Shared Flashbulb Memories lead to Identity Fusion: Recalling the Defeat in the Brexit Referendum Produces Strong Psychological Bonds among Remain Supporters

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Declaration of Conflicting Interest

The Authors declare that there is no conflict of interest.

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Authors' Contribution

BM and HW conceived the study. RK and VVM contributed to the design and implementation of the research and the Open Science pre-registration. VVM performed the analyses. BM wrote the manuscript; VVM, RK, and HW provided critical feedback and revision.

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Abstract

Identity fusion – a visceral feeling of oneness with a group – is thought to result from the sharing of emotional, often dysphoric, experiences. In this pre-registered longitudinal study, we address the impact of flashbulb memories of learning about the outcome of the Brexit referendum on both identity fusion and social identification. As predicted, the visceral quality of people's flashbulb memories had a transformative effect on personal identity via processes of personal reflection and this, in turn, led to identity fusion via perceived sharedness with the group. Sharing personally transformative memories in this way did not lead to social identification, suggesting that perceived sharedness is key to identity fusion but not to social identification. Understanding how emotional public events impact personal identities and how they produce peculiar forms of group alignment have important implications for explaining and managing societal threats such as polarization and forms of political and religious extremism.

Key words: identity fusion; flashbulb memory; social perception; group processes; public event

General Audience Summary

Shared suffering has been shown to create 'identity fusion' – a visceral sense of oneness with the group that has been linked to various forms of extreme pro-group action, ranging from acts of charity to violent self-sacrifice. Identity fusion is thought to stem from sharing autobiographical memories of transformative experiences that are both defining for the personal identity and the group, in contrast with other more de-personalising forms of group alignment like 'social identification'. For 'Remainers' opposed to the UK's departure from the European Union, the result of the 2016 referendum on EU membership (so-called *Brexit*) was a distressing shared event. In this longitudinal study, 200 Remainers completed a questionnaire roughly one year after the referendum result and then again nearly a year after that, allowing us to examine their memories and the psychological factors that uniquely characterise identity fusion as compared with social identification. We show that the visceral and emotional components of memory recall, and not the accuracy of their contents, were associated with a sense of being personally transformed by the event, and that this process took place as result of prolonged personal reflection on the meaning of the event. Our findings also shed light on the key process that fuses personal and the group identities, showing that, when similarly visceral memories of the referendum results were shared with other Remainers, this was associated with higher levels of identity fusion (but not social identification). Since identity fusion is known to fuel extreme pro-group behaviours, understanding the impact of Brexit on identity fusion is an important step towards explaining and potentially healing divisions in society that can lead to polarization and conflict.

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Identity fusion (hereafter, fusion) is a strong form of social cohesion that has been shown to motivate self-sacrifice for the group, from acts of charity to willingness to fight and die for each other (Swann, et al., 2009). Fusion is thought to stem from the sharing of emotionally intense and meaning-laden experiences and memories that are both transformative for the individual and the group (Whitehouse & Lanman, 2014; Whitehouse, 2018a). Studies conducted in the aftermath of the 2011 Libyan revolution show that armed fighters who directly shared experiences of frontline combat had greater levels of fusion with their comrades than those in the battalion who lacked such shared experiences (Whitehouse et al., 2017). This relationship between shared combat experience and identity fusion has also been found among soldiers lacking control over their deployment, suggesting that the arrow running from shared experience to fusion is not merely correlative (Whitehouse et al., 2017). Surveys and experiments conducted in a diversity of populations, from football fans (Whitehouse et al., 2017) and religious groups (Kavanagh et al., 2020) to victims of terrorist atrocities (Buhrmester et al., 2015; Jong et al., 2015) and mothers experiencing the agonies of childbirth (Tasuji, et al., 2020), show that memories of, and reflections on, shared experiences, especially dysphoric ones, can generate fusion.

In the social psychology literature, two types of group bonding are often distinguished: identity fusion and *social identification* (hereafter, identification) (Tajfel & Turner, 1979). In fused individuals, personal and group identities function synergistically, such that making the group identity salient activates the personal identity and vice versa (Swann et al., 2012). This synergistic quality is measured using pictorial scales in which the personal self is represented by a small circle and the group by a large circle and participants are presented with images in which the two kinds of circle overlap to varying degrees and invited to say which image best characterises their relationship with the group. Those choosing the image in which the small circle (personal self) is entirely enclosed by the big circle (group) are said to be fused (Gómez et al., 2011). By contrast, identification is a more de-personalizing form of group alignment because it entails a hydraulic relationship between personal

and group identities, such that making one salient makes the other less accessible (Swann & Buhrmester, 2015). Crucially, it has been suggested that this type of bonding can be distinguished by whether a sense of sharing these experiences with the group is required for the bonding to take place (Whitehouse, 2018a).

While the theoretical account of fusion is well elaborated (Whitehouse & Lanman, 2014; Whitehouse, 2018a; Reese & Whitehouse, 2021), little is known about how exactly autobiographical memory characteristics and processes lead to changes in identity, and how feelings of being personally transformed by the event lead to bonding in a group context. More importantly, evidence on the psychological processes differentiating fusion from identification is limited. In this pre-registered study, we examine some of the pathways by which widely shared and negatively charged events like the UK referendum on EU membership (hereafter, Brexit[1]) for supporters of the 'Remain' campaign (hereafter, Remainers), impact personal and group identities. We examine three research questions: Does the recall of autobiographical memories of emotionally arousing events lead to personal transformativeness via processes of event meaning making? Do transformative events lead to fusion when these events are perceived to be shared with other group members? Is perceived sharedness of a transformative experience a prerequisite for fusion but not identification?

