New group memberships formed after an acquired brain injury and posttraumatic growth: A prospective study

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ABSTRACT
Predicting positive psychosocial outcomes following an Acquired Brain Injury (ABI) remains a challenge. Considerable research demonstrates that social group memberships can have positive effects on psychological well-being, particularly during life transitions. Social group memberships are argued to help people derive a sense of self. This prospective study examined if social group memberships (number of groups and connectedness with groups) could predict posttraumatic growth (PTG) in those affected by ABI. Thirty-six participants (10 females, $M_{age} = 46.56, SD = 11.46$) engaged in community rehabilitation services completed measures at two time-points. Mediation analyses demonstrated that the number of new group memberships (groups formed post-injury) predicted greater PTG at time 2, via stronger connectedness with these new group memberships (controlling for initial PTG). The observed results suggest that a focus on developing and strengthening connections with new group memberships may promote positive adjustment after brain injury.

ARTICLE HISTORY
Received 26 June 2021
Accepted 17 December 2021

KEYWORDS
Social group memberships; Posttraumatic growth; ABI; social identity change; SIMIC; SIMTIC

Acquired brain injury (ABI) is one of the most common neurological disorders (Howes et al., 2005), with approximately 69 million people estimated to sustain a traumatic brain injury globally each year (Dewan et al., 2019). Experiencing an ABI can lead to many life changes and can result in long-term physical, behavioural, and cognitive impairments (Langlois et al., 2006). Furthermore, some may find their sense of self changed by their injury (Bryson-Campbell et al., 2013; Carroll & Coetzter, 2011; Ellis-Hill & Horn, 2000; Gracey et al., 2008; Hutton & Ownsworth, 2019; Ownsworth, 2014). Social identity theory posits that people can derive a sense of identity from social group memberships.
(Tajfel & Turner, 1979), and research has demonstrated the importance of social group memberships for adjustment during periods of vulnerability and life transition (Haslam et al., 2014; Haslam et al., 2019; Seymour-Smith et al., 2017). The discourse around recovery from and living with an ABI is often presented as life diminishing. While acknowledging that many ABI survivors develop clinically significant distress (Bombardier et al., 2010; Hackett et al., 2005; Jones et al., 2012; McMillan et al., 2003), drawing on the social identity approach we consider whether engagement in social groups post-injury can lead to positive growth following an ABI.

**Positive growth after adverse life changes**

Over the past two decades, research has accumulated to show that positive growth, often referred to posttraumatic growth (PTG), may be possible after ABI (for a review see; Kinsella et al., 2015). Posttraumatic growth typically arises when a person appraises an adverse event, such as an ABI, in a way that allows them to find benefits arising from the experience and this in turn has positive downstream effects on psychological well-being and functional behaviour (e.g., Joseph, 2011; McGrath, 2004). Posttraumatic growth is evidenced where positive changes occur in a person’s relationships (e.g., a greater connection to others and greater compassion for others), their self-view (e.g., greater appreciation of oneself, greater awareness of future possibilities), and their life philosophy (e.g., greater clarity about what is important in life), after the experience of an adverse life event (Tedeschi & Calhoun, 2004). After an ABI, people who have experienced PTG have reported making family a priority, having an increased appreciation of life, acting with more consideration and kindness towards others, and taking up new hobbies and interests (Pais-Hrit et al., 2020). Importantly then, PTG is different from recovery as it involves moving beyond pre-trauma baseline levels of psychological functioning (Janoff-Bulman, 2004; Lepore & Revenson, 2006). Evidence of PTG has been observed a few months after a brain injury, but also in individuals who experienced a brain injury as much as 29 years previous (Baseotto et al., 2022; Pais-Hrit et al., 2020; Rogan et al., 2013; Silva et al., 2011).

**Social group membership and adjustment to change**

However, it is difficult to ascertain who will develop PTG and who will not. The social identity approach to health has highlighted the importance of social group memberships and group-based identification for health and positive adjustment (e.g., Cruwys et al., 2013; Cruwys, Haslam, Dingle, Haslam, et al., 2014; Haslam & Reicher, 2006; Haslam, Steffens, et al., 2019; Jetten et al., 2014). Social group memberships can refer to any type of social grouping, for instance, sports clubs, work teams, and family groups. In particular, social
group memberships have been shown to be protective against adverse psychological outcomes during times of change or life transitions, as groups are thought to provide individuals with the social, psychological, and material resources to cope with adverse life changes (Haslam, Steffens, et al., 2019; Jetten et al., 2015; Kearns et al., 2018; Walsh et al., 2015), and can help individuals construct a sense of self (Simon, 2008). Indeed, in the context of ABI, research has shown that belonging to multiple social groups is associated with better self-regulation skills (Kinsella et al., 2020) and greater well-being (Haslam et al., 2008). The Social Identity Model of Identity Change (SIMIC; Haslam et al., 2008; Haslam, Jetten, et al., 2018; Jetten et al., 2014) places importance on two processes by which groups can help navigate identity change during life transitions, as illustrated in Figure 1. First, the maintenance of valued pre-existing group memberships allows for better adjustment (the social identity continuity hypothesis). Second, the development of new group memberships allows for positive change and can be a source of resilience (the social identity gain hypothesis). More recently, research has argued that in the case of traumatic identity change, such as the

