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**Are spousal partner perceptions of continuity and discontinuity within the relationship
linked to the symptoms of acquired brain injury?**

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Running head: Continuity and discontinuity

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Are spousal partner perceptions of continuity and discontinuity within the relationship linked to the symptoms of acquired brain injury?

Purpose: Some partners experience their relationship with a person with brain injury as the continuation of a loving pre-injury relationship (*continuity*), but others feel that the pre-injury relationship has been lost and replaced with something very different (*discontinuity*). This study provided a quantitative test of claims arising from qualitative research that certain symptoms of the injury might contribute to the experience of discontinuity – specifically, lack of emotional warmth, reduced social interaction and aggression.

Method: Fifty-three partners providing care to someone with brain injury completed questionnaires assessing continuity/discontinuity and a range of symptoms (emotional warmth, conversational ability, aggression, depression, somatic complaints, cognition, communication, aggression and physical disability).

Results: Discontinuity was significantly correlated with all symptom variables except physical disability but, in a multiple regression, only the measures of emotional warmth, conversation, aggression and depression made a significant unique contribution.

Conclusion: Discontinuity has been linked with relationship dissatisfaction and dysfunction, greater burden and distress, and a less person-centred approach to the provision of care. Identifying which symptoms contribute to discontinuity may enable partners to be more effectively supported in terms of how they make sense of and react to those symptoms, so that a greater sense of continuity may be retained.

Keywords: marriage, caregivers, interpersonal relationships, relationship continuity, brain injury, aggression

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Introduction

Partners/spouses providing care to those with an acquired brain injury (ABI) vary in the experience of their relationship with that person. For some the relationship feels like a continuation of a loving pre-injury relationship, but for others this pre-injury relationship has been lost and replaced with something very different [1-5]. Similar differences have been reported for partners providing care for people with dementia [6-10]. Using findings from this dementia research as a framework, Villa and Riley [11] explored in more depth these experiences of continuity and discontinuity in the context of ABI. They suggested several components that cluster around the core experience of the relationship as a continuation of a loving pre-injury relationship, and several contrasting components clustering round the core experience of discontinuity. In the case of *discontinuity*, the relationship is no longer experienced as a marriage or partnership, but as a relationship defined by the giving and receiving of care, with some likening it to a parent/child or nurse/patient relationship. Associated with this, the sense of being a partnership is lost and the spouse/partner responds to their situation from a more individualistic perspective (*I* rather than *we*). A major contributor to experiencing discontinuity in the relationship is a sense that the other person is no longer the same person they were before the injury: It is difficult to feel love and affection for someone who feels like a stranger. Love is replaced with other feelings, often those characteristic of a relationship based on care provision, such as feelings of responsibility and protectiveness. Finally, the experience of losing the pre-injury person and relationship gives rise to loss and grief. By contrast, in the case of *continuity*, despite the changes that have occurred, the relationship and the person with the injury are both experienced as essentially a

continuation of what preceded the injury; feelings of love and affection are retained, as is the sense of belonging to a couple; and feelings of loss and grief are more limited or absent.

Individually, these various experiences have been widely reported in the ABI literature; for example, partners in qualitative studies have often described how the person with the injury has become a stranger to them [1,2,5,12,13]. What is novel in the study by Villa and Riley [11] is the suggestion that these experiences cluster around the central core of either the loss or retention of a loving pre-injury relationship. More generally, the approach differs from many other conceptualizations of the impact of ABI on relationships in that it incorporates the idea that a pre-injury loving relationship can, in some cases, survive the injury. Although some participants in qualitative studies do express the persistence of positive feelings towards the person with the ABI [1,2,4,11], many thematic summaries of the partner experience focus almost exclusively on negative changes to the relationship [5,12,14] or describe how the relationship breaks down before being rebuilt in the longer term [15,16]. The suggestion that a loving relationship can persist in some cases is not to suggest that there are no changes in those relationships, that those changes are not difficult and challenging, or that the partner is in denial about the changes. Rather, for some individuals, despite the changes and an acknowledgement of them, the essential core of a loving relationship persists.

Yasmin, Keeble and Riley [17] described the development and evaluation of a questionnaire to measure perceptions of relationship continuity and discontinuity in the context of ABI (the *Birmingham Relationship Continuity Measure – Acquired Brain Injury* (BRCM-ABI)). Items on the questionnaire address the different components of the experience of continuity/discontinuity outlined by Villa and Riley [11] (specifically, *redefining the relationship, same/different person, same/different feelings, couplehood and loss*). Psychometric evaluation of the measure provided support for the underlying

assumption that the experiences of partners tend to cluster around continuity or discontinuity, rather than being a mixture of the two.