Flashbulb memories, personal reflection, and personal identity transformativeness

Autobiographical memories – long-term recollections for personal experiences – play an important role in the construction of personal identity (Conway & Pleydell-Pearce, 2000). It is theorized that group-relevant autobiographical memories that become an essential component of the personal identity contribute to the formation of fusion (Whitehouse & Lanman, 2014). We build on the hypothesis that emotionally arousing experiences trigger memories that have a personally transformative quality when the individual engages in prolonged moments of personal reflection upon

[1] The Brexit referendum determined that the UK should leave (52%) rather than remain (48%) within the EU. We refer hereafter to remain voters as Remainers and leave voters as Leavers. The referendum was a distressing event for Remainers.

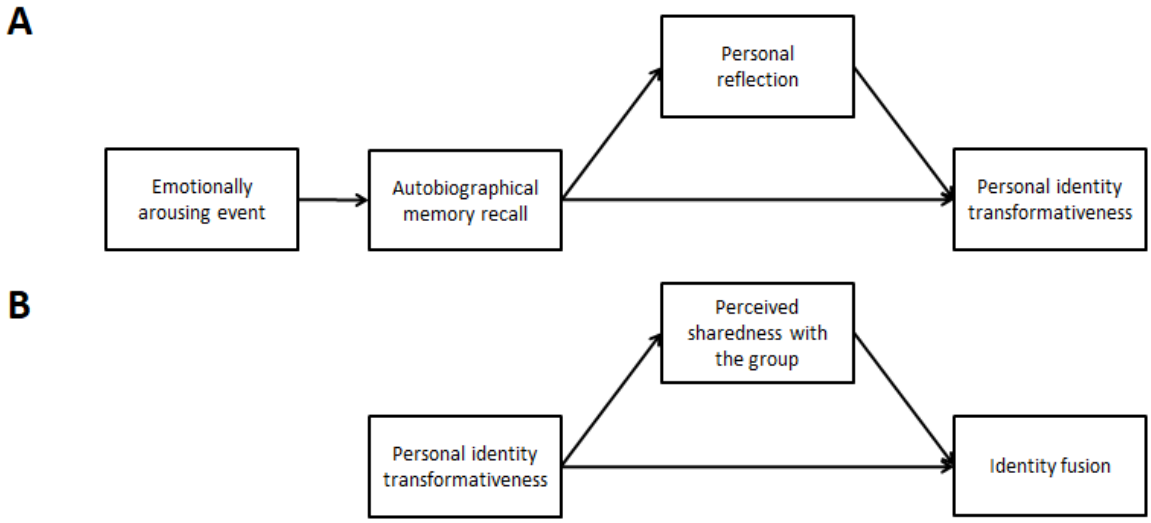
the meaning of the experience (Whitehouse et al., 2017; Whitehouse, 2018a; Reese & Whitehouse, 2021).

In this study, we focus on the role of flashbulb memories – autobiographical memories for the reception context of important news (Brown & Kulik, 1977) – to explore the shared experiences pathway to fusion (see Figure 1A). While previous research has been heavily focused on issues of veracity, our aim is to examine the impact of flashbulb memory on the formation of personal and group identities. We seek to characterize the memory components leading to transformativeness of the personal self via personal reflection, measuring them in terms of memory richness and memory visceralness. *Memory richness* includes information that participants recall about the reception context, e.g., where they were and what they were doing while they first learned the news (Brown & Kulik, 1977). *Memory visceralness* is used as a proxy of memory recall's subjective experience, as it reflects the physical experiences associated with recalling the event, e.g., feeling tense all over when thinking back to the memory (Talarico & Rubin, 2003). In addition, we measured the degree of emotional intensity and valence associated with the event to ascertain whether it predicts memory recall (Finkenauer et al., 1998).

Because our goal was to address the effects of post-event exegetical reflection and personal identity transformativeness following a negative group event, we measured flashbulb memories one and two years after Brexit. Previous research on the shared-experiences-pathway to fusion suggests that the process by which transformative life events shape the personal self, giving rise to fusion when shared with others, can take months (Buhrmester et al., 2018), even continuing over the lifespan (Buhrmester, Zeitlyn & Whitehouse, 2020; Newson, Buhrmester & Whitehouse, 2016).

Figure 1

Theoretical models of (A) the autobiographical memory pathway to personal identity transformativeness and (B) the social perception pathway to identity fusion.



Perceived Sharedness, Fusion and Identification

To date, most empirical studies contrasting fusion and identification have focused on how they differ in motivating pro-group behaviours, rather than on the processes that give rise to them (e.g., Swann et al., 2009 demonstrating that fusion predicts willingness to fight or die for the group over and beyond identification). Drawing on studies of categorical affiliation and stereotyping (Rosenberg, 1987), researchers propose that identification is a depersonalizing form of group alignment whereas fusion taps into personal agency because it arises from the sharing of emotionally arousing experiences that are both central to the personal and group identities (Whitehouse, 2018a). The perception of sharing autobiographical memories of a group-defining experience, that is the *perceived sharedness* with the group, is critical for getting from a sense of personal transformativeness to fusion, ultimately working as a key mediator that 'fuses' one's personal and group identity (see Figure 1B) (Whitehouse & Lanman, 2014). For fusion to occur, one needs to

perceive that their interpretation and memory for an event is shared, and that other group members have engaged in similar reflective processes (Kavanagh et al., 2020). Anthropological studies of collective ritualistic experiences (Whitehouse, 1992; 2004) and more recent studies on different populations including football fans (Newson, et al., 2016), martial arts practitioners (Kavanagh, Jong, McKay & Whitehouse, 2019) and supporters of political parties (Kapitány, Kavanagh, Buhrmester, Newson & Whitehouse, 2019) suggest that sharedness may be stronger among those who co-attended an event simultaneously, as one can have greater confidence that the perception of sharing the same memories is accurate.

