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**Anxiety related to discharge from inpatient neurorehabilitation:
Exploring the role of self-efficacy and internal health control beliefs**

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Anxiety related to discharge from inpatient neurorehabilitation: Exploring the role of self-efficacy and internal health control beliefs

ABSTRACT

The study aimed to determine the prevalence of anxiety, related to discharge, among a group of 42 participants who were likely to have sustained an at least moderate-severe ABI and who were due to be discharged home following a period of inpatient neurorehabilitation. Differential relationships between psychological factors (self-efficacy and internal health control beliefs) were examined, alongside the relative influence of demographic and clinical characteristics on discharge-anxiety. Data were obtained via self-report measures and retrospective reviews of participant's inpatient, medical records. While relatively few participants ($n = 6$; 14%) reported markedly elevated trait-anxiety, almost half the sample ($n = 19$; 45%) reported clinically significant levels of transient, state-anxiety. Notably, state-anxiety was strongly associated with discharge-anxiety. Multivariate analyses revealed that age, self-efficacy and internal health control beliefs made independent contributions to self-reported discharge-anxiety, with perceived self-efficacy alone explaining 69% of the variance and mediating the effects of age and internal health control beliefs. None of the other demographic or clinical characteristics examined were significantly associated with discharge-anxiety. While causality cannot be inferred, findings suggest that anxiety related to discharge from rehabilitation might be best predicted by poor perceptions of self-efficacy. Implications for clinical practice and future research are discussed.

Keywords: discharge, anxiety, brain injury, self-efficacy, locus of control

INTRODUCTION

Over the past two decades there have been numerous studies reporting on the challenges faced by individuals who survive an acquired brain injury (ABI), following discharge from inpatient care to the community. Findings suggest that many individuals experience physical, cognitive and social difficulties on returning to the community and home life (Fletcher, 2009; Lai, Studenski, Duncan & Perera, 2002). Notwithstanding this, there has been little research exploring the potential concerns, or emotional status, of patients prior to their discharge from neurorehabilitation.

Stroke and traumatic brain injury (TBI) represent the largest proportion of ABI in the UK (National Audit Office; NAO, 2010). Around 150,000 people suffer a stroke each year, while moderate to severe TBI affects around 25/100,000 people annually (National Institute for Clinical Excellence; NICE, 2012). It is estimated that 10–20% of people who sustain ABI suffer permanent disability, whereas 65–85% experience a good physical but not necessarily cognitive or social recovery (Turner-Stokes, 2003).

Recovery following ABI often involves intensive engagement with specialist services (Robertson, 2008). In the UK, rehabilitation starts in the acute stages of hospital care, where focus is on preventing health complications and reducing injury-related impairments (Turner-Stokes, 2003). Although not all people require specialist intervention beyond this stage, a proportion may experience significant physical or cognitive difficulties. In these instances, further rehabilitation on post-acute units may promote recovery and support the person to return home (Turner-Stokes, 2003).

Discharge from neurorehabilitation

The transition from inpatient care to home has been recognised as a distinct and critical phase in the rehabilitation continuum following ABI (Ellis-Hill et al., 2009). Although this transition has been linked to positive perceptions of recovery (Turner,

Fleming, Ownsworth & Cornwell, 2008) research has indicated that this is also often associated with negative perceptions of decreased health monitoring and support (Dowswell et al., 2000). These factors may compound feelings of anxiety linked to “relocation stress”. According to Carpenito-Moyet (2006) “relocation stress” is defined as: “a state in which a person experiences physiologic or psychological disturbances as a result of transfer from one environment to another” (p. 597).

In a review of the research literature Turner et al. (2008) highlighted seven qualitative studies that explored the experiences of inpatients with stroke during their transition to community life. A common theme within these studies was that the discharge process was perceived to be a distressing experience. Words used to describe the process included “stressful” and “overwhelming” (Turner et al., 2008). Specific concerns identified included those related to reduced independence in activities of daily living; a perceived need for greater dependence on others; and difficulties re-engaging in pre-injury social and occupational roles (Turner, Fleming, Cornwell, Haines & Ownsworth, 2009; Nalder, Fleming, Foster, Cornwell, Shields & Khan, 2012). Notwithstanding this, the vast majority of studies in the area to date have explored anxiety shortly after admission to acute hospital settings or some months after discharge to the community (Turner et al., 2008; Turner et al., 2009)). Moreover, studies have explored levels of generalised anxiety and not anxiety expressly related to discharge *per se*.