Relationship continuity appears to have benefits in comparison to discontinuity. Some qualitative ABI studies have reported that participants who perceived discontinuity describe a greater sense of burden and distress, whereas those who perceived continuity feel more able to cope emotionally with the situation [1,11]. It may be that the loving relationship acts as a buffer against more negative emotional reactions [1,11]. Discontinuity is also, in part, a type of 'ambiguous' loss in which the person is physically present but psychologically absent, and the negative emotional impact that such loss has across different contexts is well documented [18]. Qualitative studies also suggest that continuity is associated with a more individualised person-centred approach to the provision of care [1,11]. A recent mixed-methods study [19] using the BRCM-ABI supported this: Greater continuity (measured by the BRCM-ABI) was significantly correlated with being more person-centred in the understanding and management of challenging interpersonal behaviours (measured by quantitative coding of interview data). Qualitative studies have also reported that discontinuity is associated with greater dissatisfaction with the relationship and doubts about remaining within it [1,11]. Consistent with this, Yasmin, Keeble and Riley [17] reported that scores on the BRCM-ABI were significantly correlated with scores on questionnaires assessing relationship satisfaction and general relationship qualities such as dyadic consensus and cohesion.

Given the potential benefits of continuity, it is important to understand why some partners experience continuity, but others experience discontinuity. Such knowledge would permit the identification of those likely to experience discontinuity, and enable them to be supported at an earlier stage in how they make sense of, and adjust to, changes in their

relationship. Knowing why these different experiences arise would also deepen our understanding of their nature and thereby enable the development of more effective support.

One reason for individual differences in continuity/discontinuity may relate to the symptoms of the brain injury: It may be more difficult to maintain a sense of continuity of the person with ABI and of the relationship in the face of certain changes in the person with the ABI. For participants in the qualitative study by Villa and Riley [11] a lack of warmth, affection and empathy from the person with ABI appeared to present a particular challenge in terms of maintaining a sense of continuity. The lack of expressed love made it difficult to maintain loving feelings in return. Furthermore, the love shown by the person with the ABI before the injury was central to the way some participants identified that person and their relationship, and its disappearance appeared to undermine the identity of the individual and the relationship. Consistent with this, a quantitative study by Weddell and Wood [20] found that family reports of lower perceived empathy were strongly correlated with judgments of global personality change in the person with ABI, a concept closely related to perceptions of discontinuity in the identity of that individual. Participants in a qualitative study by Bodley-Scott and Riley [1] similarly described how the absence of affection and empathy had a corrosive effect on the relationship, but their perceptions of continuity were also challenged by broader changes in the level of engagement in pro-social interactions (i.e. interactions that strengthen social bonds with others): Lack of conversation, social withdrawal and a reduced sense of humour appeared to undermine the sense of shared enjoyment of life that was part of the identity of their pre-injury relationship and part of the sense of being a married couple. Participants in this study also highlighted the negative impact that aggression had on the continuity of loving feelings within the relationship. They found it difficult to switch off the hurt and resentment engendered by the aggression in favour of the loving feelings that characterised their pre-injury relationship.

In summary, qualitative research has suggested that the experience of discontinuity is influenced by aggression, a lack of emotional warmth and empathy within the relationship, and a broader lack of pro-social interaction on the part of the person with the ABI. The aim of the present study was to evaluate these suggestions using quantitative methodology. Participants completed the BRCM-ABI along with questionnaires about aggression, emotional warmth and conversational ability (as a measure of pro-social interaction). To provide a contrast, participants also completed a range of questionnaires evaluating other symptoms of ABI that were not expected to have a particularly strong association with relationship continuity/discontinuity (e.g. the need for support in the activities of daily living). It was hypothesised that BRCM-ABI scores would show a stronger association with the measures of aggression, emotional warmth and general conversational ability than with the measures of other symptoms.

Method

Ethical approval for the study was provided by the ethics committee of the University that sponsored the research. All participants provided fully informed written consent.

Participants

A convenience sample was recruited through Headway, a UK organization that provides information and support to those affected by ABI. Participants opted into the research in response to advertising posters, presentations given about the research, or invitation letters distributed by the organization. Participants were required to be the partner of someone with an ABI that happened at least one year prior to participation, but no more than 15 years previously; to be currently living with this person and providing some degree of support; and to have lived with the person for at least 1 year prior to the ABI. To eliminate the inclusion of minor injuries (which might be expected to have less impact on the

relationship), the person with the injury who was being supported was required to have spent some time as a hospital in-patient because of their ABI.

The *Relationship Assessment Scale* [21] was also used to screen potential participants. The conceptualization of relationship continuity and discontinuity concerns the continuation of a loving pre-injury relationship; it was therefore important to exclude potential participants whose pre-injury relationship was not satisfactory because their inclusion might have contaminated the findings. Participants were accordingly required to complete the *Relationship Assessment Scale* with reference to their pre-injury relationship. This gives a measure of the general quality of relationships, and, to be included in the study, participants were required to score 21 or higher, as this score indicates that, overall, the person rated the pre-injury relationship as 'average' or 'better than average'.

The statistical analysis involved correlations and multiple regression. According to G*Power [22], in order to test the individual contribution of eight predictor variables (i.e. the number of symptom measures to be entered in the regression), with alpha set at .05 and power at 0.8, a sample size of 52 would be required to detect large effect sizes ($f^2=.35$). A sample of 53 participants was therefore recruited for the study. This sample size was also adequately powered for the correlation analysis. With alpha set at .05, a sample of 53 was adequate to detect large correlations ($r=.5$) with a power of .97. The power analysis focused on large effect sizes because moderate and small effects are less likely to have clear practical implications for developing interventions for couples dealing with ABI. Expending the resources required to detect moderate or small effects is also unjustifiable in the earlier phases of researching a topic when it has yet to be established that there is an effect of interest.

