Conversations consultation documents frustration, worry, and powerlessness as common emotional responses to climate change in Ireland;[lv] this aligns with work finding high concern and belief in climate change across Europe.[lvi] Nationally representative survey data from Irish teenagers indicate that climate change is a major concern for most respondents and co-occurs with high self-reported anxiety and depression.[lvii]

Together, the Irish evidence base suggests that climate change-related extremes and environmental change can generate sustained distress through loss, disruption, and uncertainty, and that psychosocial impacts are strongly shaped by governance processes, trust, perceived control, and the quality of communication and engagement. The policy and practice implications are clear despite the limited causal evidence. *First*, flood and coastal adaptation should explicitly plan for mental health and wellbeing, not only material damages: across Irish case studies, place attachment, identity, and sense of control repeatedly emerged as mechanisms shaping distress and community acceptance of adaptation measures, indicating that technical or engineering-led responses alone are insufficient.[cxlviii,cxlix,lviii] *Second*, risk communication and warning systems should be designed to support coping and effective action: behavioural evidence from Ireland shows that perceived severity, likelihood, and coping confidence shape worry and preparedness, implying that messages need to build self-efficacy, clarify protective actions, and maintain trust, while infrastructure resilience is a practical lever for reducing disruption and associated stress during storms.[cliii,cliii] *Third*, community engagement and knowledge co-production are not optional: lack of voice and perceived imposition can intensify anxiety and erode trust, whereas meaningful participation and people-centred planning can reduce powerlessness and longer-term distress. [lix,lx,lxi,cxlviii] *Finally*, the gaps in the Irish evidence base point to a need for rigorous research, including longitudinal, event-based studies following floods, storms, and heat events, with mixed-methods designs and linkage to exposure and service-disruption data; this would allow us to better quantify the duration, distribution, and drivers of post-event mental health impacts and to identify what supports recovery.

Case Studies

Below, we outline two case studies from areas which have experienced major flooding in order to explore the mental health impacts of specific flooding events on local populations and the effects of supports and services on mental health. These locations were chosen because they represent similar contexts to Ireland and cover short-term (Northern Rivers) and long-term (Hull City) effects of flooding on mental health. These case studies provide valuable lessons for policy and practice.

Case Study - Northern Rivers, New South Wales, Australia

Northern Rivers is the most north-easterly region of the Australian state of New South Wales (NSW), which lies on the south-eastern coastline of Australia. The population was approximately 320,000 as

of 2024, with a median age of 46 years,[lxii] with a significant concentration of the population living in the coastal parts of the region.[lxiii] Having a mild, sub-tropical climate, the Northern Rivers region receives a relatively high amount of rain, ranging between 750-1,250 millimetres of rainfall per year.[lxiv] Due to this rainfall, the Northern Rivers region has experienced multiple flood events over the past decade. From February to April of 2022, the region experienced record-breaking rainfall and subsequent flooding; this was Australia's "biggest natural disaster since…1974."[lxv] In Linsmore, one of the most affected localities, the existing flood levee was overtopped and flooding reached a maximum depth of 14.37 meters, with approximately 4,000 people evacuated.
[lxvi] Across the entire Northern Rivers region, 13 people died, 4,055 properties were declared uninhabitable, and more than 7,330 people were temporarily displaced from their homes and had to use formal emergency accommodation.[clxii]

Additionally, an approximate 200,000 individuals across the Northern Rivers region were impacted by the temporary closure of more than 60 primary health care services.[lxvii] While primary health care and primary health networks were not formally recognised in disaster management arrangements at the time, a local organisation partnered with the Northern NSW Local Health District and other emergency agencies to respond effectively to the disruption of primary health care. A key part of this response was providing workforce wellbeing support to health care professionals and first responders,[clxii,clxvi] as well as educating and training these cadres on flood recovery, trauma-informed care, and PTSD.[clxvi] These supports also included the co-design (with health professionals) of a wellbeing initiative that centred on the creation of a 'buddy system' among first responders. This allowed for similar professionals to offer their 'buddy' rest time by working temporarily in their service[clxvi] - prioritising localised support as opposed to bringing in resources from elsewhere. [clxii] The rationale for creating these initiatives is supported by the Northern Rivers Community Foundation, who found that 47% of community organisations providing flood response in the Northern Rivers region reported burnout or poor mental health among their staff or volunteers.[lxviii]

Eight months after the 2022 flood, Southern Cross University conducted a survey among 800 respondents from Northern Rivers communities to better understand the impact of the floods and the supports that were (un)available.[clxvii,lxix] When asked what kind of support would most aid their flood recovery, the most common responses were assistance with insurance and financial aid, raising and clean-up of homes and farms, provision of secure and affordable housing, and mental health support. Having received support from local 'community hubs' for things such as food and clothing was frequently mentioned as being extremely helpful in the recovery process.[clxviii] When asked about the barriers they faced when trying to access recovery support, the two most common responses were "the number of forms I have to fill" (23% of respondents) and "it's hard to find out what support is available to me" (22% of respondents), suggesting that both reduced bureaucracy and clear communication of available support services should be priorities in flood response. Finally, respondents gave recommendations for future flood mitigation measures for the region. The most salient recommendation was enhanced community preparedness, including better mobile connectivity during a flood, enhanced early warning systems, and improved resourcing for emergency services.[clxviii] Indeed, delays and uncertainty as part of the recovery process were found to be associated with negative impacts to the mental health and wellbeing of flood-affected individuals in Northern Rivers.[lxx]