Anxiety in the aftermath of ABI

Epstein and Ursano (2005) summarised clinical diagnoses of anxiety disorders following traumatic brain injury, as reported in 12 studies, using different versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM; APA, 1987; 1994). These reviewers reported the pooled prevalence of anxiety disorders to be 29% among individuals with traumatic brain injury, with specific diagnoses including:

generalised anxiety disorder (GAD; 3-28%); post-traumatic stress disorder (3-27%) and panic disorder (4-17%). Studies amongst stroke survivors have reported prevalence of anxiety disorders to be as high as 20%, with phobic disorders and GAD the most commonly reported differential diagnoses (Campbell Burton et al., 2013). In preference to psychiatric diagnoses, these studies have increasingly explored anxiety via the use of self-report tools such as the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). In one such study – which involved a synthesis of predictors and associated outcomes of anxiety (up to 10 years after stroke) - Ayerbe et al. (2014) reported prevalence rates ranging from 32-38%. Notably, in this study, 58% of patients were assessed as suffering from clinically significant levels of anxiety at 3 months post-stroke.

Studies using the HADS have also provided further information about the *nature* of anxiety following stroke. For example, in a longitudinal study exploring post-stroke anxiety, De Wit et al. (2008) noted that while the *prevalence* of anxiety did not differ significantly over time, the *severity* of symptomatology increased from two and four months post-stroke and decreased between four and six months. Notably, in this study, the clinical setting of participants, at different assessment intervals, was not made explicit. To the author's knowledge, to date there has been little research exploring factors related to clinical context, as potential correlates of anxiety in the aftermath of ABI.

Factors associated with anxiety

Historically, anxiety following ABI has been conceptualised as either a pathophysiological mechanism; attributed to damage to the brain and consequent neurochemical responses (e.g. Castillo et al., 1993; Epstein & Ursano, 2005) or as a direct response to injury-related impairments (e.g. Rapoport et al., 2002; Sagen et al., 2009). However, studies have found little empirical support for the predictive role

of neuropathology (localisation of brain injury) (Åström, 1996; Castillo et al., 1993); physical (Castillo, Schultz & Robinson, 1995; Morrison, Johnston & MacWalter, 2000) or cognitive impairment (Barker-Collo et al., 2007) in the aetiology of anxiety post-ABI. Accordingly, researchers have suggested that anxiety might be mediated by psychological factors; which serve to influence reactions to injury-related functional changes and environmental changes (Epstein & Ursano, 2005; Morrison et al., 2000) Notwithstanding this, to the author's knowledge a single empirical study to date has explored psychological factors as potential mediators of anxiety following ABI. In this study Morrison, Pollard, Johnston and MacWalter (2005) noted that low internal locus of control and poor personal confidence in recovery were related to post-stroke anxiety. In regression analyses, 25% of the variance in anxiety was explained by personal confidence in recovery alone (Morrison et al., 2005). Notably, in this study stroke survivors were assessed six-months after their discharge from an acute stroke unit. Given that hospital environments may render personal control unlikely (Scharloo & Kaptein, 1997), it may be useful to explore the influence of control beliefs and self-efficacy, on anxiety symptomatology, *prior to* discharge from inpatient care.

Self-efficacy and locus of control

According to Bandura (1977) self-efficacy relates to a person's beliefs in their capabilities to execute behaviours required in order to achieve a desired outcome. Numerous studies have demonstrated that poor self-efficacy expectancies perpetuate distress subsequent to chronic health conditions (e.g. Edwards, Cecil & Lenoci, 2001; Stuifbergen, Seraphine & Roberts, 2000). A construct closely related to self-efficacy is that of locus of control. According to Rotter (1966) internal locus of control denotes beliefs that events are shaped by one's own behaviour and external control to beliefs that outcomes are contingent on chance or the actions of others. Locus of control beliefs are primarily viewed as domain specific, with one of the most

widely studied constructs being health control (Luszczynska & Schwarzer, 2005). Several studies have reported a positive association between lower internal health control beliefs and distress, in relation to illness (e.g. Wu, Tang & Kwok, 2004). However, others have found no such association (Wallston, Stein & Smith, 1994).

Although few studies have explored self-efficacy or locus of control beliefs in relation to ABI, theoretical models in the area allude to the importance of exploring these constructs. For example, Taylor, Todman and Broomfield (2011) in their “social cognitive transition model of post-stroke emotional adjustment” suggest that stroke survivors’ may be at increased risk of developing belief systems characterised by poor self-efficacy, consequent to failed attempts at coping with post-stroke changes.

Klonoff (2010) suggests seven phases of adaptation following ABI, wherein each phase is characterised by distinct events and experiences. From pre-injury (phase 0) and time of the injury (phase 1), the person may negotiate early adjustment (phase 2), before seeking help (phase 3) and beginning outpatient therapy (phase 4).

According to Klonoff (2010) in phase 3, people recognise injury-related difficulties as potentially overwhelming for themselves and their families, leading to a search from treatment resources. Those that cope well in this phase are thought to have an appropriate degree of trust in their support systems, while those at risk of maladaptive coping strategies tend to dismiss or underestimate difficulties, or attribute these to external factors. In phase 4, people are immersed in a process of developing awareness. In some cases, there may be a ‘honeymoon period’, where individuals are enthusiastic about their treatment and prospects for making a full recovery; however, as awareness increases (and they gain greater insight into the nature and extent of their injury-related difficulties and impairments) some people might be at risk of experiencing catastrophic reactions. In these cases, an inability to cope with feedback from others may perpetuate emotional distress.