Measures

Birmingham Relationship Continuity Measure – Acquired Brain Injury [17]. This is a 23-item questionnaire designed to evaluate a partner's perceptions of relationship continuity/discontinuity following ABI. Previous psychometric evaluation of the measure indicated good internal consistency, test-retest reliability, discriminative power and construct validity [17]. Higher scores indicate a greater sense of relationship continuity.

LaTrobe Communication Questionnaire (LCQ) [23]: The informant-based version of the LCQ was used. The scale was developed to assess conversation skills in traumatic brain injury and was used in this study to provide the measure of general pro-social interaction. Items address initiation/ conversation flow, disinhibition/ impulsivity, communicational effectiveness, and partner sensitivity. Psychometric evaluations have shown satisfactory internal consistency (Cronbach's alpha above 0.7 for all subscales), test-retest reliability and discriminative validity [23,24]. Only the total score was used in the analysis of the results of the present study. Higher scores indicate greater impairment.

Neurobehavioral Functioning Inventory (NFI) [25]: The NFI was developed to assess a range of symptoms following traumatic brain injury and has subscales relating to depression, somatic complaints, memory/attention, communication, aggression and motor problems. The *family record form*, in which a family member rates the symptoms, was used in the present study. The original psychometric evaluation of this informant version showed good internal reliability (Cronbach's alphas ranged from .86 to .95) and construct validity [26]. Each subscale total was used as a predictor variable in the multiple regression except for *communication*. The LCQ score was used in preference to this because the LCQ focuses on more sophisticated conversational skills, whereas the *communication* subscale addresses more basic abilities (e.g. the ability to talk sense) and abilities that are not particularly pro-social (e.g. reading and writing). Higher scores indicate higher levels of impairment.

Activities of Daily Living Questionnaire (ADLQ) [27]: The ADLQ is an informant-based assessment that evaluates functioning in the areas of self-care, household care, employment and recreation, shopping and money, travel, and communication. A higher total score indicates the need for more assistance in activities of daily living. The ADLQ was developed in the context of dementia and has been reported to have good internal consistency and construct validity [27]. Psychometric evaluation of its use in ABI has not been carried out. It was chosen because it is informant-based and covers a wide range of activities from more basic self-care skills to more complex ones such as community travel. In these respects, it had an advantage over some measures of the activities of daily living that have been evaluated for use in ABI.

Intimate Bond Measure (IBM) [28]: The IBM was developed to assess one person's perceptions of the other person's care and control in an intimate relationship. Only the *care* score was used in the present study. This concerns whether the other person is viewed as loving, affectionate and caring, and was used in this study to provide a measure of the extent to which the person with the injury showed emotional warmth to the participant. Higher scores indicate a greater level of warmth. The measure was developed and psychometrically evaluated with reference to intimate relationships in general, showing good internal reliability and concurrent validity [28]. It has not been evaluated for use with relationships in ABI, but it was not possible to identify a measure of emotional warmth that has been evaluated in ABI.

As well as the above questionnaires, participants provided information about their demographic status, the length of their relationship with the person with ABI, what type of ABI was involved and when the ABI occurred. As part of the psychometric evaluation of the validity of the BRCM-ABI, participants also completed two questionnaires about the quality of their current relationship. The results of this, along with another evaluation study involving a different sample of 50 participants, are reported elsewhere [17].

Procedure

Participants were given the option of completing the questionnaires at the Headway centre they attended or returning them by post. The first author was available, at the centre or by telephone, to answer any questions or address any difficulties participants had in completing the questionnaires.

Results

Participants

Demographics details and information related to the ABI are contained in Table 1. Some participants did not provide a full set of demographic and ABI-related information because they were mistakenly given an incomplete version of the questionnaire about these issues. Subsequent attempts to obtain the information were not successful in every case. Table 2 shows the descriptive statistics for the ADLQ scores which provide an index of overall disability. Using the categories suggested by Johnson et al. [27], one participant fell into the ‘mild’ category, 18 into the ‘moderate’ category and 34 into the ‘severe’ category. The mean for the sample was on the cut-off point between the ‘moderate’ and ‘severe’ categories. For the measure of the pre-injury relationship (RAS), the mean was 29.11, the standard deviation was 2.84 and scores ranged from 24 to 35.

It is unclear how representative of the population the sample was. Those in a same-sex relationship were unrepresented since all participants were in a heterosexual relationship. Although there were more females than males with an ABI (Table 1), the ratio differed according to the type of injury. There were 14 male and 6 female partners with traumatic brain injury, and this approximates the 2:1 male to female ratio of traumatic brain injury in the UK population [29]. There were 8 males and 16 females with stroke. Although the incidence of stroke in the general population tends to be higher in males, females tend to be

more severely affected [30]. Given that the partners of most of the present sample were more severely disabled, the higher number of females with stroke may reflect this association between gender and severity.

