

Delving into the eye of the cyclone to quantify the causal impacts of natural disasters on life satisfaction

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This study examines the effects of cyclones on life satisfaction in Australia, exploiting local exposure to cyclones as a natural experiment to address the limited causal evidence in the existing literature. Using 24 years of nationally representative panel data and individual fixed-effects models, we find that only the most severe Category 5 events—particularly those occurring in close proximity to individuals' residences—have statistically significant and economically meaningful negative effects on overall life satisfaction, as well as on satisfaction with community and health. Moreover, these severe cyclones generate persistent or delayed adverse effects on satisfaction with employment opportunities, neighbourhood, community, and personal safety. Back-of-the-envelope calculations indicate that the estimated effects of Category 5 cyclone exposure within 100 km of one's residence are equivalent to an income loss of approximately 1.4% to 6.5%, depending on the life satisfaction domain considered. The negative impacts are most pronounced among males, younger individuals, and those without prior residential insurance coverage, underscoring the importance of insurance in mitigating the adverse effects of natural disasters on life satisfaction.

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JEL classifications: I12; I31; Q54

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1. Introduction

Natural disasters have a profound impact on various facets of society, including social dynamics, health outcomes, and economic stability (Dell *et al.* 2014; Hsiang & Kopp 2018; Botzen *et al.* 2019). As concerns over increasing natural disaster risks intensify (Elsner *et al.* 2008; Fischer *et al.* 2021), there is a corresponding rise in research examining the effects of these events on life satisfaction (Carroll *et al.* 2009; Gunby & Coupé 2023; Sharma *et al.* 2026). However, there remains a significant gap in strong causal evidence regarding the influences of natural disasters on various domains of life satisfaction (see Section 2 for a literature review). This underscores the need for more robust studies that can provide a deeper understanding of these complex relationships.

Establishing the causal impact of natural disasters on life satisfaction remains a challenge. Existing studies often rely on cross-sectional individual-level data. These data limitations make it difficult to account for unobserved individual time-invariant factors, such as residential preferences, which may be correlated with both natural disaster exposure and life satisfaction (Dell *et al.* 2014; Botzen *et al.* 2019). This is particularly concerning given prior research suggesting individuals residing in disaster-prone regions tend to have more disadvantaged backgrounds (Currie & Rossin-Slater 2013; Nguyen & Mitrou 2024). Furthermore, much of the current literature relies on disaster exposure measures that are influenced by human behaviour, potentially confounding the estimated effects of natural disasters (Wooldridge 2010; Spencer & Strobl 2025). As such, the validity of existing findings hinges on effectively addressing the confounding influence of these unobserved characteristics.

To overcome these limitations, the present study leverages 24 years of nationally representative longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, linked to detailed historical cyclone records. By exploiting exogenously measured cyclone exposures as natural experiments and estimating individual fixed-effects models that

additionally control for year and location fixed effects, this study identifies the causal impact of cyclones on life satisfaction among Australians. It contributes to the existing literature in three important ways.

First, this study provides a novel and comprehensive analysis of the effects of cyclones on life satisfaction in Australia. While cyclones are a significant threat in this nation, no prior study has documented their impact on life satisfaction. A fresh examination is crucial given the catastrophic nature of cyclones, ranking among the most devastating extreme weather events with the potential to inflict widespread disruption and damage (Krichene *et al.* 2023). Understanding the ramifications of cyclones on life satisfaction is imperative for crafting effective policies to support affected populations.

Second, this study is one of a few employing longitudinal individual-level data and exogenously constructed natural disaster exposure measures to examine the effect of natural disasters on life satisfaction (refer to Section 2 for a literature review). Specifically, the HILDA dataset enables the estimation of individual fixed-effects models that incorporate both time and location fixed effects, thereby controlling for unobserved time-invariant individual heterogeneity (Dell *et al.* 2014; Botzen *et al.* 2019; Spencer & Strobl 2025). Additionally, our study utilizes various cyclone exposure metrics identified exogenously by combining the distance from the individual's residing postcode centroid to the eye of the cyclone and the cyclone category. By incorporating these exogenous measures within the individual fixed-effects framework, our empirical strategy - identified by Spencer and Strobl (2025) in their recent literature review as the most robust approach in this literature - mitigates potential biases arising from unobserved individual factors. Moreover, this extensive and long-term panel dataset facilitates an investigation of the dynamic impacts of cyclones on life satisfaction.

Third, our rich longitudinal data facilitates an exceptionally rich heterogeneous analysis. Spanning 24 years and encompassing over 100 cyclones of varying severity, the dataset offers

a unique opportunity to explore the differential impact of natural disasters with various levels of severity. As a result, our findings can be generalized to a broader range of cyclones. Moreover, the richness of our linked datasets allows us to explore the impacts of cyclones for diverse sub-populations, identified by numerous individual, household and regional characteristics. Some of these dimensions—such as the role of prior residential insurance coverage in mitigating the adverse effects of natural disasters on life satisfaction—have received limited attention in prior research (Spencer & Strobl 2025).

Furthermore, this study considers not only overall life satisfaction, as most prior studies did, but also a comprehensive list of seven life satisfaction domains, including home, community, financial, personal safety and health satisfaction. This comprehensive heterogeneous analysis illuminates the channels through which cyclones influence overall life satisfaction as well as various life satisfaction domains and identifies vulnerable groups and regions for targeted support and resilience-building strategies.

Our study yields three main sets of findings. First, the individual fixed-effects model reveals a substantial decline in overall life satisfaction associated with the most severe Category 5 cyclones, with more pronounced effects for cyclones occurring in closer proximity to residences. These severe cyclones also exert adverse effects on specific satisfaction domains, including community and health satisfaction. Additionally, our findings indicate that the adverse effects of cyclone exposure on satisfaction with employment opportunities, community, neighbourhood, and personal safety either persist over time or may take time to materialise. Remarkably, the identified impacts of cyclones on life satisfaction parallel, and in some cases exceed, the documented effects of the devastating 2009 Black Saturday Bushfires in Australia (Johnston *et al.* 2021), underscoring the potential for substantial economic and wellbeing losses. Back-of-the-envelope calculations indicate that the estimated effects of

Category 5 cyclone exposure within 100 km of one's residence are equivalent to an income loss of approximately 1.4% to 6.5%, depending on the life satisfaction domain considered.

Second, our thorough heterogeneous analysis uncovers significant variations in the impacts of cyclones on life satisfaction, depending on diverse factors such as gender, age, prior homeownership, income levels, residential insurance coverage, rural or urban residency, coastal proximity, and community cyclone history. The impacts vary across various life satisfaction domains, with a prevailing trend indicating more pronounced effects among males, younger individuals, and those lacking previous residential insurance.

Third, our findings demonstrate robustness through a series of sensitivity analyses, including a falsification test confirming that future cyclones do not influence current life satisfaction, as well as various randomization tests. Furthermore, the results highlight the importance of accounting for unobserved, time-invariant individual characteristics when estimating the effects of cyclones on life satisfaction.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature, providing context for our research question. Section 3 describes the data employed in the analysis. Section 4 outlines the empirical models utilized to investigate the impact of cyclones on life satisfaction. Section 5 then presents our key findings and provides an economic interpretation of the magnitude of cyclone impacts on life satisfaction. To establish the robustness of our results, Section 6 details the various sensitivity tests conducted. Section 7 investigates heterogeneous effects across different subpopulations. Finally, Section 8 concludes.

2. Literature review

By examining the effects of cyclones on life satisfaction, this study intersects with two distinct lines of research. The first line, a substantial body of work, focuses on the social and economic

impacts of natural disasters (Dell *et al.* 2014; Hsiang & Kopp 2018; Botzen *et al.* 2019). Within this domain, our study is closely related to an increasing number of investigations evaluating the effects of cyclones/hurricanes/typhoons on various factors, including economic growth (Hsiang & Jina 2014), migration (Gröger & Zylberberg 2016; Mahajan & Yang 2020; Nguyen & Mitrou 2024; Blonz *et al.* 2025), income (Deryugina *et al.* 2018; Groen *et al.* 2020), health (Currie & Rossin-Slater 2013; Bakkensen & Mendelsohn 2016), insurance acquisition (Nguyen & Mitrou 2024, 2025e), and fertility (Fontaine *et al.* 2024; Nguyen & Mitrou 2025c). Our research also contributes to a rich line of inquiry examining the role of various factors affecting life satisfaction/subjective wellbeing/happiness.¹ These factors include income (Frijters *et al.* 2004), life events (Nguyen *et al.* 2020), pollution (Levinson 2012; Zhang *et al.* 2017), weather (Feddersen *et al.* 2016; Lignier *et al.* 2023), and macroeconomic conditions (Di Tella *et al.* 2003; Nguyen & Duncan 2020). Within this literature, our study is particularly related to a growing number of studies focusing on the effects of natural disasters on life satisfaction.

Appendix Table B1 summarises the literature on natural disasters and life satisfaction. Research in this narrower field has explored the life satisfaction impacts of various types of natural disasters, including droughts (Carroll *et al.* 2009; Lohmann *et al.* 2019; Berlemann & Eurich 2021), floods (Luechinger & Raschky 2009; Sekulova & Van den Bergh 2016; Van Ootegem & Verhofstadt 2016; Hudson *et al.* 2019; Stein & Weisser 2022), wildfires (Kountouris & Remoundou 2011; Johnston *et al.* 2021), hurricanes (Calvo *et al.* 2015; Berlemann 2016), and multiple natural disasters (Ahmadiani & Ferreira 2021; Frijters *et al.* 2023).

¹ Life satisfaction, subjective wellbeing and happiness have been used interchangeably in this literature (for reviews, see Frey and Stutzer (2002) or Ferrer-i-Carbonell (2013)).

Most studies within this literature grapple with one or both of two primary issues, undermining the interpretability of their findings as causal (Dell *et al.* 2014; Botzen *et al.* 2019; Spencer & Strobl 2025). The first issue pertains to the utilization of cross-sectional data, which lack the capacity to control for individual unobservable factors that may correlate with both natural disaster exposure and life satisfaction.

The second issue arises from the reliance on natural disaster exposure measures contingent upon human behaviours, which may confound the natural disaster estimates (Wooldridge 2010). Examples of such measures include individuals' self-reported experiences of natural disasters, employed by studies using them as proxies for direct natural disaster exposure (Calvo *et al.* 2015; Gunby & Coupé 2023; Sharma *et al.* 2026). Additionally, some studies classify regions as disaster-affected areas following official declarations (Luechinger & Raschky 2009; Frijters *et al.* 2023). Others have utilized indirect natural disaster exposure measures based on actual damage incurred by such disasters (von Möllendorff & Hirschfeld 2016; Ahmadiani & Ferreira 2021).

Three notable studies utilizing individual panel data and exogenously measured exposure to natural disasters are Rehdanz *et al.* (2015), Johnston *et al.* (2021) and Stein and Weisser (2022). Rehdanz *et al.* (2015) investigate the impact of the tsunami and nuclear accident at Fukushima, Japan, in 2011; Johnston *et al.* (2021) examine the Black Saturday Bushfires in Victoria, Australia, in 2009; and Stein and Weisser (2022) explore the relationship between self-reported flood experiences, exposure to local floods, and wellbeing among Thai and Vietnamese individuals surveyed between 2007 and 2017. All three studies employ panel data and individual fixed-effects models, measuring exposure by the distance between the individual's place of residence and the disaster event.

Building upon the methodologies of these studies, our current research utilizes various cyclone exposure metrics identified exogenously. These metrics combine the distance from the

individual's residing postcode centroid to the eye of the cyclone and the cyclone category. As noted by Dell *et al.* (2014), Botzen *et al.* (2019), and Spencer and Strobl (2025), these geophysical or meteorological metrics are independent of human behaviours. By integrating these exogenous measures within the individual fixed-effects framework, while additionally controlling for location and time fixed effects, our empirical strategy effectively addresses potential biases arising from unobserved individual factors. Consequently, it enables a robust quantification of the causal impacts of cyclones on various life satisfaction domains.

Appendix Table B1 also shows that Australian studies have explored the effects of droughts (Carroll *et al.* 2009), bushfires (Johnston *et al.* 2021) or self-reported weather-related home damage (Gunby & Coupé 2023; Sharma *et al.* 2026) on life satisfaction.² However, no study has examined the impact of cyclones on life satisfaction in Australia, a cyclone-prone country. This study thus contributes as the first to explore the effects of cyclones on life satisfaction in Australia.

3. Data and sample

3.1. Data

Our study draws upon two primary data sources. The first dataset originates from the Household, Income and Labour Dynamics in Australia (HILDA) survey (Summerfield *et al.*

² This study also relates to other research that utilises the same dataset and broadly similar methods to examine the effects of cyclones on residential choices (Nguyen & Mitrou 2024), locus of control (Nguyen & Mitrou 2025b), health insurance uptake (Nguyen & Mitrou 2025e), the Big Five personality traits (Nguyen & Mitrou 2025a), and fertility (Nguyen & Mitrou 2025c). However, none of these studies exclusively investigate the impacts of cyclones on life satisfaction, as the present study does. Nguyen and Mitrou (2025d) show that self-reported weather-related home damage in HILDA—as used in two previous Australian studies (Gunby & Coupé 2023; Sharma *et al.* 2026)—exhibits substantial inconsistencies, and relying on this measure to assess its impact on life satisfaction may produce biased estimates. Our study is also related to, but distinct from, three previous studies using HILDA to examine the relationship between weather conditions, as measured by daily temperature and precipitation, and overall life satisfaction (Feddersen *et al.* 2016; Hailemariam *et al.* 2023; Lignier *et al.* 2023). Specifically, the present study complements this literature by focusing on cyclones, which represent relatively rare but potentially severe and geographically concentrated shocks that can affect individuals through direct physical damage, disruption to economic and social activities, and heightened uncertainty. Notably, these studies find either insignificant or relatively small effects of daily temperature measured on the survey date and no significant effects of wind speed on overall life satisfaction. In addition, whereas previous HILDA studies have focused exclusively on overall life satisfaction, the present study examines both overall life satisfaction and seven specific life satisfaction domains.

2025). This nationally representative survey, initiated in 2001 and conducted annually, tracks individuals in private households over time, providing detailed individual and household-level data, including residential information, health outcomes, and life satisfaction. A notable advantage lies in HILDA's ability to follow individuals who relocate, ensuring the sample's representativeness and facilitating the utilization of an individual fixed effects model to robustly quantify the effects of cyclones on life satisfaction. We utilize the latest release 24 of HILDA, spanning 24 waves from 2001 to 2024.