During the latter phases of adjustment, the person is likely to engage in retraining (phase 5) and may negotiate therapy transitions (phase 6), as they move toward the future (phase 7). According to Klonoff (2010) phases 4-6 necessitate the essential tasks of increasing the person's awareness of their difficulties; promoting their acceptance of injury-related deficits and achieving a greater sense of realism in relation to future planning. In each of these phases, coping strategies would be at risk of becoming maladaptive. For example, difficulties in improving awareness may result in failures, which may hold implications for future employment or family life.

With regard to TBI, Moore, Stambrook and Wilson (1995) propose a "model of cognitive beliefs and appraisals following TBI", wherein it is suggested that:

"following TBI individuals may interpret poor outcomes as unrelated to efforts to control their environment; thereby creating and reinforcing a belief system characterised by an external locus of control and poor self-efficacy" (p. 113).

Following from the literature, it would be reasonable to assume that individuals who have engaged in inpatient rehabilitation following ABI and who feel under confident about their capabilities to organise and execute actions required to adapt to injury-related changes (i.e. who have poor self-efficacy and low internal health control beliefs) might feel more anxious about leaving inpatient care, to return home.

The current study

The current study sought to explore self-reported anxiety symptomatology, in a group of individuals with ABI who were due to be discharged home following inpatient rehabilitation, and to explore associations with demographic, clinical and psychological factors (self-efficacy and control beliefs). This is important because the transition from hospital to home has been recognised as marking a critical point in an individual's recovery following ABI; since it marks the commencement of community reintegration (Turner et al., 2009). Managing emotional distress has been shown to

present a major challenge for individuals during this transition period. It is important for clinicians to be able to accurately assess and identify those individuals who may be at greatest risk of developing anxiety conditions, as this may support clinical decisions regarding treatment (Barker-Collo, 2007). It is encouraging to note that National Clinical Guidelines for Stroke (NIHCE, 2012; RCP; 2010) recommend the routine assessment and management of mood-related difficulties following stroke. Moreover, that the National Stroke Strategy (DOH, 2007) highlights the importance of addressing psychological factors, which may impact on post-stroke adjustment.

Based on theory and past research it was hypothesised that:

1. Individuals with ABI would report higher levels of discharge-anxiety (or state-anxiety) than generalised / global anxiety (i.e. trait-anxiety). This would be in keeping with Carpenito-Moyet's (2006) theory of "relocation stress", in which the prospect of an imminent move, or transition, from one environment (i.e. an inpatient setting) to another (i.e. the community) could be seen as a fear-producing trigger.
2. There would be significant differential relationships between (a) self-efficacy and (b) internal health control beliefs and discharge-anxiety.
3. Self-efficacy and health control beliefs would interact with (and possibly mediate) each-other in influencing and predicting discharge-anxiety.

METHODS

Design

The study employed a cross-sectional, single group design to explore relationships between variables. Quantitative methods were used, wherein data were obtained via self-report tools and retrospective reviews of medical files. Prior to the initiation of the study, approval was obtained from an NHS Research Ethics Committee (REC). Authorisation was also obtained from Research and Development

(R&D) Departments at each of the study sites. In keeping with guidelines stipulated by these authorities, informed consent was obtained from all participants. Data were stored in accordance with Caldicott Principles (Department of Health; DOH, 2003) and the British Psychological Society's Code of Ethics and conduct (BPS, 2009).

Procedure

Recruitment took place across three post-acute neurorehabilitation units in the UK, over a 15-month period (from March 2012 to June 2013). During this period, individuals were invited to take part in the research if they: (a) were aged 18 or over; (b) were inpatient; (c) had a diagnosis of moderate to severe ABI (as per their medical file), including TBI (sustained through road traffic accidents, complications from falls, tumoral or vascular neurosurgery); stroke and anoxic brain damage); (d) had capacity to provide informed consent; (e) had adequate English language comprehension skills; (f) were able to effectively communicate their answers to self-report measures; (g) were due to be discharged from the unit (and had been informed of their discharge date); and (h) were due to return home upon discharge.

The method of recruitment at each of the study sites was based on guidance from R&D Departments. At each unit, the study was introduced to individuals who met inclusion criteria by a 'site advisor' (a qualified psychologist who was familiar with the study). To minimise potential for distress, only those who were aware of their discharge date were approached. During this approach, individuals were given a brief verbal explanation of the study, along with a participant information sheet and consent form. Accordingly, individuals' capacity to provide consent to participate in the research was appraised by site advisors in the first instance.

Once verbal consent had been obtained, a meeting with the researcher was arranged. This meeting was facilitated three days after the initial approach and was scheduled so as not to conflict with therapeutic activities. During the meeting

participants were given a detailed explanation of the study and encouraged to ask questions. Written consent was then obtained from each participant, following which self-report measures were completed. To enhance standardisation, measures were verbally administered by the researcher (in the order presented below).