While perceived sharedness of self-defining experiences is thought to contribute to fusion, identification results from the sharing of socially learned identity markers (Whitehouse & Lanman, 2014). Identified individuals share prototypical features with the group that stem from a *categorical tie*, but not transformative experiences that are essential to both the personal and the group identity (Gómez et al., 2011). Until now, however, we have limited empirical evidence that perceived sharedness is a necessary condition only for fusion and not for identification. To fill this gap, we examine whether perceived sharedness mediates the relationship between personal identity transformativeness and fusion but not identification with those co-present when the news of Brexit was first learned and fellow Remainers.

Pre-registered hypotheses

The following list of pre-registered hypothesis can be found in the Open Science Framework (osf.io/fwud7), together with the full dataset (osf.io/9d67f/).

Hypothesis 1 – The referendum outcome will trigger fusion with co-presents and fellow Remainers (Whitehouse et al., 2017).

Hypothesis 2 – The negative affect of Brexit for Remainers will predict richness and visceralness of flashbulb memories at re-test (Finkenauer et al., 1998; Whitehouse, 2018a).

Hypothesis 3 – Flashbulb memories' richness and visceral-ness will predict levels of personal reflection which will in turn predict levels of personal identity transformativeness (Conway, Singer & Tagini, 2004; Jong et al., 2015).

Hypothesis 4 – The degree of perceived sharedness with an ingroup target will mediate the relationship between personal identity transformativeness and fusion with the same target (Tasuji et al., 2020; Whitehouse, 2018a).

Hypothesis 5 – The mediating effect of perceived sharedness on fusion will be stronger among those who co-attended the event as compared to an extended target like the Remainers (Newson & Buhrmester, 2016).

Hypothesis 6 – Perceived sharedness mediates the relationship between transformativeness and fusion, but not identification (Whitehouse & Lanman, 2014).

Methods

Participants and procedure

In May 2017 (Time 1), nearly one year after the referendum (23 June 2016), we recruited 324 participants as part of a larger project led by the first author. A total of fifty-eight participants were excluded because they completed less than 90% of the survey or did not provide their email address to participate at the second phase. In total, the sample at Time 1 included 266 participants. We invited those participants to complete the survey a second time in March 2018 (Time 2). A total of 233 individuals complied. Of these, twenty-three participants were excluded from the analyses. Eighteen participants completed less than 90% of the survey, three participants completed the survey but reported several missing values on focal questions necessary for the analyses (e.g., fusion and identification), and two participants failed to provide their personal identification code, preventing us from matching their Time 1 and Time 2 responses. As our research was primarily concerned with the Remainers, we further excluded seven participants based on their preference for leaving the EU on the question 'What was your vote preference in the referendum?'. Three participants were further excluded as they chose the 'I prefer not to say' option. Thus, the final sample included 200 participants. 73% of our sample were female (n = 146), with one unreported value (0.5%). Participants' age ranged between 18 and 74 years (M = 38.35, SD = 12.29). Participants were recruited in the United Kingdom among general population, undergraduate psychology students, and experimenters' acquaintances through snowball sampling. They were required to be fluent in English

and a resident in the UK, regardless of their nationality. 78% were British, 21% were from other countries in Europe, and 1% was not European. Participants completed both surveys online on the Qualtrics online platform. They took part to the first stage of the study voluntarily, and at the second stage, they were incentivized by a raffle and win one of the five £50 Amazon vouchers.

Materials

We created a questionnaire by adapting instruments used in previous research (e.g., Jiménez et al., 2015; Kapitány et al., 2019; Whitehouse et al., 2017). The questionnaire started with a brief introduction to the study; participants were thanked for taking part, informed that the study focused on their personal experience of Brexit, and asked to sign the informed consent statement to proceed. To avoid question order bias, factors were assessed in the following order:

Flashbulb memory richness

We first assessed autobiographical memories of learning about Brexit (hereafter, flashbulb memories), using two indices: memory richness and memory visceralness. To measure memory richness, we used a free recall task in which participants were asked to recall the image they had in mind of the context where they first learned the news (i.e., reception context). We provided participants with a box where they could type their answer under the following prompt: "*Think back to the moment when you first learned the news of the outcome of the UK Referendum. Please type a description of the image or images you have in mind. If you need more space, the text box will get bigger".* We used this format for three reasons. First, to give participants complete freedom of recall. Second, and to avoid any bias due to inferential processing, i.e., the tendency for individuals to infer information in response to a specific question (e.g., 'Where were you when you first learned about the Brexit news?'). Third, we asked participants to recall an image of the reception context because we were interested in assessing, if any, the presence of perceptive details, which have been shown to be key to define flashbulb memory (Muzzulini, Tinti, Conway, Testa & Schmidt, 2020). To gather an index of memory richness, we coded the free recalls according to the presence (vs. absence) of canonical categories and perceptive details. Initially identified by Brown & Kulik (1977), canonical categories are used to subsume the contents that people typically recall when asked to think back to

