

Article

Assessing the Long-Term Transitional Impact and Mental Health Consequences of the Southern Alberta Flood of 2013

Eamin Z. Heanoy ^{1,*} , Connie Svob ²  and Norman R. Brown ¹

¹ Department of Psychology, University of Alberta, Edmonton, AB T6G 2E9, Canada; nrbrown@ualberta.ca

² Department of Psychiatry, Columbia University, New York, NY 10032, USA; connie.svob@nyspi.columbia.edu

* Correspondence: heanoy@ualberta.ca

Abstract: Natural disasters pose an increasing threat to individuals and their well-being. Although much is known about the short-term effects of a disaster, there has been much less work on how disasters affect individuals over long periods. Additionally, disaster research has traditionally focused either on the mental outcome or economic impacts, limiting the understanding of the link between disaster-induced changes (i.e., transition) and mental health. Thus, this exploratory study aimed to measure the long-term transitional impacts of the Southern Alberta flood of 2013 and the relationship between this disaster-specific transition and well-being. In this follow-up, conducted six years after the flood, 65 participants were re-assessed on the 12-item *Transitional Impact Scale* (TIS-12) and their ratings were compared across two-time points (2013 vs. 2019). Additionally, the 21-item DASS and the 8-item PCL-5 were introduced in the follow-up to assess these participants' mental health states. Paired T-tests of the material and psychological subscale of the TIS demonstrated significantly lower ratings in 2019 than in 2013. After six years, PTSD had a high correlation with the material and psychological subscale of the TIS and DASS. However, depression and anxiety were reliably related to psychological TIS only. Overall, the findings suggest that individuals' well-being is largely determined by the level of disaster-related material and psychological life changes experienced over time. These findings might be useful to take note of the short-term and long-term impact of disaster-specific transitions while assisting professionals and policymakers in formulating interventions to preserve people's well-being during the disaster and promote resilience following it.

Keywords: transition; disaster; depression; anxiety; PTSD; mental health



Citation: Heanoy, E.Z.; Svob, C.; Brown, N.R. Assessing the Long-Term Transitional Impact and Mental Health Consequences of the Southern Alberta Flood of 2013. *Sustainability* **2023**, *15*, 12849. <https://doi.org/10.3390/su151712849>

Academic Editor: Fanli Jia

Received: 30 June 2023

Revised: 17 August 2023

Accepted: 19 August 2023

Published: 25 August 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Natural disasters are large-scale events that are often unexpected and unpredictable, resulting in a sense of collective distress, social disruption, and impact on economic conditions [1–4]. Moreover, there is converging evidence that major disasters contribute to developing mental health issues [5,6]. Nowadays, floods are the most frequent type of major natural disaster, and it tends to have a large socio-economic and well-being impact [7–9]. Furthermore, flood stands out from other types of disaster because post-flood recovery periods are often lengthy, and sometimes associated with major distress as people engage in rebuilding their lives [7].

In June 2013, a period of rapid snowmelt combined with torrential rain caused several rivers in the Southern Alberta region to overflow their banks, resulting in widespread flooding. This flood led to the evacuation of approximately 120,000 residents over 3 days [10–12]. As a result, businesses closed for over a week, and school and utility services were severely disrupted [9]. The damage from the flood was estimated at billions of dollars' worth, making it one of the most expensive natural disasters in Canadian history [13].

To capture how this disaster affected people's lives during its initial stage, we conducted an online survey in September 2013, 12 weeks after the flood. At that time, data were collected from some 200 flood survivors. Prior literature demonstrated that people affected

by disasters sometimes experience high levels of distress, poor well-being, and other major psycho-social issues and that these problems can persist for many years [7,14–17]. As the 2013 Southern Alberta flood appeared to have long-term consequences for some [9,11,12], we conducted a follow-up study, six years after the flood, in October 2019. This second sample included several individuals who participated in the first survey, as well as others who had experienced the flood but had not taken part in the first survey. Thus, this study had reports of both longitudinal and cross-sectional data.

The current project takes the *Transition Theory* [18,19] as its starting point and assumes that the 2013 Southern Alberta flood had a transitional impact on the lives of at least some of the flood-affected individuals. In this view, a transition is an event or a series of events that result in fundamental and enduring changes in the “fabric of daily life”—what people do, where they do it, and with whom, the people who go through it. In other words, significant transitions bring a sudden halt to the normal routine life and guide to a different one [19]. In addition to having an effect on people’s material condition, important transitions can also impact their thoughts, attitude, self-image, and well-being [20–26]. Hence, it is important to document the changes brought by the disaster-specific transition from its onset and follow as it progressed.

In the last few years, the *Transitional Impact Scale* (TIS-12) [27,28] has been used to measure the effect of different transitional events, both personal and collective, on the lives of people who went through them [29–31]. The TIS is comprised of 12 items that separately measure the material, and psychological effects of a specific transition. For each item, such as “This event has changed the activities I engage in”, the respondents rated their agreement on a 5-point Likert scale. Theoretically, if a potential event of transition scores higher than 3.0 (neutral), it can be deduced that the event has produced a moderate level of change in an individual’s life, at least.

In addition to being potentially life-changing [32–35], transitional events are sometimes traumatic, especially, when they induce fear and hopelessness [36]. This is particularly true of disaster-induced transitions, which are known to give rise to mental issues such as post-traumatic stress disorder (PTSD), depression, anxiety, and stress [3,7,9,37]. According to DSM-V, the diagnosis of PTSD is predicated on experiencing trauma, that is, directly or indirectly affected by disaster in the form of life-threatening or severe injury to self or loved ones [1–3,38,39].

Therefore, based on this prior research, we expected that the 2013 Southern Alberta flood would affect some people more than others. Specifically, people who experienced drastic alterations in their routine lives and material circumstances should have experienced greater flood-related impact than those who have not, and this should be reflected in higher TIS scoring. Moreover, as discussed earlier, life changes brought by an external event are stressful and are associated with the well-being of the individuals going through them. Hence, it was reasonable to expect that major life changes (e.g., job-loss, displaced-house) experienced because of the flood should be distressing and should have a negative well-being impact, for example, depression and anxiety. However, this critical link between disaster-related changes or transition and well-being has been largely under-examined.

Another shortcoming in this area of research concerns its focus on the short-term impact of disaster [1,2,40]. This is a limitation as the effect of a disaster might be experienced over longer periods of time. This is because, following the disaster, affected people start rebuilding their lives, and their social, financial, and personal networks are re-established [41,42]. As mentioned earlier, these post-disaster changes can be distressing. Therefore, it is important to longitudinally assess the disaster to get a better understanding of its transitional properties, and how this impact of disaster-induced transition relates to the affected individuals’ well-being.

Given these facts, we were interested in assessing the transitional impact of the flood, the mental health consequences of the flood, and determining whether we would find a relationship between the two. Based on other transition research [30,31,43,44], we expected that, at the outset, affected individuals would produce a high TIS score for

material change, especially, whose socio-economic conditions were altered by the flood. For TIS questions assessing the psychological effect, we anticipated at least a moderate level of psychological change, regardless of the level of effect in their material circumstances because disasters, are inevitability distressing, and anxiety-provoking for individuals in affected communities [7,9,45,46]. We had no firm prediction concerning the long-term TIS outcome of the flood-affected people, but we anticipated that, at minimum, material and psychological-TIS ratings should be consistent with the ratings from the early stage of the flood [47–50].