The second dataset comprises a publicly available historical cyclone database sourced from the Australian Bureau of Meteorology (BOM). This database furnishes comprehensive information regarding tropical cyclones occurring south of the equator within longitudes 90E and 160E (BOM 2025a). For each documented cyclone, it delineates the track (longitude, latitude, and time) and strength measures such as wind speed.

We establish a connection between the two datasets by aligning the cyclone path and timing from the historical database with the individual's residential postcode centroid and interview date from HILDA. We utilize the restricted-access version of the HILDA dataset, which requires a specialized application process and includes postcode-level data, providing the finest geographical granularity available (Summerfield *et al.* 2025). Appendix Figure A1 graphically depicts the cyclone hit map during the study period.

3.2. Cyclone exposure measures

Following the methodology outlined by Nguyen and Mitrou (2025e, 2025c), we determine an individual's exposure to cyclones within a given year by considering the distance to the cyclone's eye and its category. Initially, we ascertain the closest distance between the individual's residential postcode centroid and the cyclone's eye, where areas directly beneath its path typically experience the severest damage (BOM 2025b). To ensure the analysis remains manageable and informative, we utilize two distance bands - 40 km and 100 km - to assess

exposure. A similar approach has been employed in both international and Australian studies (Currie & Rossin-Slater 2013; Henry *et al.* 2020; Nguyen & Mitrou 2025e, c).

In addition to distance, we gauge exposure to a cyclone by its category, which ranges from 1 (weakest) to 5 (strongest). Specifically, we adopt the BOM's recommended cutoffs to classify a cyclone based on its maximum mean wind speed (BOM 2025b). The respective maximum mean wind speed cutoffs for each cyclone category are as follows (in km/h): Category 1 (≤ 88), 2 (> 88 and ≤ 117), 3 (> 117 and ≤ 159), 4 (> 159 and ≤ 199), 5 (> 199). Other studies have also utilized maximum wind speed to assess cyclone exposure (Currie & Rossin-Slater 2013; Hsiang & Jina 2014). Importantly, as emphasized by Hsiang and Jina (2014), using wind speed thresholds allows for a more flexible examination of potential non-linear effects of cyclone intensity.

To facilitate analysis—given the relative rarity of annual cyclone events—and to enhance clarity and focus in presentation, we aggregate cyclone intensities into three groups: Categories 1–2, Categories 3–4, and Category 5 only. Individuals with no recorded cyclone exposure serve as the comparison group. Each exposure group is then matched with the distance from the cyclone's path to the centroid of the individual's residential postcode. This approach yields a set of six cyclone exposure variables, each defined by cyclone intensity and proximity to the cyclone eye.

3.3. Outcome variables

This study utilizes an individual's overall satisfaction with their life as the primary measure of subjective well-being. This outcome is derived from the direct question: “All things considered, how satisfied are you with your life?” Respondents select a point on a scale ranging from 0 (completely dissatisfied) to 10 (completely satisfied), with higher scores indicating greater life satisfaction. Beyond the overall life satisfaction indicator, the study explores respondents' satisfaction with other life domains available in the data. These domains are obtained from

responses to questions asking the respondents about their satisfaction with their employment opportunity (thereafter called “employment opportunity”, applicable only to employed individuals), financial situation (“financial situation”), the home in which they live (“home”), feeling part of their local community (“community”), the neighbourhood in which they live (“neighbourhood”), how safe they feel (“personal safety”), and their health (“health”).

The selection of specific life satisfaction domains was informed by their perceived sensitivity to cyclones, as noted in prior research (Currie & Rossin-Slater 2013; Bakkensen & Mendelsohn 2016; Johnston *et al.* 2021).³ These life satisfaction measures, available in all survey waves, have been widely used in Australian studies across various contexts (Feddersen *et al.* 2016; Nguyen & Duncan 2020; Nguyen *et al.* 2020; Johnston *et al.* 2021; Gunby & Coupé 2023; Lignier *et al.* 2023). Appendix Table A2 presents the correlation matrix for the key life satisfaction variables, revealing positive associations between overall life satisfaction and the individual domain-specific measures. However, the strengths of these associations vary between 0.2 and 0.5, indicating that each life satisfaction domain contributes uniquely to the construct of overall life satisfaction. This supports the rationale for conducting separate investigations of each domain.

3.4. Sample

The paper's unit of analysis is the individual due to the availability of all life satisfaction measures at the individual level. Our baseline analysis is centred on states and territories affected by at least one cyclone during the study period, a restriction that enhances the efficiency of individual fixed effects estimates for exposed individuals. This is because cyclone

³ The study does not incorporate some other measures due to theoretical or practical limitations. For instance, we do not use another aspect of life satisfaction asking respondents about “the amount of free time that they have” due to a lack of established theoretical and empirical frameworks connecting natural disasters to free time satisfaction (Nguyen *et al.* 2020). Similarly, we do not consider some other aspects of wellbeing such as the respondents’ satisfaction about their relationship with partner or children since responses are only available to specific sub-populations (e.g., partnered individuals, parents).

exposure remains constant over time for those in unaffected regions (Wooldridge 2010). As a result, New South Wales, Queensland, Western Australia, and the Northern Territory constitute our baseline sample.

Furthermore, we stipulate that individuals must be observed at least twice within the study period, as our primary empirical model relies on an individual fixed effects model. We also exclude individuals with missing data on key variables included in the model (see Section 4 for details; Appendix Table A1 provides variable descriptions and summary statistics). By combining these restrictions, the final sample size varies depending on the outcome. For instance, to examine the impact of cyclones on overall life satisfaction, we have a longitudinal sample comprising over 224,000 individual-year observations from more than 23,000 unique individuals across 24 years of data. This represents the largest sample size in the study.

4. Empirical model

Following prior studies that examine the effects of natural disasters using individual-level panel data (Currie & Rossin-Slater 2013; Henry *et al.* 2020; Stein & Weisser 2022; Nguyen & Mitrou 2025e, c), we employ an individual fixed effects (FE) model to examine the effects of cyclones on life satisfaction outcome Y for individual i at time t :

$$Y_{it} = \alpha + \sum_{L=1}^k [Z_{i(t-L)}\beta_L] + X_{it}\gamma + \lambda_t + M_{it} + \delta_i + \varepsilon_{it} \quad (1)$$

In Equation (1), the key explanatory variable $Z_{i(t-L)}$ captures cyclone exposure, defined as a categorical variable indicating whether individual i experienced a category 1–2, 3–4, or 5 cyclone (with unaffected individuals as the reference group) within their residential postcode during various time windows.

X_{it} represents a set of time-variant explanatory variables. δ_i denotes individual time-invariant unobservable factors, and ε_{it} is the usual random error term. α , β_L and γ are vectors of parameters to be estimated, where β_L represents the vector of primary interest.

We incorporate a minimum number of individual and household-level time-variant variables into X_{it} to mitigate potential confounding effects. These variables encompass the individual's age (and its square), education level, household size, and residency in major cities. Additionally, we address temporal disparities in outcomes by including dummy variables for survey month (M_{it}) and year (λ_t) separately. Regional discrepancies are accounted for through the inclusion of state/territory dummy variables in Equation (1). Furthermore, we account for local socio-economic conditions that may influence individual behaviour by incorporating regional unemployment rates and the Socio-Economic Indexes for Areas (SEIFA).

We employ an individual FE regression to account for individual heterogeneity, including residential preferences, in Equation (1). This approach is crucial as it enables us to control for individual unobservable time-invariant factors, which is particularly relevant given findings suggesting that areas more prone to natural disasters tend to exhibit higher levels of disadvantage (Dell *et al.* 2014; Botzen *et al.* 2019). Our estimates of the cyclone impact (β_L) are derived from yearly variations in cyclone occurrences within a postcode for the same individuals. This, coupled with the stochastic nature of cyclone impacts despite spatial clustering and our exogenously identified natural disaster measures, enhances the strength of causal inference.

We begin by examining the contemporaneous effect of cyclone exposure ($L = 1$ in Equation (1)), defined as exposure occurring within the 12 months prior to the interview date, on life satisfaction, which is measured at the time of the survey. We then explore potential lagged

effects by including k lags of cyclone exposure in addition to the contemporaneous measure. The optimal number of lags (k) is determined empirically based on the data.

It is crucial to note that discrepancies in survey and cyclone dates may result in individuals residing in the same postcode experiencing varying degrees of cyclone exposure from the same cyclone within the same survey year (refer to Appendix Figure A2 for the distribution of survey and cyclone timing).⁴ This synchronization of survey dates with cyclone occurrences bolsters identification assumptions. To address potential serial correlation issues, we cluster standard errors at the individual level, given that the treatment varies for the same individual over time (Cameron & Miller 2015). As a robustness check, we also present results with standard errors clustered at the postcode level or with additional postcode fixed effects, which yield largely similar findings.

5. Results

5.1. Descriptive results

Table 1 presents descriptive statistics for key variables, stratified by cyclone exposure status. Within our final sample, 8,817 individuals from 6,020 unique persons experienced at least one cyclone within a 100 km radius annually, constituting our “treated” group. Although a relatively small proportion of the study population (3.93%) was affected by a cyclone, the substantial number of individuals affected during the study period ensures that we can detect any impact of cyclones on life satisfaction (Wooldridge 2010).⁵

⁴ Appendix Figure A2 displays the distribution of cyclone occurrences and HILDA interview dates. The bulk of HILDA interviews (90%) took place during the concentrated period of August to October. Almost all observed cyclones (95%) transpired within the November-April timeframe throughout the study period.

⁵ Furthermore, the final column in Appendix Table A1 illustrates that despite the relatively infrequent occurrence of yearly cyclones during the study period, our sample comprises a substantial number of individuals exposed to various cyclones, thus enabling the reliable detection of potential effects. However, it is important to note that the number of individuals affected by more severe cyclones, especially those in closer proximity, is comparatively small. For instance, the minimum count of individuals affected is 662, exposed to a category 5 cyclone within 40 km. Therefore, prudence is advised when interpreting results related to such cyclone exposure measures.

Comparatively, individuals in the “treated” group exhibit distinct sociodemographic characteristics in contrast to the unexposed “control” group. They are statistically significantly younger, possess lower levels of educational attainment, have smaller family units, and predominantly reside in rural areas. Notably, although regions encompassing the “treated” group have lower unemployment rates, they exhibit lower overall socio-economic status, as indicated by lower SEIFA scores. This corroborates previous research (Dell *et al.* 2014; Botzen *et al.* 2019), suggesting that populations vulnerable to natural disasters, as defined by education and socioeconomic disadvantage measured by the SEIFA decile, are disproportionately susceptible to their impacts. Consequently, rigorous methodological approaches that account for individual fixed effects are imperative when investigating the consequences of cyclones.

This table reveals statistically significant ($p < 0.05$) differences in selected life satisfaction outcomes between cyclone-exposed and unaffected individuals. Unexpectedly, exposed individuals report higher levels of overall life satisfaction, as well as in domains of employment opportunity, financial situation, and personal safety satisfaction. However, as discussed in Section 4, these disparities may not solely reflect direct cyclone impacts but rather pre-existing differences influencing both exposure and satisfaction outcomes. The subsequent analysis addresses this critical issue by employing an individual FE model to control for potentially confounding factors.

5.2. *Main regression results*

Table 2 presents estimates of the contemporaneous effects of cyclone exposure, disaggregated by two distance bands—40 km and 100 km from the cyclone’s eye—based on individual FE regressions.⁶ These models control for observable time-varying covariates and unobservable time-invariant individual characteristics. The results indicate significant negative

⁶ The estimates for the remaining key explanatory variables, presented in Appendix Table A3, are generally in line with expectations and consistent with findings from prior studies (Nguyen & Duncan 2020; Nguyen *et al.* 2020; Johnston *et al.* 2021).

contemporaneous impacts of cyclone exposure on selected life satisfaction measures, particularly in the case of more severe cyclones. For example, all estimates related to exposure to Category 5 cyclones—regardless of distance—show a negative and statistically significant effect (at the 5% level) on overall life satisfaction (see Panel A, Columns 1 and 2 of Table 2). This suggests that individuals exposed to any Category 5 cyclone report significantly lower levels of overall life satisfaction.

The individual FE estimates also reveal a statistically significant (at the 10% level or better) negative relationship between Category 5 cyclone exposure and several life satisfaction domains: community satisfaction (Panel B, Column 1), personal safety satisfaction (Panel B, Column 5), and health satisfaction (Panel B, Columns 7 and 8). These results suggest that individuals exposed to Category 5 cyclones experience significant declines in these specific dimensions of life satisfaction.

In contrast, the estimate for exposure to Category 1–4 cyclones within 100 km of the cyclone’s eye on community satisfaction is positive and statistically significant at the 5% level (Panel B, Column 2), suggesting that individuals affected by such cyclones report a higher level of community satisfaction. Similarly, positive and statistically significant estimates (at the 5% level) are observed for exposure to Category 3–4 cyclones—regardless of distance—with respect to neighbourhood satisfaction (Panel B, Columns 3 and 4), indicating that individuals affected by these cyclones exhibit greater satisfaction with their neighbourhoods.

This pattern is consistent with anecdotal evidence suggesting that neighbours in Australia often support one another during natural disasters (Longman *et al.* 2023). It also aligns with the findings of Johnston *et al.* (2021), who used the same HILDA dataset to show that individuals affected by the 2009 Black Saturday bushfires in Victoria experienced increased community satisfaction in the aftermath of the disaster. However, such positive associations are only observed for cyclones of Category 4 or lower or for more distant cyclones (as in the case of

community satisfaction), whereas exposure to more severe Category 5 cyclones is associated with the opposite effect.

The observed positive impacts of less severe cyclones on community and neighbourhood satisfaction may also contribute to the statistically significant (at the 5% level or better) positive effects of Category 1–2 cyclone exposure on overall life satisfaction (Panel A, Columns 1 and 2). These findings suggest that the impact of cyclone exposure on community, neighbourhood, and overall life satisfaction is contingent on the severity of the event.