Examples of mental health supports that have been implemented in Northern Rivers to address the impact of floods include:

- Government funded "Safe Haven" hubs across multiple communities. The hubs are staffed by mental health clinicians and serve as drop-in wellbeing clinics for flood impacted residents.[clxv]
- The "Resilient Kids Program", offering school-based mental health support programmes for children and their families.[lxxi]
- A "Community Wellbeing and Resilience Program" - a government funded programme that helps communities recover from floods and build capacity to face future extreme weather events.[clxv]
- A "Rural Adversity Mental Health Program", which provides information and links to mental health support for rural and remote communities in the region.[lxxii]
- Free consultation space at the local university, which nearly 30 flood-impacted primary care providers used as a venue to provide services, including mental health services.[clvi]

Case Study - Hull City, England

Hull is a city in East Yorkshire on the north bank of the Humber Estuary, with a population of approximately 267,000.[lxxiii] It is roughly the same size as County Clare, at 71.45 square kilometres. Much of the city is low-lying and relies on a pump-dependent drainage system; large areas are built on reclaimed marshland, and around 90% of Hull is below high tide level.[lxxiv] Hull has a temperate oceanic climate, receiving approximately 747mm of rainfall a year. This combination of topography and drainage contributes to high vulnerability to flooding, while local defences have historically focused more on tidal and river flooding than on pluvial flooding.[clxxiii,lxxv]. Hull City Council declared a climate emergency in 2019 and published the Hull 2030 Carbon Neutral Strategy in 2020.[lxxvi]

In June 2007, prolonged heavy rainfall affected parts of the United Kingdom. On 12 June, the Met Office issued a warning for heavy rainfall and possible flooding across Yorkshire and the Midlands, followed by further warnings as the event developed. On 25 June, Hull received around a month's rainfall (96 mm) in a single day, described as a 1 in 150 year event. With the ground already saturated, the city's drainage system could not manage the volume of water, leading to drains backing up and overflow, and widespread pluvial flooding.[clxxiii] The warning systems were only prepared for coastal, estuarine or river flooding, so no warnings were provided for the events that unfolded.[clxxiii]

The impacts were extensive. The event was associated with one death, around £40 million in damages, and flooding affected more than 10,000 properties, including 95 of 98 primary schools.[clxxiv] Around 6% of households were displaced due to damage. Residents also reported a strong sense of being overlooked compared with other places affected during the same period, reflected in Hull being described as "the forgotten city".[clxxiv]

Ten years on, the Living with Water Partnership and the University of Hull surveyed residents in three affected areas using questionnaires sent to 450 households. Around half of respondents reported that insurance covered their flood losses, while fewer than a third reported taking steps to protect their property afterwards. Preparedness actions were uncommon, with fewer than 10% reporting an emergency kit and 6% reporting a household flood plan.[lxxvii] One in five respondents reported that the flood affected the health or wellbeing of at least one household member.[clxxvi] Residents described persistent fear and distress linked to rainfall, with one respondent indicating that the flood caused a ten-year phobia of the sound of rain: "It took 10 years before I was able to hear the rain on my roof and not be scared". The stress of flooding was said to shorten the life of a respondent's husband, while another stated that their wife had a mental breakdown due to the effects of the flooding.[lxxviii]

Reported mental health impacts included stress, anxiety, and depression, with pre-existing mental health difficulties sometimes exacerbated by the flood exposure. Respondents described the stress of recovery processes, including dealing with builders and insurers, alongside the stress of the flooding itself. In the Living with Water analysis, 54% identified aspects of recovery as the worst part of the experience, compared with 28% who cited the devastation, and 18% who highlighted helplessness.[lxxix] Across responses, residents focused less on mental health services and more on flood defences, drainage maintenance, and better warnings, alongside practical help with insurers, builders, and access to appropriate healthcare referrals.[clxxviii] Concern about future flooding was higher among residents who reported negative mental health impacts, with concern varying by age group.[xciii]

The severity of the flood and its impact on the area prompted a review of the region's flood defences, subsequently leading to millions being spent on improvements.[clxxiii] Recommendations noted that the drainage system at the time could not handle a 1 in 30 year flooding event, let alone a greater than 1 in 150 year event. Warnings were expanded to cover all types of flooding. It was also suggested that there be close co-operation between local authorities and agencies on issues such as operation, investment and design. [clxxiii] From the Living with Water review, measures such as flood plans and emergency kits were found to provide peace of mind, along with the understanding that flood defences make individuals feel safer.[clxxvi] Further recommendations pointed towards improving community engagement through working with trusted intermediaries, supporting local volunteers and establishing a local flood group. It was also stressed that the most vulnerable receive help before, during and after flooding, including periodically coordinating flood emergency plans with partners and involving health agencies in flood recovery.[clxxviii]

Workshops

Methods

We conducted a thematic content analysis using data from two participatory workshops, from which we collected qualitative data. One in-person workshop was held in Midleton on 25 November 2025 (*n* = 9; 3 men, 6 women), with additional written reflections submitted by two women and an interview with a third woman following the workshop. A second workshop was held in Enniscorthy on 6 December 2025 (*n* = 2; both men).