the news' reception context. The canonical contents include five chunks of information: the source of the news, the place where the news was first learned, the activity in which participants were involved just before learning the news, the other people around in that moment, and ones' immediate reaction to the news (the latter includes actions and emotional reactions). Perceptive details on the other hand, are information of the reception context containing sensory-like characteristics; these are often visual, as if the moment in which the news was learned was captured by a snapshot. Importantly, while canonical categories may serve as a structure to build the memory narrative, idiosyncratic details do not always serve a narrative purpose. Examples of perceptive details might include the colour of someone's clothes, the unusual position of an object, a sudden sound in the environment. As such, perceptive details do not always fit under the above-mentioned canonical categories, but they are yet essential to make flashbulb memories so uniquely vivid and memorable (Muzzulini et al., 2020). Hence, we analysed the free recalls qualitatively (all ranged between one and three paragraphs in length) and awarded a score of 1 for each piece of information that fit under each canonical category (i.e., source of news, place, activity, others around, immediate reactions) and perceptive details. A score of 0 was assigned whenever the information was missing. The points attributed to each canonical and perceptive details were summed up in a cumulative index that could range from 0 to 6 (hereafter described for the sake of consistency on a scale of 1 – 7). The memory richness index was calculated both at Time 1 and Time 2. All the responses to the free-recall task were coded by the first author; two trained Research Assistants of the University of Oxford blind to the hypotheses provided reliability coding for 150 participants each. The intraclass correlation among the three coders was fair: for Time 1 contents, Cohen's Kappa was .49 ($p < .001$), for Time 2 contents, it was .44 ($p < .001$) (Syed & Nelson, 2015).

Flashbulb memory visceralness

Memory visceralness refers to the subjective feelings associated to the recall of the news' reception context. We provided participants with the prompt '*When I think about the moment in which I learned the news for the first time…*', followed by five items on a five-point scales (1 = *not at all;* 5

= *very much*; Talarico & Rubin, 2003). Items' examples include: '*I feel tense all over*'; '*I feel butterflies in my stomach*'. We aggregated the values into a mean at Time 1 and Time 2.

Emotional arousal

To assess the degree to which the event had triggered an emotional reaction, we asked participants to rate the intensity of their emotional reaction toward Brexit on a five-points scale (1 = *not intense at all*; 5 = *very intense*) at Time 1. Participants also rated the extent to which they considered Brexit as a negative or positive event (1= *very negative*; 5 = *very positive*). For ease of interpretation, the scores were reverse coded such that 1 = very positive and 5 = very negative.

Target identity groups

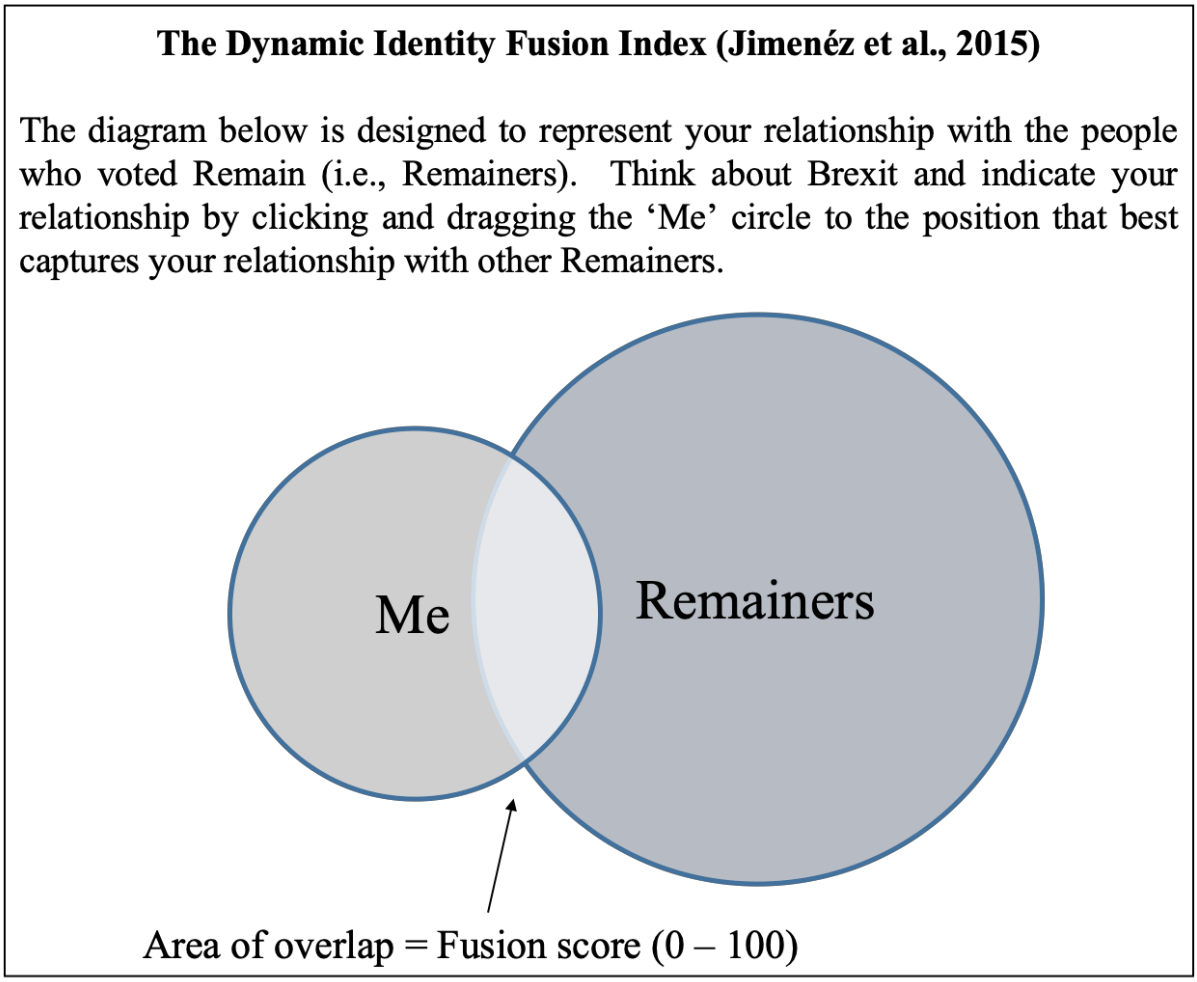
We chose three targets reflecting two ingroups and one outgroup. The first ingroup target was 'the co-presents' and it was operationalised as follow: '*Think about the people you first turned to when you learned the news of Brexit. It might be a person, or some persons, with whom you were in that moment, or with whom you discussed the news in the immediate days after*'. The second ingroup target was 'Remainers', operationalised as: '*The people who voted to remain in the EU*'. Finally, the outgroup target was 'Leavers', defined as: '*The people who voted to leave the EU*'.