Comparing the estimates by distance to the cyclone's eye suggests that the effects are more pronounced—both in terms of absolute magnitude and statistical significance—for individuals closer to the cyclone, particularly in the case of the most severe Category 5 events. For example, the negative impact of Category 5 cyclones on overall life satisfaction, while statistically significant at the 5% level for both distance cutoffs, is approximately 43% larger in absolute value for individuals residing within 40 km of the cyclone's eye compared to those within 100 km. Similarly, the negative effect on health satisfaction—statistically significant at the 10% level or better in both cases—is roughly 10% greater for individuals within 40 km than for those within 100 km of a Category 5 cyclone. Furthermore, the estimated effects on community and personal safety satisfaction are statistically significant (at the 10% level or better) exclusively for individuals located within a 40 km radius. These patterns underscore the heightened vulnerability of individuals located closer to the eye of the most intense cyclones.

When statistically significant, the estimated effects are substantial in magnitude. For example, the largest observed effect on overall life satisfaction is -0.10 , associated with exposure to a Category 5 cyclone within 40 km of its eye. This represents a 1.26% decline relative to the sample mean of overall life satisfaction. Similarly, the largest estimate for personal safety satisfaction is -0.13 , also linked to Category 5 cyclone exposure within 40 km, corresponding to a 1.58% decrease relative to the sample mean for this domain. In the case of health

satisfaction, the largest estimate is -0.10 , again for individuals exposed within 40 km of a Category 5 cyclone's eye, amounting to a 1.38% decline relative to the sample mean of this satisfaction domain.

Overall, the analysis demonstrates that only the most severe Category 5 cyclones substantially reduce overall life satisfaction, with the effects diminishing as the distance from the cyclone eye increases. These severe events also negatively impact specific domains of life satisfaction, including community, personal safety, and health. In contrast, an exception to this pattern is observed among individuals exposed to less severe cyclones, either of lower intensity or at greater distances from their homes, who tend to report higher levels of community, neighbourhood, and overall life satisfaction.

For the sake of focus and brevity, unless otherwise stated, the remainder of this paper concentrates on exposure to the most severe Category 5 cyclones, which have been shown to exert devastating effects on overall life satisfaction and several specific domains. Similarly, we restrict our analysis to cyclone exposure within 100 km of the cyclone's eye to ensure a sufficiently large number of affected individuals for robust statistical inference.

5.3. *Dynamic impacts of cyclones on life satisfaction*

Recognizing the potential for delayed effects on life satisfaction, this study examines the dynamic influence of cyclone exposure over time. To capture this temporal dimension, we introduce an additional variable into Equation (1), representing exposure to any Category 5 cyclone within 100 km of its eye in the year preceding the measurement of life satisfaction outcomes (i.e., $k = 2$ in Equation (1)). The estimated coefficients for both contemporaneous and one-year lagged exposure to Category 5 cyclones within 100 km are presented in Panel B of Table 3. Notably, the results for contemporaneous exposure are broadly consistent with those reported in the baseline model (Panel A), and in most cases, exhibit larger absolute effect sizes and greater statistical significance. These findings are encouraging, particularly given the

reduced sample size associated with the inclusion of lagged variables, and they reinforce our prior conclusions.

Moreover, several estimates for the one-year lagged exposure variable are negative and statistically significant, suggesting delayed adverse effects of cyclones on certain life satisfaction domains. Specifically, individuals residing within 100 km of the path of a Category 5 cyclone report lower community satisfaction in the subsequent survey wave ($p < 0.1$; Panel B, Column 5), with the magnitude of the estimate comparable to that of contemporaneous exposure. Similarly, the same group reports a significant decline in personal safety satisfaction of 0.08 points ($p < 0.05$; Panel B, Column 7) one year after the event.

Panel C of Table 3 extends this analysis by incorporating two-year lagged exposure variables (i.e., $k = 3$ in Equation (1)). The results suggest continued adverse effects up to two years after exposure for four life satisfaction domains: employment opportunity, community, neighbourhood, and personal safety satisfaction. The two-year lagged estimates for these outcomes are all negative, statistically significant at least at the 10% level, and sizable, ranging from -0.07 for personal safety satisfaction to -0.15 for employment opportunity satisfaction. Furthermore, the coefficients on contemporaneous and one-year lagged exposure variables remain consistent with those from the earlier specifications, further corroborating the robustness of our findings.

In summary, this dynamic analysis not only reinforces our earlier conclusions regarding the substantial contemporaneous effects of cyclone exposure, but also reveals that the most severe Category 5 cyclones have either persistent or delayed negative impacts on life satisfaction. These effects are evident up to two years post-exposure and are particularly pronounced in domains related to employment opportunities, community, neighbourhood, and personal

safety.⁷ To our knowledge, this evidence of the delayed impacts of severe cyclones—uncovered through individual-level panel data and dynamic fixed-effects modelling—has not been documented in the existing literature (Calvo *et al.* 2015; Berlemann 2016).

5.4. Discussion

Our findings of a statistically significant impact of category 5 cyclones on selected indicators of life satisfaction align relatively well with some findings in previous research by Johnston *et al.* (2021), who used the same HILDA dataset to document the impacts of the 2009 Black Saturday Bushfires (BSB), one of the worst natural disasters on record in Australia, on life satisfaction.⁸ For instance, Johnston *et al.* (2021) found that the BSB reduced overall life satisfaction by between 0.15 and 0.19 points on a 0-10 scale, similar to the scale used in this study. This estimate is slightly higher than our largest estimate of (minus) 0.10 points, observed for exposure to a category 5 cyclone within 40 km from homes. Additionally, our statistically significant (at the 5% level) estimate of -0.13 points for personal safety satisfaction due to the same cyclone exposure is slightly smaller (in absolute terms) than their marginally statistically significant (at the 10% level) estimate of -0.17 points for the immediate impact of the BSB on this domain.

However, unlike Johnston *et al.* (2021), who found no significant effect of the BSB on health satisfaction, our study reveals a substantial negative impact of exposure to a Category 5 cyclone—whether within 40 km or 100 km of individuals' residences—on this domain. Furthermore, while Johnston *et al.* (2021) reported a positive effect of the BSB on community satisfaction, the present study identifies a statistically significant (at the 10% level) negative effect of exposure to a Category 5 cyclone on this analogous domain. Additionally, our study

⁷ Appendix Table A4 presents results from models including three-year lagged exposure variables (i.e., $k = 4$ in Equation (1)), which show no statistically significant effects beyond the two-year lag.

⁸ We refrain from comparing our results with those of other studies which use different datasets, life satisfaction measures, or empirical models.

documents substantial and sustained negative impacts on specific life satisfaction domains, contrasting with the absence of significant delayed effects observed in Johnston *et al.* (2021) for the BSB. These differences in findings suggest that cyclones may exert more pronounced adverse effects on certain aspects of life satisfaction and highlight that different types of natural disasters may influence overall life satisfaction and its various domains in distinct ways.

To provide an economic interpretation of the magnitude of cyclone impacts on life satisfaction, we follow Johnston *et al.* (2021), Nguyen *et al.* (2025), among others, and introduce equivalised household disposable income as an additional covariate. This variable is measured in the same survey year as the life satisfaction outcomes. To facilitate interpretation, we use the natural logarithm of income, such that the estimated coefficients can be interpreted as percentage changes in income.⁹ The log income variable is included alongside the contemporaneous and two-year lagged Category 5 cyclone exposure indicators, which were found to be statistically significant in the individual fixed-effects regressions for each life satisfaction outcome.

The results of this exercise, reported in Table 4, reveal three main patterns. First, consistent with prior studies (Frijters *et al.* 2004; Nguyen & Duncan 2020), the estimated coefficient on income is positive and statistically significant at the 1% level for all outcomes except community satisfaction. This suggests that individuals residing in higher-income households report higher levels of life satisfaction across most domains. Second, the estimated coefficients on cyclone exposure variables remain largely unchanged compared to those reported in Table 3, Panel C, indicating that our main findings are robust to the inclusion of income controls.

⁹ We assign a value of 1 to a small number of households reporting zero or negative disposable income in the previous financial year, as the logarithm is undefined for non-positive values. The results are robust to excluding these observations from the regressions. Consistent with the existing literature (Frey & Stutzer 2002; Ferrer-i-Carbonell 2013), the estimated coefficient on income should not be interpreted causally due to potential endogeneity.

Third, a comparison of the magnitudes and statistical significance of the income and cyclone exposure coefficients suggests that the adverse effects of severe cyclones carry substantial economic implications. For outcomes where both the income and cyclone exposure coefficients are statistically significant, the estimated effect of cyclone exposure is equivalent to an income loss ranging from approximately 1.36% (for employment opportunity satisfaction, calculated as $-0.15/0.11$) to 6.50% (for neighbourhood satisfaction, calculated as $-0.13/0.02$).¹⁰ The implied income-equivalent loss for community satisfaction would be substantially larger, as the cyclone exposure coefficients are negative and statistically significant at the 10% level or better, while the income coefficient is statistically insignificant (Column 5 of Table 4).

Overall, this exercise indicates that the adverse effects of severe cyclones documented in our study likely entail substantial economic and wellbeing consequences, comparable to or even exceeding those associated with one of Australia's most devastating natural disasters—the 2009 Black Saturday Bushfires, as examined by Johnston *et al.* (2021).

The empirical results thus far indicate that exposure to only the most severe Category 5 cyclones—characterised by maximum wind speeds exceeding 199 km/h—has a statistically significant negative effect on life satisfaction. This finding points to a highly non-linear relationship between cyclone intensity and life satisfaction. It aligns with Nordhaus (2010), who demonstrated that the macroeconomic impact of U.S. hurricanes is also highly non-linear, with catastrophic effects concentrated above a certain wind speed threshold. It is further consistent with recent U.S. evidence that only the most destructive hurricanes increase migration (Blonz *et al.* 2025), and with Australian evidence that only the most severe Category 5 cyclones lead to increased health insurance uptake (Nguyen & Mitrou 2025e) and decreased fertility (Nguyen & Mitrou 2025c).

¹⁰ These income-equivalent calculations are based only on estimates that are statistically significant for both the income and cyclone exposure variables.

6. Robustness checks

To bolster confidence in the reliability of our results, we implemented a series of sampling and specification tests. Due to brevity constraints, we focus on presenting results based on one key concurrent cyclone exposure measure: experiencing a category 5 cyclone within 100 km of the eye. This measure has been shown to have statistically significant negative effects on various life satisfaction domains.

Our initial sampling test involved restricting the regression analysis to individuals residing in Local Government Areas (LGAs) directly impacted by at least one cyclone within 100 km during the study period. This test aimed to address concerns regarding potential limitations in the baseline sample's cyclone exposure variation. The results obtained from this more restricted sample are reported in Panel B1 of Appendix Table A5. Reassuringly, these results closely mirrored the baseline findings (re-reported in Panel A) in terms of both magnitude and statistical significance. To further strengthen the validity of our findings, we also analysed the full sample covering all states and territories (Panel B2) and again observed similar results. In some cases—such as community and health satisfaction—the estimates are even more pronounced in terms of absolute magnitude or statistical significance.

To enhance the robustness of our model, we conducted seven additional specification checks. First, we incorporated postcode fixed effects to account for unobserved time-invariant factors potentially influencing both cyclone exposure and life satisfaction outcomes within a specific locality (Panel C1). Second, we clustered standard errors at the postcode level to acknowledge potential spatial correlation within geographic units (Panel C2).

Third, we estimated a pooled Ordinary Least Squares (OLS) regression that omits individual fixed effects.¹¹ The pooled OLS estimates (Panel C3) diverged substantially from the baseline

¹¹ To address potential confounding effects, we included time-invariant variables, such as gender and migration status, in these specifications.

results (Panel A). Specifically, the coefficients on overall life satisfaction, community satisfaction, and health satisfaction become statistically insignificant. In contrast, the estimates for employment opportunity, neighbourhood, and personal safety satisfaction, while remaining negative, attain statistical significance at least at the 10% level. These marked differences between the individual fixed-effects and pooled OLS estimates, together with unreported Hausman test results that favour the fixed-effects specification, underscore the importance of accounting for individual-specific heterogeneity. Failure to do so would result in biased estimates of the effects of cyclones on life satisfaction.

Fourth, we applied a Random Effects (RE) model, which produced results broadly consistent with those of the FE model (Panel C4). Fifth, we re-estimated the model excluding potentially cyclone-affected time-varying control variables (Panel C5). Sixth and seventh, we conducted separate analyses that incorporated additional time-varying variables potentially co-affected by cyclone exposure, such as non-wage irregular income—which may rise due to disaster-related assistance (Panel C6)—and Short-Form (SF) 36 general health summary (Panel C7) (Nguyen & Mitrou 2025e)). Across all these robustness checks—which lend support to the baseline empirical model employed in this study—the key findings remain consistent, indicating that our results are robust to alternative model specifications.

To further strengthen the causal interpretation of the relationship between cyclone exposure and life satisfaction, we conducted a falsification test. Specifically, we included lagged (one year prior), contemporaneous, and lead (one year ahead) cyclone exposures in an individual FE model. We hypothesized that since future cyclones are unexpected, they should not exert any influence on current life satisfaction when controlling for individual characteristics and past cyclones. The results confirmed this hypothesis (Table 3, Panel D). Specifically, estimates for current and lagged cyclones closely mirrored the baseline findings (Table 3, Panel B),

suggesting robust causal inferences. Additionally, the lack of statistical significance for future cyclones reinforces the exogeneity of cyclone exposure.

To further test the robustness of our findings against potential model misspecification, we conduct three randomization tests following the methodology of Hsiang and Jina (2014). First, we randomly assign cyclone exposure observations across the entire sample—referred to as the “whole sample” approach. Second, to account for potential spurious correlations driven by regional trends, we randomly reallocate each individual’s cyclone exposure history to another individual while preserving the timing of exposure—termed the “between individual” approach. Third, we randomly reassign the timing of cyclone exposure within each individual, thereby altering only the temporal structure of the data to assess whether time-invariant cross-sectional patterns could generate false correlations—termed the “within individual” approach.

These randomization exercises are implemented using Equation (1), incorporating contemporaneous exposure to Category 5 cyclones within 100 km as the sole exposure variable, with 500 replications. Figure 1 presents the results for the three life satisfaction outcomes found to be significantly affected by this exposure—overall life satisfaction, community satisfaction, and health satisfaction (all significant at the 10% level or better). Two key findings emerge. First, the distribution of all placebo treatment effects, depicted by the blue line in Figure 1, is centred around zero, suggesting that the model specified in Equation (1) does not systematically produce biased estimates. Second, the coefficients derived from the actual data (depicted by solid red lines) consistently fall in the left tail of the distribution, with p-values—calculated as the proportion of randomized estimates less than or equal to the observed estimate—falling below 0.05 in all cases. These results reinforce the validity of our findings, indicating that the observed effects are highly unlikely to have occurred by chance.