**Figure 1.** Pathways through which social group memberships can influence adjustment to an ABI, as hypothesized by SIMIC, adapted from Haslam et al. (2018, p. 238).
experience of an ABI, the development of new social groups (and associated social identities) can form the basis for PTG (the Social Identity Model of Traumatic Identity Change, SIMTIC; Muldoon, Haslam, et al., 2019). As such, we would expect ABI survivors who maintain a greater number of social group memberships from pre- to post-injury, and who gain more new social group memberships, to demonstrate better psychosocial outcomes, and by extension greater PTG. However, no research has yet examined if social group memberships can prospectively predict positive growth following an ABI.

It should be noted that SIMIC also argues that having multiple group memberships prior to a life transition is protective. Outside of providing a person with more psychological resources to draw from when coping with life changes (Jetten et al., 2015; Praharso et al., 2017), belonging to multiple groups increases the likelihood of maintaining at least some of these groups during adverse life transitions (contributing to a sense of social continuity). Further, pre-injury groups may also scaffold the development of new social identities through increased opportunities to join new groups (contributing to social identity gain; Cruwys, Haslam, Dingle, Jetten, et al., 2014; Haslam et al., 2008; Iyer et al., 2009). The consensus from this research is that it is better to have multiple group memberships before life change strikes. However, there is little a person can do to modify the total number of groups they belonged to prior to a life change once a change has occurred; it is simply too late. Therefore, it is particularly important to examine if maintaining any groups held pre-injury and if joining new groups can have unique effects on positive adjustment, controlling for any potential influence of the total number of pre-injury groups (similar to; Seymour-Smith et al., 2017).

Social identity continuity and adaption to ABI

It is not uncommon for survivors of an ABI to suffer social group membership loss. Often individuals may find they cannot meet the expectations of their previous social roles (e.g., Nochi, 1998; Ponsford, 2013). Maintaining previous group memberships is therefore hypothesized to promote adaption as it allows a person to maintain a consistent self-narrative and sense of self (Ownsworth, 2014; Sani et al., 2008). In support of this, Haslam et al. (2008) found social identity continuity predicted psychological well-being after the experience of a stroke. Specifically, people who held multiple group memberships before the experience of a stroke were more likely to maintain some of these pre-injury groups post-stroke, and this in turn was associated with greater life satisfaction.

Social identity gain and adaption to ABI

However, it may not always be possible to maintain previous group memberships and people who experience an ABI may let go of old identities (Horne
et al., 2014; Hutton & Ownsworth, 2019). The development of new valued group memberships may counter this loss and provide a basis for self-redefinition (Muldoon, Haslam, et al., 2019). For instance, brain injury survivors that redefined their sense of self and took on new identities adapted better than individuals who struggled with this change in identity (Ellis-Hill & Horn, 2000). Likewise, a longitudinal study demonstrated that ABI survivors who reported greater connectedness (stronger ties) with new group memberships reported both lower postraumatic stress (PTS) symptomatology and greater resilience over time (Jones et al., 2012). In the same study, individuals who were recovering from an orthopedic injury did not exhibit this relationship between new group memberships, PTS, and resilience. Jones and colleagues (2012) argued that new groups were only important in the context of a brain injury as this type of trauma led to an opportunity to develop a new identity in ways an orthopedic injury did not. Further evidence for trauma resulting in positive changes to social identities and perceptions of social resources stems from a qualitative analysis of interviews with people affected by ABI (N = 15; Muldoon, Walsh, et al., 2019). In this study, respondents living with ABI spoke of their increased awareness of group-based resources following trauma (e.g., in the form of kindness and generosity from family and community). These participants focused on their good fortune and their new group memberships (of which many replaced pre-injury social and occupational group memberships) and saw these social groups as central to their adaptation and growth post-injury.