We chose to focus on Midleton and Enniscorthy at the behest of the Climate Change Advisory Council, and because these are areas which have experienced recent and severe flooding. Midleton has a long history of flooding, with risk coming from a mixture of fluvial, tidal, pluvial, and groundwater sources. The most recent severe flood was October 2023 (Storm Babet), when severe fluvial flooding through the Owenacurra and Dungourney system damaged hundreds of properties, with losses estimated at €180 to €200 million. The flooding during Babet led to evacuations (including displacement of residents from care facilities), disruptions to schools, and a boil water notice affecting nearly 10,000 people. In Storm Babet, the immediate response involved multi-agency emergency coordination, with Cork North and East Civil Defence activated and a control centre set up at Midleton fire station to coordinate evacuations, pumping, transport, and welfare checks, alongside a rest centre for emergency accommodation. In the aftermath, Cork County Council's Midleton Flood Relief Scheme steering group progressed interim measures, such as river and drainage clearance, repairs to non-return valves, and installation of additional hydrometric gauges. While OPW approved funding for

individual flood barriers for flood-impacted homes in October 2024, these are still being procured, and larger-scale flood defences are not planned for completion until 2031.

Enniscorthy similarly has a long history of flooding, but it is fluvial flooding from the River Slaney (and, to a lesser extent, the River Urrin), with recurring impacts along Abbey Quay, Shannon Quay, the Promenade, and Island Road. Although flooding occurs frequently in Enniscorthy, the most recent significant flooding event was December 2021, when the Slaney overtopped and flooded the town with major road disruption and wider bridge and infrastructure damage across the county. Institutional response included coordinated evacuations and temporary accommodation arrangements under the local Flooding Emergency Plan, with Civil Defence carrying out swift water rescues and liaising with the Coast Guard and Royal National Lifeboat Institution during the event. The Enniscorthy Flood Relief Scheme was rejected in March 2022; the follow-up is currently in the planning and preliminary design phase with a planning application envisaged for Q3 2026.

Participants were presented with a short summary of the findings of the systematic review, as well as a brief description of the two case studies, and then took part in a focus group lasting more than an hour. See Appendix B for the focus group questions. Workshops were audio-recorded and transcribed, and analysis also incorporated detailed written narratives submitted by affected residents. An inductive analytic approach was used: transcripts and narratives were read repeatedly, segments of text were coded to capture experiences, impacts, and interpretations of flooding and response, and codes were iteratively grouped into higher-order themes through comparison across participants and sites. Through this analysis, we identified multiple pathways through which flooding affected mental health, including acute trauma during flooding events, chronic fear and hypervigilance linked to anticipated recurrence, prolonged distress driven by disrupted recovery and financial strain, and anger and demoralisation associated with perceived institutional inaction and poor communication.

Mental Health Impacts

In both Midleton and Enniscorthy, participants described flooding as having both immediate and enduring effects on mental health, beginning with acute fear and trauma during flood events and extending into chronic psychological distress long after waters receded. During flooding, participants described intense fear, panic, and helplessness, often linked to a lack of warning, threats to personal safety, and threats to the safety of children and vulnerable community members. For example, in Midleton, one participant described how “within what felt like minutes the lower level was underwater” and how “the floorboards popped instantly and jammed the front door shut, trapping me inside with my [children].” These experiences were recalled in vivid sensory detail, with participants describing the flooding as “one of the most frightening experiences of our lives.” They heard “the sound of the water pushing through the outside walls,” which one participant stated was something they would “never forget.” Several participants emphasised the terror experienced by children, describing them as “crying, shaking, asking if the house was going to fall down,” and in one case developing “day terrors for months afterwards.” Participants' descriptions were in line with post-traumatic stress responses, with participants emphasising vivid memories, bodily reactions, and ongoing emotional reactivity when recalling the events.

For many, these acute experiences had evolved into persistent anxiety and hypervigilance centred on the anticipation of future flooding. Participants described living in a near constant state of alertness, closely monitoring rainfall, river gauges, and weather forecasts. One participant stated,

"You don't do anything all week long except think of the rivers… your anxiety starts to build when you're watching," while another explained, "I watch river level gauge readings every day, wet or dry… it is constant, never ending." This vigilance was described as mentally consuming and incompatible with normal functioning: "It does take over that you can't actually think of other things," and "I do my daily chores… but I am not living." Importantly, participants emphasised that this anxiety was not solely about past floods, but about the expectation that flooding would happen again, something viewed as "inevitable" given lack of flood protections.

Mental health impacts were further intensified by the prolonged and uncertain recovery process following flooding. Participants described extended displacement, financial strain, and the stress of navigating insurance claims, builders, and repairs, often over months or years. One participant noted, "We had to start the process of rebuilding our lives all over again, but things have never been the same," while another described being out of their home for nearly two years and carrying the burden of managing repairs alone. These practical stressors were repeatedly described as feeding into psychological distress, leaving participants feeling exhausted, demoralised, and unable to move on. Several participants framed this experience as a form of ongoing loss, with one stating, "It's a bit like grieving," and another explaining, "I don't have interest in my home anymore because I'm still waiting for the next flood."