By contrast, Appendix Figure A3 presents the randomization results for the remaining life satisfaction outcomes, which were not significantly affected by concurrent cyclone exposure.

In these cases, the coefficients derived from the actual data are close to zero, with p-values exceeding 0.10, thereby confirming the absence of statistically significant contemporaneous effects.

Overall, this comprehensive sensitivity analysis strengthens our confidence in the causal relationship observed between cyclone exposure and life satisfaction. The findings demonstrate resilience to various sampling and specification tests, bolstering the internal and external validity of the study.

7. Heterogeneity

To explore potential mechanisms through which cyclones influence life satisfaction and identify vulnerable sub-populations, we follow Nguyen and Mitrou (2024, 2025e) to employ the individual FE model (i.e., Equation (1)) to estimate effects within distinct groups defined by eight individual, household, or regional characteristics. These characteristics encompass gender (male vs. female), age group (young vs. old, categorized relative to the median population age), homeownership status (renters vs. homeowners), income group (lower income vs. higher income households, defined relative to the median), residential insurance status (insured vs. uninsured)¹², urban/rural residence (major city vs. rural area), distance to the coast (coastal areas vs. inland areas), and whether the individual resides in a historically “cyclone-prone area” (postcode experiencing a cyclone within 100 km in the past 30 years) or a “cyclone-free area”.

To mitigate concerns regarding the influence of cyclones on sub-population classification, individuals are categorized based on the values of time-variant variables (excluding age) observed at their first appearance in the sample. For conciseness and illustrative clarity, this

¹² Building on Nguyen and Mitrou (2024, 2025e), this study classifies individuals as “insured” if their reported annual household expenditure on combined home, contents, and motor vehicle insurance exceeds \$1,250 (adjusted to 2010 prices). Conversely, those reporting lower expenditures are categorized as “uninsured”. Data on home and contents insurance are available from Wave 6 onwards, with the exception of Wave 23, and are derived from responses to the “other insurance (home/contents/motor vehicle)” expenditure question.

section utilizes a singular cyclone exposure indicator (exposure to a category 5 cyclone within 100 km) due to its robust statistical impact in the pooled regression (Table 2) and to ensure adequate sample size for robust heterogeneous analysis across sub-populations. Figure 2 graphically represents subgroup results for the eight life satisfaction domains, with each domain presented in a separate panel. Each panel displays regression estimates visually, depicting both the impact of cyclones and the average life satisfaction within each subgroup. Figure 2 reveals the heterogeneous effects of cyclones across subgroups for various life satisfaction outcomes.

Panel A indicates that cyclones exert a more substantial negative impact on the overall life satisfaction of specific subgroups. This is evidenced by larger (in absolute term) or statistically significant cyclone estimates for males, younger individuals, homeowners, individuals from higher-income households, those without prior residential insurance, and residents of rural, coastal, or cyclone-prone areas. Our finding of a more pronounced negative impact of cyclones on the overall life satisfaction of rural residents aligns with other studies, which also report a heightened negative impact of droughts on rural residents in Australia (Carroll *et al.* 2009) and forest fires in Europe (Kountouris & Remoundou 2011).

Conversely, our finding of more pronounced cyclone effects for males, younger individuals, and individuals from higher-income households contrasts with the evidence by Johnston *et al.* (2021), who used the same HILDA data to demonstrate that bushfires have a more pronounced impact on females, older individuals, and lower-income individuals.¹³ These differing impacts of cyclones and bushfires on selected sub-populations suggest that the life satisfaction effects of these two natural disasters are not uniform, underscoring the necessity for separate analyses for each type of natural disaster.

¹³ Unfortunately, Johnston *et al.* (2021) did not report heterogeneous results for other life satisfaction domains, preventing a comparison of our findings with theirs.

Panels C and D reveal that while cyclones do not significantly influence financial situation and home satisfaction for the entire population (as shown by the horizontal dashed line representing the cyclone estimate for the whole population), they do reduce these life satisfaction domains for residents of historically cyclone-free areas. This is due to negative and statistically significant cyclone estimates ($p < 0.05$) for these subgroups. Notably, the cyclone estimates are large, accounting for 7% and 6% of the subgroup sample mean of the financial situation and home satisfaction outcome, respectively. This finding aligns with evidence in Nguyen and Mitrou (2024) that residents in historically cyclone-free areas are more likely to relocate following a cyclone. Together, these results suggest that individuals lacking prior experience with extreme weather events may be particularly susceptible to increased vulnerability to damages when encountering them for the first time (Dell *et al.* 2014). This underscores the role of natural disaster readiness in protecting individuals in historically natural disaster-free regions from future disasters.

Panel E suggests that cyclones disproportionately reduce the community satisfaction for males, younger individuals, those without prior residential insurance, and residents of coastal areas or historically cyclone-free areas. Similarly, Panel G indicates that while Category 5 cyclones occurring within 100 km of residences do not have a statistically significant effect on overall feelings of personal safety for the full sample, they are associated with a significant reduction in this domain among younger individuals, as evidenced by the negative and statistically significant (at the 5% level) coefficient for this subgroup. Finally, Panel H demonstrates a disproportionate reduction in health satisfaction for males, younger individuals, individuals from higher income or uninsured households, and residents of rural or inland areas.

Overall, the aforementioned heterogeneous analysis highlights substantial differential cyclone impacts on life satisfaction among various socio-demographic groups. The extent of this heterogeneity varies across life satisfaction domains. However, a general finding is that

individuals with specific characteristics - males, younger individuals, and those lacking prior residential insurance - are more negatively affected. This underscores the necessity for targeted support policies aimed at building resilience and assisting vulnerable populations. Additionally, the finding that life satisfaction is disproportionately diminished among individuals without prior residential insurance, when viewed alongside evidence presented by Nguyen and Mitrou (2024) that acquiring residential insurance serves as an effective coping mechanism, emphasizes its importance. Together, our findings demonstrate that residential insurance not only mitigates future home-related repair costs but also helps maintain life satisfaction when exposed to future natural disasters.

8. Conclusion

This study presents the first causal investigation of the effects of cyclones on various domains of life satisfaction in Australia. Utilising an individual fixed-effects model and exogenously determined measures of cyclone exposure, the analysis reveals that only the most severe Category 5 cyclones—particularly those occurring in close proximity to residences—significantly reduce overall life satisfaction. These cyclones also have adverse effects on community and health satisfaction. Our findings further suggest that severe cyclones have a substantial and lasting adverse impact on satisfaction with employment opportunities, community, neighbourhood, and personal safety. Back-of-the-envelope calculations indicate that the estimated impacts of Category 5 cyclone exposure within 100 km of one's residence are equivalent to an income loss ranging from approximately 1.4% to 6.5%.

The newly identified impacts on life satisfaction are comparable to, or even exceed, the effects of one of Australia's most devastating natural disasters—the 2009 Black Saturday Bushfires (Johnston *et al.* 2021). Additionally, the robustness of our results is reinforced through a series of sensitivity analyses, including a falsification test—which confirms that future cyclone exposure does not affect current life satisfaction—as well as three randomization tests.

Our extensive heterogeneous analysis reveals significant differential impacts of cyclones on life satisfaction based on various individual, household, or regional characteristics. This heterogeneity varies across life satisfaction domains, with a general trend showing more pronounced impacts for males, younger individuals, and those lacking prior residential insurance.

This study provides novel and robust evidence on the impacts of cyclone exposure on life satisfaction. However, several limitations suggest directions for future research. First, it is beyond the scope of this study to investigate the impact of other natural disasters, such as floods, on life satisfaction. Further research into the distinct impacts of various natural disasters would offer a more comprehensive understanding of their effects on life satisfaction. Second, this study identifies that exposure to less severe cyclones enhances community and neighbourhood satisfaction among affected individuals. The mechanisms through which cyclones improve the sense of community remain unclear. Further research into these potential mechanisms, such as the role of neighbourly assistance during natural disasters, would be beneficial. Additionally, exploring the pathways through which cyclones influence other domains of life satisfaction would be valuable, as collectively, these insights could inform strategies to mitigate the negative impacts of natural disasters on life satisfaction.

Despite these limitations, the results presented in this study carry important methodological and policy implications. Methodologically, our findings underscore the necessity of accounting for unobserved, time-invariant individual characteristics when estimating the effects of cyclones on life satisfaction, as neglecting these factors may result in biased impact estimates. From a policy perspective, the novel evidence of substantial negative effects of exposure to the most severe Category 5 cyclones on life satisfaction provides critical insights for designing effective interventions and support mechanisms, particularly for disproportionately affected populations.

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Table 1: Sample means of key variables by cyclone exposure status

	Affected by any cyclone	Unaffected	Affected - Unaffected (1) - (2)
	(1)	(2)	(3)
Age (years)	44.146	45.023	-0.877***
Year 12 ^(a)	0.159	0.152	0.008*
Vocational or Training qualification ^(a)	0.401	0.358	0.043***
Bachelor or higher ^(a)	0.170	0.186	-0.016***
Household size	2.849	2.889	-0.04**
Major city ^(a)	0.336	0.611	-0.275***
Local area unemployment rate (%)	4.989	5.028	-0.039***
Local area SEIFA decile	5.154	5.450	-0.296***
Overall life satisfaction	7.961	7.926	0.035**
Employment opportunity satisfaction	7.167	7.092	0.075***
Financial situation satisfaction	6.703	6.602	0.101***
Home satisfaction	8.009	8.031	-0.022
Community satisfaction	6.764	6.779	-0.015
Neighbourhood satisfaction	7.875	7.891	-0.016
Personal safety satisfaction	8.320	8.239	0.081***
Health satisfaction	7.240	7.266	-0.026
Observations	8,817	215,474	

Notes: Figures are sample means. Estimated sample from the regression of “Overall life satisfaction” as an outcome. ^(a) indicates a binary variable. Tests are performed on the significance of the difference between the sample mean for “affected” individuals (identified as those living in a postcode affected by any cyclone within 100km from the cyclone eye) and “unaffected” individuals (remaining individuals). The symbol * denotes significance at the 10% level, ** at the 5% level, and *** at the 1% level.

Table 2: Concurrent impacts of cyclone exposure on life satisfaction

Distance to cyclone eye:	40km	100km	40km	100km	40km	100km	40km	100km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:	Overall life satisfaction		Employment opportunity satisfaction		Financial situation satisfaction		Home satisfaction	
Category 1-2	0.10***	0.04**	0.01	0.03	0.06	-0.01	-0.05	-0.02
	[0.03]	[0.02]	[0.07]	[0.04]	[0.06]	[0.03]	[0.05]	[0.03]
Category 3-4	0.02	-0.00	0.05	0.03	-0.06	-0.05*	-0.04	-0.02
	[0.03]	[0.02]	[0.05]	[0.04]	[0.04]	[0.03]	[0.04]	[0.03]
Category 5	-0.10**	-0.07**	-0.03	-0.03	-0.02	-0.01	-0.05	-0.01
	[0.04]	[0.03]	[0.08]	[0.06]	[0.06]	[0.05]	[0.06]	[0.04]
Observations	224,221	224,221	176,341	176,341	224,036	224,036	224,167	224,167
No of unique persons	23,501	23,501	21,954	21,954	23,488	23,488	23,502	23,502
Mean dependent variable	7.93	7.93	7.10	7.10	6.61	6.61	8.03	8.03
Panel B:	Community satisfaction		Neighbourhood satisfaction		Personal safety satisfaction		Health satisfaction	
Category 1-2	0.03	0.07**	-0.02	0.03	0.01	0.02	0.02	0.01
	[0.06]	[0.03]	[0.05]	[0.03]	[0.04]	[0.02]	[0.05]	[0.02]
Category 3-4	0.06	0.06**	0.08**	0.05*	-0.00	0.02	-0.01	-0.00
	[0.04]	[0.03]	[0.04]	[0.02]	[0.03]	[0.02]	[0.04]	[0.02]
Category 5	-0.11*	-0.08	-0.08	-0.03	-0.13**	-0.03	-0.10*	-0.09**
	[0.06]	[0.05]	[0.06]	[0.05]	[0.05]	[0.04]	[0.05]	[0.04]
Observations	223,772	223,772	223,984	223,984	224,161	224,161	224,244	224,244
No of unique persons	23,476	23,476	23,489	23,489	23,506	23,506	23,505	23,505
Mean dependent variable	6.78	6.78	7.89	7.89	8.24	8.24	7.26	7.26

Notes: Results reported in each column and panel are from a separate individual FE regression. Cyclone exposure is measured by the distance from the cyclone eye, as indicated in the first row of the table. Individuals who were not affected by any cyclone serve as the comparison group. Other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors are clustered at the individual level and reported in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Table 3: Dynamic impacts of category 5 cyclone exposure on life satisfaction

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Concurrent								
Current	-0.08**	-0.04	-0.00	-0.01	-0.09*	-0.03	-0.03	-0.09**
	[0.03]	[0.06]	[0.05]	[0.04]	[0.05]	[0.05]	[0.04]	[0.04]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
No of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505
Panel B: One-year lagged								
Current	-0.10***	-0.08	-0.05	-0.04	-0.10**	-0.06	-0.03	-0.11***
	[0.04]	[0.07]	[0.05]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]
One-year lagged	0.01	-0.09	-0.02	-0.06	-0.09*	-0.07	-0.08**	-0.01
	[0.04]	[0.07]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]	[0.04]
Observations	196,908	152,974	196,789	196,847	196,532	196,701	196,841	196,920
No of unique persons	18,773	17,402	18,772	18,776	18,766	18,771	18,774	18,777
Panel C: Two-year lagged								
Current	-0.10***	-0.09	-0.05	-0.04	-0.09*	-0.07	-0.03	-0.12***
	[0.04]	[0.07]	[0.06]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]
One-year lagged	0.01	-0.10	-0.03	-0.06	-0.10*	-0.07	-0.10**	-0.02
	[0.04]	[0.07]	[0.05]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]
Two-year lagged	-0.00	-0.15**	-0.06	-0.02	-0.08*	-0.13***	-0.07*	-0.01
	[0.03]	[0.07]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]	[0.04]
Observations	176,256	135,764	176,176	176,197	175,927	176,066	176,197	176,265
No of unique persons	16,587	15,308	16,585	16,586	16,573	16,576	16,587	16,587