**Quantity versus quality**

However, the conceptualization of social group membership can vary across research studies. Some research simply counts the number of groups a person belongs to (e.g., Kinsella et al., 2020), while other researchers measure the quality of group memberships, that is a sense of connectedness, belonging, and identification with group memberships (e.g., Iyer et al., 2009; Jones et al., 2012). Although some research assesses both indices, the relationships between these constructs and psychological outcomes are examined separately (e.g., Haslam et al., 2008). A premise of the social identity approach to health is that subjective perceptions of belonging to a group is what drives positive adjustment, such that individuals who identify as a member of a particular group and report stronger ties with other group members, will reap the benefits; this has been termed the “the social cure” (Haslam, Jetten, et al., 2019; Jetten et al., 2012). Much research has implicated the importance of identifying with a group and engaging with a group, rather than just the quantity of group memberships (e.g., Postmes et al., 2019; Sani et al., 2012). Indeed, research examining only the quantity of groups is mixed; sometimes the number of groups a person belongs to is related to positive psychological outcomes (Study 2, Jetten et al.,
other times it is not (Study 1a, Jetten et al., 2015; Sonderlund et al., 2017). However, in the latter the subjective importance of these groups was associated with positive psychological outcomes. Therefore, the present work will build on prior research by examining if connectedness with social group memberships can explain the link between number of groups and positive adjustment.

The present research

We conducted surveys at two time-points with brain injury survivors engaged in post-acute community rehabilitation services in Ireland to examine if the number of social group memberships and feelings of connectedness with these group memberships were associated with PTG longitudinally. Specifically, we tested the social identity continuity hypothesis and social identity gain hypothesis. By controlling for other group membership types (e.g., total number of pre-injury groups) and initial PTG (PTG at time 1), we examined the unique predictive utility of groups maintained (from pre- to post-injury) and new groups developed post-injury in predating subsequent PTG at a seven-month follow-up. We also tested the extent to which connectedness with group memberships can explain the effects of group memberships on positive adjustment.

We hypothesized that a greater number of groups maintained from pre- to post-injury would predict PTG longitudinally, via connectedness with these groups, over and above the effects of both pre-injury groups and new groups formed post-injury. We also hypothesized that the number of new group memberships and connectedness with these group would predict PTG longitudinally, controlling for any effects of pre-injury groups and groups maintained.

Method

Design and sample

This study used a longitudinal survey design to explore the role of social group membership in the development of PTG after an ABI across two time points.

Participants

Participants were recruited through a Commission for Accreditation of Rehabilitation Services (CARF) approved post-acute community neurorehabilitation service (ABI Ireland) in the South-West of Ireland. Participants could be living in the community (independently or with family) and accessing supports in their home or at their local ABI centre, or participants could be living in assisted living units supported by ABI Ireland. All participants were required to have
experienced a brain injury and be over 18 years of age. Participants could not have significant comprehension difficulties (as judged by their multidisciplinary team) that would preclude them from understanding the questionnaires administered. Staff working at ABI Ireland initially contacted participants to explain the study and assess their interest in learning more. If a participant was interested the researcher then met with the participant, provided more information about the study, and explained that they would be asked to answer questionnaires at two time-points, about six months apart. Approximately five months later the researcher telephoned all participants who completed time 1 measures to arrange a follow-up visit.

**Measures**

**Number of social group memberships**
Consistent with previous research assessing the number of social group memberships a person belongs to, participants were asked to list any groups they considered themselves to be a member of (i) before their brain injury and (ii) after their brain injury (Haslam et al., 2008). The instructions stated that the groups could be social groups, sporting groups, professional groups, or any other type of group. For the purposes of analysis, the total number of groups that participants belonged to pre-ABI and post-ABI were computed. From this, the number of groups maintained from pre- to post-ABI (i.e., how many groups listed were the same before and after injury) and the number of new groups joined post-ABI were computed.

**Strength of group connectedness**
To assess feelings of connectedness with social group memberships, that is, a sense of belonging, connection, and support associated with group memberships, participants completed the Exeter Identity Transition Scales (EXITS; Haslam et al., 2008). Participants completed all items using seven-point scales (1 = *do not agree at all*, 7 = *agree completely*).

Four items (α = .930) assessed connectedness with multiple groups prior to the ABI (e.g., “Before my ABI, I joined in the activities of lots of different groups”), four items (α = .843) assessed connectedness with pre-injury group memberships maintained (e.g., “After my ABI, I am friends with people in the same groups as I was before my ABI”), and four items (α = .929) assessed new groups formed after their brain injury (e.g., “After my ABI, I have strong ties with one or more new groups”). Items from each subscale mirrored each other.