A strong, clearly articulated, and closely linked theme concerned anger, betrayal, and loss of trust in institutions, which participants identified as a major driver of ongoing mental health strain. They articulated intense frustration and anger at their communities' continued high risk of flooding without adequate mitigation responses. They described sustained efforts to engage with councils, agencies, and elected representatives, coupled with a lack of visible action, which they experienced as profoundly demoralising. This was commonly summarised as receiving "the same copy and paste answers when we ask," despite having "been working at it and pushing at it for two years." Several participants were explicit that they were not forgotten in the sense of being unknown but rather known and not acted upon: "The frustrating thing is we're not forgotten… nothing's been done." This distinction appeared important in shaping emotional responses, shifting distress from shock to anger and bitterness.

Many participants described feeling devalued or treated as less important than other interests, a perception that directly contributed to feelings of humiliation and powerlessness. One participant stated plainly, "You're a second-class citizen essentially… you're in the know when they decide to tell you." A number of participants referenced feeling like environmental concerns were placed above their wellbeing, and that they were being pushed "down to the bottom after the fish, after the mayflies, the grubs, the worms, all that sort of thing". This perceived institutional inaction actively intensified and prolonged psychological distress. One participant stated directly, "Two years on and nobody is going to do anything, and that makes me worse." Several emphasised that uncertainty and lack of control were more psychologically damaging than the flood itself.

Policy Suggestions

Policy suggestions articulated by participants were clear, consistent, and strongly centred on preventing homes from flooding, with prevention framed as the most direct way to reduce distress and restore control. Participants called for practical flood protection and mitigation, including straightforward structural measures: "build a wall," and "Why can't Enniscorthy do even the most basic of things for it? And it has been happening for years here." Others linked prevention explicitly

to avoiding mental health harm, stating, “We need a flood task force created in this country… Someone who’s going to help solve the problem that then is going to prevent us ever having mental health issues.” Participants also argued for changes to planning and risk reduction upstream, including “stop building on flood plains full stop,” and “more investment in upstream natural flood management solutions, not just walls and barriers”. They wanted authorities to “prevent, instead of react to flooding.”

Participants emphasised early warning systems, clear emergency planning, and coordinated response as essential complements to physical flood protection, particularly in reducing panic and longer-term anxiety. Inadequate warning was repeatedly identified as a source of both immediate danger and lasting psychological distress, with one participant stating that “if we had even been given 20 minutes’ notice, we could have done something.” Participants also described the absence of coordination during and after flooding as emotionally damaging, contributing to feelings of isolation and abandonment: “there was no coordination, no public coordination… this adds to the fact of being completely alone.” Participants called for practical, accessible guidance and visible support structures, including clear information for households on what to do before, during, and after flooding, and staffed, in person assistance to help residents navigate post-flooding supports. As one participant argued, “Cork County Council or the OPW [Office of Public Works] should be able to produce a sheet of paper for every house in this town to say ‘this is what you should be doing.’” Note that pre- and post-flood guidance does exist (e.g. in Cork they have a website of Public Flood Guidance, and there is also floodinfo.ie) but clearly this had either not been communicated sufficiently to participants, or they did not find these resources to be sufficient or to be what they were looking for. For example, floodinfo.ie gives details on Who to Contact, but it is just the general websites and phone numbers for the county council that are provided, rather than specialised supports. Similarly, Midleton Town & Environs Local Flood Action Plan was published in October 2025; it does not include contact details or plans for residents before or after a flood.

Participants were also clear that responsibility for response and recovery cannot sit with affected residents or volunteers alone. While community solidarity and peer support were described as crucial in the immediate aftermath, participants emphasised that relying on community-led groups led to exhaustion and burnout among those providing support over time. One participant noted that a community member “is doing the job but he shouldn’t have to do that job… mentally that’s a huge strain on him and his family,” while another reflected that “it was a huge community effort… there was no organisation on this thing.” Participants explicitly rejected approaches led by local community groups, stressing that “it can’t be the victims doing it,” and that while communities can identify needs and provide mutual support, responsibility for action must rest with institutions: “we can say what’s needed, but that needs to be acted on.”

One notable area that participants did not discuss much was a desire for more or strengthened psychological supports. This may be because they already feel as if their needs in terms of therapeutic intervention are being met or possibly because in a focus group setting it was not comfortable to raise the need for therapy to treat serious psychopathology in response to flooding. Instead, they focused on the need for larger structural changes in terms of flood prevention, the need for warning and coordinated responses, and a desire for institutionally led supports.

Discussion

This report integrates a systematic review of 102 studies from high-income countries, two comparative case studies (Hull, England and Northern Rivers, Australia), and workshops with people from flood-affected communities in Midleton and Enniscorthy. Across these sources, flooding was consistently linked to higher levels of post-traumatic stress, depression, and anxiety symptoms. The Irish workshops add detail on how these impacts unfold and persist: people from flood-affected communities described acute fear and confusion during the flood, followed by prolonged distress during clean up and repair, hypervigilance during storms, and a sense of ongoing threat linked to anticipated recurrence. They also described anger, demoralisation, and loss of trust associated with perceived institutional inaction and slow, fragmented recovery processes. These insights help interpret why mental health impacts can persist long after flood waters recede.