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel D: Falsification test								
Current	-0.11*** [0.04]	-0.08 [0.07]	-0.06 [0.05]	-0.06 [0.05]	-0.09* [0.05]	-0.09* [0.05]	-0.04 [0.04]	-0.13*** [0.04]
One-year lagged	0.00 [0.04]	-0.05 [0.07]	-0.03 [0.05]	-0.05 [0.05]	-0.09* [0.05]	-0.08* [0.05]	-0.09** [0.04]	-0.01 [0.04]
One-year lead	-0.06* [0.03]	0.00 [0.07]	-0.01 [0.06]	-0.01 [0.05]	-0.00 [0.06]	-0.02 [0.05]	0.03 [0.04]	-0.04 [0.04]
Observations	176,223	137,370	176,136	176,159	175,922	176,059	176,156	176,227
No of unique persons	16,598	15,377	16,593	16,597	16,588	16,597	16,599	16,597

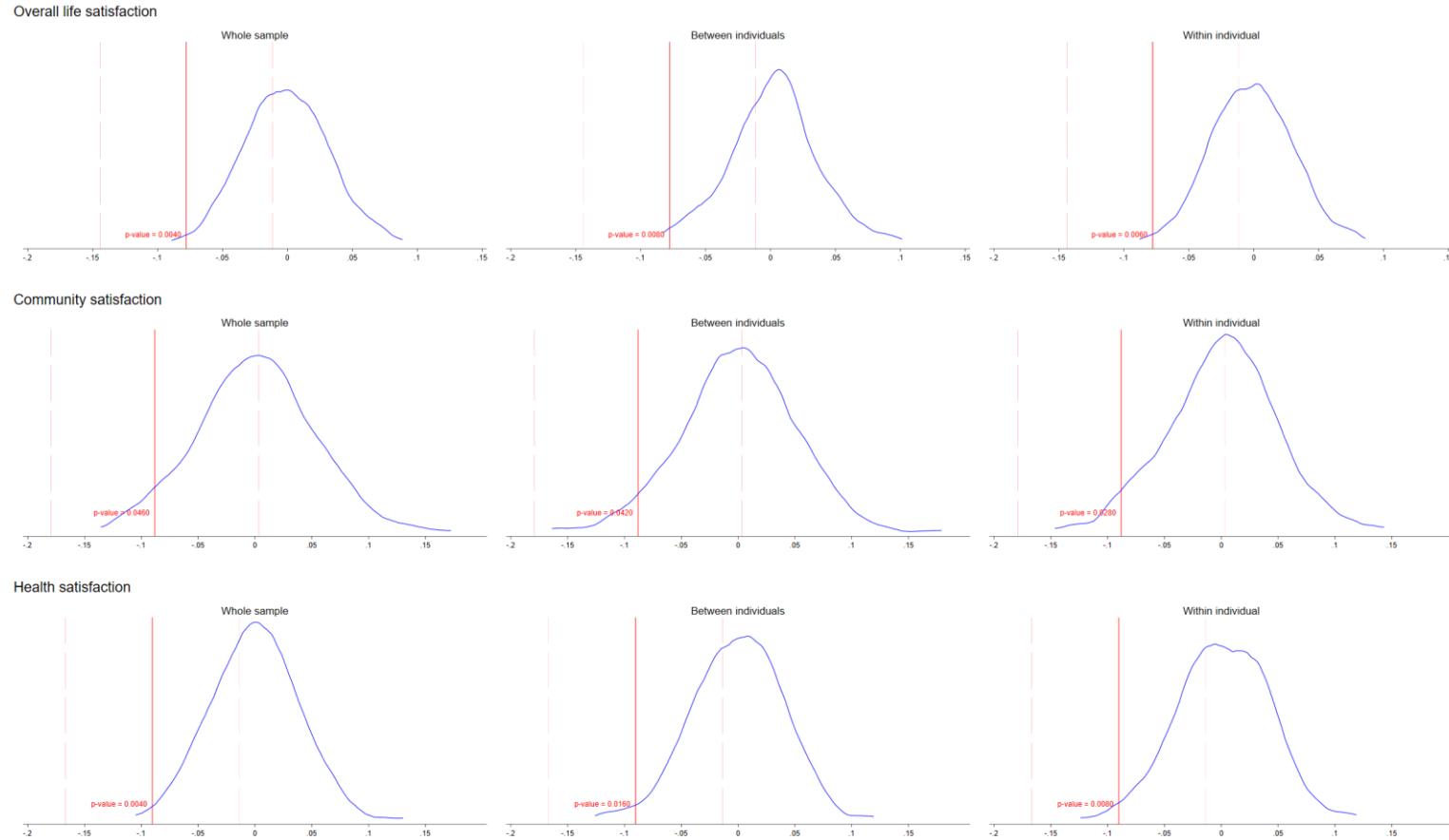
Notes: Results reported in each column and panel are from a separate individual FE regression. Cyclone exposure is defined as exposure to any Category 5 cyclone occurring within a 100-kilometre radius of the cyclone's eye. The timing of exposure is indicated in the first column of the table. Other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Table 4: Economic implications of the cyclone impacts on life satisfaction

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current category 5 cyclones	-0.10*** [0.04]	-0.10 [0.07]	-0.06 [0.05]	-0.05 [0.05]	-0.09* [0.05]	-0.07 [0.05]	-0.03 [0.04]	-0.12*** [0.04]
One-year lagged category 5 cyclones	0.01 [0.04]	-0.11 [0.07]	-0.04 [0.05]	-0.06 [0.05]	-0.10** [0.05]	-0.07 [0.05]	-0.10** [0.04]	-0.02 [0.04]
Two-year lagged category 5 cyclones	-0.00 [0.03]	-0.15** [0.07]	-0.07 [0.05]	-0.03 [0.05]	-0.08* [0.05]	-0.13*** [0.04]	-0.07* [0.04]	-0.01 [0.04]
Equivalised household disposable income (in natural log)	0.04*** [0.01]	0.11*** [0.01]	0.18*** [0.01]	0.04*** [0.01]	-0.00 [0.01]	0.02*** [0.01]	0.04*** [0.00]	0.04*** [0.01]
Observations	176,137	135,663	176,059	176,078	175,809	175,947	176,078	176,148
No of unique persons	16,578	15,298	16,576	16,577	16,565	16,567	16,578	16,578
Mean of dep. variable	7.92	7.15	6.72	8.03	6.81	7.89	8.24	7.19

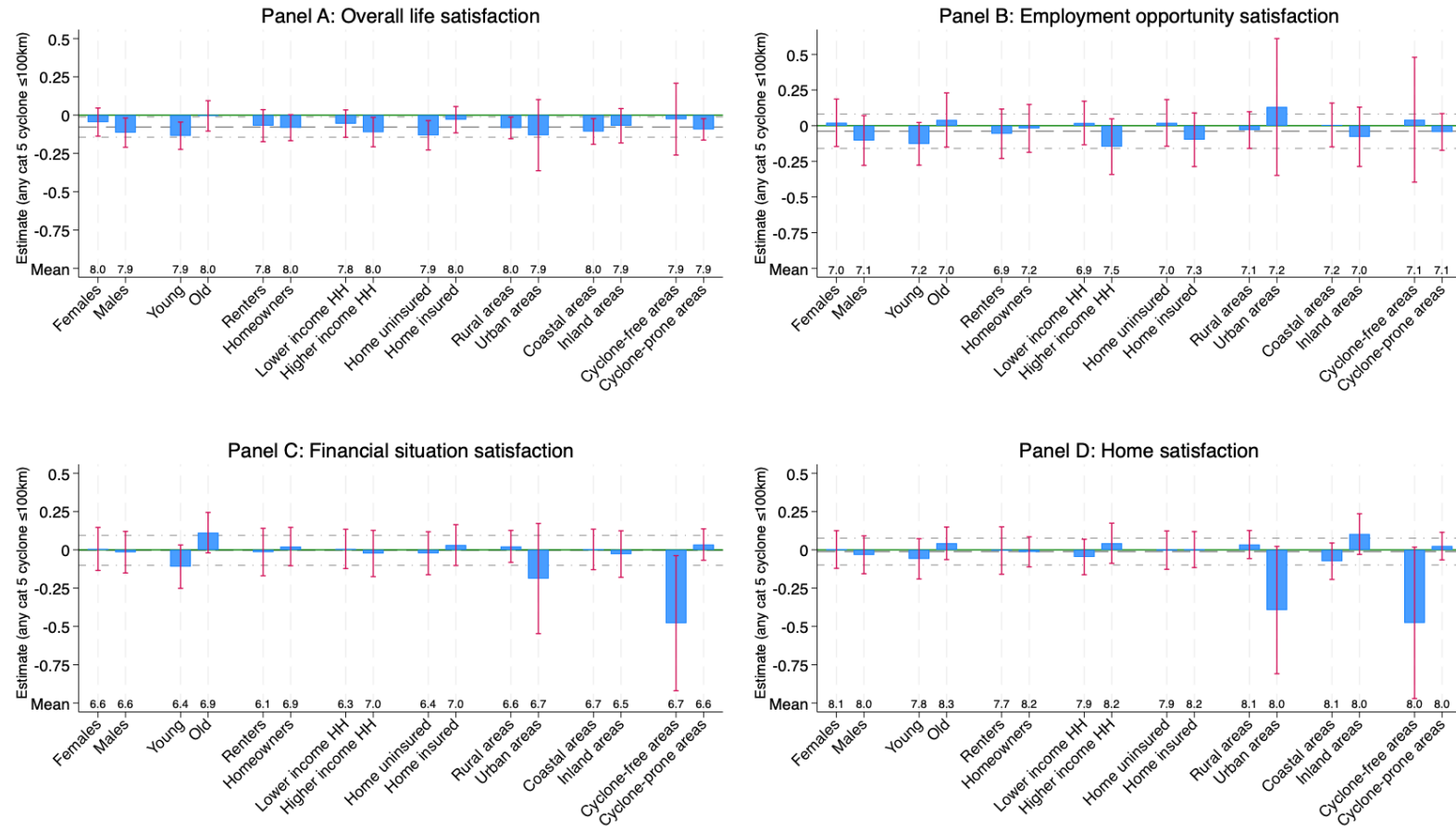
Notes: Results reported in each column are from a separate individual FE regression. Cyclone exposure is defined as exposure to any Category 5 cyclone occurring within a 100-kilometre radius of the cyclone's eye. The timing of exposure is indicated in the first column of the table. Other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Figure 1: Randomization tests



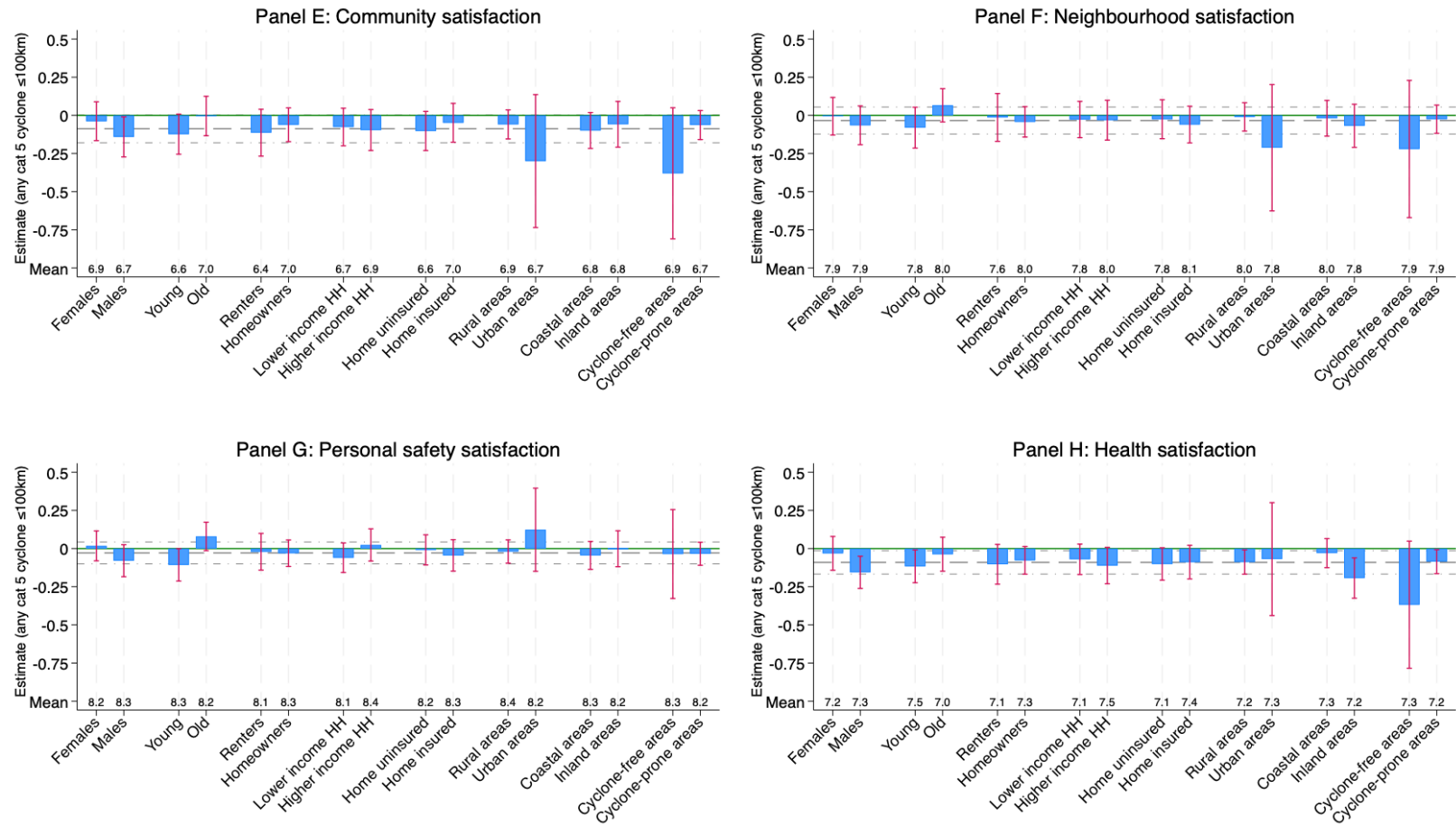
Notes: The blue line depicts the distribution of 500 regression estimates for the effect of randomly assigned exposure to a category 5 cyclone within 100 km of its eye, obtained from Equation (1). The vertical solid red line represents the coefficient estimate, while the long-dashed red lines indicate the 95% confidence intervals for exposure to a Category 5 cyclone within 100 km of its eye, obtained from the actual data using Equation (1). The p-value is calculated as the probability that the estimate from the real data is smaller than or equal to the estimates from the randomized data. We use the Stata command `rndm`, developed by Hsiang and Jina (2014), to implement the randomization procedure.