Sample size

It was recognised that a sample of between 28-35 participants would be needed to achieve a high level of power ($\beta = 0.80$) to attain a significant result ($p < 0.05$; two-tailed) if the magnitude of correlation co-efficients was moderate ($r = 0.3$; Bonnett & Wright, 2000). With regard to regression analyses, it was noted that at least 36 participants would be required for a model with three predictors (where the level of power was 0.80 and the effect size was large - $R^2 = 0.26$; Cohen, 1992). Literature further indicated that between 10-15 participants per predictor would be needed to achieve sufficient power in testing a regression model (Field, 2009).

Measures

State-Trait Anxiety Inventory

Anxiety at time of discharge was measured in two ways. Firstly, the State-Trait Anxiety Inventory; Form Y (STAI; Spielberger, 1983) was completed. This measure comprises two distinct, 20-item scales: trait-anxiety (i.e. a relatively stable tendency to attend to and report anxiety across situations) and state-anxiety (anxiety that is transient in nature) (Tilton, 2008). On each scale, items are rated using a 4-point Likert format. Individual item scores are summed to yield a total score on each subscale (ranging from 20-80). Higher scores indicate greater anxiety.

Although the STAI has been infrequently used in ABI populations, it has been shown to be reliable in these populations (Curran, Ponsford & Crowe, 2000).

In the current study, the internal consistency reliability of both scales was found to be good (trait subscale Cronbach's $\alpha = 0.92$; state subscale Cronbach's $\alpha = 0.86$).

Patient Anxieties Questionnaire

In addition to the STAI, the Patient Anxieties Questionnaire (PAQ; Main & Gudjonsson, 2005) was included. This scale was included in view of the absence of a measure of anxiety related to discharge from neurorehabilitation. Notably, the PAQ was originally developed to appraise anxiety related to discharge from forensic units.

The PAQ comprises six items; each of which is rated on a continuous scale, from 1-7. Scores on individual items are subsequently summed to yield an overall score. Total scores range from 7-42, with higher scores indicating greater anxiety.

For the purpose of the current study, the wording of one of the items on the PAQ was changed (i.e. "how worried are you about leaving the *neurorehab* unit"). To establish face validity, the adapted scale was given to four inpatients on a neurorehabilitation unit for comments, with no concerns noted. Internal consistency of this version was found to be good in the current study (Cronbach's $\alpha = 0.87$).

Multidimensional Health Locus of Control Scale

Participants' health control beliefs were assessed via the Multidimensional Health Locus of Control Scale (MHLC; Wallston et al., 1994). This self-report scale was designed to be used with a range of health conditions and has been shown to possess good construct validity (Wallston et al., 1994). The scale contains 18 items, which are rated using a Likert format (from *strongly disagree* to *strongly agree*).

The MHLC yields scores on three distinct subscales: "internal" "chance" and "others", wherein higher scores reflect greater beliefs about control being governed by that domain. For the purposes of the present study, only the internal subscale (MHLC-Internal) was included in analyses. Scores on this subscale range from

6-36, with higher scores indicating greater perceptions of an internal locus of control.

The MHLC has demonstrated adequate face validity and good internal consistency reliability amongst both TBI and stroke populations (e.g. Moore, Stambrook & Wilson, 1991; Schepers, Visser-Meily, Ketelaar & Lindeman, 2006).

In the current study sample Cronbach's α of the MHLC-Internal subscale was 0.82.

Traumatic Brain Injury Self-Efficacy Questionnaire

In the absence of a measure of self efficacy, which has been validated in both TBI and stroke populations, self-efficacy beliefs were assessed via the Traumatic Brain Injury Self-Efficacy Questionnaire (TBI-SE; Cicerone & Azulay, 2007). This self-report tool was designed for use with TBI populations and is considered to possess good construct validity and internal consistency reliability (Cicerone & Azulay, 2007). The scale comprises 13 statements (each of which is preceded by the question "how confident are you that you can..."). Responses to individual items are rated on a scale from 1-10 (i.e. from *not at all confident* to *totally confident*). Individual item scores are summed for a total score, which ranges from 13-130. Higher scores reflect greater self-efficacy. Permission to include the TBI-SE in the current study was obtained from the author. Cronbach's α of the total scale was 0.94 in this study.

Demographic and clinical information

Demographic data on age, gender and ethnicity were recorded for each participant. The following information was also obtained from their medical files: ABI diagnosis; severity of ABI; brain injury location (left brain hemisphere, right brain hemisphere or diffuse damage); number of prior hospital admissions, length of current admission (in days) and time until discharge from inpatient care (in days).