[INSERT TABLE 1 ABOUT HERE]

[INSERT TABLE 2 ABOUT HERE]

Data checks

There were no univariate or multivariate outliers, and no variable showed a significant departure from the normal distribution. Assumptions for correlation and multiple regression analyses were also met by the data, except for an issue about multicollinearity (explained below).

Descriptive statistics

Table 2 shows the means, standard deviations, ranges and Cronbach's alpha for all variables. The relatively low alpha for some subscales of the NFI should be noted.

Correlations

Correlations are shown in Table 3. As expected, the BRCM-ABI showed large correlations ($r > .70$) with measures of aggression (NFI-Aggression), the ability of the person with the ABI to engage positively in social interaction (LCQ), and to show warmth and affection (IBM). Participants who experienced aggression, poor social engagement and a lack of warmth were significantly more likely to report discontinuity in their relationship. Consistent with the expectation that these variables would be more strongly associated with discontinuity than other symptom variables, correlations with the BRCM-ABI were higher than those between the BRCM-ABI and the other symptom variables. However, the BRCM-ABI did show significant correlations with all the other symptom measures except NFI-

Motor. There were also high correlations between the different symptom measures. It was important, therefore, to use a multiple regression analysis to determine which measures made a significant unique contribution to the variance in BRCM-ABI scores.

[INSERT TABLE 3 ABOUT HERE]

Multiple regression

The initial regression analysis involved entering all eight symptom variables as predictors (using the LCQ in preference to the NFI-Communication) with the BRCM-ABI scores as the outcome variable. However, using the criteria of a conditioning index greater than 30 and two variance proportions above .5 for any given dimension [31], an unacceptable level of multicollinearity occurred. The problem reflects the number of variables being entered relative to the sample size, as well as the high correlations amongst variables (Table 3) [31]. Because the interest was in evaluating whether certain variables (i.e. the IBM, LCQ and NFI-Aggression) made a significant unique contribution to BRCM-ABI scores, the problem was addressed by reducing the number of variables in the analysis, rather than removing those with high intercorrelations (which would have removed the variables of interest). Starting with the variable with the lowest correlation with the BRCM-ABI, variables were removed from the analysis until an acceptable level of multicollinearity was achieved. This was achieved when the two predictor variables that showed the smallest correlations with BRCM-ABI scores (i.e. the ADLQ and NFI-Motor – Table 3) were removed. The results of this analysis are shown in Table 4. In line with the hypotheses, the measures of warmth and positive social interaction (IBM and LCQ) both made significant unique contributions to the variance in BRCM-ABI scores, as did the NFI-aggression. The Somatic and Memory/Attention subscales of the NFI did not make significant contributions, although the Depression subscale did. Overall, the model explained 83% of the variance in BRCM-ABI scores (adjusted R-squared = .825).

[INSERT TABLE 4 ABOUT HERE]

Demographic and injury-related variables

Relationships between questionnaires scores and the demographic/injury-related variables shown in Table 1 were examined, using one-way ANOVA for categorical variables and Pearson's correlation for continuous ones. Because of the small number of participants in some categories, only White British and Asian British participants were compared in terms of ethnicity and, for religion, those who stated that they had no religion were compared with those who declared a religious belief. There were few significant findings. In terms of how participants rated their partner with ABI on the NFI, White British partners (mean=26) had more somatic impairment than Asian British (mean=23) ($F(1,44)=4.25$; $p=.045$); and males (mean=26) had more motor impairments than females (mean=23) ($F(1,51)=5.43$; $p=.024$). Those with traumatic brain injury (mean=78) showed more impairment on the LCQ than those with stroke (mean=68) ($F(1,42)=5.80$; $p=.021$).

Discussion

The findings were generally in line with the hypotheses derived from qualitative research [1,11]. Those who reported discontinuity were significantly more likely to report that the person with the ABI was aggressive (measured by NFI-Aggression), showed less warmth and affection within the relationship (measured by the IBM) and was generally less communicative and less likely to make a positive contribution to conversations (measured by the LCQ). Furthermore, these variables made significant unique contributions to the variance in BRCM-ABI scores, whereas most of the variables measuring other symptoms (specifically, NFI-Memory, NFI-Somatic, NFI-Motor and ADLQ) either showed weak/absent correlations with BRCM-ABI scores or did not make a significant contribution to the variance in BRCM-ABI scores in the multiple regression. This suggests stronger connections

between discontinuity and aggression, lack of warmth and communication in comparison to other symptoms of brain injury.

The findings are consistent with some research on relationship continuity and discontinuity in dementia. Discontinuity has been reported to be correlated with challenging interpersonal behaviours and communication difficulties, but not with cognitive decline, changes in mood or psychotic symptoms [32,33]. The more restricted concept of discontinuity in the identity of the person with dementia has also been linked with lack of warmth, affection and empathy [34,35].