Again, following a disaster, people often face economic uncertainty and disruption in social, personal- and work-life, problems that are often related to negative well-being outcomes [8,37,51,52]. Hence, mental health issues might emerge immediately after the flood event, or sometime time later (e.g., years) [53–56]. On the one hand, people might feel distressed shortly after experiencing a flood disaster, and over time, undergo improved mental health [57]. Studies have often indicated that among disaster-affected people, the majority of them do not develop psychological issues, and recover to their previous level of functioning in the aftermath of disaster [58–60]. On the other hand, the lingering psychological effect of the disaster might not subside with time, indicating that people could experience fluctuating distress-like symptoms (e.g., PTSD, depression) at different time points following the disaster [17,61]. This is because in the aftermath, rebuilding a life can be difficult, slow, and distressing, which can increase the stress and anxiety level to a pathological state [42,62,63]. Therefore, we introduced the mental health measures (i.e., DASS, PTSD-checklist) during the second wave of data collection to determine whether six years after the flood, people were still reporting elevated levels of depression, anxiety, stress, and PTSD. Moreover, this was to examine whether there would be a clear relationship between the long-term material and psychological change and negative mental health outcomes.

In summary, we assessed the long-term transitional impact of the Southern Alberta flood of 2013 and its relationship to mental health. Longitudinal follow-up assessment of natural disasters has the benefit of assisting professionals in formulating a strategic intervention to preserve people's well-being during a disaster-crisis, and address policymakers' concern in taking initiatives to promote resilience following disasters.

2. Methods

Participants

Initially, 300 respondents from Southern Alberta, Canada completed a web-based survey, which investigated the immediate transitional impact of the 2013 Southern Alberta flood. Wave 1 took place from 15 September 2013 to 31 December 2013, starting some 3 months after the flood had occurred. These people were the general adult population, all residing in the Southern Alberta region, and whose day-to-day language was English. Wave 2 was initiated 72 months later with the same population. Data were collected between 10 October 2019 to 15 December 2019. Participants (240 out of 300) who specifically stated during Wave 1 that they would be interested in taking part in the follow-up and provided their email addresses were sent an online survey form. The second wave of data collection took place with the respondents who participated in the first wave. In total, 125 participants out of 240 returned the completed survey form, and the remaining 115 did not fill out the questionnaire. The reasons we anticipated were that the study participation was strictly voluntary, the time gap between the two waves was quite long (i.e., six years), and some of the email addresses provided by the respondents during the first wave might not be in use anymore. Additionally, a new group of 32 people affected by the 2013 Southern Alberta flood were recruited for replication purposes. Note that this new group of people did not participate in the first survey immediately after the flood. The advertisement of study recruitment was disseminated over websites and social media which included an URL link to the online questionnaire. Participants could fill out the survey form at their own pace. All participants who took part in the follow-up study were remunerated if they completed

the questionnaire and indicated that they would like to receive the money. Among the 125 longitudinal participants, 65 indicated that they were living in the High River area, the town that was worst hit by the flood [10,64,65]. The rest of the samples were from other locations in Southern Alberta, e.g., Calgary, Canmore, Lethbridge, and Cochrane (Figure 1). Our current study sample focused on the 65 High River-area respondents who participated in Wave 1 and Wave 2. We restricted the analysis to these 65 respondents because, during the flood, this community was at the epicenter [13,64,66,67]. The 2013 flood also had a different time course and impact level on different areas of Southern Alberta, and we were interested in investigating the effect the flood of 2013 had on this High River community over time. Demographic characteristics of the Wave 1 and Wave 2 samples are reported in Table 1.

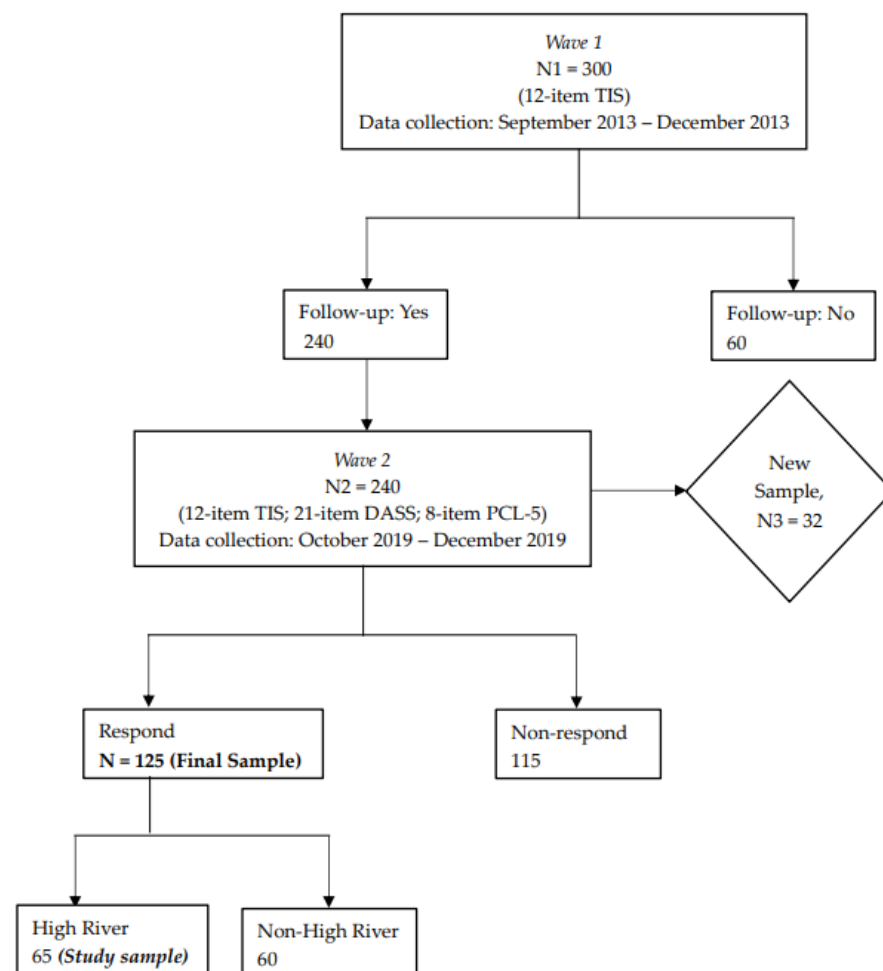


Figure 1. Number of participants and participation timeline from Wave 1 to Wave 2.

Table 1. Demographics of High River residents (N = 65).

Demographics	Wave 1	Wave 2
Age (M, SD)	43.49, 12.24	49.49, 12.24
Gender (n, %)		
Female		52, 80%
Male		13, 20%
Displaced Home (n, %)		
Yes	65, 100%	30, 46.2%
No	0, 0%	35, 53.8%
Lost Job (n, %)		
Yes	32, 49.2%	27, 41.5%
No	33, 50.8%	38, 58.5%

3. Materials

3.1. Transitional Impact Scale

We used a modified version of the *Transitional Impact Scale* (TIS-12, File S1) [27] to assess the type and degree of change brought about by the Southern Alberta flood of 2013. We modified the original scale by replacing “this event” in all statements with “Southern Alberta flood of 2013”. The material change subscale was inclusive of 6-items, and the other 6-items were under the psychological change subscale. For each statement, participants rated their agreement on a 1 (strongly disagree)-to-5 (strongly agree) scale. The 2013 flood’s overall material impact was calculated by averaging the ratings of the six material items and its overall psychological impact was calculated by averaging the ratings of the six psychological items.