Identity fusion

Fusion was measured at Time 2 using the Dynamic Identity Fusion Index (DIFI; Jiménez et al., 2015). The DIFI scale consists of a dynamic small circle labelled '*Me*' and a larger circle labelled according to the target group in question. Participants were asked to click and drag the small '*Me*' circle to the position that best captured their relationship with the target group. Fusion was the value (ranging from 0 to 100) of overlap between the '*Me*' circle and the given target circle. Fusion was measured with the target groups co-presents, Remainers, and Leavers. An example of DIFI and the adapted prompt, is depicted in Figure 2.

Figure 2

Example of the Dynamic Identity Fusion Index (DIFI) used to measure identity fusion.



Social identification

Identification was measured at Time 2 using adapted items of Mael & Ashforth, (1992). We chose this scale because previous research identified it as the most representative for comparisons between identification and fusion (Gómez et al., 2011). However, for the sake of brevity, we used only the three items with the highest factor loadings on the identification construct: '*When someone criticised other members of the [target], it feels like a personal insult*'; '*I am very interested in what others think about other members of the [target]*'; '*When I talk about other members of the [target], I usually say 'we' rather than 'they'*'. seven-points Likert scale was used as suggested by Fombelle

and collaborators (Fombelle, Jarvis, Ward, & Ostrom, 2012) (1 = *strongly disagree*; 7 = *strongly agree*). We aggregated the three items into an index of identification with the co-presents, Remainers, and Leavers. Because items' reliability was unacceptable for the Leavers target, and further because we did not draw specific hypotheses, all results concerning this target are reported within the supplementary materials.

Personal identity transformativeness

Personal identity transformativeness was measured at Time 2 adapting 4 items of the Centrality for Event Scale (Berntsen & Rubin, 2006), on a seven-points Likert scale (1 = *strongly disagree; 7 = strongly agree*). Following the prompt: '*I feel that my experience on Brexit' participants were asked questions like: 'has become part of my identity*' and '*has permanently changed my life*'. All items were aggregated into a single score of personal identity transformativeness.

Personal reflection

Personal reflection was measured at Time 2 on a five-item scale adapted from previous studies (Kapitány et al., 2019). Prompts include: '*I have spent a lot of time actively thinking about Brexit*', '*I actively think about Brexit, more than many other recent experiences*'. All items were measured with a seven-points Likert scale (1= *strongly disagree; 7= strongly agree*). Items were aggregated into a single score of personal reflection.

Perceived sharedness with the group

At Time 2, we assessed perceived sharedness separately for each of the three targets (i.e., the co-presents, Remainers, and Leavers) using three items on a seven-points scale (1= *not at all; 7= a lot*). The first item followed the memory visceralness scale and asked participants to '*Consider the answers you just provided above'* (e.g., 'When I think about the moment in which I learned the news for the first time, I feel tense all over') and to rate the extent to which '*members of the [target] would give the same exact answer as you*'. The other two items were formulated as follow: '*To what extent do you think that you and [target] share*: '*The same feelings about Brexit?*'; '*The same memories*

about Brexit?'. Items were collapsed into three separate mean scores reflecting each target: the co-presents, Remainers, and Leavers.

Results

Results are presented across four sections. In the first section, we report the relevant descriptive statistics and regression analyses to demonstrate the impact of Brexit on fusion (*Hypothesis 1*) and flashbulb memory recall (*Hypothesis 2*, Figure 1A) respectively; in the second section, we report results of mediation analyses used to assess the pathway from flashbulb memory to personal identity transformativeness through personal reflection (*Hypothesis 3*, Figure 1A); in the third section, we report the results of mediation analyses used to assess the pathway from personal identity transformativeness to fusion and identification with the Remainers and co-presents (*Hypothesis 4, 5, 6,* Figure 1B). The results pertaining to the Leavers' target and the correlational matrix are reported within the supplementary material (see Figure S1 and Table S1 respectively) due to unsatisfactory reliability of its measure. The raw mean values for each variable can be found in Table 1.

Table 1

Descriptive statistics of the variables under investigation.