The findings of the present study, and the suggestions about relationship continuity that underpinned the study, are also consistent with wider research on the impact of different symptoms of ABI on family members. A reliable finding in this literature is that, as in the present study, social, emotional and behavioural changes have a greater impact on family members than physical and cognitive changes [36-39]. Furthermore, reduced emotional responsiveness, a lack of communal prosocial behaviours towards family members, and challenging interpersonal behaviours such as aggression have been highlighted as major contributors to an increased sense of burden and reduced emotional wellbeing in the family member providing care following ABI [36,38-43]; and, in cases where this is a spouse or partner, to dissatisfaction, dysfunction and breakdown in the relationship [4,36,38,44]. Despite the importance of these outcomes (i.e. emotional wellbeing of the partner and the strength of the relationship), the mechanisms by which they are connected to interpersonal and emotional changes in the person with the ABI have rarely been investigated in a systematic way and so little is known about them [1]. The suggestion that these changes challenge the ability of the partner to maintain their connection with a loving pre-injury relationship, is a step forward in developing a better understanding of the issue.

An unanticipated finding in the present study was that the NFI-Depression variable made a significant contribution in the multiple regression analysis. Weddell and Leggett [45] similarly found that depression in the person with the ABI was correlated with relatives' judgments of global personality change, a concept closely related to the idea of discontinuity in the identity of the person. It is unclear why this is the case. Possibly, depression may have contributed to discontinuity because it leads to reductions in emotional warmth and affection within the relationship and to a decrease in general pro-social interaction (i.e. interactions that strengthen social bonds with others). Indeed, the NFI-Depression variable was highly correlated with the IBM and LCQ that were included as measures of affection and pro-social interaction (Table 3). It is possible that this provides only a partial explanation because, in the multiple regression, the variable still made a significant unique contribution to BRCM-ABI scores even when its correlations with the IBM and LCQ were taken into account. However, the LCQ focuses on the skills involved in holding a conversation and it does not address other aspects of pro-social interaction, the absence of which have been linked to continuity, such as a sense of humour and a readiness to spend time with others [1]. The NFI-Depression variable may have been more sensitive to these changes.

Limitations

Some limitations relate to the measures used in the study. The IBM and ADLQ have not been psychometrically evaluated for use with ABI samples, although they did show satisfactory internal consistency in the current sample (Table 2). Cronbach's alpha for some of the subscales of the NFI was below 0.7 and suggested relatively low internal consistency (Table 2). Although initial evaluations of the inventory suggested high levels of internal consistency [25,26], a more recent evaluation [46] also found that some of the subscales lack internal consistency. More generally, it should be noted that the full range of ABI symptoms

were not assessed in the present study and therefore some contributors to perceptions of discontinuity may have been overlooked.

Other limitations of the study should also be noted. The sample was self-selected and therefore it is unclear how representative it is of the population. As noted earlier, one issue was that all the relationships were heterosexual. Furthermore, the current sample also provided other data, not reported here, that was used to evaluate the psychometric properties of the BRCM-ABI and sample bias may have had an inflated effect because of its impact on both studies. The design of the study also prevents any conclusions about the direction of causality: Rather than symptoms impacting on the experience of continuity, it may be, for example, that those who experience discontinuity in the relationship are also more likely to provide a more negative account of certain symptoms. The analysis of the links between questionnaire scores and demographic/injury-related variables was limited by insufficient numbers in some of the demographic categories and by some missing data (e.g. about the type of injury). A larger sample would have allowed these links to be properly analysed. It would also have allowed detection of any smaller associations that exist amongst the variables, as well as delivering greater precision in the estimates of effect size. Finally, data about initial brain injury severity were not gathered. This was because the organizations from which participants were recruited do not keep medical records. It could be argued that a measure of the severity of subsequent disability (such as that provided by the ADLQ in the present study) is more relevant to considering the impact of ABI on intimate relationships than the severity of the initial injury.

Implications

The present study is consistent with suggestions from qualitative research that it may be more difficult to maintain a loving relationship in the face of aggression, emotional coldness and reduced prosocial interaction. Previous qualitative studies have begun to

explore the reasons for this. For example, the lack of expressed affection and love from the person with the ABI may make it difficult to maintain loving feelings in return [1,11] and some participants have described how difficult it is to switch off the hurt and resentment engendered by behaviours such as aggression in favour of the loving feelings that characterised their pre-injury relationship [1]. However, these are complex issues that merit more detailed qualitative investigation.

Better understanding of the impact of these symptoms on the relationship would lay the foundation for developing interventions aimed at supporting the partner cope more effectively with the changes. Yasmin and Riley [47] described a case study involving an intervention designed, in part, to promote a sense of relationship continuity in a couple where the husband had experienced a stroke. One aspect of the intervention involved supporting the wife to appraise some of the changes in his behaviour, not as signs of a radical change in his personality or feelings towards her, but as symptoms of the stroke interacting with aspects of her husband's personality and feelings towards her that were continuous with how he was before the stroke. For example, the wife found her husband's lack of communication annoying and upsetting. She interpreted it as a sign that he no longer cared for her. Lack of caring and communication was in marked contrast to his pre-stroke identity, and this may have contributed to her sense of discontinuity in his identity and their relationship, and her struggle to maintain loving feelings for him. Through facilitating communication between them and working collaboratively on a formulation of the difficulty between them, the wife came to see her husband's lack of communication as being driven, in part, by his perception that his laboured communication was frustrating for her and by his desire, in the context of his perception that he was a burden to her, not to add to her burden by talking about his own problems and difficulties. These motives were highly consistent with her perception that, before the stroke, he was strongly driven by a desire to protect her from upset and distress.