Although limited by available evidence, our systematic review provides insights into which aspects of exposure and disruption are most consistently associated with worse mental health outcomes. Studies that compared degrees of exposure generally found poorer outcomes among people directly exposed to flooding compared with those indirectly exposed or unexposed, and being displaced from homes or communities was repeatedly linked to higher symptom levels. Flood severity indicators such as greater inundation depth, more substantial or persistent property damage (including mould and ongoing housing problems), longer duration of disruption (including displacement), and difficulties accessing basic services were also associated with higher symptom levels. Finally, financial strain and long, uncertain recovery processes were also repeatedly linked to worse outcomes. This is consistent with previous reviews on flooding and mental health[lxxx]

A further contribution from the systematic review is that the small subset of studies examining mechanisms points to pathways that match what was described in the Irish workshops. The available evidence suggests that peritraumatic distress, coping strategies, and social support influence how exposure translates into symptoms months later. Several studies also indicate that anxiety about future floods can sustain distress after the immediate event, consistent with the anticipatory fear and recurrent re-experiencing described by Irish participants. Where studies examined communication processes, findings suggest that how people discuss and process flood experiences within families and communities can influence post flood anxiety for some groups, including children. Overall, these findings reinforce that mental health impacts are shaped by what happens before and after the flood - including preparedness, protection, communication, and recovery - rather than solely by the flood event itself.

The workshops and case studies contributed two key findings beyond those identified from the review of the literature. First, they show that sustained distress can be driven by unresolved risk: participants linked ongoing anxiety to uncertainty about whether flood protection would be delivered and to a belief that flooding would recur. Second, they show how mental health impacts can be mediated through experiences of governance. In Midleton and Enniscorthy, participants described repeated engagement with authorities, perceived inconsistency in communication, and long periods of uncertainty about responsibility, timelines, and eligibility for support. These experiences were not simply frustrating: they were described as emotionally harmful and as undermining a sense of safety, dignity, and belonging, including perceptions of being treated as second-class within their town. The case studies and workshops also highlighted cumulative pressures on local responders and community volunteers, including burnout, which has implications for sustaining community capacity across repeated flooding events. This suggests that flood risk management - not just floods themselves - is a determinant of population mental health. The

converging evidence does not support treating flood-related mental health impacts only through short-term, individual-level interventions such as immediate post-event clinical services. Instead, effective responses would strengthen multisystemic resilience resources at community, family, and individual levels, alongside clear institutional accountability for prevention, warning, communication, and recovery. Prevention, warning and communication, and recovery arrangements operate as upstream levers that shape whether distress persists or eases, and may be critical in determining the efficacy of individual-level interventions. This perspective is consistent with broader climate change and mental health literature, which emphasises that impacts can be direct, indirect, and intersectional, and shaped by social and structural conditions.[lxxxi] With climate related hazards increasing, there is a need to reduce avoidable mental health burdens through flood adaptation and risk reduction.[vi]

However, there are important gaps in the available evidence base, which limit what we can say about effective policies and practices. Most flood-mental health studies are cross-sectional, focus on adults, and have limited capacity to track recovery trajectories, cumulative exposure, or the mental health implications of specific prevention, warning, and recovery policies over time. Intervention evidence is particularly sparse: in our systematic review, only four studies evaluated interventions designed to reduce mental health impacts following flooding, and these were all conducted with specific populations. This limited evidence base mirrors wider reviews of climate change and mental health evidence, which note a strong emphasis on describing associations and a relative lack of evaluated interventions and policy levers.[xxviii,lxxxii,lxxxiii] There is a need to link population-based mental health outcome data to high resolution hazard and exposure data to strengthen causal inference and support timely monitoring after events.[xi] In Ireland, trends towards wetter, cloudier winters and more frequent storms may reduce light exposure and disrupt daily routines, which could increase the risk or severity of seasonal affective disorder. This may also intersect with more frequent acute climatic events, where baseline seasonal vulnerability combines with stressors from acute climate hazards, potentially amplifying the mental health impacts and underscoring the need for targeted monitoring and research.

Irish quantitative evidence directly focused on flooding and mental health remains limited. Building an Ireland-specific evidence base will require routine, standardised measurement of mental health outcomes after major flood events; linkage of outcomes with objective exposure and disruption indicators (e.g., inundation depth and duration, displacement, and time to reinstatement of services); and attention to differential impacts within communities. The lack of evidence in this area is a major problem because it seriously limits what we can say about which policies, programmes, and interventions are effective at actually improving mental health (or preventing the development of mental health difficulties) when exposed to extreme climatic events. If we had such data, we would be able to be clearer in our observations and resultant action would be more likely to be successful. Future Irish work should combine linked data approaches with targeted qualitative studies to ensure that the most affected groups and the most policy-relevant mechanisms are included within the evidence base.

A central implication of these findings is that flood risk management functions as a mental health intervention, whether or not it is framed that way. When protection is delayed, unclear, or contested, uncertainty can become chronic and anticipatory fear can persist, particularly where repeat flooding is expected. This aligns with wider work arguing that the indirect and cascading mental health costs of climate related hazards are often missed in economic assessments and in adaptation planning,

despite their potential to shape recovery trajectories over the life course.[lxxxiv] In practice, these indirect costs can include reduced functioning, days off work, and increased health and social care use; capturing them in Ireland will require linking post-event mental health data with employment, education, service, and claims and grant indicators. It also aligns with established guidance on mental health and psychosocial support in emergencies, which emphasises that effective responses depend on practical support, clear communication, and strengthened community and primary care supports, not only specialist services after the fact.[lxxxv]

Policy Implications

First, recovery should be organised to reduce prolonged uncertainty and administrative burden. Our systematic review and case studies converge on the importance of extended disruption, persistent damage, displacement, and financial strain as drivers of poorer mental health. Navigating insurance, builders, grants, and fragmented supports over months or years can become a sustained stressor that prevents recovery. Recovery responses would therefore benefit from integrated, locally accessible recovery hubs; proactive outreach and case management; and the availability of psychosocial support that is embedded within practical recovery services, rather than relying solely on referral to specialist mental health care. Psychosocial support here refers to brief, trauma-informed supports embedded in recovery services, including psychological first aid, structured coping and problem-solving support, guided peer support, and handovers into stepped care and specialist services for those with severe or persistent symptoms.