For the current sample, the internal consistency coefficient of TIS-12 was 0.88 (Cronbach’s $\alpha_{\text{material}} = 0.80$; Cronbach’s $\alpha_{\text{psychological}} = 0.85$) for the first wave, and for second wave the coefficient was 0.91 (Cronbach’s $\alpha_{\text{material}} = 0.85$; Cronbach’s $\alpha_{\text{psychological}} = 0.88$). The corrected-item total correlation of the TIS scale ranged between 0.42 and 0.65 for Wave 1, and 0.44 and 0.75 for Wave 2. The intraclass correlation coefficient (ICC) value for Wave 1 TIS was 0.86, and 0.88 for Wave 2 TIS.

3.2. Depression, Anxiety, and Stress Scale

This 21-item scale measures the negative emotional states of depression, anxiety, and stress [68]. Each of the three subscales (depression, anxiety, stress) comprised of 7 items. For each item, participants rated on a 0 (did not apply to me at all) to 3 (applied to me very much or most of the time) scale. For the current sample, the internal-consistency coefficient of the DASS was 0.97 (Cronbach’s $\alpha_{\text{depression}} = 0.95$; Cronbach’s $\alpha_{\text{anxiety}} = 0.88$; Cronbach’s $\alpha_{\text{stress}} = 0.94$). The corrected item-total correlation for the 21-item DASS scale ranged between 0.42 and 0.86. The ICC value of the DASS was found to be 0.96.

3.3. Posttraumatic Stress Disorder Checklist

We used the 8-item abbreviated version of the PCL-5 [69] which measures the PTSD symptoms characterized by prolonged distress of individuals after experiencing a traumatic event. Participants rated their agreement with each item on a 0 (not at all) to 4 (extremely) scale, and the total score of the scale ranged between 0 and 32. For the current sample, the internal consistency coefficient (Cronbach’s α) of the 8-item PCL-5 was 0.94. The corrected item-total correlation ranged between 0.75 and 0.84, and the ICC value was 0.94.

Note that the DASS-21 and 8-item PCL-5 questionnaires were introduced during the second wave with the goal of evaluating the extended psychological impact of the 2013 Southern Alberta flood.

In addition, demographic data (e.g., gender, age, and residential location) were collected to capture sample characteristics. Additionally, we asked the participants to specify whether they had a change in their job and residence condition because of the 2013 flood (i.e., Yes/No response)

At the end of the survey, an open-ended question was provided to participants to describe how they were affected by the Southern Alberta flood of 2013. We mention this for the sake of completeness. However, these open-ended responses are not discussed further in this article.

4. Procedure

To recruit participants, a convenience/snowball sampling strategy was used. This strategy was applied during the first wave of data collection by advertising through social media, and academic channels such as institution email lists and websites. The advertisement included a URL link to the online survey questionnaire which participants could fill out at their convenience. During the first survey, respondents specified their interest in taking part in a follow-up. Therefore, in the second survey, these participants were sent an invitation email including the link to the online questionnaire, and were

requested to complete the Google form at their own pace. Participation in the survey was strictly voluntary, and only people whose age was 18 years or older were eligible to participate. Respondents were given 10 CAD as compensation for their participation. Only the survey forms that were fully completed were included in the analysis. Ethics approval was obtained from the Research Ethics Board of the University of Alberta (Pro00094043).

5. Results

Tests of normality were performed using the Shapiro–Wilk test, demonstrating the normal distribution of the data (all $p > 0.05$). Table 2 displays the mean TIS rating for the sample as a whole and as a function of change in their financial and living condition (i.e., job, house) between Wave 1 and Wave 2. Table 3 displays the mean DASS scores, and PTSD rating for the sample as a whole and as a function of change in their financial and living conditions (i.e., job, house) in Wave 2.

Table 2. Average ratings on TIS subscales produced by participants with a change in house and job condition (N = 65).

		Wave 1					Wave 2			
	*	Home	No Home	**	** No	*	^ Home	^ No Home	^^	^^ No
	Overall	Displaced (n = 65)	Displaced (n = 0)	Job-Loss (n = 32)	Job-Loss (n = 33)	Overall	Displaced (n = 30)	Displaced (n = 35)	Job-Loss (n = 27)	Job-Loss (n = 38)
		<i>M, SD</i>					<i>M, SD</i>			
Material-TIS	3.81, 0.82	3.81, 0.82	0, 0	3.84, 0.92	3.78, 0.72	2.93, 1.24	3.06, 1.28	2.82, 1.21	3.17, 1.17	2.76, 1.27
Psychological-TIS	3.94, 0.74	3.94, 0.74	0, 0	4.24, 0.52	3.66, 0.82	3.28, 1.16	3.38, 1.20	3.20, 1.13	3.49, 1.15	3.13, 1.16

* Paired-test, $t_{\text{material}} = 4.43$, $t_{\text{psychological}} = 3.81$, all $p < 0.001$. ** Independent-test, $t_{\text{material}} = -0.30$, $p > 0.05$; $t_{\text{psychological}} = -3.43$, $p < 0.01$. ^ Independent-test, $t_{\text{material}} = -0.76$, $t_{\text{psychological}} = -0.63$, all $p > 0.05$. ^^ Independent-test, $t_{\text{material}} = -1.32$, $t_{\text{psychological}} = -1.26$, all $p > 0.05$. Note—significant values are bolded.

Table 3. Average ratings on DASS, and PTSD scale produced by participants with a change in house and job condition (N = 65).

	Wave 2				
	Overall	* Home Displaced (n = 30)	* No Home Displaced (n = 35)	** Job-Loss (n = 27)	** No Job-Loss (n = 38)
	<i>M, SD</i>				
Depression	7.74, 6.68	9.40, 6.81	6.31, 6.31	10.00, 6.62	6.13, 6.33
Anxiety	6.52, 5.91	8.53, 5.85	4.80, 5.47	8.81, 5.75	4.89, 5.53
Stress	10.23, 6.55	12.00, 6.20	8.71, 6.55	12.07, 6.31	8.92, 6.49
PTSD	9.75, 8.70	9.97, 9.21	9.57, 8.37	9.52, 8.24	9.92, 9.12

* Independent-test, $t_{\text{depression}} = -1.89$, $t_{\text{ptsd}} = -0.18$, all $p > 0.05$; $t_{\text{anxiety}} = -2.66$, $t_{\text{stress}} = -2.07$, all $p < 0.05$. ** Independent-test, $t_{\text{stress}} = -1.95$, $t_{\text{ptsd}} = 0.18$, all $p > 0.05$; $t_{\text{depression}} = -2.38$, $t_{\text{anxiety}} = -2.77$, all $p < 0.05$. Note—significant values are bolded.