This may have helped her restore a sense of continuity in their relationship. Measures taken before and after therapy indicated an increase in her perceptions of continuity, decreased stress and higher ratings of relationship quality.

Recent reviews of interventions for families affected by ABI suggest that most current interventions for family carers focus primarily on providing education, general coping skills (such as problem-solving and stress management) and peer support [48,49]. Although there are some exceptions [50], few are based on a theoretical conceptualization of how ABI affects family relationships. Developing interventions that focus on specific ideas about how relationships are challenged by the ABI may produce more targeted and effective support for family members.

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Declaration of conflicting interests

The authors report no conflicts of interest.

References

1. Bodley-Scott SEM, Riley GA. How partners experience personality change after traumatic brain injury – its impact on their emotions and their relationship. *Brain Impair.* 2015;16(3):205-220.
2. Gill CJ, Sander AM, Robins N, et al. Exploring experiences of intimacy from the viewpoint of individuals with traumatic brain injury and their partners. *J Head Trauma Rehabil.* 2011;26(1),56–68.
3. Gosling J, Oddy M. (1999). Rearranged marriages: marital relationships after head injury. *Brain Inj.* 1999;13(10),785–796.
4. Hammond FM, Davis CS, Whiteside OY, et al. Marital adjustment and stability following traumatic brain injury: a pilot qualitative analysis of spouse perspectives. *J Head Trauma Rehabil.* 2011;26(1),69–78.
5. Kratz AL, Sander AM, Brickell TA, et al. Traumatic brain injury caregivers: A qualitative analysis of spouse and parent perspectives on quality of life. *Neuropsychol Rehabil.* 2017;27(1):16-37.
6. Chesla C, Martinson I, Muwaswes M. Continuities and discontinuities in family members' relationships with Alzheimer's patients. *Fam Relat.* 1994;43(1),3-9.
7. Evans D, Lee E. Impact of dementia on marriage: a qualitative systematic review. *Dementia (London).* 2014;13(3):330-349.
8. Kaplan L. A couplehood typology for spouses of institutionalized persons with Alzheimer's Disease: Perceptions of 'We'–'I'. *Interdisciplinary Journal of Applied Family Relations.* 2001;50(1),87-98.
9. Lindauer A. Harvath TA. The meanings caregivers ascribe to dementia-related changes in care recipients: a meta-ethnography. *Res Gerontol Nurs.* 2015;8(1),39-48.

10. Walters AH, Oyebode JR, Riley GA. The dynamics of continuity and discontinuity for women caring for a spouse with dementia. *Dementia (London)*. 2010;9(2):169-189.
11. Villa D, Riley GA. Partners' experiences of relationship continuity in acquired brain injury. *Cogent Psychology*. 2017;4(1).
12. Brunsden C, Kiemle G, Mullin S. Male partner experiences of females with an acquired brain injury: An interpretative phenomenological analysis. *Neuropsychol Rehabil*. 2017;27(6):937-958.
13. Whiffin CJ, Ellis-Hill C, Bailey C, et al. We are not the same people we used to be: An exploration of family biographical narratives and identity change following traumatic brain injury. *Neuropsychol Rehabil*. 2019;29(8):1256-1272.
14. Holloway M, Orr D, Clark-Wilson J. Experiences of challenges and support among family members of people with acquired brain injury: a qualitative study in the UK. *Brain Inj*. 2019;33(4): 401-411.
15. Godwin EE, Chappell B, Kreutzer JS. Relationships after TBI: A grounded research study. *Brain Inj*. 2014;28(4):398–413.
16. O'Keeffe F, Dunne J, Nolan M, et al. "The things that people can't see" The impact of TBI on relationships: an interpretative phenomenological analysis, *Brain Inj*. 2020;34(4):496-507.
17. Yasmin N, Keeble HS, Riley GA. The development and psychometric evaluation of the Birmingham Relationship Continuity Measure for Acquired Brain Injury. *Brain Inj*. 2020;34(8):1089-1099.
18. Boss P, Yeats JR. Ambiguous loss: a complicated type of grief when loved ones disappear, *Bereavement Care*. 2014;33(2),63-69.
19. Riley GA, Keeble HS, Yasmin N, et al. Relationship continuity and person-centred care: An exploratory mixed-methods investigation of spousal partners' responses to the