**Posttraumatic growth**
Participants completed the Posttraumatic Growth Inventory Short-Form (PTGI; Cann et al., 2010) at time 1 (α = .761) and time 2 (α = .802) of data collection. The PTGI-SF is a 10-item self-report measure designed to assess
life changes due to a traumatic experience. We changed the original wording of the survey, “my crisis”, to “brain injury” so answers reflected growth related to the experience of a brain injury not any other life event that may have occurred. The PTGI-SF includes the same five factors that have been shown to exist in the 21-item PTGI (Linley et al., 2007; Taku et al., 2008). The short form version of the scale was chosen to represent an efficient and comparable substitute for the PTGI to provide a single global indicator of PTG. Examples of items include “I changed my priorities about what is important in life” and “I discovered that I am stronger than I thought I was”. All ten items were rated by participants on a five-point scale ranging from 0 (I did not experience this change as a result of my brain injury) to 5 (I experienced this change to a very great degree as a result of my brain injury). In the present study, the mean score on the PTGI-SF was 26.72 (SD = 10.08) at time 1 and 29.33 (SD = 9.93) at time 2 (range 6–50). Similar levels of PTG have been reported by other research employing the long-form version of the PTGI. For instance, Powell et al. (2007) and Powell et al., (2012) observed similar levels of PTG in cohorts 10–12 years post-injury (M = 68.10, SD = 16.60 and M = 64.6, SD = 16.5, respectively). Note that scores on the PTGI-SF are approximately half the total scores reported in studies using the longer-form version; 10 items (possible range: 0–50) versus 21 items (possible range: 0–105).

**Procedure**

Full ethical approval was provided by both the host university and partner non-governmental organization (NGO), ABI Ireland, prior to commencement of the project. Staff working at ABI Ireland centres first contacted participants to explain the study and assess their interest in learning more. If a participant was interested, the researcher then met with the participant at a location accommodating their needs, for example, at ABI sites in Clare, Kerry, Cork, and Limerick, or in the participant’s own home. Data collection took part in the Munster region of Ireland which covers a total area of 26,675 km squared and included participants living in rural and urban areas. The researcher then provided more information about the study, explaining that participants would be asked to answer questionnaires at two time-points approximately six months apart. Participants were encouraged to contact the researcher with any questions about the study and reminded that they could opt out of the study at any stage. The researcher obtained informed consent and read aloud each of the questions associated with the measures to participants. Participants indicated their response to each item which was noted by the researcher for analysis. Approximately 5 months later the researcher telephoned participants to arrange a meeting for time two data collection at a time and place that suited each participant. The time period between time 1 and time 2 data collection ranged from 5–10 months, with a mean time of 7.31 months.
Overview of analysis

A series of Pearson’s correlations were conducted to examine associations between the study variables. Next, we tested two separate mediation models to examine (i) if the number of social group memberships maintained from pre- to post-injury predicted PTG at time 2, via connectedness with group memberships maintained and (ii) if the number of new group memberships predicted PTG at time 2, via connectedness with new group memberships. In both models, we controlled for initial PTG at time 1, total number of group memberships pre-injury, connectedness with group memberships pre-injury, length of time since the injury occurred, and participant age. In the model with maintained groups as the predictor we controlled for new group memberships (both number and connectedness) in order to assess the unique predictive ability of groups maintained. Similarly, in the model with new group memberships as a predictor we controlled for maintained group memberships (both number and connectedness) to assess the unique predictive ability of new groups. Simple mediation analyses were conducted using PROCESS for SPSS, model 4 (Version 3.5; Hayes, 2017). Bootstrapping drew 10,000 random samples from the data to estimate each pathway effects. Effects were deemed significant when the lower to the upper limits of the 95% confidence intervals (CI) did not pass through zero.

Monte Carlo power analyses (Schoemann et al., 2017), with 1,000 repetitions, 20,000 Monte Carlo draws, and a 95% confidence interval, indicated 49 participants were needed to achieve .80 power to detect a significant indirect effect. Follow-up sensitivity analyses using Monte Carlo power analyses (Schoemann et al., 2017) indicated we had .71 power to detect a significant indirect effect, should one exist.

Results

Participants

In total, 51 people (40 men, 11 women) aged 22–67 years ($M = 45.12$, $SD = 12.10$), who were engaged with a post-acute community neurorehabilitation service (ABI Ireland), were recruited to take part in the study, of which 50 participants fully completed psychometric scales. The main analyses report on 36 of these participants (26 men, 10 women) aged 25–67 years ($M = 46.56$, $SD = 11.46$) who fully completed measures at both time points, however we also report descriptive data for the full sample of 50 participants. All participants were of Irish origin. The causes of brain injury included road traffic accident (11), stroke (6), tumour (3), fall (4), viral infection (2), hypoxia (2), cerebral
hemorrhage (2), altercation/assault (1), aneurysm (2), hydrocephalus (1), venous thrombosis (1), and information was not reported for one individual. Participants lived alone (6), with parents (7), with a partner/spouse (5), in supported accommodation (11), with children (5), and two participants did not report their living circumstances. Time 1 measurements were taken 10.22 years ($SD = 9.60$) post-injury. PTG was assessed again at time 2, around 7.31 months later ($SD = 1.45$), approximately 10.83 years ($SD = 9.54$) post-injury. Reasons for non-participation at Time 2 included death and deterioration of health (e.g., following a stroke). A minority of participants did not show up to final appointments, and where this happened on two occasions the researcher did not pursue further data collection given the long journeys required to access participants who were widely dispersed in the South-West of Ireland. Glasgow Coma Scale (GSC) scores were available for 10 out of 36 participants. Using the GSC classifications three participants had mild injuries (GSC scores of 13–15), one participant had a moderate-to-severe injury (score of 9–12), and six participants had severe injuries (scores <8). Severity was not included in analyses due to the small number of scores available and the uneven distribution of these scores.