Second, flood prevention and protection should be treated as a mental health intervention as well as a physical and economic one. Preventing flooding in the first instance can avert the exposures that lead to later mental health problems, while prevention after an initial event (and ahead of repeat flooding) can reduce ongoing distress by limiting the likelihood of re-exposure. In the Irish workshops, anticipatory fear was sustained by the expectation of repeat flooding and by uncertainty about whether protection would be delivered. This suggests that timely delivery of credible protection measures, and clear public communication about planned timelines and interim risk reduction, are likely to reduce chronic anxiety and restore a sense of control. Nature-based solutions (e.g. restored floodplain wetlands for water storage, re-meandered rivers with riparian buffers, floodable parks and green retention basins, rain gardens and roadside bioswales for runoff) may have co-benefits of reducing the risk of flooding while also improving mental health. Individual-level supports (e.g., brief psychological supports for distress, sleep disruption, and post-event worry) may prevent or reduce symptoms and can support functioning. However, the evidence in this report suggests that these supports cannot substitute for structural prevention and protection measures; clear risk communication; and fair, timely recovery systems, which remain the primary levers for reducing population mental health impacts. Coping and emotion regulation matter, but they are shaped by access to multisystemic resilience resources in families, communities, services, and policies.

Third, early warning systems and risk communication should be designed to support effective action and coping. Evidence from the wider extreme weather literature (including floods) indicates that limited or absent warning is associated with higher anxiety and post-traumatic stress symptoms,[clxxix] and the Irish workshop data reinforce that inadequate warning increased both danger and lasting distress. Warning systems should therefore combine timely alerts with clear, practical guidance for households and services, and should be accompanied by accessible information on post-flood supports. Particular attention is needed for vulnerable households to ensure warnings and guidance are received and usable. This would align with existing Irish policy: the Health Sectoral Adaptation

Plan notes that Ireland currently lacks a system to measure and respond to the health impacts of extreme weather events, and sets out actions on surveillance and incident reporting to address this.[lxxxvi]

Finally, meaningful community engagement should be embedded across adaptation planning and delivery. Where people experience repeated non-response, unclear decision making, or exclusion from planning, distress can be intensified through loss of trust in local and national governments and feelings of injustice. Transparent processes, clear accountability for decisions, and genuine participation in local adaptation planning may act as protective factors for wellbeing while also improving the acceptability and effectiveness of adaptation measures.

Limitations

This study has several limitations that should be considered when interpreting its findings. For the systematic review, although it was pre-registered and followed PRISMA guidance,[xli] only a subset of titles, abstracts, and full texts were screened in parallel, which introduces a risk of missed or misclassified studies. We also limited inclusion to studies published in English or Spanish, potentially missing relevant work published in other languages. The included quantitative studies were heterogeneous in design, measures, and exposure definitions, limiting comparability or a meta-analysis within this report. The case studies were intended to illustrate contrasting recovery and governance contexts rather than to provide a representative sample of all flood experiences. The workshops involved a small number of participants and may over-represent those with the time, motivation, or support to take part; they should be interpreted as illustrating mechanisms and priorities rather than estimating prevalence or capturing the full range of experience. Finally, while this report draws out policy-relevant implications, further Irish data are needed to test how specific prevention and recovery interventions change mental health outcomes over time.

Conclusion

Our work points to key priorities for Ireland. First, obviating flood risk is essential. Prevention and credible protection can prevent harms,[xxxii] with economic appraisals of flood risk management consistently showing benefits that substantially exceed costs.[lxxxvii,lxxxviii,lxxxix] Where flooding does occur, a layered approach to post-flood support, combining universal information and practical assistance with targeted follow-up for those at higher risk (e.g., people with prior mental health difficulties, repeated exposure, high levels of disruption, facing multidimensional poverty, or weak social support), using clear referral routes that do not rely on self-identification alone, would be of benefit. UK public health guidance provides a practical model for this, with a four-tier, phased response that combines universal public health messaging and practical help with psychological first aid delivered by trained responders, active monitoring and short-term one-to-one support for those who need it, and escalation to targeted screening and specialist referral for people with severe or persistent symptoms, including children.[xc] Additionally, it is important that we strengthen the evidence base through routine post-flood monitoring and robust evaluation of policies and practices, including scalable options that may extend reach when face-to-face provision is not feasible, while explicitly tracking uptake and equity so that supports do not widen gaps.