- challenging care needs of those with acquired brain injury. *Neuropsychol Rehabil.* 2020;30(6):1169-1189.
20. Weddell RA, Wood RL. Perceived personality change after traumatic brain injury II: comparing participant and informant perspectives. *Brain Inj.* 2018;32(4):442-452.
 21. Hendrick SS, Dicke A, Hendrick C. The Relationship Assessment Scale. *J Soc Pers Relat.* 1998;15(1):137-142.
 22. Faul F, Erdfelder E, Lang AG, et al. G*power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods.* 2007;39:175-191.
 23. Douglas JM, Bracy CA, Snow PC. Exploring the factor structure of the La Trobe Communication Questionnaire: Insights into the nature of communication deficits following traumatic brain injury. *Aphasiology.* 2007;21(12):1181-1194.
 24. Struchen MA, Pappadis MR, Mazzei DK, et al. Perceptions of communication abilities for persons with traumatic brain injury: Validity of the La Trobe Communication Questionnaire. *Brain Inj.* 2008;22(12):940-951.
 25. Kreutzer JS, Seel RT, Marwitz JH. *Neurobehavioral Functioning Inventory.* San Antonio (TX): Pearson; 1999.
 26. Kreutzer JS, Marwitz JH, See1 R, Serio CD. Validation of a neurobehavioral functioning inventory for adults with traumatic brain injury. *Arch Phys Med Rehabil.* 1996;77:116-24.
 27. Johnson N, Barion A, Rademaker A, et al. The Activities of Daily Living Questionnaire: a validation study in patients with dementia. *Alzheimer Dis Assoc Disord.* 2004;18(4):223-230.
 28. Wilhelm K, Parker G. The development of a measure of intimate bonds. *Psychol Med.* 1988;18(1):225-234.

29. Headway: Statistics resources [Internet]. London: Headway; no date [cited 2020 Dec 3]. Available from: <https://www.headway.org.uk/about-brain-injury/further-information/statistics/statistics-resources/>
30. Appelros P, Stegmayr B, Terent A. Sex differences in stroke epidemiology: a systematic review. *Stroke* 2009;40(4):1082-90.
31. Tabachnik BG, Fidell LS. Using multivariate statistics. London: Allyn & Bacon; 2001.
32. Lewis MA, Riley GA. Are spousal carers' perceptions of continuity and discontinuity within the relationship influenced by the symptoms of dementia? *Dementia* (London). in press.
33. Poveda B, Osborne-Crowley K, Laidlaw K, et al. Social cognition, behaviour and relationship continuity in dementia of the Alzheimer Type. *Brain Impair.* 2017;18(2):175-187.
34. Boylstein C, Hayes J. Reconstructing marital closeness while caring for a spouse with Alzheimer's. *J Fam Issues* 2012;33(5):584-612.
35. Strohminger N, Nichols, S. Neurodegeneration and identity. *Psychol Sci.* 2015;26(9):1469-1479.
36. Anderson MI, Parmenter TR, Mok M. The relationship between neurobehavioural problems of severe traumatic brain injury (TBI), family functioning and the psychological well-being of the spouse/caregiver: path model analysis. *Brain Inj.* 2002;16(9):743-57.
37. Kreutzer JS, Gervasio AH, Camplair PS. Patient correlates of caregivers' distress and family functioning after traumatic brain injury. *Brain Inj.* 1994;8(3):211-30.
38. Ponsford J, Olver J, Ponsford M, et al. Long-term adjustment of families following traumatic brain injury where comprehensive rehabilitation has been provided. *Brain Inj.* 2003;17(6):453-68.

39. Schönberger S, Ponsford J, Olver J et al. A longitudinal study of family functioning after TBI and relatives' emotional status. *Neuropsychol Rehabil.* 2010;20(6):813-829.
40. Griffin JM, Lee MK, Bangerter LR et al. Burden and mental health among caregivers of veterans with traumatic brain injury/polytrauma. *Am J Orthopsychiatry.* 2017;87(2):139-148.
41. Riley GA. Stress and depression in family carers following traumatic brain injury: the influence of beliefs about difficult behaviours. *Clin Rehabil.* 2007;21(1):82–88.
42. Tam S, McKay A, Sloan S et al. The experience of challenging behaviours following severe TBI: A family perspective *Brain Inj.* 2015;29(7-8):813-821.
43. Winter L, Moriarty HJ. Quality of relationship between veterans with traumatic brain injury and their family members, *Brain Inj.* 2017;31(4):493-501.
44. Wood RL, Liossi C, Wood L. The impact of head injury neurobehavioural sequelae on personal relationships: Preliminary findings. *Brain Inj.* 2005;19(10):845–851.
45. Weddell RA, Leggett JA. Factors triggering relatives' judgements of personality change after traumatic brain injury. *Brain Inj.* 2006;20(12):1221–1234.
46. Czuba KJ, Kersten P, Kayes NM et al. Measuring neurobehavioral functioning in people with traumatic brain injury: Rasch analysis of Neurobehavioral Functioning Inventory. *J Head Trauma Rehabil.* 2016;31(4):E59-68.
47. Yasmin N, Riley GA. Psychological intervention for partners post-stroke: a case report. *NeuroRehabilitation.* 2020;47(2):237-245.
48. Baker A, Barker S, Sampson A et al. Caregiver outcomes and interventions: a systematic scoping review of the traumatic brain injury and spinal cord injury literature *Clin Rehabil.* 2017;31(1):45–60.
49. Malec JF, Van Houtven CH, Tanielian T et al. Impact of TBI on caregivers of veterans with TBI: Burden and interventions. *Brain Inj.* 2017;31(9):1235-1245.