**Group memberships and PTG**

At time 1, participants ($n = 36$) listed approximately 3.03 groups ($SD = 2.02$) that they belonged to pre-ABI and 1.50 new groups post-ABI ($SD = 1.61$). Participants reported maintaining an average of 0.72 groups ($SD = 1.03$) from pre- to post-ABI. The full range of group listings are reported in Table 1. Likewise, means and standard deviations for group connectedness, PTG at time 1, and PTG at time 2 are presented in Table 1. Briefly, the most popular groups participants reported belonging to pre-ABI were hobby and sports groups (e.g., music, art, drama, sport, $n = 22$), work or college/school groups ($n = 18$), friendship groups ($n = 11$), and family groups ($n = 6$). The most reported groups maintained from pre- to post-ABI, were hobby/sports groups ($n = 17$), followed by friendship groups ($n = 5$), family groups ($n = 4$), and work groups ($n = 4$). In terms of new

| Table 1. Mean, standard deviation, minimum, and maximum of main study variables. |
|---------------------------------|---------------------------------|---------------------------------|
| Completed both time-points ($n = 36$) | Completed Time 1 ($n = 50$) |
| Mean (SD) | Min–Max | Mean (SD) | Min–Max |
| PTG Time 1 | 26.72(10.08) | 6–45 | 26.79(10.28) | 4–49 |
| PTG Time 2 | 29.33(9.93) | 6–50 |    |
| # Groups pre-ABI | 3.03(2.02) | 0–9 | 2.80(1.80) | 0–9 |
| # Groups maintained | 0.72(1.03) | 0–4 | 0.58(0.93) | 0–4 |
| # New groups | 1.50(1.61) | 0–6 | 1.56(1.51) | 0–6 |
| EXITS Pre-ABI | 5.06(1.93) | 1–7 | 4.68(2.01) | 1–7 |
| EXITS Maintain | 3.32(1.71) | 1–7 | 3.15(1.77) | 1–7 |
| EXITS New Groups | 4.61(2.09) | 1–7 | 4.62(2.09) | 1–7 |
| Age | 46.56(11.46) | 25–67 | 45.12(12.10) | 22–67 |
| Time since ABI (years) | 10.22 (9.60) | 1–41 | 9.94(9.37) | 1–41 |

Note. # = Number of groups
groups, many participants reported groups associated with their use of ABI Ireland services \((n = 16)\), new hobby groups \((n = 10)\), and engagement with other groups specific to their brain injury \((n = 8)\).

Pearson’s correlations were conducted to examine the associations between the main study variables and are presented in Table 2. The results show that higher levels of PTG at time 2 were associated with greater PTG at time 1, greater number of new group memberships at time 1, and greater connectedness with new group memberships at time 1. There was no relationship between PTG at time 2 and total number of group memberships pre-injury, connectedness with group memberships pre-injury, number of group memberships maintained from pre- to post-injury and connectedness with maintained groups, time elapsed since ABI, and participant age.

### Predicting PTG at time 2

#### Group memberships maintained
There was no indirect effect of the number of group memberships maintained from pre- to post-injury on PTG at time 2 via connectedness with maintained groups, \(b = 0.73, 95\% \text{ CI } [−1.43, 3.84]\), controlling for PTG at time 1, new groups (number and connectedness), total number of groups pre-injury (number and connectedness), age, and length of time since injury. In addition, there was no significant total effect, \(b = −1.35, t = −0.92, p = .365, [−4.37, 1.66]\) and no direct effect, \(b = −2.08, t = −1.10, p = .279, [−5.95, 1.79]\). Figure 2 shows the full model tested. It appears groups memberships maintained post-injury were not predictive of PTG.