For the sake of completeness, we did look into the between-group difference (i.e., High River vs. Non-High River) for the TIS, DASS, and PTSD scores by conducting independent t-tests. As expected, the High River group had significantly higher material and psychological change immediately after the 2013 flood. However, after six years, this group difference became non-reliable indicating that, as time passed, the after-effect of the flood might be similar for both groups (e.g., evacuees returned to their job and home). On the other hand, consistent with previous findings, the High River people were reliably more depressed, anxious, and stressed compared to the non-High River Group after six

years [2,3,59]. In addition, none of the groups demonstrated any persistent PTSD-like symptoms suggesting that, overall, the flood event might not be a traumatic experience per se for the individuals of the flood-affected community. A total of 78 participants from the High River area did not participate during the second wave. In the first wave, the mean material-TIS and psychological-TIS for this group were 3.84 and 4.11, respectively. To see whether there was a difference in the Wave 1 TIS scores between the people from High River who only participated in the first wave and those who participated in both waves, we conducted a separate set of independent t-tests. As anticipated, the two groups did not significantly differ while rating material and psychological TIS during the first wave (all $p > 0.05$). This indicates that the flood might have a robust material and psychological impact for the High River residents in general, at least during the early stage. Additionally, we looked into the mean ratings of TIS, DASS, and PCL-5 of the new sample. However, the average of the material and psychological TIS rating for the new group were not very high, scoring 3.55 and 3.34, respectively. This indicates that after six years, the flood might not have produced a drastic change in respondents' lives. In addition, the depression, anxiety, and stress levels were in the moderate range. Moreover, the respondents did not demonstrate any persisting PTSD symptoms.

These data make a couple of points. First, immediately after, the flood produced a modest change, if not radical, in the lives of most respondents. As mentioned earlier, in theory, an event scoring higher than 3.0 (neutral) in material and psychological TIS should indicate a moderate impact on life at least. For example, immigration from China to Canada was found to be of major impact, yielding mean scores of 4.52 and 4.0 for material-TIS and psychological-TIS, respectively [30]. Here, the overall the TIS score was moderately high for the current flood sample. Collapsing over groups, the average material TIS was 3.81, $SD = 0.82$ and the average psychological TIS was 3.94, $SD = 0.74$. On the other hand, six years after the flood, the overall TIS score dropped to an average of 3.0 which is notably low compared to the TIS score from Wave 1. Collapsing over groups, the mean material TIS was 2.93, $SD = 1.24$, and the mean psychological TIS was 3.28, $SD = 1.16$. Paired t-tests were conducted to statistically compare these average TIS-ratings between two waves and reliable differences were found (all $p < 0.001$). This indicates that in the long run, the 2013 flood might not have generated a marked alteration in the lives of individuals. Rather, comparatively, the short-term effect of the flood was more prominent. This makes sense as at the outset, the flood affected the lives of all the individuals residing in the affected area at least to some extent (e.g., evacuation). Second, after six years, on average, people who experienced a change in their job and housing situation as a result of the flood, visibly rated higher in both material and psychological TIS-subscale than those who did not. However, running a set of independent t-tests, these between-group score differences were not statistically significant (all $p > 0.05$). On the other hand, immediately after the flood, the mean psychological-TIS rating was significantly higher for the job-loss group than no-job-loss group ($p < 0.01$), but no reliable group difference was found for mean material-TIS ($p > 0.05$). This pattern indicates that, at least at the outset, people's experience with the flood-transition was somewhat different based on the level of flood-related life changes (e.g., job-loss vs. no-job-loss). However, as time passed, this flood-transition experience might have become more similar in quality, regardless of the flood-induced life changes (e.g., losing a job, being displaced from home) they faced or endured in the long run.

The mean DASS and PTSD scores from Wave 2 are presented in the Table 3. Overall, these scores indicated that individuals who responded to our survey were mildly depressed, anxious, and stressed, and showed no indication of persistent PTSD symptoms six years after the 2013 flood. To investigate the effect of change in job and housing conditions on people's mental health, we conducted another set of independent t-tests on the ratings of depression, anxiety, stress, and PTSD. Consistent with prior research [70–72], overall, respondents in the displaced-home group and the job-loss group indicated that they were more depressed, anxious, and stressed than the respondents in the no-home-displaced

group and the no-job-loss group (all $p < 0.05$). In addition, no reliable group difference was found for PTSD symptoms ($p > 0.05$), which indicates that experiencing PTSD in the long-term did not depend on whether their job and housing situation was changed or not.

Table 4 represents a Pearson's correlation matrix that includes all the variables discussed above. Note that DASS and PTSD were correlated to material and psychological TIS-subscale of the second wave only. This was because these mental health assessments were introduced during Wave 2, not in Wave 1. As time passed, material changes due to the 2013 Southern Alberta flood yielded a strong correlation with the PTSD rating, but not a reliable association with depression, anxiety, and stress ratings. Additionally, participants who experienced psychological change due to the flood showed a high correlation with PTSD symptoms, a significant association with depression and stress level, but not a reliable relationship with anxiety level. As anticipated, material and psychological TIS had a significant relationship with each other in the respective wave (all $p < 0.01$) but interestingly, TIS scores between Wave 1 and Wave 2 did not produce a significant association (all $p > 0.05$). One explanation could be that, over the years, the affected individuals might have gone through different post-disaster recovery processes (e.g., some returning to old jobs or taking a new one whereas others lost their job permanently). Thus, it might not be possible to accurately anticipate people's long-term material and psychological outcomes from their short-term material and psychological consequence, at least for the current flood-sample. Note that in past research, test–retest reliability of TIS was high (Cronbach alpha > 0.80) across different age groups and socioeconomic status, as well as various transitional events including the traumatic ones [28]. This indicates that TIS is a reliable scale to measure psychological and material changes brought by different transitions (e.g., positive, negative) in the lives of people with diverse demographics, e.g., age, gender, SES, education [28,43].

Table 4. Pearson's correlation matrix of DASS, PTSD, material, and psychological subscale of TIS.

	Depression	Anxiety	Stress	PTSD	MAT-2	PSY-2	MAT-1	PSY-1
Depression	--	0.83 **	0.84 **	0.29 *	0.23	0.26 *	--	--
Anxiety		--	0.84 **	0.32 *	0.19	0.22	--	--
Stress			--	0.29 *	0.24	0.25 *	--	--
PTSD				--	0.56 **	0.53 **	--	--
MAT-2					--	0.63 **	−0.19	−0.17
PSY-2						--	−0.17	−0.05
MAT-1							--	0.41 **

** $p < 0.01$, * $p < 0.05$; MAT-1 = Wave 1 material-TIS, PSY-1 = Wave 1 psychological-TIS; MAT-2 = Wave 2 material-TIS, PSY-2 = Wave 2 psychological-TIS.

As our interest lies in understanding the long-term relationship between material and psychological change and negative mental health consequences, we conducted a set of regressions. As many of the correlations (Table 4) were moderate, we performed a multiple linear regression, specifically for PTSD and for each DASS measure, using material-TIS and psychological-TIS from the second wave as predictors. The output of these analyses are presented in Table 5. These regressions indicated that, in the long run, both material change and psychological change were reliably associated with PTSD symptoms but not with the level of depression, anxiety, and stress.

Table 5. Regression results for DASS and PTSD used in Wave 2.