50. Yeates G. Towards the neuropsychological foundations of couples therapy following acquired brain injury: a review of empirical evidence and relevant concepts. *Neuro-Disability and Psychotherapy*. 2013;1(1):108-150.

Table 1

Demographic and Injury-Related Information

(N= 53)	Participants	Partner with ABI
Gender	Men= 28 (53%) Women= 25 (47%)	Men= 25 (47%) Women= 28 (53%)
Age	Mean= 57.11 SD= 12.70 Range= 36-81	Mean= 57.91 SD= 13.15 Range= 35-85
Ethnicity	White British= 35 (66%) British Asian= 10 (19%) Other=8 (15%)	White British= 32 (60%) British Asian= 14 (26%) Other=7 (13%)
Religious belief	No religion= 20 (38%) Christian= 18 (34%) Muslim= 6 (11%) Missing data= 9 (17%)	No religion= 20 (38%) Christian= 18 (34%) Muslim= 6 (11%) Missing data= 9 (17%)
Employment status ¹	Employed= 36 (68%) Unemployed= 8 (15%) Missing data= 9 (17%)	Employed= 8 (15%) Unemployed= 36 (68%) Missing data= 9 (17%)
Type of brain injury		Traumatic brain injury= 20 (38%); Stroke = 24 (45%); Missing data= 9 (17%)
Duration of pre-injury partnership (in years)	Mean= 26 SD= 12 Range= 2-53	
Time since injury (in months)	Mean= 44 SD= 30 Range= 12-144	

¹ 'Employed' includes those working part-time

Table 2

Descriptive Statistics

(N=53)	Mean (standard deviation)	Possible Min/Max	Obtained Min/Max	Cronbach's alpha
BRCM-ABI	57.85 (23.37)	23/115	23/113	.963
IBM	15.17 (10.75)	0/36	1/36	.964
ADLQ	66.60 (11.99)	0/100	31/87	.773
LCQ	37.06 (15.14)	30/120	32/97	.896
Depression	42.28 (10.60)	13/65	18/58	.915
Somatic	25.75 (5.77)	11/55	15/36	.591
Memory/ Attention	64.66 (13.20)	19/95	24/83	.876
Communication	32.25 (7.29)	10/50	19/46	.611
Aggression	23.13 (7.29)	9/45	12/43	.862
Motor	24.72 (5.00)	8/40	13/33	.617

BRCM-ABI=Birmingham Relationship Continuity Measure – Acquired Brain Injury; IBM=Intimate Bond Measure; ADLQ=Activities of Daily Living Questionnaire; LCQ=LaTrobe Communication Questionnaire; other variables are subscales of the Neurobehavioral Functioning Inventory

Table 3

Correlations

	BRCM -ABI	IBM	ADLQ	LCQ	Depression	Somatic	Memory/ Attention	Commun -ication	Aggression
IBM	.829* <.001								
ADLQ	-.337* .014	-.218 .118							
LCQ	-.703* <.001	-.545* <.001	.470* <.001						
Depression	-.806* <.001	-.694* <.001	.368* .007	.653* <.001					
Somatic	-.477* <.001	-.483* <.001	.282* .041	.234 .091	.508* <.001				
Memory/ Attention	-.682* <.001	-.610* <.001	.348* .011	.615* <.001	.700* <.001	.516* <.001			
Communication	-.401* .003	-.264 .056	.359* .008	.373* .006	.292* .034	.473* <.001	.512* <.001		
Aggression	-.789* <.001	-.800* <.001	.095 .500	.467* <.001	.649* <.001	.392* .004	.519* <.001	.067 .633	
Motor	-.050 .723	-.006 .966	.050 .720	-.149 .288	.077 .582	.007 .960	.008 .955	.175 .209	-.074 .599

*p<.05

BRCM-ABI=Birmingham Relationship Continuity Measure – Acquired Brain Injury; IBM=Intimate Bond Measure; ADLQ=Activities of Daily Living Questionnaire; LCQ=LaTrobe Communication Questionnaire; other variables are subscales of the Neurobehavioral Functioning Inventory

Table 4

Multiple Regression

	Standardised coefficient Beta	t-value	p-value	part correlation
IBM	.280	2.55	.014*	.148
LCQ	-.239	-2.87	.006*	-.166
Depression	-.232	-2.27	.028*	-.132
Somatic	-.042	-0.58	.568	-.033
Memory/ Attention	-.043	-0.48	.634	-.028
Aggression	-.264	-2.66	.011*	-.154

*p<.05

IBM=Intimate Bond Measure; ADLQ=Activities of Daily Living Questionnaire; LCQ=LaTrobe Communication Questionnaire; other variables are subscales of the Neurobehavioral Functioning Inventory