Statistical analyses

Data were analysed using SPSS for Windows; Version 17.0 (SPSS, 2009). Descriptive statistics confirmed that there were no missing data or significant outliers. Histograms and Shapiro-Wilk tests revealed a non-normal distribution of data related to the following variables: time since injury, length of current admission and time until discharge. These data remained skewed following square-root transformations (Field, 2009). Therefore, non-parametric tests were used where appropriate.

The prevalence of anxiety within the sample was appraised by comparing scores on the STAI and adapted-PAQ. Associations between study variables were explored via Mann-Whitney *U* tests, one-way ANOVA's and correlational analyses. In exploring relationships between variables the following adjustments were made:

- In a one-way ANOVA exploring brain areas affected by ABI, participants for whom relevant clinical information was unavailable ($n = 8$) were excluded.
- In a point-biserial correlation exploring ethnicity, participants from black and minority ethnic (BME) groups were combined to form one group ($n = 11$) that was compared with a group comprising Caucasian participants ($n = 31$)

Variables that were found to be significantly associated with discharge-anxiety were included in a hierarchical regression model (Field, 2009). Finally, tests of indirect effects (meditation) were carried-out using bootstrapping techniques (Hayes, 2009). Level of statistical significance for all analyses was defined as $p < 0.05$ (two-tailed).

A Kruskal-Wallis test revealed no significant differences in time since injury [$H(2) = 4.05$, $p = 0.13$]; length of admission [$H(2) = 2.74$, $p = 2.56$] or time until discharge [$H(2) = 2.61$, $p = 0.27$] across the three study sites. A one-way ANOVA confirmed that scores on measures did not differ significantly between study sites (Table 1 and 2). Therefore, subsequent analyses included the entire sample ($N = 42$).

Table 1 here

Table 2 here

Characteristics of the sample

The final sample comprised 31 men (74%) and 11 women (26%) ($N= 42$). The mean age of the sample was 44.7years ($SD =13.3$, range 19-74 years).

In terms of ethnicity: 31 participants (74%) self-identified as White British or Irish; three (7%) as Black British and two (5%) as Afro-Caribbean. The remaining six participants (14%) self-identified as belonging to various other ethnic groups (including Indian, Pakistani, South-Asian and mixed-heritage backgrounds).

Medical records indicated that 22 participants (52%) had suffered a stroke (cerebral infarction or haemorrhage), while 18 (43%) had sustained TBI (through: road traffic accidents; complications from falls; tumoral or vascular neurosurgery). Two participants (5%) had a diagnosis of anoxic brain injury; a consequence of areas of the brain being deprived of oxygen (Pesquine, Picq & Pradat-Diehl, 2004).

With regard to the location of trauma to the brain: 20 participants (47%) had sustained injury to the right hemisphere; 10 (24%) had left hemisphere injury; and four (10%) had diffuse brain damage. In eight cases (19%), ABI location was not specified. Detailed medical information related to ABI severity was unavailable for the majority (72%) of participants (only information communicated by the referring unit was accessible); however, admission to a post-acute neurorehabilitation unit would suggest that all suffered moderate to severe injuries (Maas, Stocchetti & Bullock, 2008). Notably, the three study sites (post acute units) did not accept patients with mild injuries or minimal functional impairment (specifying within their admission criteria that referrals would be considered for only those who required input from a minimum of three different professional disciplines – i.e. medics; occupational therapists; speech and language therapists; physiotherapists; and / or psychologists).

The majority of participants ($n = 37$; 83%) had been admitted to the unit from an acute hospital ward, while five (12%) had been transferred from a different post-acute rehab unit. At the time of the study, the mean length of time since injury was 4.52 months ($SD = 2.59$, range 1-12) and mean length of stay on the unit was just under three months ($M = 82.29$; $SD = 49.75$; range 27-240 days). On average, individuals were assessed 4.24 days ($SD = 3.87$; range 0-14) prior to discharge from the unit.

RESULTS

Prevalence of anxiety

The final sample ($N = 42$) had a mean STAI trait-anxiety score of 37.29 ($SD = 10.52$) and a mean state-anxiety score of 42.40 ($SD = 14.68$). This difference was statistically significant [$t(41) = 2.81$, $p = 0.008$]. According to Spielberger (1983) STAI subscale scores of ≥ 45 are suggestive of clinically significant anxiety. Descriptive statistics revealed that only six participants (14%) had a trait-anxiety score of ≥ 45 , while 19 participants (45%) had a state-anxiety score of ≥ 45 .

The mean adapted-PAQ score for the sample was 18.12 ($SD = 8.27$, range 6-36). A *moderate* positive correlation was found between this score and STAI trait-anxiety ($r = 0.51$, $p < 0.01$; Cohen, 1992) and a *large* positive correlation between this score and STAI state-anxiety ($r = 0.77$, $p < 0.001$; Cohen, 1992).

Correlates of discharge-anxiety

There was a small but significant positive correlation between age and discharge-anxiety ($r = 0.31$, $p = 0.04$) and a small but significant negative correlation between internal control beliefs and discharge-anxiety ($r = -0.37$, $p = 0.02$). There was a large negative correlation between self-efficacy and discharge-anxiety ($r = -0.84$, $p < 0.001$). No other variables were significantly correlated with discharge-anxiety (Table 3).