The mental health impacts associated with flooding in Ireland are closely linked to unresolved risk, prolonged disruption, and how prevention and recovery are managed over time. Evidence from flood-affected communities shows that ongoing fear, hypervigilance, and demoralisation arise where flooding is expected to recur, recovery is slow or fragmented, and progress on protection is unclear. Our findings indicate that decisions about flood protection, warning systems, communication, and recovery arrangements shape whether distress persists or eases. As climate change increases flood risk, adaptation policy will increasingly influence mental health outcomes in exposed communities. Addressing prevention, early warning, and recovery will be central to reducing long-term harm and supporting effective and equitable adaptation in Ireland.

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Appendix A. Search strategy and selection criteria

We conducted two searches when carrying out this review: a preliminary search with a broader focus on climate change, followed by a more targeted search on flooding and mental health. The search terms are shown in Tables 1 and 2.

1. The first search included search terms related to knowledge, attitudes, and practices, which were included for a separate review, but with included papers separated out at the screening stage. For the first search, a subject librarian at Trinity conducted a search for relevant publications in the following databases: ERIC, PsycINFO, Embase, MEDLINE, CINAHL, and Web of Science on 05 August 2025, returning 20980 studies after duplicates were removed.
2. We then conducted the second search, which was more specific to flooding and climate change, using an alteration of the search terms and adding variants on 'flood'. We searched ERIC, PsycINFO, MEDLINE, Web of Science, CINAHL, and Embase with this updated search string on 26 September 2025, returning 1944 records after duplicates were removed.

In total, these two searches resulted in 357 articles which were screened at the full-text stage, of which 102 articles met our inclusion criteria (Figure 1). To promote rigour and in line with best practice, we conducted independent parallel screening of 15% of the titles and abstracts and 5% of the full texts.

***Table 1*. Search Terms for First Search**

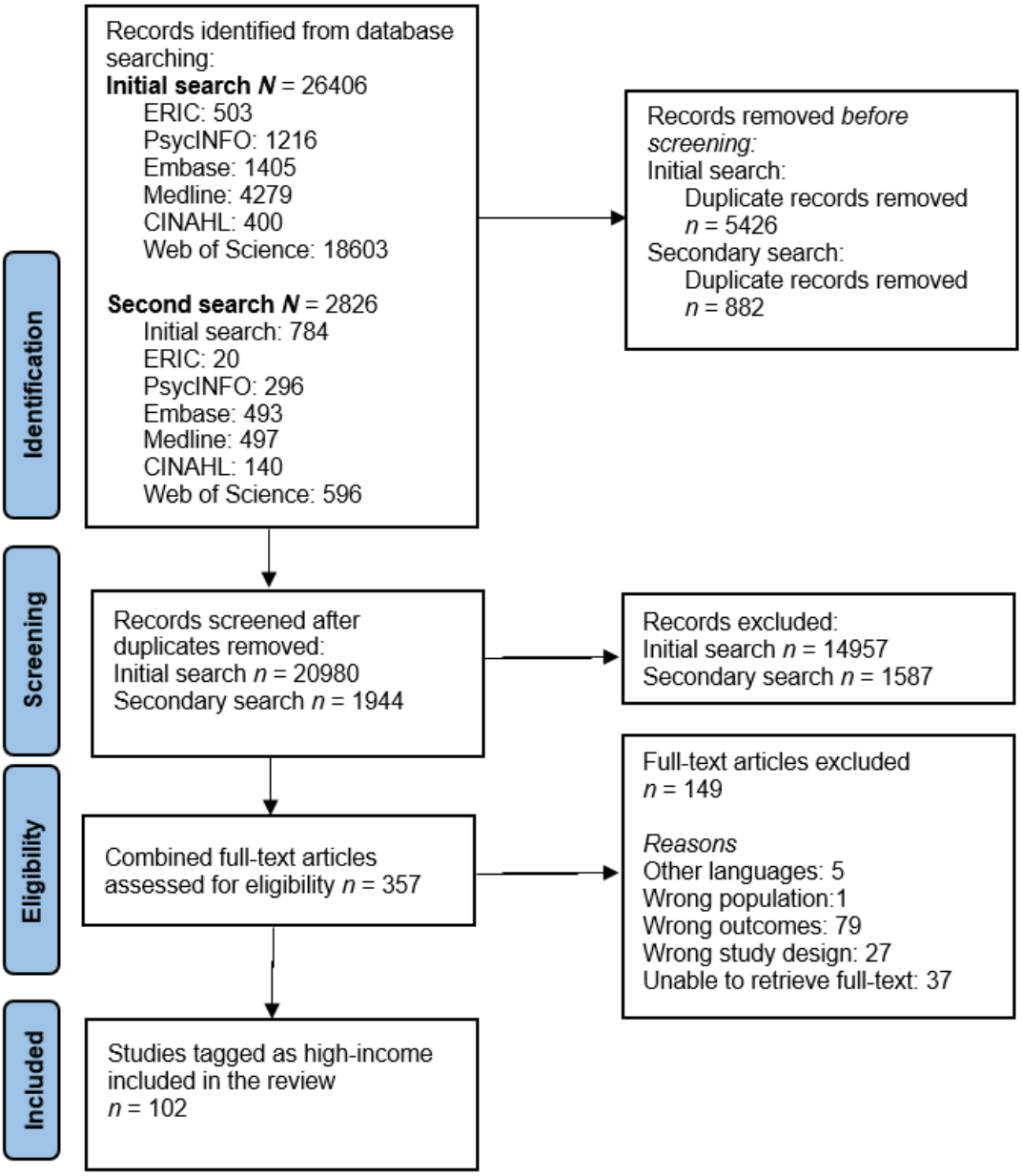
Climate Change		Mental Health & KAPs		Quantitative "Assessment or Measure"
"carbon footprint*" OR "climate change" OR "climate crisis" OR "climate emergency" OR "extreme climatic event*" OR "extreme weather" OR "global warming" OR "planetary breakdown" OR "weather event*"	NEAR/10	"action* OR attitude* OR aware* OR behav* OR belie* OR knowledge* OR opinion* OR perce* OR perspect* OR pract* OR understanding* OR anxi* OR "community impact*" OR depress* OR distress* OR ecoanxiety OR "eco-guilt" OR ecoguilt OR "eco-grief" OR ecogrief OR "ecological grief" OR "eco-coping" OR ecocoping OR "eco-resilience" OR ecoresilience OR emotion* OR "mental health" OR "mental ill*" OR "post-traumatic stress*" OR "posttraumatic stress*" OR "PTSD" OR psychopatholog* OR solastalgia OR wellbeing OR "well being"	(AND)	experiment* OR instrumentation OR inventor* OR likert OR "outcome assessment*" OR "outcome measure*" OR quantitative OR questionnaire* OR scale* OR survey*