	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>R</i> ²	<i>F</i>
PTSD				0.36	17.73 **
MAT-2	2.68	0.92	0.38 **		
PSY-2	2.15	0.98	0.29 *		
Depression				0.08	2.59 ns
MAT-2	0.61	0.85	0.11 ns		
PSY-2	1.11	0.90	0.19 ns		
Anxiety				0.05	1.65 ns
MAT-2	0.40	0.76	0.08 ns		
PSY-2	0.83	0.81	0.16 ns		
Stress				0.07	2.41 ns
MAT-2	0.69	0.83	0.13 ns		
PSY-2	0.94	0.89	0.17 ns		

** $p < 0.01$, * $p < 0.05$; ns = non-significant.

6. Discussion

This study examined the long-term transitional impact of the 2013 Southern Alberta flood and its effect on people's well-being six years after the flood. As anticipated, immediately after the flood, in general, people experienced a greater material and psychological change, but in the long run, the flood did not seem to have generated a drastic change in most of the participants' lives. When conditioned on the house- and job-loss, the job-loss group experienced a greater change in their psychological condition (interestingly, not their material condition) than the no-job-loss group during Wave 1. However, the Wave 2 data indicated that initial changes in employment and housing did not have a lasting transitional impact (i.e., did not predict later TIS scores). Nonetheless, as expected, over time, long-term job-loss and displaced-house were related to depression, anxiety, and stress. Note that job-loss and displacement did not contribute to having persistent PTSD-like symptoms in the long term.

Nevertheless, six years after the 2013 flood, on average, respondents had mild to moderate levels of depression, anxiety, and stress. Finally, it is noteworthy that material and psychological change were correlated with PTSD, but they did not reliably predict the course of depression, anxiety, and stress among the participants. These findings give rise to a couple of questions: one relates to the long-term transitional impact of the Southern Alberta flood of 2013, and the other is about the relationship between this transitional impact of the flood and the mental issues it seems to have resulted in the long run. These questions are taken up below.

First, it is clear from the TIS data that during the onset, the 2013 flood produced at least a moderate change in people's material and psychological conditions. Past research has demonstrated that important transitional events, ones that are found to have a major life impact, produced average TIS scores of 4.0 and above [31,73]. Conforming with previous findings, at the outset, the flood yielded an average TIS rating of around 4.0, suggesting a significant life consequence. In other words, these respondents were dealing with difficult changes to their living conditions. In particular, people who lost their job because of the flood were more psychologically affected than those who did not. However, those who lost their job and those who did not reported similar effects on their material circumstances. This is likely because during the initial survey, all respondents were evacuated, and hence, were at least temporally unhoused. Then, after six years, the flood did not produce a significant material and psychological change in people's lives compared to the initial stage, even for those who had endured loss in their employment and housing condition. This indicates that the affected people were able to rebuild their lives by returning to their old homes and jobs, or by renovating their houses and finding new jobs. Thus, this post-flood reconstruction of life experience might be similar for all those who have gone through this phase. Moreover, most people might be able to accept these novel after-flood life circumstances, including the losses and changes that have occurred. That being said,

with the passage of time, affected individuals might have also developed an increased sense of personal strength and growth, and confidence in their ability to manage future disaster-specific adversities [60].

Second, six years after the flood, we found mild to moderate levels of depression, anxiety, and stress among the respondents, although no persisting symptoms of PTSD were apparent. Specifically, we found elevated levels of depression, anxiety, and stress for those who endured loss in their job and housing conditions than those who did not, but still, no lasting PTSD-like symptoms. Perhaps, a simple way to describe this pattern is to concede that the 2013 flood resulted in prolonged disruption of regular life through displacement, loss, etc., and to assume that this type of disruption might have caused enough distress to make people depressed and anxious [63]. Consistent with the present findings, elsewhere, it has been reported that there was an increase in the anxiety and stress level of the High River residents following the 2013 flood, particularly those who lost their houses and valuable possessions [12,65,67]. Interestingly, during Wave 2, we observed a relatively strong correlation between PTSD and flood-related changes. This suggests that coping with extensive persistent disaster-related problems could have been associated with PTSD-like symptoms. To interpret the association, one possibility is that, the more extensive the flood-related problems (e.g., complete destruction of the house, death/injury of close others) the more pronounced might be the PTSD-symptoms [74–76]. However, it is also possible that the severity of the PTSD symptoms due to adverse life experiences could have had material and psychological consequences [43].

7. Limitation

We take note that the baseline data for DASS and PTSD are not available, and this limits our understanding of the course of mental issues for flood-affected people over time. However, in our 2021 British Columbia, Canada, wildfire sample, we saw a steady downward trajectory of the DASS and PTSD scores after one year of the fire event [77]. Based on this finding, we could anticipate that immediately after the 2013 flood, the DASS and PTSD scores would have been at least at a moderate level. In total, 65 participants also took part in both waves, hence, caution is required when generalizing these findings. Therefore, we believe that the correlational outcome (i.e., a high correlation between PTSD and material and psychological-TIS) would be generalized to a representative sample. Moreover, we lacked socioeconomic details such as income and educational level, etc., which might have had an influence on explaining the findings [78,79]. Another limitation is that the questions we asked regarding the displaced home and lost job variables were binary (i.e., yes or no response). Thus, it is difficult to interpret when the participants were responding to those questions during Wave 2, whether they meant being back to the old house or moving to a new one (i.e., no to displaced house question), and, whether they are still unemployed or simply did not go back to the old job but found a new one (i.e., yes to job-loss question). Finally, data were self-reported. Although DASS-21 and PCL-5 brief are widely used measures, they may not necessarily be equivalent to clinical diagnostic tools (e.g., clinical interview), which may lead to conservative estimates [80,81]. Nonetheless, to the best of our knowledge, this study was the first that described the disaster as a transitional event and assessed the relationship between this impact of disaster-specific transitions and mental health outcomes.

8. Conclusions

Looking back at the 2013 Southern Alberta flood, it was a time of change and emotional upheaval. Especially at the outset, many people experienced a significant change (e.g., displaced from home, loss of employment) in their otherwise routine life. However, for some, these changes ultimately were not “life-altering,” as many of those who were displaced returned to their old houses and jobs after the disaster. This pattern was clear from the TIS scores, especially the material TIS scores from two-time points. Likewise, individuals reported elevated levels of psychological distress after six years of the flood,

but not to an extreme degree. The picture might have been different if we had categorized the affected based on the level of change (e.g., complete loss to no loss at all) and focused on more vulnerable populations (e.g., individuals who had experienced complete destruction of the house, and death of close others). Nevertheless, it is important to understand that there is often a gap between the early reaction to an adverse event and the way that the adverse event impacts the lives of the affected in the long run [82]. Therefore, we recognize that it is imperative to follow a disaster event as a fair number of people might adjust to a relatively minor series of changes to their routine, whereas a few others might grapple with cataclysmic life changes [28]. Finally, these findings could potentially expand the understanding of long-term disaster recovery needs for communities as well as individuals residing within them. The implication is that ensuring healthy post-disaster mental health is necessary to build a resilient community. This effort requires collaborative actions across disciplines, involving practitioners and policymakers, informed by community knowledge and needs. Hence, it is important to provide attention to post-disaster mental health care services in affected communities to support holistic, long-term psychosocial adjustment where recovery times are expected to be lengthy [12,65]. In conclusion, effective post-disaster recovery programs should be developed, and practical policies should be formulated that would assist affected individuals in getting back to their normal lives, e.g., returning to their houses and jobs.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su151712849/s1>, File S1: Transitional Impact Scale (TIS-12).