#### New group membership and PTG
There was a significant indirect effect of the number of new group memberships on PTG at time 2 via connectedness with new groups, \(b = 1.03, 95\% \text{ CI } [0.01, 3.16]\), controlling for PTG at time 1, groups maintained (number and connectedness), total number of groups pre-injury (number and connectedness), age, and

### Table 2. Correlations between PTG at time 1 and time 2 with other study related variables \((N = 36)\).

|                        | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. PTG Time 1          | +.637*** | +.316 | +.157 | +.436** | +.162 | +.133 | +.426* | −.056 | −.083 |      |
| 2. PTG Time 2          |      | +.098 | −.111 | +.375* | −.044 | −.025 | +.552*** | −.057 | −.026 |      |
| 3. # Groups pre-ABI    |      |      | +.237 | +.197 | +.451** | +.175 | +.048 | −.008 | −.246 |      |
| 4. # Groups            |      |      |      | −.275 | +.285 | +.594*** | −.078 | −.040 | −.222 |      |
| 5. # New groups        |      |      |      |      | +.069 | +.083 | +.442** | −.216 | +.183 |      |
| 6. EXITS Pre-ABI       |      |      |      |      |      | +.283 | +.147 | +.081 | −.146 |      |
| 7. EXITS Maintain      |      |      |      |      |      |      | −.061 | −.047 | −.195 |      |
| 8. EXITS New Groups    |      |      |      |      |      |      |      | −.140 | −.133 |      |
| 9. Age                 |      |      |      |      |      |      |      |      |      | −.160 |
| 10. Time since ABI     |      |      |      |      |      |      |      |      |      |      |

***\(p < .001\), **\(p < .010\), *\(p < .05\). See Supplementary Material (Table S1) for correlations between time 1 variables for the full sample at time 1 \((n = 50)\).
length of time since injury. There was no significant total effect, \( b = 0.33, t = 0.28, p = .781, [-2.12, 2.79] \) and no direct effect, \( b = -0.69, t = -0.58, p = .569, [-3.14, 1.76] \). Figure 3 demonstrates that individuals who formed more new group memberships post-injury and reported greater connectedness with these new groups, reported greater PTG at time 2.

**Discussion**

**Overview of findings**

We found evidence that new group memberships formed after an ABI were associated with greater PTG through stronger connectedness with these new group memberships, even controlling for initial PTG, and any potential effects of total pre-injury group memberships and maintained group memberships. This provides support for the social identity gain hypothesis, and the arguments of SIMIC and SIMTIC. However, in contrast to our predictions, the number of group memberships maintained and connectedness with these group memberships was not predictive of subsequent PTG. It appears that for PTG the quality of new group memberships, in terms of how strongly a person identifies as a member of these groups and feels connected to these groups, is an important predictive factor of future PTG.

**New groups and PTG**

The results from this research provide support for the hypothesis that the formation of new group memberships can facilitate positive adaptation to life
transitions, consistent with the predictions of SIMIC (Iyer et al., 2009; Jetten et al., 2015). It also offers support for the specific prediction of SIMTIC that new groups can form the basis of PTG (Muldoon, Haslam, et al., 2019). Specifically, we show that for ABI survivors new social group memberships (i.e., group-based connections made after injury) were predictive of an increase in PTG over time when individuals felt more strongly connected with these new group memberships. This extends previous research that showed connectedness with new social groups led to lower PTS for survivors of an ABI (Jones et al., 2012). Our study suggests that when people feel an increased sense of connectedness with new social groups they may experience a sense of growth where the self is “transformed” (Joseph, 2011). In the present sample, participants that felt more connected to their new social group memberships reported newfound priorities for life, a greater appreciation of life, an enhanced understanding of spiritual matters, increased engagement and closeness with others, and increased inner strength to overcome future difficulties. Notably, this increase in PTG was evident across a period of around seven months between the first measurement point and the second. Hence, facilitating access to and encouraging identification with new social groups can potentially improve PTG for people who have experienced an ABI (see also; Jetten et al., 2014).

Similar to some past research (Study 1a, Jetten et al., 2015; Sønderlund et al., 2017), we show that it was not just the mere quantity of new social group memberships that was important (the number of which were quite small in the present sample). Rather, the perceived quality of connections with these new groups was critical for the development of PTG. Individuals who reported being more active, making more friends, and building stronger ties within new social groups reported an increase in PTG. This offers strong support for the theoretical position that simply bringing people together and providing social support is not necessarily sufficient for positive health outcomes, rather people need to identify with their social groups and experience a sense of belonging and enhanced social connectedness (Cruwys, Haslam, Dingle, Jetten, et al., 2014; Jetten et al., 2014; Muldoon, Walsh, et al., 2019; Postmes et al., 2019; Sani et al., 2012).