Factor	Variable	Test	Number of Items (α)	Scale	M (SD)
Emotional arousal	Valence	T1	1	1 – 5[1]	4.47 (0.74)
	Emotional reaction	T1	1	1 – 5[2]	3.44 (1.15)
Flashbulb memory	Richness	T1	Free recall	1 – 7	4.05 (1.69)
		T2	Free recall	1 – 7	4.34 (1.37)
	Visceralness	T1	5 (.78)	1 – 5	2.56 (0.86)
		T2	5 (.74)	1 – 5	2.53 (0.79)
Personal reflection		T2	5 (.90)	1 – 5[3]	4.11 (1.55)
Transformativeness		T2	5 (.92)	1 – 5[3]	3.09 (1.76)
Perceived Sharedness	Co-presents	T2	3 (.72)	1 – 7[4]	5.12 (1.32)
	Remainers	T2	3 (.75)	1 – 7[4]	4.98 (1.35)
	Leavers	T2	3 (.72)	1 – 7[4]	2.36 (1.27)
Identity Fusion	Co-presents	T2	1	0 – 100	68.2 (35.64)
	Remainers	T2	1	0 – 100	65.39 (37.8)
	Leavers	T2	1	0 – 100	6.96 (17.91)
Social identification	Co-presents	T2	3 (.79)	1 – 7[3]	5.54 (1.62)
	Remainers	T2	3 (.77)	1 – 7[3]	4.12 (1.51)
	Leavers	T2	3 (.52)	1 – 7[3]	2.36 (1.27)

Note. [1] 1=very positive, 5= very negative (reverse coded); [2] 1=not intense at all, 5=very intense; [3] 1=strongly disagree, 5=strongly agree; [4] 1=not at all; 7=a lot.

The impact of Brexit on fusion and flashbulb memory recall

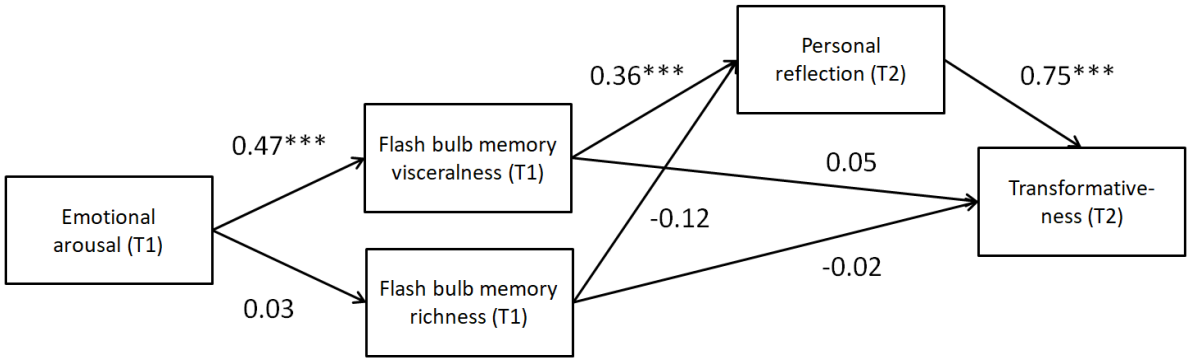
Research suggests that emotionally arousing, negatively charged events that are remembered as distinct episodic memories produce fusion (e.g., Whitehouse et al., 2017). In this section, we assess whether Brexit could be considered one of such events by testing *Hypothesis 1* (i.e., that Brexit will trigger fusion with the co-presents and other Remainers) and *Hypothesis 2* (i.e., that the initial emotional intensity associated with Brexit will predict richness and visceralness of flashbulb memories at re-test). As can be observed from Table 1, participants (who were all Remainers) rated Brexit as an intense and highly negative event. To establish whether Brexit produced fusion with each target (*Hypothesis 1*), we used a cut-off based on previous studies suggesting that scores beyond 4 on a scale ranging from 1 to 6 indicate fusion with a group (see Swann et al., 2009, p. 1000). As the DIFI scale used in this study ranged between 0 and 100, the cut-off was determined to be at 66.6. Mean values reported in Table 1 suggest that, on average, there was fusion with the co-presents but not with the Remainers, although the latter did not reach the threshold by one decimal (M = 65.39). If we look at the proportion of participants who scored beyond the threshold, however, we note that 58% of participants was fused with the Remainers and 62% with the co-presents. Results of a paired t-test revealed no significant differences between fusion scores with the co-presents and fusion scores with Remainers, $t_{(199)} = 1.17$, $p = .24$. These results partially support *Hypothesis 1*.

As we can observe in Table 1, participants could recall a fair number of details about how they first learned the news (i.e., richness) at both time points, indicating the long-lasting presence of a flashbulb memory. The sense of viscerality associated with these memories was also fairly high. We used a regression analysis to test *Hypothesis 2* that the emotional intensity associated with Brexit predicted flashbulb memory recall. As we can observe in Figure 3, model A (full statistics are reported in Table S2 of the Supplementary Materials), the emotional intensity associated with Brexit predicts memory visceralness ($R^2 = .22$). As depicted in model B, emotional intensity did instead not predict memory richness ($R^2 < .01$). These results partially support *Hypothesis 2*, though importantly,

they indicate that greater initial emotional intensity toward Brexit is associated with the visceral – but not detailed-oriented – component of autobiographical memory.

Figure 3

Double mediation model testing Hypotheses 2 and 3.



The memory pathway from emotional arousal (Time 1) to memory visceralness and richness (both Time 1), and from there to personal identity transformativeness (Time 2), via personal reflection (Time 2). *** $p < .001$.