Figure 2: Heterogeneity in the cyclone impact on life satisfaction



Notes: Results for different sub-populations are obtained from a separate FE regression. The dash (short dash dot) horizontal line shows the cyclone exposure coefficient (95% confidence interval) estimates for the whole population. “Mean” indicates the mean of the dependent variable for each sub-population printed below the bars. Detailed regression results are reported in Appendix Table A6.

Figure 2: Heterogeneity in the cyclone impact on life satisfaction (continued)



Notes: Results for different sub-populations are obtained from a separate FE regression. The dash (short dash dot) horizontal line shows the cyclone exposure coefficient (95% confidence interval) estimates for the whole population. “Mean” indicates the mean of the dependent variable for each sub-population printed below the bars. Detailed regression results are reported in Appendix Table A6.

Online Appendix

for refereeing purposes and to be published online

Appendix Table A1: Variable description and summary statistics

Variable	Description	Mean	Min	Max	Standard deviations		
					Overall	Between	Within
Age (years)	The respondent's age at the survey time (years)	44.99	14.00	101.00	18.92	19.00	5.30
Year 12	Dummy: = 1 if the individual completes Year 12 and zero otherwise	0.15	0.00	1.00	0.36	0.33	0.17
Vocational or Training qualification	Dummy: = 1 if the individual has a vocational or training qualification and zero otherwise	0.36	0.00	1.00	0.48	0.45	0.17
Bachelor or higher	Dummy: = 1 if the individual has a bachelor degree or higher and zero otherwise	0.19	0.00	1.00	0.39	0.37	0.13
Household size	Number of household members	2.89	1.00	17.00	1.49	1.39	0.87
Major city	Dummy variable: = 1 if the individual lives in a major city and zero otherwise	0.60	0.00	1.00	0.49	0.46	0.19
Local area unemployment rate	Yearly unemployment rate at the individual's residing local government area (%)	5.03	2.10	8.10	1.19	0.87	1.06
Local area SEIFA decile	Socio-Economic Indexes for Areas (SEIFA) decile at the individual's residing local government area	5.44	1.00	10.00	2.87	2.67	1.26
Overall life satisfaction	Responses to a question "All things considered, how satisfied are you with your life?"	7.93	0.00	10.00	1.47	1.30	1.00
Employment opportunity satisfaction	Responses to a question asking the respondents about their satisfaction with their employment opportunity	7.10	0.00	10.00	2.35	2.13	1.65
Financial situation satisfaction	Responses to a question asking the respondents about their satisfaction with their financial situation	6.61	0.00	10.00	2.22	1.95	1.51
Home satisfaction	Responses to a question asking the respondents about their satisfaction with the home in which they live	8.03	0.00	10.00	1.78	1.49	1.33
Community satisfaction	Responses to a question asking the respondents about their satisfaction with feeling part of their local community	6.78	0.00	10.00	2.18	1.87	1.53
Neighbourhood satisfaction	Responses to a question asking the respondents about their satisfaction with the neighbourhood in which they live	7.89	0.00	10.00	1.75	1.52	1.26
Personal safety satisfaction	Responses to a question asking the respondents about their satisfaction with how safe they feel	8.24	0.00	10.00	1.58	1.37	1.13
Health satisfaction	Responses to a question asking the respondents about their satisfaction with their health	7.26	0.00	10.00	1.95	1.73	1.23

Notes: Estimated sample from the regression of "Overall life satisfaction" as an outcome.

Appendix Table A1: Variable description and summary statistics (continued)

Variable	Description	Mean	Min	Max	Standard deviations			Number of individuals affected
					Overall	Between	Within	
Any category 1 or 2 cyclone within 40 km	Dummy variable: = 1 if an individual's residential postcode was within 40 km of any category 1 or 2 cyclone's eye last year and zero otherwise	0.005	0.00	1.00	0.07	0.04	0.06	1,019
Any category 3 or 4 cyclone within 40 km	Dummy variable: = 1 if an individual's residential postcode was within 40 km of any category 3 or 4 cyclone's eye last year and zero otherwise	0.007	0.00	1.00	0.08	0.04	0.08	1,586
Any category 5 cyclone within 40 km	Dummy variable: = 1 if an individual's residential postcode was within 40 km of any category 5 cyclone's eye last year and zero otherwise	0.003	0.00	1.00	0.05	0.03	0.05	662
Any category 1 or 2 cyclone within 100 km	Dummy variable: = 1 if an individual's residential postcode was within 100 km of any category 1 or 2 cyclone's eye last year and zero otherwise	0.016	0.00	1.00	0.13	0.07	0.12	3,605
Any category 3 or 4 cyclone within 100 km	Dummy variable: = 1 if an individual's residential postcode was within 100 km of any category 3 or 4 cyclone's eye last year and zero otherwise	0.018	0.00	1.00	0.13	0.08	0.13	4,006
Any category 5 cyclone within 100 km	Dummy variable: = 1 if an individual's residential postcode was within 100 km of any category 5 cyclone's eye last year and zero otherwise	0.005	0.00	1.00	0.07	0.04	0.07	1,206

Notes: Estimated sample from the regression of “Overall life satisfaction” as an outcome.

Appendix Table A2: Correlation structure among life satisfaction variables

	Life satisfaction	Employment opportunity satisfaction	Financial satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
Life satisfaction	1.00							
Employment opportunity satisfaction	0.38	1.00						
Financial satisfaction	0.46	0.47	1.00					
Home satisfaction	0.44	0.25	0.35	1.00				
Community satisfaction	0.40	0.27	0.31	0.31	1.00			
Neighbourhood satisfaction	0.42	0.26	0.29	0.44	0.51	1.00		
Personal safety satisfaction	0.46	0.31	0.37	0.37	0.38	0.46	1.00	
Health satisfaction	0.50	0.35	0.33	0.23	0.31	0.33	0.34	1.00

Notes: Estimated sample from the regression of “Overall life satisfaction” as an outcome. All correlations are statistically significant at the 1% level.

Appendix Table A3: Remaining results from regressions of concurrent impacts of cyclone exposure on life satisfaction

Life satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	0.00 [0.03]	-0.04 [0.06]	0.13*** [0.05]	0.06 [0.04]	0.06 [0.05]	-0.00 [0.04]	0.04 [0.04]	-0.05 [0.04]
Age squared	0.00*** [0.00]	-0.00 [0.00]	0.00*** [0.00]	0.00*** [0.00]	-0.00*** [0.00]	-0.00*** [0.00]	0.00*** [0.00]	0.00 [0.00]
Year 12 ^(a)	-0.18*** [0.02]	0.17*** [0.04]	-0.22*** [0.04]	-0.24*** [0.03]	-0.47*** [0.03]	-0.22*** [0.03]	-0.22*** [0.02]	-0.30*** [0.03]
Vocational or training qualification ^(a)	-0.12*** [0.03]	0.38*** [0.04]	-0.00 [0.04]	-0.26*** [0.04]	-0.38*** [0.04]	-0.22*** [0.03]	-0.17*** [0.03]	-0.25*** [0.03]
Bachelor degree or higher ^(a)	-0.15*** [0.03]	0.41*** [0.05]	0.09* [0.05]	-0.39*** [0.04]	-0.47*** [0.05]	-0.26*** [0.04]	-0.14*** [0.03]	-0.28*** [0.04]
Household size	0.02*** [0.00]	-0.02*** [0.01]	-0.00 [0.01]	0.03*** [0.01]	0.08*** [0.01]	0.02*** [0.01]	0.03*** [0.00]	-0.01** [0.00]
Major city	-0.11*** [0.02]	0.05 [0.03]	-0.12*** [0.03]	-0.30*** [0.03]	-0.44*** [0.03]	-0.45*** [0.03]	-0.26*** [0.02]	-0.12*** [0.02]
Local area unemployment rate	-0.01** [0.00]	-0.10*** [0.01]	-0.06*** [0.01]	0.01 [0.01]	0.01** [0.01]	0.00 [0.01]	0.00 [0.00]	-0.00 [0.01]
Local area SEIFA index	0.01*** [0.00]	0.03*** [0.00]	0.02*** [0.00]	0.03*** [0.00]	0.03*** [0.00]	0.13*** [0.00]	0.03*** [0.00]	0.01*** [0.00]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
No of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505

Notes: Results reported in each column are from a separate individual FE regression. Cyclone exposure is defined as being located within a 100-kilometre radius of the cyclone's eye, and the corresponding results are presented in Table 2. ^(a) indicates "Year 11 or under" as the baseline group. Other explanatory variables include state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Appendix Table A4: Dynamic impacts of category 5 cyclone exposure on life satisfaction - Three-year lagged

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current	-0.08** [0.04]	-0.09 [0.07]	-0.04 [0.06]	-0.05 [0.05]	-0.09* [0.05]	-0.08* [0.05]	-0.02 [0.04]	-0.12*** [0.05]
One-year lagged	0.00 [0.04]	-0.10 [0.07]	-0.02 [0.06]	-0.05 [0.05]	-0.08 [0.05]	-0.08* [0.05]	-0.09** [0.04]	-0.02 [0.05]
Two-year lagged	-0.01 [0.04]	-0.13* [0.07]	-0.04 [0.05]	-0.01 [0.05]	-0.10* [0.05]	-0.12*** [0.05]	-0.05 [0.04]	-0.02 [0.04]
Three-year lagged	-0.00 [0.03]	-0.09 [0.07]	0.01 [0.05]	0.03 [0.05]	-0.01 [0.05]	-0.02 [0.05]	-0.03 [0.04]	0.03 [0.04]
Observations	158,761	121,282	158,700	158,702	158,466	158,597	158,709	158,774
No of unique persons	15,059	13,902	15,057	15,056	15,052	15,055	15,058	15,058

Notes: Results reported in each column are from a separate individual FE regression. Cyclone exposure is defined as exposure to any Category 5 cyclone occurring within a 100-kilometre radius of the cyclone's eye. The timing of exposure is indicated in the first column of the table. Other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Appendix Table A5: Robustness checks for the impacts of cyclone on life satisfaction

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Baseline								
Any category 5 cyclone within 100 km	-0.08** [0.03]	-0.04 [0.06]	-0.00 [0.05]	-0.01 [0.04]	-0.09* [0.05]	-0.03 [0.05]	-0.03 [0.04]	-0.09** [0.04]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
N of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505
Mean of dep. variable	7.93	7.10	6.61	8.03	6.78	7.89	8.24	7.26
Proportion affected (%)	0.54	0.60	0.54	0.54	0.54	0.54	0.54	0.54
Panel B1: Different sample - Including only local government areas with at least one cyclone within 100 km								
Any category 5 cyclone within 100 km	-0.08** [0.03]	-0.06 [0.06]	0.02 [0.05]	-0.01 [0.04]	-0.07 [0.05]	-0.02 [0.05]	-0.04 [0.04]	-0.10** [0.04]
Observations	79,566	63,410	79,487	79,529	79,376	79,481	79,532	79,567
N of unique persons	9,134	8,571	9,130	9,134	9,122	9,132	9,136	9,137
Mean of dep. variable	7.94	7.11	6.54	8.02	6.71	7.88	8.29	7.24
Proportion affected (%)	1.52	1.66	1.52	1.52	1.52	1.52	1.52	1.52
Panel B2: Different sample - Using a sample of all individuals observed in the data								
Any category 5 cyclone within 100 km	-0.08** [0.03]	-0.05 [0.06]	-0.01 [0.05]	-0.01 [0.04]	-0.11** [0.05]	-0.07 [0.05]	-0.02 [0.04]	-0.10*** [0.04]
Observations	370,220	292,903	369,895	370,101	369,516	369,839	370,134	370,247
N of unique persons	37,158	34,567	37,136	37,159	37,130	37,146	37,165	37,163
Mean of dep. variable	7.93	7.12	6.64	8.03	6.77	7.90	8.26	7.26
Proportion affected (%)	0.33	0.36	0.33	0.33	0.33	0.33	0.33	0.33

Notes: The results presented in each column and panel are based on separate individual FE regression, unless otherwise specified. Unless stated otherwise, other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level, unless indicated otherwise, in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Appendix Table A5: Robustness checks for the impacts of cyclone on life satisfaction (continued)

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel C1: Different specification - Controlling for postcode dummies								
Any category 5 cyclone within 100 km	-0.07** [0.03]	-0.03 [0.06]	0.01 [0.05]	0.00 [0.04]	-0.06 [0.05]	-0.01 [0.04]	-0.02 [0.04]	-0.08** [0.04]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
N of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505
Panel C2: Different specification - Clustering at the postcode level								
Any category 5 cyclone within 100 km	-0.08* [0.04]	-0.04 [0.09]	-0.00 [0.06]	-0.01 [0.06]	-0.09* [0.05]	-0.03 [0.05]	-0.03 [0.04]	-0.09* [0.05]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
N of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505
Panel C3: Different specification - Using pooled cross sectional OLS model								
Any category 5 cyclone within 100 km	-0.07 [0.04]	-0.14* [0.07]	0.01 [0.06]	-0.05 [0.05]	-0.08 [0.06]	-0.10* [0.05]	-0.09** [0.04]	-0.08 [0.05]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
Panel C4: Different specification - Using Random Effects model								
Any category 5 cyclone within 100 km	-0.08** [0.03]	-0.05 [0.06]	-0.00 [0.05]	-0.01 [0.04]	-0.09* [0.05]	-0.04 [0.04]	-0.03 [0.04]	-0.09** [0.04]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
N of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505

Notes: The results presented in each column and panel are based on separate individual FE regression, unless otherwise specified. Unless stated otherwise, other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level, unless indicated otherwise, in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Appendix Table A5: Robustness checks for the impacts of cyclone on life satisfaction (continued)