We also provide evidence that the experience of a traumatic life change, such as an ABI, can promote the development of new social groups. For instance, over 40% of participants reported becoming part of a rehabilitation or community group for survivors of brain injury and many participants also joined a new hobby group. This points to ways in which traumatic experiences can present opportunities for the growth of group memberships. Another example of this is when individuals recovering from alcohol or drugs misuse form new peer networks with others who are in recovery (e.g., Best et al., 2011). Further these groups can be transitional groups, opening up more opportunities for new group memberships (e.g., community groups, Best et al., 2014; Dingle, Cruwys, et al., 2015). Of course, this is not to say that trauma always leads to
the development of new group memberships. For some people the experience of an ABI can result in social membership loss and identity loss (Muldoon, Walsh, et al., 2019). Further, trauma can lead to social withdrawal (Hofmann et al., 2003; Orsillo et al., 1996) and impair people’s ability to engage with and bond with others (Cloitre et al., 2008), particularly where the trauma is stigmatized (Kellezi et al., 2009; Naughton et al., 2019). More research is needed to elucidate when trauma may act as a vehicle to promote group membership growth, and when it does not.

**Maintenance of pre-injury Groups and PTG**

However, inconsistent with the hypotheses of SIMIC we found that maintenance of pre-injury group memberships did not predict PTG. Typically, maintenance of groups held prior to a life transition predicts greater well-being (Cubis et al., 2019; e.g., Haslam et al., 2008), but this was not observed in the present sample in terms of PTG. There could be several reasons for this finding, including methodological differences between studies (specifically time since injury), the nature of ABI, and the nature of PTG.

In the present sample participants were on average ten years post-injury. It is possible given this timeframe that for some participants maintenance of these “old” group memberships was no longer important in terms of adjustment and the development of PTG. Indeed, a previous study reporting a positive association between group continuity and well-being focused on people who had recently experienced an ABI (approximately 8 months post-injury; Haslam et al., 2008). However, our results are somewhat similar to Jones et al. (2012) who found maintenance of pre-injury groups had no effect on PTS, and this was in a sample of people who were 3 months post-injury. More research is needed to determine if time since injury influences the effects of social continuity on subsequent psychological outcomes.

Previous research has also highlighted the importance of old and new identities being compatible (Iyer et al., 2008, 2009; Jetten et al., 2012; Seymour-Smith et al., 2017; Sønderlund et al., 2017). Perhaps due to the nature of ABI identity continuity can sometimes be compromised by past groups being less compatible with the post-injury self, for instance, due to a changed sense of self, or other factors such as physical or cognitive barriers. It is also worth noting that sometimes group continuity is not particularly helpful, for instance holding onto a “user” identity following a drug and alcohol misuse treatment programme has been shown to undermine recovery (Dingle, Stark, et al., 2015). Our results and those of Jones and colleagues (2012) suggest that the positive effects of maintaining pre-injury group memberships may depend on the type of traumatic event experienced, at least in terms of PTG and PTS consistent with prior hypotheses (Muldoon, Walsh, et al., 2019). Indeed, Jones et al. (2012) argue that ABI is often a permanent existential change, and brain injuries often
create difficulties in interacting with the pre-injury social network (Gracey et al., 2008; Jones et al., 2012; Muldoon, Walsh, et al., 2019). Hence, for ABI survivors meeting the norms and expectations of pre-injury social groups may at times be challenging, whereas membership of new social groups can sometimes be more accepting and offer a new sense of belonging (Muldoon, Haslam, et al., 2019).

Another important aspect to consider is the nature of PTG itself which taps into transformation and the establishment of a reconstructed self. Whilst maintaining continuity with previous group memberships may have observable benefits for well-being, a break from social identity continuity potentially affords the formation of a new sense of belonging, a transformed self and hence, PTG. Although this change in group membership may cause some increased threat and psychological disruption in the short-term, in the longer-term relinquishing old group memberships and exploring a new sense of belonging within new social groups might be beneficial (Iyer et al., 2009; Muldoon, Walsh, et al., 2019; Oswald & Clark, 2003). It is conceivable and worthy of further research that whilst maintaining pre-existing social groups (social identity continuity) may protect well-being in some cases, for certain life-changing and traumatic events taking up new groups and relinquishing old groups may be necessary to facilitate PTG; however, time since injury needs to be considered.

Considerations and future directions

It is worth noting that the overall change in PTG from time 1 to time 2 was modest \( (M_{\text{change}} = 2.61, \ SD = 8.52) \). However, other research employing a range of interventions to promote PTG report similar changes in PTG over time. For instance, Knaevelsrud et al. (2010) demonstrated that an online cognitive behavioural therapy (twice weekly 45-minute sessions for 5 weeks) resulted in a 4.90 increase in PTG (using the full PTGI) in individuals who experienced a trauma approximately 10.7 years previously. Similarly, an internet-based cognitive behavioural writing intervention (5 weeks, 2 assignments per week) resulted in a mean increase of PTG of 4.54 for individuals who suffered a bereavement in the past 4 years (Wagner et al., 2007).