Table 2. **Search Terms for Second Search**

Flood		Mental Health		Quantitative "Assessment or Measure"
Flood*	NEAR/10	anxi* OR "community impact*" OR depress* OR distress* OR ecoanxiety OR "eco-guilt" OR ecoguilt OR "eco-grief" OR ecogrief OR "ecological grief" OR "eco-coping" OR ecocoping OR "eco-resilience" OR ecoresilience OR emotion* OR "mental health" OR "mental ill*" OR "posttraumatic stress*" OR "posttraumatic stress*" OR "PTSD" OR psychopatholog* OR solastalgia	(AND)	experiment* OR instrumentation OR inventor* OR likert OR "outcome assessment*" OR "outcome measure*" OR quantitative OR questionnaire* OR scale* OR survey*

Studies were eligible for inclusion if they were original empirical research, published in either Spanish or English, which assessed mental health in relation to flooding. Mental health was defined as per the dual continuum model, incorporating both psychopathology and wellbeing. Studies that employed flood-exposed participants of any age were included. Studies that employed psychosocial interventions (psychosocial, psychological, public health, or community-based strategies aimed at mitigating flood-related mental health impacts) were included. Quantitative and mixed-methods studies with extractable quantitative data were included, as were randomised and non-randomised studies. During screening, we included only studies which were conducted in high-income countries as defined by the OECD in 2025.[xc]

Figure 1. **PRISMA Diagram of Review Process**



Appendix B. Studies by Location & References

- United States (*n* = 37, 36.3%).
- [xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc]
- United Kingdom (*n* = 17, 16.7%). [xxxii,xii,xiii,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc], - Australia (*n* = 14, 13.7%) [xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc,xc]
- Canada (*n* = 9, 8.8%)[xc,xc,xc,xc,xc,xc,xc,xc,xc] - including three that investigated the same flood.[cx,cxi,cxii]
- Germany (n=6)[xc,xc,xc,xc,xc,xc]
- Japan(n=5)[xc,xc,xc,xc,xc]
- Poland (n=3)[xc,xc,xc]
- Spain (n=2)[xc,xc]
- Other (n=9) (Ireland[i], Italy,[xc] France,[xc] Greece,[xc] Belgium,[xc] Croatia,[xc] Netherlands,[xc] South Korea,[xc] and Trinidad.[xc]) while one study used data from flooding that had occurred across multiple countries in Europe (Germany, Spain, Sweden, Poland, Türkiye, the Czech Republic, and the United Kingdom).[xc]

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Appendix C. Focus group questions

Reflecting on flooding examples

1. What are your thoughts on the two examples of flooding we shared?
2. What do you think are the similarities and differences between your community and Hull / New South Wales?

Personal /community impacts of climate change and flooding and existing supports

3. Can you tell us about your own experiences of flooding or other extreme weather events (storms, etc)?
    a. How do these examples from the UK and Australia relate to those experiences?
    b. If experienced flooding:
        i. How was your home affected?
        ii. Did you lose insurance?
        iii. Did you lose access to services (phone, electricity)?
        iv. Did you make use of any supports?
        v. What could have made the flooding experience less stressful for you?
        vi. How did this flooding experience affect your physical health?
        vii. How did this flooding experience affect your mental health?
4. What are your concerns in terms of flooding in this area (Midleton / Enniscorthy)?
5. What are your concerns in terms of climate change in this area (Midleton / Enniscorthy)?
6. What do you think about climate change or flooding-related policies in Ireland?
    a. Do you think the policies are effective?
    b. What would you like to see changed?
    c. What policies do you think Ireland should implement to reduce the effects of flooding on your health (and specifically your mental health)?
7. Have any climate adaptation strategies been put in place in your community, such as nature-based solutions, emergency strategies, or assistance schemes?
    a. If so: Have these efforts had any impact on your mental health or wellbeing? What have the impacts been?
    b. What kinds of supports would you like in your community to address the mental health impact of flooding and climate change?
8. Is there anything else you would like to tell us about the impact of flooding or climate change on you or your community?