Author Contributions: Conceptualization, E.Z.H. and N.R.B.; methodology, E.Z.H. and C.S.; project administration, C.S. and E.Z.H.; writing—original draft preparation, E.Z.H.; writing—review and editing, C.S. and N.R.B.; visualization, E.Z.H.; supervision, N.R.B. and C.S.; funding acquisition, N.R.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the third author's Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant, RES0038944.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Research Ethics Board of University of Alberta. (Pro00094043; 3 October 2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The anonymous raw data supporting the conclusions of this article will be made available on reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Neria, Y.; Nandi, A.; Galea, S. Post-Traumatic Stress Disorder Following Disasters: A Systematic Review. *Psychol. Med.* **2007**, *38*, 467–480. [[CrossRef](#)] [[PubMed](#)]
2. Norris, F.H.; Friedman, M.J.; Watson, P.J.; Byrne, C.M.; Diaz, E.; Kaniasty, K. 60,000 Disaster Victims Speak: Part I. An Empirical Review of the Empirical Literature, 1981–2001. *Psychiatry Interpers. Biol. Process.* **2002**, *65*, 207–239. [[CrossRef](#)] [[PubMed](#)]
3. Goldmann, E.; Galea, S. Mental Health Consequences of Disasters. *Annu. Rev. Public Health* **2014**, *35*, 169–183. [[CrossRef](#)] [[PubMed](#)]
4. Tremblay, M.A.; Blanchard, C.M.; Pelletier, L.G.; Vallerand, R.J. A Dual Route in Explaining Health Outcomes in Natural Disaster. *J. Appl. Soc. Psychol.* **2006**, *36*, 1502–1522. [[CrossRef](#)]
5. de Jong, J.T.V.M. Lifetime Events and Posttraumatic Stress Disorder in 4 Postconflict Settings. *JAMA* **2001**, *286*, 555. [[CrossRef](#)] [[PubMed](#)]
6. Silove, D.; Steel, Z.; Bauman, A.; Chey, T.; McFarlane, A. Trauma, PTSD and the Longer-Term Mental Health Burden amongst Vietnamese Refugees. *Soc. Psychiatry Psychiatr. Epidemiol.* **2007**, *42*, 467–476. [[CrossRef](#)]
7. Stanke, C.; Murray, V.; Amlôt, R.; Nurse, J.; Williams, R. The Effects of Flooding on Mental Health: Outcomes and Recommendations from a Review of the Literature. *PLoS Curr.* **2012**, *4*, e4f9f1fa9c3cae. [[CrossRef](#)]
8. Fernandez, A.; Black, J.; Jones, M.; Wilson, L.; Salvador-Carulla, L.; Astell-Burt, T.; Black, D. Flooding and Mental Health: A Systematic Mapping Review. *PLoS ONE* **2015**, *10*, e0119929. [[CrossRef](#)]

9. Hetherington, E.; McDonald, S.; Wu, M.; Tough, S. Risk and Protective Factors for Mental Health and Community Cohesion after the 2013 Calgary Flood. *Disaster Med. Public Health Prep.* **2017**, *12*, 470–477. [CrossRef]
10. Haney, T.J.; McDonald-Harker, C. “The River Is Not the Same Anymore”: Environmental Risk and Uncertainty in the Aftermath of the High River, Alberta, Flood. *Soc. Curr.* **2016**, *4*, 594–612. [CrossRef]
11. Fulton, A.E.; Drolet, J. Responding to Disaster-Related Loss and Grief: Recovering from the 2013 Flood in Southern Alberta, Canada. *J. Loss Trauma* **2018**, *23*, 140–158. [CrossRef]
12. Hayes, K.; Poland, B.; Cole, D.C.; Agic, B. Psychosocial Adaptation to Climate Change in High River, Alberta: Implications for Policy and Practice. *Can. J. Public Health* **2020**, *111*, 880–889. [CrossRef] [PubMed]
13. Alberta Floods Costliest Natural Disaster in Canadian History. *CBC News*. 23 September 2013. Available online: <https://www.cbc.ca/news/canada/calgary/alberta-floods-costliest-natural-disaster-in-canadian-history-1.1864599> (accessed on 30 June 2023).
14. McFarlane, A.C. The Phenomenology of Posttraumatic Stress Disorders Following a Natural Disaster. *J. Nerv. Ment. Dis.* **1988**, *176*, 22–29. [CrossRef] [PubMed]
15. McFarlane, A.C.; Clayer, J.R.; Bookless, C.L. Psychiatric Morbidity Following a Natural Disaster: An Australian Bushfire. *Soc. Psychiatry Psychiatr. Epidemiol.* **1997**, *32*, 261–268. [CrossRef]
16. Parslow, R.; Jorm, A.F.; Christensen, H. Associations of Pre-Trauma Attributes and Trauma Exposure with Screening Positive for PTSD: Analysis of a Community-Based Study of 2085 Young Adults. *Psychol. Med.* **2005**, *36*, 387–395. [CrossRef]
17. Bryant, R.A.; Waters, E.; Gibbs, L.; Gallagher, H.C.; Pattison, P.; Lusher, D.; MacDougall, C.; Harms, L.; Block, K.; Snowden, E.; et al. Psychological Outcomes Following the Victorian Black Saturday Bushfires. *Aust. N. Z. J. Psychiatry* **2014**, *48*, 634–643. [CrossRef]
18. Brown, N.R. Transition Theory: A Minimalist Perspective on the Organization of Autobiographical Memory. *J. Appl. Res. Mem. Cogn.* **2016**, *5*, 128–134. [CrossRef]
19. Brown, N.R.; Schweickart, O.; Svob, C. The Effect of Collective Transitions on the Organization and Contents of Autobiographical Memory: A Transition Theory Perspective. *Am. J. Psychol.* **2016**, *129*, 259. [CrossRef]
20. Holmes, T.H.; Rahe, R.H. The Social Readjustment Rating Scale. *J. Psychosom. Res.* **1967**, *11*, 213–218. [CrossRef]
21. Wyler, A.R.; Masuda, M.; Holmes, T.H. Magnitude of Life Events and Seriousness of Illness. *Psychosom. Med.* **1971**, *33*, 115–122. [CrossRef]
22. Sarason, I.G.; Johnson, J.H.; Siegel, J.M. Assessing the Impact of Life Changes: Development of the Life Experiences Survey. *J. Consult. Clin. Psychol.* **1978**, *46*, 932–946. [CrossRef] [PubMed]
23. Wheaton, B. Life Transitions, Role Histories, and Mental Health. *Am. Sociol. Rev.* **1990**, *55*, 209. [CrossRef]
24. Turner, R.J.; Wheaton, B. Checklist Measurement of Stressful Life Events. In *Measuring Stress: A Guide for Health and Social Scientists*; Cohen, S., Kessler, R.C., Gordon, L.U., Eds.; Oxford University Press: New York, NY, USA, 1995; pp. 29–58.
25. Rutter, M. Transitions and Turning Points in Developmental Psychopathology: As Applied to the Age Span between Childhood and Mid-Adulthood. *Int. J. Behav. Dev.* **1996**, *19*, 603–626. [CrossRef]
26. Tennant, C. Life Events, Stress and Depression: A Review of Recent Findings. *Aust. N. Z. J. Psychiatry* **2002**, *36*, 173–182. [CrossRef]
27. Svob, C.; Brown, N.R.; Reddon, J.R.; Uzer, T.; Lee, P.J. The Transitional Impact Scale: Assessing the Material and Psychological Impact of Life Transitions. *Behav. Res. Methods* **2013**, *46*, 448–455. [CrossRef]
28. Uzer, T. Validity and Reliability Testing of the Transitional Impact Scale. *Stress Health* **2020**, *36*, 478–486. [CrossRef] [PubMed]
29. Uzer, T.; Brown, N.R. Disruptive Individual Experiences Create Lifetime Periods: A Study of Autobiographical Memory in Persons with Spinal Cord Injury. *Appl. Cogn. Psychol.* **2015**, *29*, 768–774. [CrossRef]
30. Shi, L.; Brown, N.R. The Effect of Immigration on the Contents and Organization of Autobiographical Memory: A Transition-Theory Perspective. *J. Appl. Res. Mem. Cogn.* **2016**, *5*, 135–142. [CrossRef]
31. Gu, X.; Tse, C.-S.; Brown, N.R. The Effects of Collective and Personal Transitions on the Organization and Contents of Autobiographical Memory in Older Chinese Adults. *Mem. Cogn.* **2017**, *45*, 1335–1349. [CrossRef]
32. Hareven, T.K.; Masaoka, K. Turning Points and Transitions: Perceptions of the Life Course. *J. Fam. Hist.* **1988**, *13*, 271–289. [CrossRef]
33. Pillemer, D.B. *Momentous Events, Vivid Memories*; Harvard University Press: Cambridge, MA, USA, 2009.
34. Singer, J.A.; Salovey, P. *The Remembered Self: Emotion and Memory in Personality*; Free Press: New York, NY, USA, 1993.
35. Shum, M.S. The Role of Temporal Landmarks in Autobiographical Memory Processes. *Psychol. Bull.* **1998**, *124*, 423–442. [CrossRef] [PubMed]
36. Ozer, E.J.; Best, S.R.; Lipsey, T.L.; Weiss, D.S. Predictors of Posttraumatic Stress Disorder and Symptoms in Adults: A Meta-Analysis. *Psychol. Trauma Theory Res. Pract. Policy* **2008**, *5*, 3–36. [CrossRef]
37. Mason, V.; Andrews, H.; Upton, D. The Psychological Impact of Exposure to Floods. *Psychol. Health Med.* **2010**, *15*, 61–73. [CrossRef] [PubMed]
38. Galea, S.; Nandi, A.; Vlahov, D. The Epidemiology of Post-Traumatic Stress Disorder after Disasters. *Epidemiol. Rev.* **2005**, *27*, 78–91. [CrossRef] [PubMed]
39. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed.; American Psychiatric Publishing: Washington, DC, USA, 2013.
40. Norris, F.H.; Friedman, M.J.; Watson, P.J. 60,000 Disaster Victims Speak: Part II. Summary and Implications of the Disaster Mental Health Research. *Psychiatry Interpers. Biol. Process.* **2002**, *65*, 240–260. [CrossRef]