Flashbulb memories, personal reflection, and personal identity transformativeness

Research suggests that emotional experiences become part of one's personal identity through processes of event meaning making (Jong et al., 2015; Whitehouse & Lanman, 2014). In this section, we test how flashbulb memories are involved in this process. For *Hypothesis* 3, we originally pre-registered two separate regression analyses: one, to test the hypothesis that flashbulb memory predicts personal reflection and two, to test the hypothesis that personal reflection predicts personal identity transformativeness. However, based on the theoretical framework described in the introduction and the distinction drawn between memory richness and visceralness, we collapsed the regressions into a double mediation model which was not originally pre-registered (see Figure 3).

The mediation model included three predictor variables (level of emotional arousal, memory visceralness, memory richness), one mediator variable (personal reflection) and one outcome variable (transformativeness). The model was run on standardized variables and was bootstrapped (n = 5000). As expected, emotional arousal led to increased memory visceralness, but counter our hypothesis it did not lead to memory richness. Further in line with our hypotheses, memory visceralness predicted transformativeness via personal reflection (b = 0.27, p < .001), while this indirect pathway was not significant for memory richness (b = -0.09, p = .07), probably due to memory richness not significantly predicting personal reflection. These indirect pathways significantly differ (b = 0.36, p < .001). Taken together, results of the mediation models reported in Figure 3 partially support *Hypothesis 3:* more visceral – but not more detailed – flashbulb memories at Time 1 predict subsequent personal identity transformativeness through personal reflection at Time 2.

Perceived Sharedness, Fusion and Identification

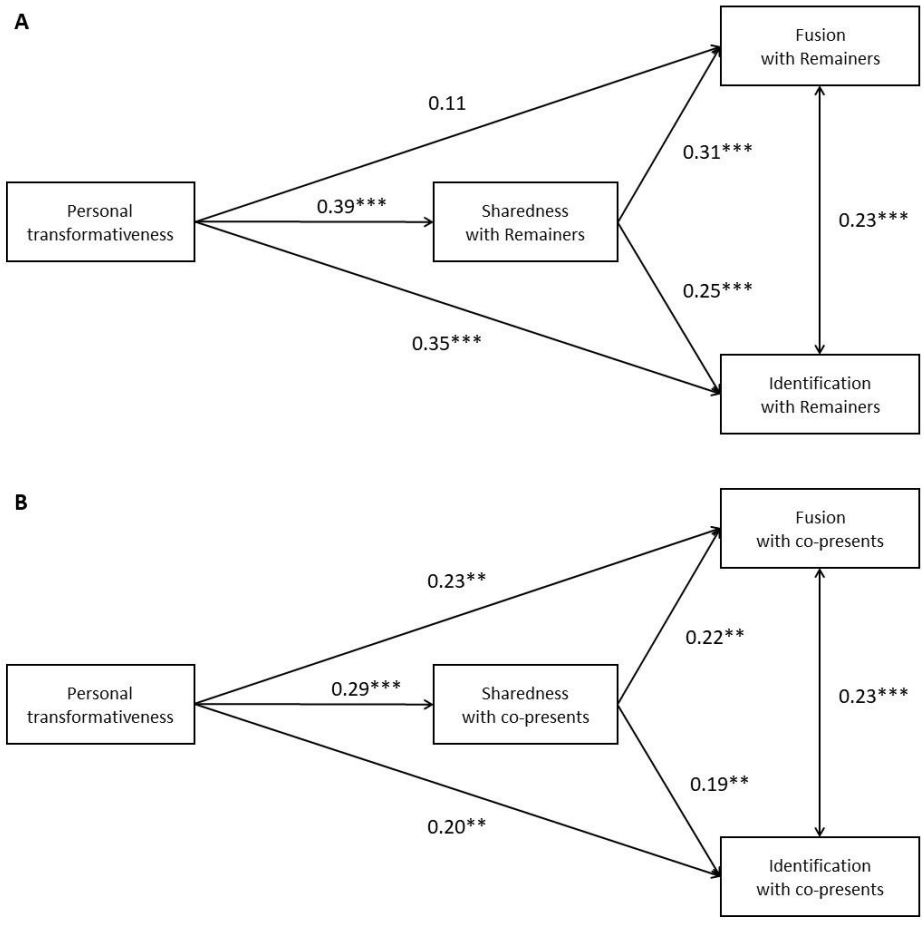
Research suggests that fusion and identification are shaped by different psychological processes, with perceived sharedness as one of the key factors that distinguish them (Whitehouse, 2018a). Here, we test this hypothesis empirically. In *Hypothesis 4,* we pre-registered that perceived sharedness with the Remainers and co-presents mediated the relationship between personal identity transformativeness and fusion with matched ingroups. Moreover, we predicted in *Hypothesis 6* that perceived sharedness would mediate the effect of transformativeness for fusion but not identification. Further under *Hypothesis 5*, we predicted that the effect of sharedness on fusion should be stronger with the co-presents as compared to the Remainers (Whitehouse et al., 2017). We performed two mediation models to test these hypotheses, see Figure 4 and Tables S3A and S3B in the Supplementary Materials for the full statistics. Both mediation models contain one predictor variable (transformativeness), one mediator variable (perceived sharedness with target group), and two outcome variables (fusion or identification with target group). The models differ with regards to their target: (A) Remainers and (B) co-presents. These models were run on standardized variables and were bootstrapped (n = 5000).

Mediation model (A) shows that transformativeness leads to both fusion ($b = 0.12$, $p < .001$) and identification *(*$b = 0.10$, $p = .001$) with Remainers via perceived sharedness, and these indirect effects do not significantly differ ($b = 0.03$, $p = .46$). However, the direct effect of transformativeness on fusion is not significant, while it is for identification.