Table 3 here

Predictors of discharge-anxiety

Three variables (age, control beliefs and self-efficacy) were included in a hierarchical regression model (with discharge-anxiety as the criterion variable). As can be seen from Table 4 at step one of the model, age alone accounted for 10% of the variance in discharge-anxiety. This model was significant [$F(1,40) = 4.32$, $p = 0.05$]. At the second step, internal control beliefs were included. This model was also significant [$F(2,39) = 5.57$, $p = 0.007$]. Internal control beliefs explained a further 12% of the variance in discharge-anxiety when age was taken into account. At the third step, self-efficacy was added to the model. This overall model accounted for 71% of the variance in discharge-anxiety [$F(3,38) = 31.15$, $p < 0.001$]. At this final step, age and control beliefs did not contribute significantly to the model. All variance inflation factor values were less than three, indicating that multicollinearity among the predictors did not unduly influence estimates (Tabachnick, Fidell & Osterlind, 2001).

A univariate regression, in which only self-efficacy was entered as a predictor with discharge-anxiety as the dependent variable, was subsequently performed. This model was significant [$R^2 = 0.69$, $t = -9.66$, $F(1,40) = 93.44$, $p < 0.001$] and revealed that self-efficacy alone accounted for 69% of the variance in discharge-anxiety.

Table 4 here

Tests of indirect effects: mediation

Mediational analysis explores the difference between the *direct effect* of an independent variable (X) on an outcome variable (Y) and the *indirect effect* of this relationship, after an interceding or mediating variable (M) has been taken into account (Preacher & Hayes, 2008). In the current study, two mediational models were tested. The first model explored the effect of internal health control beliefs (X)

on discharge-anxiety (Y) through self-efficacy (M). The second model explored the effect of self-efficacy (X) on discharge-anxiety (Y) through health control beliefs (M).

Using an SPSS macro (syntax; Preacher & Hayes, 2004) 1,000 identically sized datasets were created by iteratively resampling cases from the original dataset. Confidence intervals for the direct path coefficients were then derived. Using this method, mediation was considered to be significant if the upper and lower bounds of the bias-corrected confidence intervals did not contain zero (Hayes, 2009).

As can be seen in Table 5, control beliefs did *not* mediate the relationship between self-efficacy and discharge-anxiety. Conversely, self-efficacy was seen to significantly mediate the relationship between control beliefs and discharge-anxiety.

Table 5 here

DISCUSSION

The current study explored anxiety, related to discharge, amongst 42 individuals, with moderate to severe ABI, who were due to be discharged home following a period of inpatient neurorehabilitation. The study also investigated demographic and clinical characteristics, and the relative influence psychological factors (locus of control and self-efficacy beliefs), on self-reported discharge-anxiety.

Whilst few participants (14%) recorded substantially elevated trait-anxiety almost half (45%) of the sample recorded clinically significant levels of transient, state-anxiety. Notably, state-anxiety (appraised via the STAI state subscale) was significantly associated with discharge-anxiety (assessed via the adapted-PAQ).

With regard to the use of self-report measures, it is recognised that some researchers tend to rely on standardised instruments for the assessment of anxiety, without due consideration of what it is that the instrument may be presumed to measure (Keedwell & Snaith, 1996). In selecting an appropriate measure for the

current study, it was recognised that the HADS (Zigmond & Snaith, 1983) assesses generalised anxiety symptomatology (including feelings of tension, worry, fear and panic; difficulties relaxing; and restlessness) (Bjelland, Dahl, Haug & Neckelmann, 2002). Although widely used in studies amongst ABI populations, problems have been identified with some questions in the HADS, with these potentially being related to injury-related impairments (Dawkins, Cloherty, Gracey & Evans, 2006). In keeping with this, low specificity and high misclassification rates have been reported for the HADS, amongst ABI populations (Johnson et al., 1995; Dawkins et al., 2006).

The STAI trait anxiety subscale, is reported to capture a relatively stable personal inclination to react to stressful situations and to perceive a larger number of situations as threatening; while the STAI state anxiety subscale refers to a transitory emotional state, characterised by feelings of tension (of which the intensity may vary over time) (Spielberger, 1983). Accordingly, in the current study, the choice was made to use the STAI, as this was felt to most accurately capture the constructs of anxiety (i.e. both stable and transitory areas of psychopathology) being examined.

Notwithstanding the above, it is recognised that the majority of published studies to date have used the HADS to explore anxiety in ABI populations, limiting direct comparison of prevalence rates within the current study. Nonetheless, it is interesting to note that studies that have used the HADS in inpatient settings (up to four months post-ABI) have reported comparable anxiety prevalence; between 14-22% (De Wit et al., 2008; Jorge, Robinson & Starkstein, 1993), while community-based studies (exploring anxiety up to five years post-ABI) have reported prevalence rates to be as high as 36% (Bergersen, Frosli, Sunnerhagen & Schanke, 2010).