41. Kessler, R.C.; Galea, S.; Gruber, M.J.; Sampson, N.A.; Ursano, R.J.; Wessely, S. Trends in Mental Illness and Suicidality after Hurricane Katrina. *Mol. Psychiatry* **2008**, *13*, 374–384. [\[CrossRef\]](#)
42. Gibbs, L.; Waters, E.; Bryant, R.A.; Pattison, P.; Lusher, D.; Harms, L.; Richardson, J.; MacDougall, C.; Block, K.; Snowdon, E.; et al. Beyond Bushfires: Community, Resilience and Recovery—A Longitudinal Mixed Method Study of the Medium to Long Term Impacts of Bushfires on Mental Health and Social Connectedness. *BMC Public Health* **2013**, *13*, 1036. [\[CrossRef\]](#)
43. Uzer, T.; Beşiroğlu, L.; Karakılıç, M. Event Centrality, Transitional Impact and Symptoms of Posttraumatic Stress in a Clinical Sample. *Anxiety Stress Coping* **2019**, *33*, 75–88. [\[CrossRef\]](#)
44. Kirkegaard Thomsen, D.; Talarico, J.M.; Steiner, K.L. When Does a Wedding Mark the Beginning of a New Chapter in One's Life? *Scand. J. Psychol.* **2021**, *62*, 675–682. [\[CrossRef\]](#)
45. Paranjothy, S.; Gallacher, J.; Amlôt, R.; Rubin, G.J.; Page, L.; Baxter, T.; Wight, J.; Kiriage, D.; McNaught, R.; SR, P. Psychosocial Impact of the Summer 2007 Floods in England. *BMC Public Health* **2011**, *11*, 145. [\[CrossRef\]](#)
46. Alderman, K.; Turner, L.R.; Tong, S. Assessment of the Health Impacts of the 2011 Summer Floods in Brisbane. *Disaster Med. Public Health Prep.* **2013**, *7*, 380–386. [\[CrossRef\]](#) [\[PubMed\]](#)
47. Ruch, L.O.; Holmes, T.J. Scaling of Life Change: Comparison of Direct and Indirect Methods. *J. Psychosom. Res.* **1971**, *15*, 221–227. [\[CrossRef\]](#) [\[PubMed\]](#)
48. Lee, C.; Gramotnev, H. Life Transitions and Mental Health in a National Cohort of Young Australian Women. *Dev. Psychol.* **2007**, *43*, 877–888. [\[CrossRef\]](#) [\[PubMed\]](#)
49. Kim, J.E.; Moen, P. Retirement Transitions, Gender, and Psychological Well-Being: A Life-Course, Ecological Model. *J. Gerontol. Ser. B Psychol. Sci. Soc. Sci.* **2002**, *57*, P212–P222. [\[CrossRef\]](#)
50. Kralik, D.; Visentin, K.; van Loon, A. Transition: A Literature Review. *J. Adv. Nurs.* **2006**, *55*, 320–329. [\[CrossRef\]](#)
51. Kaniasty, K. Predicting Social Psychological Well-Being Following Trauma: The Role of Postdisaster Social Support. *Psychol. Trauma Theory Res. Pract. Policy* **2012**, *4*, 22–33. [\[CrossRef\]](#)
52. Tracy, M.; Norris, F.H.; Galea, S. Differences in the Determinants of Posttraumatic Stress Disorder and Depression after a Mass Traumatic Event. *Depress. Anxiety* **2011**, *28*, 666–675. [\[CrossRef\]](#)
53. Tunstall, S.; Tapsell, S.; Green, C.; Floyd, P.; George, C. The Health Effects of Flooding: Social Research Results from England and Wales. *J. Water Health* **2006**, *4*, 365–380. [\[CrossRef\]](#)
54. Anderson, D. Enduring Drought Then Coping with Climate Change: Lived Experience and Local Resolve in Rural Mental Health. *Rural. Soc.* **2009**, *19*, 340–352. [\[CrossRef\]](#)
55. Swim, J.K.; Stern, P.C.; Doherty, T.J.; Clayton, S.; Reser, J.P.; Weber, E.U.; Gifford, R.; Howard, G.S. Psychology's Contributions to Understanding and Addressing Global Climate Change. *Am. Psychol.* **2011**, *66*, 241–250. [\[CrossRef\]](#)
56. Azuma, K.; Ikeda, K.; Kagi, N.; Yanagi, U.; Hasegawa, K.; Osawa, H. Effects of Water-Damaged Homes after Flooding: Health Status of the Residents and the Environmental Risk Factors. *Int. J. Environ. Health Res.* **2013**, *24*, 158–175. [\[CrossRef\]](#) [\[PubMed\]](#)
57. Galea, S. Trends of Probable Post-Traumatic Stress Disorder in New York City after the September 11 Terrorist Attacks. *Am. J. Epidemiol.* **2003**, *158*, 514–524. [\[CrossRef\]](#) [\[PubMed\]](#)
58. Breslau, N. Epidemiology of Trauma and Posttraumatic Stress Disorder. In *Psychological Trauma*; Yehuda, R., Ed.; American Psychiatric Press: Washington, DC, USA, 1998; pp. 1–431.
59. Norris, F.H.; Tracy, M.; Galea, S. Looking for Resilience: Understanding the Longitudinal Trajectories of Responses to Stress. *Soc. Sci. Med.* **2009**, *68*, 2190–2198. [\[CrossRef\]](#) [\[PubMed\]](#)
60. Morganstein, J.C.; Ursano, R.J. Ecological Disasters and Mental Health: Causes, Consequences, and Interventions. *Front. Psychiatry* **2020**, *11*, 1. [\[CrossRef\]](#)
61. Bryant, R.A.; O'Donnell, M.L.; Creamer, M.; McFarlane, A.C.; Silove, D. A Multisite Analysis of the Fluctuating Course of Posttraumatic Stress Disorder. *JAMA Psychiatry* **2013**, *70*, 839. [\[CrossRef\]](#)
62. Moosavi, S.; Nwaka, B.; Akinjise, I.; Corbett, S.E.; Chue, P.; Greenshaw, A.J.; Silverstone, P.H.; Li, X.-M.; Agyapong, V.I.O. Mental Health Effects in Primary Care Patients 18 Months after a Major Wildfire in Fort McMurray: Risk Increased by Social Demographic Issues, Clinical Antecedents, and Degree of Fire Exposure. *Front. Psychiatry* **2019**, *10*, 683. [\[CrossRef\]](#)
63. Mao, W.; Agyapong, V.I.O. The Role of Social Determinants in Mental Health and Resilience after Disasters: Implications for Public Health Policy and Practice. *Front. Public Health* **2021**, *9*, 658528. [\[CrossRef\]](#)
64. Woods, J. Province Boosts Cost of Albertan Floods to \$6 Billion. *Calgary Herald*. 23 September 2013. Available online: <http://www.calgaryherald.com/news/Province%3BEboosts%3BEcost%3BEAlberta%3BEfloods%3BEbillion/8952392/story.html> (accessed on 30 June 2023).
65. Lalani, N.; Drolet, J. Impacts of the 2013 Floods on Families' Mental Health in Alberta: Perspectives of Community 500 Influencers and Service Providers in Rural Communities. *Best Pract. Ment. Health* **2019**, *15*, 74–92.
66. Alberta Government. First Residents of High River Go Home. 23 June 2013. Available online: <https://www.alberta.ca/release.cfm?xID=344769171D065-C5D7-28D8-E02995572F86EB0A> (accessed on 30 June 2023).
67. Sahni, V.; Scott, A.N.; Beliveau, M.; Varughese, M.; Dover, D.C.; Talbot, J. Public Health Surveillance Response Following the Southern Alberta Floods, 2013. *Can. J. Public Health* **2016**, *107*, e142–e148. [\[CrossRef\]](#)
68. Lovibond, S.H.; Lovibond, P.F. *Manual for the Depression Anxiety Stress Scales*, 2nd ed.; Psychology Foundation of Australia: Sydney, Australia, 1995.