Satisfaction outcome:	Overall life satisfaction	Employment opportunity satisfaction	Financial situation satisfaction	Home satisfaction	Community satisfaction	Neighbourhood satisfaction	Personal safety satisfaction	Health satisfaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel C5: Different specification - Excluding some time variant variables such as education, household size and major city								
Any category 5 cyclone within 100 km	-0.08** [0.03]	-0.07 [0.06]	-0.02 [0.05]	-0.01 [0.04]	-0.09** [0.05]	-0.04 [0.05]	-0.03 [0.04]	-0.09** [0.04]
Observations	224,221	176,341	224,036	224,167	223,772	223,984	224,161	224,244
N of unique persons	23,501	21,954	23,488	23,502	23,476	23,489	23,506	23,505
Panel C6: Different specification - Including a time variant variable: non-wage income								
Any category 5 cyclone within 100 km	-0.08** [0.03]	-0.04 [0.06]	-0.00 [0.05]	-0.01 [0.04]	-0.09* [0.05]	-0.03 [0.05]	-0.03 [0.04]	-0.09** [0.04]
Observations	223,961	176,163	223,782	223,907	223,514	223,725	223,901	223,984
N of unique persons	23,496	21,948	23,483	23,497	23,470	23,484	23,501	23,500
Panel C7: Different specification - Including a time variant variable: SF 36 general health summary								
Any category 5 cyclone within 100 km	-0.07* [0.04]	-0.03 [0.07]	0.02 [0.05]	0.02 [0.05]	-0.10* [0.05]	-0.03 [0.05]	0.01 [0.04]	-0.08** [0.04]
Observations	200,173	156,939	200,066	200,122	199,829	199,991	200,119	200,195
N of unique persons	22,110	20,586	22,099	22,112	22,091	22,099	22,115	22,115

Notes: The results presented in each column and panel are based on separate individual FE regression, unless otherwise specified. Unless stated otherwise, other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level, unless indicated otherwise, in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

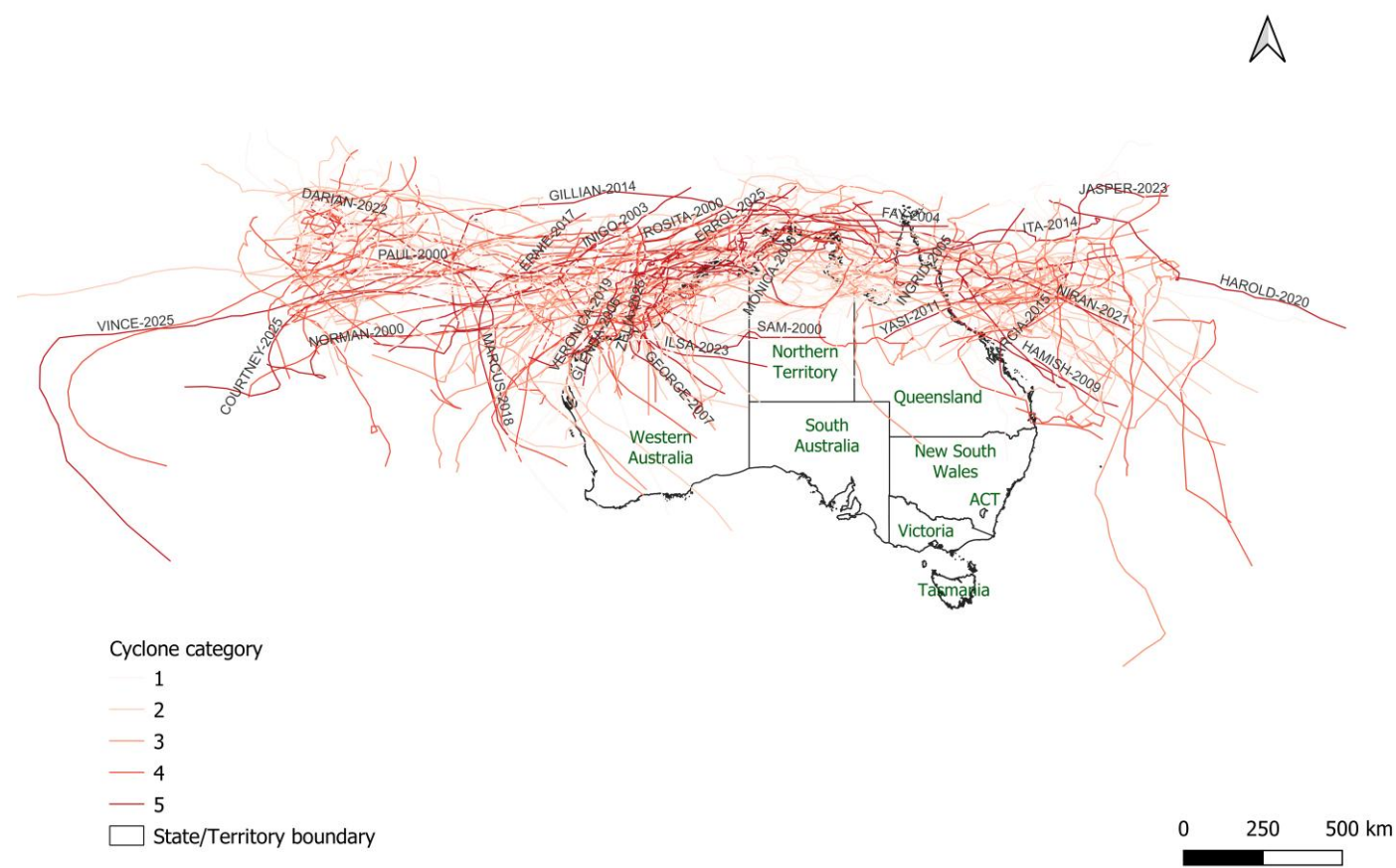
Appendix Table A6: Heterogeneity in the cyclone impact on life satisfaction

Separate by:	Gender		Age		Home ownership		Household income		Residential insurance		Rural/urban		Distance to coast		Locality cyclone history	
	Female	Male	Young	Old	Renter	Owner	Poorer	Richer	Uninsured	Insured	Rural areas	Urban areas	Coastal areas	Inland areas	Cyclone-free areas	Cyclone-prone areas
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Panel A: Overall life satisfaction																
Any category 5 cyclone within 100 km	-0.05	-0.11**	-0.13***	-0.00	-0.07	-0.08*	-0.06	-0.11**	-0.13***	-0.03	-0.08**	-0.13	-0.11**	-0.07	-0.03	-0.09***
	[0.05]	[0.05]	[0.05]	[0.05]	[0.05]	[0.04]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]	[0.12]	[0.04]	[0.06]	[0.12]	[0.04]
Observations	117,988	106,233	112,418	107,139	75,009	144,548	126,669	92,888	114,547	91,112	81,339	124,320	102,627	103,032	105,609	100,050
N of unique persons	12,042	11,459	13,170	9,278	7,354	11,483	10,417	8,420	8,704	6,374	5,955	9,123	7,580	7,498	7,800	7,278
Mean of dep. variable	7.96	7.90	7.88	7.98	7.75	8.02	7.85	8.04	7.86	8.02	8.00	7.89	7.97	7.90	7.94	7.93
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.08
Panel B: Employment opportunity satisfaction																
Any category 5 cyclone within 100 km	0.02	-0.10	-0.13*	0.04	-0.06	-0.02	0.02	-0.15	0.02	-0.10	-0.03	0.13	0.00	-0.08	0.04	-0.04
	[0.08]	[0.09]	[0.08]	[0.10]	[0.09]	[0.09]	[0.08]	[0.10]	[0.08]	[0.10]	[0.07]	[0.24]	[0.08]	[0.11]	[0.22]	[0.07]
Observations	89,410	86,931	89,233	82,190	63,955	107,468	105,965	65,458	86,434	73,038	60,332	99,140	79,698	79,774	81,382	78,090
N of unique persons	11,140	10,814	11,572	9,026	6,887	10,149	10,222	6,814	7,650	5,895	5,202	8,343	6,828	6,717	6,967	6,578
Mean of dep. variable	7.05	7.15	7.22	6.98	6.90	7.24	6.87	7.49	6.95	7.33	7.07	7.16	7.21	7.04	7.10	7.15
Proportion affected (%)	0.60	0.59	0.60	0.60	0.75	0.52	0.63	0.55	0.65	0.59	1.53	0.07	0.76	0.48	0.07	1.19
Panel C: Financial situation satisfaction																
Any category 5 cyclone within 100 km	0.01	-0.02	-0.11	0.11*	-0.01	0.02	0.01	-0.02	-0.02	0.03	0.02	-0.19	0.00	-0.03	-0.48**	0.03
	[0.07]	[0.07]	[0.07]	[0.07]	[0.08]	[0.06]	[0.07]	[0.08]	[0.07]	[0.07]	[0.05]	[0.18]	[0.07]	[0.08]	[0.23]	[0.05]
Observations	117,891	106,145	112,302	107,077	74,962	144,417	126,549	92,830	114,393	91,098	81,228	124,263	102,556	102,935	105,546	99,945
N of unique persons	12,034	11,454	13,163	9,278	7,353	11,478	10,417	8,414	8,695	6,374	5,947	9,122	7,576	7,493	7,797	7,272
Mean of dep. variable	6.63	6.57	6.37	6.88	6.09	6.90	6.33	7.01	6.38	6.96	6.60	6.66	6.74	6.53	6.67	6.60
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.09
Panel D: Home satisfaction																
Any category 5 cyclone within 100 km	0.00	-0.03	-0.06	0.04	-0.00	-0.01	-0.05	0.04	-0.00	0.00	0.03	-0.39*	-0.07	0.10	-0.48*	0.02
	[0.06]	[0.06]	[0.07]	[0.05]	[0.08]	[0.05]	[0.06]	[0.07]	[0.06]	[0.06]	[0.05]	[0.21]	[0.06]	[0.07]	[0.25]	[0.05]
Observations	117,972	106,195	112,387	107,119	75,010	144,496	126,661	92,845	114,504	91,084	81,308	124,280	102,595	102,993	105,593	99,995
N of unique persons	12,045	11,457	13,172	9,280	7,355	11,486	10,421	8,420	8,703	6,373	5,952	9,124	7,579	7,497	7,799	7,277
Mean of dep. variable	8.05	8.00	7.81	8.26	7.66	8.23	7.94	8.16	7.91	8.18	8.09	7.99	8.09	7.97	8.04	8.02
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.09
Panel E: Community satisfaction																

Separate by:	Gender		Age		Home ownership		Household income		Residential insurance		Rural/urban		Distance to coast		Locality cyclone history	
	Female	Male	Young	Old	Renter	Owner	Poorer	Richer	Uninsured	Insured	Rural areas	Urban areas	Coastal areas	Inland areas	Cyclone-free areas	Cyclone-prone areas
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Any category 5 cyclone within 100 km	-0.04 [0.06]	-0.14** [0.07]	-0.12* [0.07]	-0.00 [0.07]	-0.11 [0.08]	-0.06 [0.06]	-0.08 [0.06]	-0.10 [0.07]	-0.10 [0.07]	-0.05 [0.06]	-0.06 [0.05]	-0.30 [0.22]	-0.10* [0.06]	-0.06 [0.08]	-0.38* [0.22]	-0.06 [0.05]
Observations	117,744	106,028	112,194	106,927	74,814	144,307	126,412	92,709	114,216	90,983	81,127	124,072	102,463	102,736	105,405	99,794
N of unique persons	12,027	11,449	13,161	9,271	7,347	11,478	10,418	8,407	8,697	6,369	5,948	9,118	7,577	7,489	7,794	7,272
Mean of dep. variable	6.85	6.70	6.56	7.02	6.44	6.96	6.72	6.87	6.64	6.99	6.94	6.70	6.84	6.75	6.89	6.69
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.08
Panel F: Neighbourhood satisfaction																
Any category 5 cyclone within 100 km	-0.01 [0.06]	-0.07 [0.06]	-0.08 [0.07]	0.07 [0.06]	-0.01 [0.08]	-0.04 [0.05]	-0.03 [0.06]	-0.03 [0.07]	-0.03 [0.07]	-0.06 [0.06]	-0.01 [0.05]	-0.21 [0.21]	-0.02 [0.06]	-0.07 [0.07]	-0.22 [0.23]	-0.03 [0.05]
Observations	117,867	106,117	112,318	107,009	74,903	144,424	126,548	92,779	114,401	91,031	81,233	124,199	102,525	102,907	105,512	99,920
N of unique persons	12,036	11,453	13,169	9,274	7,348	11,484	10,419	8,413	8,704	6,370	5,953	9,121	7,579	7,495	7,798	7,276
Mean of dep. variable	7.92	7.86	7.76	8.03	7.61	8.04	7.78	8.04	7.77	8.06	7.97	7.85	7.98	7.81	7.93	7.86
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.08
Panel G: Personal safety satisfaction																
Any category 5 cyclone within 100 km	0.02 [0.05]	-0.08 [0.05]	-0.11** [0.05]	0.08* [0.05]	-0.02 [0.06]	-0.03 [0.04]	-0.06 [0.05]	0.02 [0.05]	-0.01 [0.05]	-0.04 [0.05]	-0.02 [0.04]	0.12 [0.14]	-0.04 [0.05]	-0.00 [0.06]	-0.04 [0.15]	-0.03 [0.04]
Observations	117,974	106,187	112,376	107,118	74,991	144,503	126,657	92,837	114,508	91,078	81,290	124,296	102,605	102,981	105,585	100,001
N of unique persons	12,047	11,459	13,170	9,280	7,353	11,486	10,421	8,418	8,704	6,372	5,952	9,124	7,581	7,495	7,799	7,277
Mean of dep. variable	8.19	8.30	8.27	8.21	8.11	8.31	8.12	8.40	8.18	8.34	8.37	8.17	8.28	8.22	8.28	8.22
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.08
Panel H: Health satisfaction																
Any category 5 cyclone within 100 km	-0.03 [0.06]	-0.16*** [0.05]	-0.12** [0.05]	-0.04 [0.06]	-0.10 [0.07]	-0.08* [0.05]	-0.07 [0.05]	-0.11* [0.06]	-0.10* [0.05]	-0.09 [0.06]	-0.09** [0.04]	-0.07 [0.19]	-0.03 [0.05]	-0.19*** [0.07]	-0.37* [0.21]	-0.09** [0.04]
Observations	118,015	106,229	112,411	107,171	75,027	144,555	126,704	92,878	114,547	91,130	81,343	124,334	102,633	103,044	105,626	100,051
N of unique persons	12,046	11,459	13,174	9,280	7,357	11,486	10,422	8,421	8,706	6,374	5,956	9,124	7,581	7,499	7,801	7,279
Mean of dep. variable	7.23	7.30	7.55	6.96	7.09	7.35	7.09	7.50	7.11	7.43	7.22	7.28	7.34	7.17	7.29	7.22
Proportion affected (%)	0.54	0.54	0.59	0.50	0.70	0.46	0.57	0.51	0.60	0.51	1.32	0.06	0.68	0.43	0.06	1.08