A literature search revealed a single relevant study by Curran et al. (2000) wherein the STAI was used. This study explored coping up to five years post-TBI.

Interestingly, findings revealed only slightly lower state-anxiety ($M=41.89$, $SD=16.20$) than in the current study, but significantly higher trait-anxiety ($M=44.45$, $SD=15.14$).

Taken together, the above findings tentatively suggest that transient, state-anxiety may be more prevalent in the lead-up to discharge from inpatient care (possibly as individuals experience uncertainty about their ability to cope with impending change) (Rusconi & Turner-Stokes, 2003); whereas following discharge to the community (several years after TBI) individuals may be at risk of developing a propensity to experience anxiety across situations (possibly as a consequence of injury-related difficulties and multiple experiences of failure) (Fletcher, 2009).

Relationships between psychological factors and discharge-anxiety were of central interest in the current study. Findings provided support for hypotheses that there would be associations between both (a) self-efficacy and (b) internal health control beliefs and discharge-anxiety. Although a lack of similar research in ABI populations makes it difficult to compare findings with other studies, the link between self-efficacy and discharge-anxiety may be explained by evidence, from other fields, that poor perceptions of self-efficacy perpetuate emotional distress subsequent to health conditions (e.g. Stuifbergen et al., 2000).

Published research investigating the role of health locus of control beliefs in relation to chronic health conditions was supported by the findings of the current study, in that participants who reported low internal health control beliefs were more anxious than those who reported high internal control beliefs.

For example, Wu et al. (2004), in a study examining emotional distress amongst 159 elderly women suffering from varied chronic illnesses, reported a significant association between lower internal health control and greater emotional distress. While the average age of participants in the study by Wu et al. (2004) ($M=74$ years, $SD=6.80$) was much higher than that of the current sample ($M=45$ years, $SD=13.35$)

both studies also suggested that age was correlated with negative emotional states (such that older participants reported greater anxiety or distress). These findings were in keeping with research in other illness populations, wherein anxiety has been shown to increase with advancing age (e.g. Härter, Conway & Merikangas, 2003). However, findings tended to contradict studies which have shown anxiety to be more prevalent among younger stroke survivors (Ayerbe et al., 2014; Castillo et al., 1993; Schultz, Castillo, Kosier & Robinson, 1997). One explanation may be that, since stroke is infrequent in younger cohorts, such an event may cause greater emotional distress in such cohorts (Petrea et al., 2009); however, it is recognised that the mixed sample included in the current study (i.e. study participants included TBI and stroke survivors) precludes direct comparison.

Hierarchical regression analyses facilitated exploration of the relative influence of age, internal health control and self-efficacy beliefs on discharge-anxiety. Together these three variables explained 71% of the variance in discharge-anxiety.

Further investigations into the indirect (mediational) effects of psychological factors revealed that self-efficacy mediated the relationship between internal control beliefs and discharge-anxiety. Accordingly, findings supported theoretical assumptions that self-efficacy may be derived through causal attributions (Schwarzer & Renner, 2000). For example, Moore et al. (1995) proposed an overlap between control and self-efficacy beliefs following TBI, such that “generalized expectancies [...] arising from pervasive non-contingent and suboptimal outcomes in many aspects of the TBI patient’s life, lead to feelings of low personal control over the environment and contribute to lowered self-efficacy” (p. 118).

In keeping with this, findings from the current study support the premise that self-efficacy beliefs may be more proximal to the consequences of illness conditions, whereas internal control beliefs exert their influence at a more distal level (Endler,

Kocovski & Macrodimitris, 2001). Research among other illness populations has also demonstrated support for the hypothesis that perceptions of self-efficacy mediate the relationship between health control beliefs and distress (e.g. Wu et al., 2004).

Lastly, findings that none of the clinical characteristics examined in the current study were significantly related to discharge-anxiety were somewhat surprising, given that past research has demonstrated associations between anxiety following ABI and lesions in the right brain hemisphere (Åström, 1996; Castillo et al., 1993). Although the relatively small sample in the current study may have reduced statistical power to detect a significant effect, it is worth noting that studies with larger ABI samples have also found no effect for injury location on anxiety (e.g. Morrison et al., 2000; $N=71$).

Limitations

The results of this study should be considered in light of several limitations. Firstly, the study sample was voluntary and fairly small. Recruitment took place at three post-acute neurorehabilitation units which were located in suburban settings in the UK. Participants were around three month's post-ABI and, in the absence of more robust medical data, it was presumed that all had sustained moderate to severe injuries. As such, findings may not generalise to other populations or settings.

In retrospect it would have been helpful to seek access to participants prior medical records through direct contact with referring clinicians. Future studies should seek to address issues related to consent and include requests for additional medical information (from other / external agencies) within their ethics applications.