69. Price, M.; Szafranski, D.D.; van Stolk-Cooke, K.; Gros, D.F. Investigation of Abbreviated 4 and 8 Item Versions of the PTSD Checklist 5. *Psychiatry Res.* **2016**, *239*, 124–130. [\[CrossRef\]](#)
70. Freedy, J.R.; Shaw, D.L.; Jarrell, M.P.; Masters, C.R. Towards an Understanding of the Psychological Impact of Natural Disasters: An Application of the Conservation Resources Stress Model. *J. Trauma. Stress* **1992**, *5*, 441–454. [\[CrossRef\]](#)
71. Berry, H.L.; Bowen, K.; Kjellstrom, T. Climate Change and Mental Health: A Causal Pathways Framework. *Int. J. Public Health* **2010**, *55*, 123–132. [\[CrossRef\]](#) [\[PubMed\]](#)
72. Lawrance, E.L.; Thompson, R.; Newberry Le Vay, J.; Page, L.; Jennings, N. The Impact of Climate Change on Mental Health and Emotional Wellbeing: A Narrative Review of Current Evidence, and Its Implications. *Int. Rev. Psychiatry* **2022**, *34*, 443–498. [\[CrossRef\]](#) [\[PubMed\]](#)
73. Islam, A.; Haque, S. Living-In-History Effect in the Dating of Important Autobiographical Memories. *Mem. Cogn.* **2021**, *50*, 1078–1089. [\[CrossRef\]](#) [\[PubMed\]](#)
74. Ando, S.; Kuwabara, H.; Araki, T.; Kanehara, A.; Tanaka, S.; Morishima, R.; Kondo, S.; Kasai, K. Mental Health Problems in a Community after the Great East Japan Earthquake in 2011: A Systematic Review. *Harv. Rev. Psychiatry* **2017**, *25*, 15–28. [\[CrossRef\]](#) [\[PubMed\]](#)
75. Agyapong, V.I.O.; Juhás, M.; Brown, M.R.G.; Omege, J.; Denga, E.; Nwaka, B.; Akinjise, I.; Corbett, S.E.; Hrabok, M.; Li, X.-M.; et al. Prevalence Rates and Correlates of Probable Major Depressive Disorder in Residents of Fort McMurray 6 Months after a Wildfire. *Int. J. Ment. Health Addict.* **2019**, *17*, 120–136. [\[CrossRef\]](#)
76. Brewin, C.R.; Andrews, B.; Valentine, J.D. Meta-Analysis of Risk Factors for Posttraumatic Stress Disorder in Trauma-Exposed Adults. *J. Consult. Clin. Psychol.* **2000**, *68*, 748–766. [\[CrossRef\]](#)
77. Heanoy, E.; Habermas, T.; Nicoladis, E.; Brown, N.; Weit, J. *Beyond Flood and Fire: A Follow-Up Assessment of Transitional Impact and Mental Health Outcome of Natural Disaster*; APS Annual Convention: Washington, DC, USA, 2023.
78. Hooyman, N.R.; Kramer, B.J. *Living through Loss: Interventions across the Life Span*; Columbia University Press: New York, NY, USA, 2006.
79. Hrabok, M.; Delorme, A.; Agyapong, V.I.O. Threats to Mental Health and Well-Being Associated with Climate Change. *J. Anxiety Disord.* **2020**, *76*, 102295. [\[CrossRef\]](#)
80. Goto, T.; Wilson, J.P. A Review of the History of Traumatic Stress Studies in Japan. *Trauma Violence Abus.* **2003**, *4*, 195–209. [\[CrossRef\]](#)
81. Goodwin, R.; Sugiyama, K.; Sun, S.; Takahashi, M.; Aida, J. Trajectories of Distress Following the Great East Japan Earthquake: A Multiwave Prospective Study. *Clin. Psychol. Sci.* **2020**, *8*, 1062–1068. [\[CrossRef\]](#)
82. Newnham, E.A.; Mergelsberg, E.L.P.; Chen, Y.; Kim, Y.; Gibbs, L.; Dzidic, P.L.; Ishida DaSilva, M.; Chan, E.Y.Y.; Shimomura, K.; Narita, Z.; et al. Long Term Mental Health Trajectories after Disasters and Pandemics: A Multilingual Systematic Review of Prevalence, Risk and Protective Factors. *Clin. Psychol. Rev.* **2022**, *97*, 102203. [\[CrossRef\]](#) [\[PubMed\]](#)

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.