However, perhaps the amount of time passed since the brain injury matters for the development of PTG. In the present sample time since injury varied considerably among participants. While this variation between participants is not uncommon in research on populations who have experienced an ABI (e.g., Baseotto et al., 2022; Collicutt McGrath & Linley, 2006; Rogan et al., 2013), it may have implications for the observed results and interpretation of the findings. A debate exists as to when PTG may occur following an ABI and when the greatest growth may occur. Some research argues that the greatest increases in PTG occur in the first 5 years post-injury (Pais et al., 2019). While other research
suggests that in the case of brain injury meaningful changes in PTG are only possible 3 years post-injury, arguing that after a brain injury individuals need time to adjust to a new way of living, reflect on the impacts of the injury, and shed the negative aspects of the injury to take on a new identity (Collicutt McGrath, 2011; Powell et al., 2007). This hypothesis is supported by studies showing that individuals who experienced a brain injury more than 10 years ago demonstrated higher levels of PTG compared to individuals who experienced a more recent brain injury at 7 months post-injury (Collicutt McGrath, 2011) and 1–3 years post-injury (Powell et al., 2007). Our results somewhat contradict past research, in the present sample time since injury was not related to levels of PTG. We further explored this (see Supplementary Material for full details) and found that there were no differences in PTG change between individuals less than 5-years post-injury \( (n = 13) \) and individuals more than 5-years post-injury \( (n = 23) \), as such changes in PTG observed across the seven-month follow-up were not driven by individuals who had experienced a more recent brain injury. However, the fact that both groups displayed similar levels of PTG adds support for the hypothesis that the majority of growth occurs early post-injury, consistent with the predictions of Pais et al. (2019). There is a need to replicate the observed findings within a longitudinal design using more comprehensive time assessments (e.g., 1-year post-injury, 3, 5, 10 years) to fully elucidate the potential temporal relationship between time since injury and the occurrence of PTG, both in terms of when the largest increases in PTG occur and for how long this growth continues.

There are a number of limitations with the current research. First, group memberships held pre-injury were measured retrospectively and did not specify a time-period, as such participants could interpret this question in different ways. Further, given the length of time elapsed since brain injury in the present sample (i.e., all participants experienced their brain injury over one year ago, with an average time of 10 years post-injury) self-reported information about previous social groups may have been prone to either individuals idealizing pre-injury relationships (resulting in an over-estimation of perceived connection with previous groups) or an idealization of current growth (resulting in an under-reporting of pre-injury group connectedness). Second, the number of participants that completed measures at both time-points was relatively small and quite homogenous. All participants were Caucasian and resided in the South-West of Ireland. Given the small sample size we may have lacked significant power to detect a significant indirect effect should one exist and this must be considered in interpreting the observed results. Furthermore, it must be noted that all participants were engaged with community rehabilitation services and opted to engage in this research, as such, these participants may have been more open to new experiences than individuals who did not take part in this study and they were already a member of a new group per se (ABI Ireland). In addition to this, these participants would have already been afforded
opportunities to develop social connections with other people who have experienced an ABI which may have influenced PTG. This may limit the generalizability of the present findings and therefore the observed relationships should be considered as preliminary evidence that connectedness with new groups predicts PTG. Further research is needed to replicate this effect in a more diverse and larger population.

Nevertheless, this study demonstrates that changes in social group memberships occur post-ABI and these changes are meaningfully related to PTG, even when controlling for factors known to influence outcomes in this population. This work builds on previous studies by exploring the predictions of SIMIC in a unique and vulnerable sample. One of the strengths of this work is the use of a prospective design increasing our ability to claim a causal pathway. This has implications in terms of how we support individuals suffering from an ABI. Specifically, interventions should target the development of social groups that focus on fostering connections with other group members and encourage members to identify as a member of the group. It is not enough to simply provide ABI survivors with structured groups, rather we must facilitate a sense of connection and identification with these groups to see benefits in terms of PTG. This research suggests group-based support may be a cost-effective solution to a major public health challenge and highlights the importance of continued government funding for group supports.

**Author note**

Full ethical approval was granted for this study consistent with the standards of the Declaration of Helsinki and the APA Code of Conduct. All participants provided informed consent prior to participation.

**Note**

1. Correlations among study variables for the 50 participants who only took part at time 1 are reported in the Supplementary Material, Table S1.

**Data availability statement**

The data that support the findings of this study are available from the corresponding author upon request.

**Disclosure statement**

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. All authors consented to the submission of this manuscript.
Funding

This work was supported by the Irish Research Council and Acquired Brain Injury Ireland under an Enterprise Partnership award [grant number EPSPD/2013/691] awarded to Dr Elaine Kinsella; SG, AN, and GM are funded by the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (Grant agreement No. 884927) awarded to Prof Orla Muldoon.

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