Mediation model (B) shows that transformativeness leads to both fusion ($b = 0.06$, $p = .01$) and identification *(*$b = 0.06$, $p = .02$) with the co-presents via perceived sharedness, and these indirect effects do not significantly differ ($b = 0.006$, $p = .80$). Moreover, the direct effect of transformativeness is significant for both fusion and identification, contrary to our prediction.

Figure 4

Two mediation models testing Hypotheses 4 and 6.



Model (A) shows the mediation with Remainers as target group, Model (B) with co-presents as target group. *** p < .001; ** p < .01.

Discussion

We examined how flashbulb memories of learning about an emotional, group-relevant event contribute to the formation of fusion via processes of personal reflection, personal identity transformativeness, and perceived sharedness (Figure 1) and considered whether, as predicted, perceived sharedness is essential to the formation of fusion but not identification (Figure 1B). We carried out a longitudinal study examining the effects of the Brexit referendum on Remainers' memories, reflections, identity change, and perceptions of shared experience over two years, on both fusion and identification.

Results suggest that memory visceralness is key with regards to the impact on personal identity transformativeness: more intense emotional reactions associated with Brexit predicted higher levels of memory visceralness but not memory richness, and more visceral, but not richer, memories were associated with greater levels of perceived personal transformativeness through personal reflection over time. Further, we found that higher levels of personal identity transformativeness led to fusion with other fellow Remainers due to the mediating role of perceived sharedness with the same group, but we did not find a full mediation of sharedness with fusion with the co-presents. Contrary to our hypothesis, however, we found that the mediation of perceived sharedness was crucial for fusion with all Remainers but not with the co-presents. The absence of a full mediation suggests that the co-presents may not need to *perceive* that the event was shared, as they experienced the event together, which is at the base of *direct* sharedness of an event (Whitehouse, 2018a). On the other hand, fusion with an extended target such as the Remainers may need to develop throughout the process of *perceived* sharedness. Nevertheless, the effects of mediation as reported in the present study are difficult to interpret, because the data are correlational (Bullock, et al., 2010). Future research should therefore break down the effects of perceived and actual sharedness on fusion from identification using different experimental conditions. Finally, we examined the role of perceived

sharedness in the relation between personal transformativeness and identification and, as predicted, did not find a full mediation for identification. Unexpectedly, however, we found that the direct effect of personal identity transformativeness on identification with Remainers was stronger than its effect on fusion with Remainers. This may be because emotionally relevant group events directly produce identification, whereas fusion only develops when there is a perception that the same memories of the event are shared with other fellow ingroup members.

Our study significantly extends previous research into the psychological underpinnings of fusion by showing how flashbulb memories contribute to fusion, via personal identity transformativeness. Previous studies have focused on dysphoric experiences in natural groups implying that participants retained shared memories of a dysphoric experience (Jong et al., 2015), or measured flashbulb-like memory features (Kapitány et al., 2019). In this study, we measured flashbulb memory contents and visceralness and provide the first evidence that participants with more visceral (but not more detailed) flashbulb memories were subsequently more likely to engage in deliberate processes of reflection and event-meaning making, which ultimately led to greater levels of feeling transformed by the event. We found support for the hypothesis that perceived sharedness of personally transformative experiences is one of the key psychological factors distinguishing fusion from identification (Whitehouse, 2018a; Reese & Whitehouse, 2021). On the other hand, results of mediation models of perceived sharedness with the co-presents suggest that 'perceptions of sharedness' are not required to drive fusion, given that sharedness for co-presents is simply an indisputable fact rather than a feeling. This process offers important insights not only on the development of extended fusion, but also, on how processes of *de-fusion* can take place. For example, among some extreme groups such as frontline fighters, false consensus bias might give rise to the conviction that other group members have gone through similar transformative experiences and so programs of intervention might use narrative rehearsal and conversational exchange among convicted extremists to debunk such convictions, in turn facilitating the *de-fusion* process (Whitehouse, 2018b).

We also note some limitations. First, the nature of our post-event data prevents from fully establishing whether fusion with ingroup targets was triggered solely by the news of the referendum or by the whole Brexit process most broadly. Likewise, the absence of pre-event assessments does not

establish whether fusion was already high before the result of the referendum was announced. Second, we note that more contextual information about the co-presents was needed (e.g., whether they were close ones or simple bystanders, as well as whether they were Remainer as the participant or not). Third, this study addresses the psychology underlying fusion, but does not provide an explanation for how identification may develop. Finally, we note that involving a group of Leavers would have been an illuminating way to examine the development of fusion following a euphoric event.

There are also many other questions for future research to consider. For example, does a more active and prolonged process of reflection on an emotional event make it more personally transformative? Does the memory of being co-present in a transformative life event contribute to fusion in the same way or to the same degree as perceived sharedness? How is the sharing of a directly experienced event more likely to fuse members of a group, or to fuse them more strongly, even without perceived sharedness?

Given the importance of fusion in motivating both prosocial actions and intergroup conflict, it is vital to understand its role in highly consequential political events such as Brexit in uniting and dividing groups. Moreover, because of the long-lasting nature of fusion (Newson et al., 2016), the psychological bonds among opponents of Brexit may contribute to divisions in the UK for many years to come. This may lead to increased risk of political polarisation and bitter conflict among Britons but also to stronger ties with Europe.

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Authors' Contribution

BM and HW conceived the study and RK and VVM contributed to the design and implementation of the research including materials development and Open Science pre-registration. BM performed the study. VVM analysed the data. BM wrote the manuscript; VVM, RK, and HW provided critical feedback and revision.

Data Availability Statement

The data are publicly available in Open Science framework at the following link: osf.io/9d67f/.

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