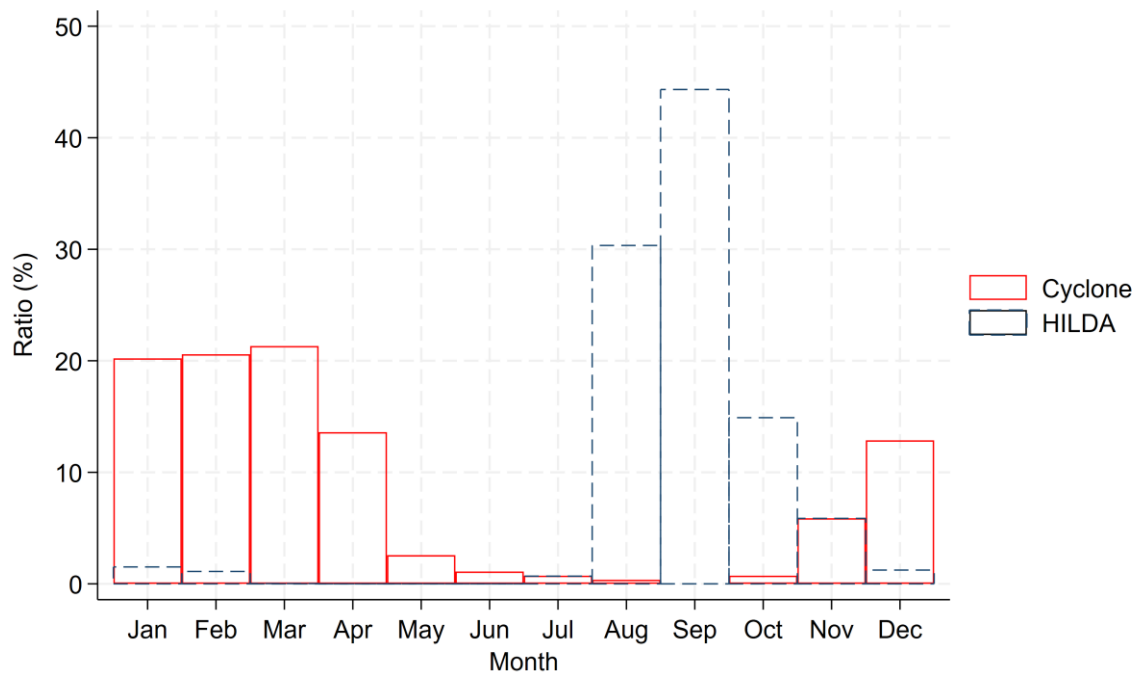
Notes: The results presented in each column and panel are based on a separate FE regression. Other explanatory variables include age (and its square), education, household size, local area socio-economic variables, state/territory dummies, year dummies, and survey month dummies. Robust standard errors clustered at the individual level in parentheses. The symbol *denotes significance at the 10% level, **at the 5% level, and ***at the 1% level.

Appendix Figure A1: Tropical cyclone hit map between 2000 and 2025



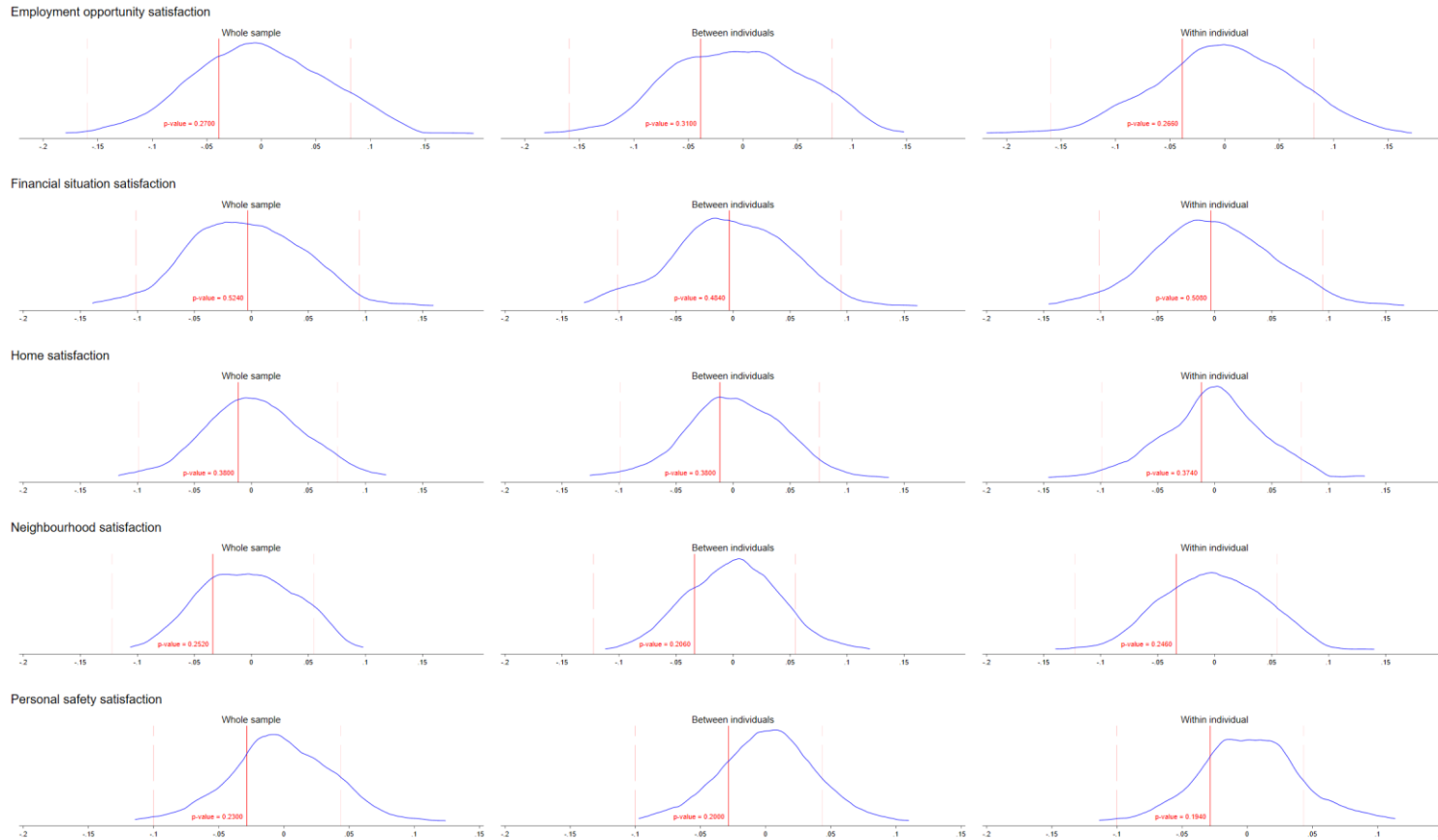
Notes: Cyclone category is classified using the maximum wind speed cut-offs from BOM. Only names and years of category 5 cyclones are listed.

Appendix Figure A2: Distribution of cyclone occurrence and HILDA interview dates



Notes: Data from historical tropical cyclone observed from 2000 to 2025 and HILDA Release 24.

Appendix Figure A3: Randomization tests – Remaining outcomes



Notes: The blue line depicts the distribution of 500 regression estimates for the effect of randomly assigned exposure to a category 5 cyclone within 100 km of its eye, obtained from Equation (1). The vertical solid red line represents the coefficient estimate, while the long-dashed red lines indicate the 95% confidence intervals for exposure to a Category 5 cyclone within 100 km of its eye, obtained from the actual data using Equation (1). The p-value is calculated as the probability that the estimate from the real data is smaller than or equal to the estimates from the randomized data. We use the Stata command `rndm`, developed by Hsiang and Jina (2014), to implement the randomization procedure.

Appendix Table B1: Summary of the literature on natural disasters and life satisfaction/subjective wellbeing/happiness

Study	Dependent variable	Disaster event and main exposure measure	Level of disaster exposure measure	Location	Main micro dataset and panel nature	Main findings
Carroll <i>et al.</i> (2009)	Life satisfaction (10-point scale)	Event: Droughts Measure: Meteorological drought	Regional (Postcode level)	Australia	Dataset: Australian Unity Wellbeing Index survey with about 2,000 individuals surveyed each wave Data type: Repeated cross-sectional	Negative only for rural residents
Luechinger and Raschky (2009)	Life satisfaction (4-point scale)	Event: Floods Measure: Events are included if they fulfill at least one of the following criteria: 10 or more people reported killed, 100 people reported affected, declaration of a state of emergency or call for international assistance	Regional (NUTS 2 level)	Europe	Dataset: Eurobarometer Survey Series Data type: Repeated cross-sectional	Negative
Kountouris and Remoundou (2011)	Life satisfaction (4-point scale)	Event: Forest fires Measure: Number of forest fire incidents and the forest area affected	Regional (NUTS 2 level)	Europe	Dataset: Eurobarometer Survey Series Data type: Repeated cross-sectional	Negative only for rural residents
Calvo <i>et al.</i> (2015)	Happiness (4-point scale)	Event: Hurricane Katrina Measure: Self-reported hurricane stressors, bereavement, and property damage	Individual	US	Dataset: 491 women affected by Hurricane Katrina Data type: Panel	Negative
Rehdanz <i>et al.</i> (2015)	Self-reported wellbeing (11-point scale)	Event: Tsunami and nuclear accident at Fukushima in 2011 Measure: Distance from the individual's residing municipality to the disaster	Regional (municipality level)	Japan	Dataset: Panel data for 5,979 individuals interviewed in Japan before and after the disaster Data type: Panel	- Negative - More pronounced for residents in greater proximity to the disaster
Berlemann (2016)	Happiness (4-point scale) and life satisfaction (10-point scale)	Event: Hurricanes Measure: Annual number of hurricanes whose centres pass a country's borders up to a 160 km distance	Country	Multiple countries	Dataset: European/World Values Survey Data type: Repeated cross-sectional	- Negative - More pronounced for lower income countries - No lasting impact
Sekulova and Van den Bergh (2016)	Life satisfaction (10-point scale)	Event: Floods Measure: Self-reported material and psychological damages	Individual	Bulgaria	Dataset: Survey about 600 respondents Data type: Cross-sectional	Negative

Study	Dependent variable	Disaster event and main exposure measure	Level of disaster exposure measure	Location	Main micro dataset and panel nature	Main findings
Van Ootegem and Verhofstadt (2016)	Life satisfaction (11-point scale)	Event: Floods Measure: Self-reported severity of the flood, the recurrence of floods and their fear of future flooding	Individual	Belgium	Dataset: Survey about 1,000 respondents Data type: Cross-sectional	Insignificant impact
von Möllendorff and Hirschfeld (2016)	Life satisfaction (11-point scale)	Event: Multiple natural disasters Measure: Events are based on their intensity which is approximated by the claims expenditure they caused for insurances	Regional (NUTS 3 regions)	Germany	Dataset: German Socio-Economic Panel Study (SOEP) Data type: Panel	- Negative - Floods have a lasting impact
Hudson <i>et al.</i> (2019)	Subjective wellbeing (11-point scale) and 7 domains	Event: Floods Measure: Self-reported flood experiences	Individual	France	Dataset: Survey of 900 flood-prone households in France Data type: Cross-sectional	Negative
Lohmann <i>et al.</i> (2019)	Life satisfaction (10-point scale)	Event: Heavy storms and droughts Measure: Self-reported past experienced events, damage suffered, perceived vulnerability and expectations for future events to occur	Individual	Papua New Guinea	Dataset: Survey 515 respondents Data type: Cross-sectional	Negative for droughts
Ahmadiani and Ferreira (2021)	Life satisfaction (4-point scale)	Type: Multiple extreme weather events. Measure: Number of deaths and estimated monetary damages	Regional (county level)	US	Dataset: Behavioral Risk Factor Surveillance System Data type: Repeated cross-sectional	Negative
Berlemann and Eurich (2021)	Expected future wellbeing (10-point scale)	Event: Droughts Measure: Drought severity and drought risk are measured at a 5 km-grid-level	Regional (Zip code)	US	Dataset: Gallup Daily Tracking Survey Data type: Repeated cross-sectional	- Negative - More pronounced for poorer individuals
Johnston <i>et al.</i> (2021)	Life satisfaction (11-point scale) and 6 satisfaction domains	Event: The 2009 Black Saturday Bushfires Measure: Distance from individual's residing region to wildfires	Regional (Statistical Areas Level 1 (SA1))	Australia	Dataset: Household, Income and Labour Dynamics in Australia (HILDA) Data type: Panel	- Negative - More pronounced for females, older, unmarried, or lower income individuals - No lasting impact
Stein and Weisser (2022)	Subjective wellbeing (5-point scale)	Event: Floods Measures: Self-reported flood experience and distance from household's residing coordinates to satellite-based floods	Individual	Thailand and Vietnam	Dataset: Thailand Vietnam Socio Economic Panel (TVSEP) Data type: Panel	- Negative - Lasting impact

Study	Dependent variable	Disaster event and main exposure measure	Level of disaster exposure measure	Location	Main micro dataset and panel nature	Main findings
Frijters <i>et al.</i> (2023)	Wellbeing (11-point scale)	Type: Multiple natural disasters Measure: County is identified as affected if it received a presidential Major Disaster Declaration	Regional (county level)	US	Dataset: Gallup Polls Data type: Repeated cross-sectional	- Negative - More pronounced for white, older, and economically advantaged subpopulations.
Gunby and Coupé (2023)	Life satisfaction (11-point scale) and home satisfaction	Event: Weather-related home damage Measure: Self-reported home damage	Individual	Australia	Dataset: Household, Income and Labour Dynamics in Australia (HILDA) Data type: Panel	Insignificant impact
Sharma <i>et al.</i> (2026)	Life satisfaction (11-point scale)	Event: Weather-related home damage Measure: Self-reported home damage	Individual	Australia	Dataset: Household, Income and Labour Dynamics in Australia (HILDA) Data type: Panel	- Negative - Lasting impact

Notes: The studies are listed chronologically and alphabetically.