It is also worth noting that black and minority ethnic groups (BME) may have been under-represented in the study sample. This may have been particularly relevant, since culture influences the development of belief systems (Bandura, 2002). With regard to gender, 31 men and 11 women were recruited to the study; possibly reflecting the fact that men more likely to sustain ABI (Turner-Stokes, 2003).

Secondly, the reliance on self-report measures may raise question as to whether findings could have been distorted by response bias. In the case of ABI, self-report data may be adversely affected by cognitive difficulties (Port, Willmott & Charlton, 2008). Nevertheless, the use of Likert scales comprising relatively short and concrete items has been shown to yield accurate data in such populations (Moore et al., 1995). This seemed to be the case in the current study as all measures demonstrated good internal consistency reliability (Cronbach, 1951). It is worth noting that reliability may have been enhanced through verbal administration of measures and recruitment criteria; which excluded those with very severe cognitive difficulties (Lezak, 2004). These considerations may be especially relevant, as it is recognised that the TBI-SE questionnaire has not been validated for use with stroke populations.

With regard to the PAQ and STAI, there is the issue of whether these scales sufficiently embodied the constructs under study. For example, it may be that health professionals and family carers have different understandings of discharge-anxiety, while the STAI may have been confounded by anxiety related to the assessment situation (Spielberger, 1983). Nonetheless, strengths of both these measures lay in that they did not include items that may have related to somatic or physical complaints as is a recognised limitation of the HADS measure (Tilton, 2008).

It is also possible that findings of the current study may have been subject to response bias, as more anxious individuals may have been more or less likely to participate in the research. Unfortunately, a lack of information relating to reasons for non-participation limited the accuracy with which interpretations about prevalence of anxiety within the wider study population could be made. In addition, some potentially relevant clinical factors may not have been included in the study. For example, although efforts were made to include information related to pharmacological and psychotherapeutic interventions information pertaining to these factors was limited.

Lastly, information relating to anxiety *prior to* ABI was limited. Therefore, it was not possible to determine whether anxiety symptomatology reported in the current study was new or ongoing. This was compounded by limitations inherent in the cross-sectional design of the study; wherein it was not possible to determine causal associations between variables. It may be that individuals who were more anxious were more likely to report poor perceptions of self-efficacy or that anxiety renders a person more vulnerable to experiences of failure, which in turn impacts on self-efficacy beliefs. Nevertheless, regardless of causal pathways, findings of the current study suggested that health locus of control and self-efficacy beliefs may be an important focus for interventions aimed at addressing anxiety post-ABI.

Clinical implications

Substantially elevated levels of anxiety following ABI have been associated with numerous adverse consequences, including increased dependence (Rapoport et al., 2002) and reduced quality of life (Åström et al., 1996; Sturm et al., 2004). Therefore, findings of this study may hold important implications for clinical practice.

Firstly, findings suggest that it may be important for clinicians to inquire about individuals' concerns in the lead-up to their discharge from inpatient care, so that the nature and degree of anxiety can be determined. This may enable anxiety-provoking issues to be addressed while the person is still resident on the inpatient unit (as opposed to post-discharge when professional support may be less accessible). In these cases, simple graded discharge procedures (e.g. overnight stays in conjunction with risk assessments; carried-out by clinical staff) and professionally supported problem-solving around anticipated difficulties might prove beneficial.

Secondly, findings that individuals with lower internal control and poorer self-efficacy were more anxious about discharge (than those with higher control and self-efficacy expectancies) may have implications for interventions. For example,

where appraisals are inaccurate, behavioural experiments could be used to promote more realistic evaluations; whereas where appraisals are accurate, mindfulness-based interventions may be of benefit (Hofmann, Sawyer, Witt & Oh, 2010).

In addition, opportunities to develop competence through mastery experiences could be used to enhance self-efficacy (Bandura, 1989). One such intervention, which has shown to be effective in supporting successful transitions from inpatient care to the community for individuals with ABI, is the transitional living unit (TLU; Minnes, Harrick, Carlson & Johnston, 1998; Olver & Harrington, 1996; Simpson et al., 2004). TLU's involve programs that are conducted in a home-like environment with an emphasis on the development of skills necessary for community living (Kendall, Ungerer & Dorsett, 2003). However, such units are not in widespread use and research is needed to validate their effectiveness (Kendall et al., 2003).

Lastly, it is notable that most participants in the current study reported having received no formal therapeutic intervention, aimed at addressing anxiety, in the lead-up to their discharge. While the possibility of self-report bias is acknowledged, it is also recognised that empirical support for the effectiveness of both medication and traditional psychotherapeutic approaches (e.g. cognitive-behavioural therapy; CBT) for targeting anxiety in people with ABI is limited (Campbell-Burton et al., 2011). Accordingly, interventions aimed at addressing self-efficacy and control cognitions (as outlined above) may be of particular benefit; both in supporting individuals with ABI during discharge from inpatient care and in helping to reduce strain placed on their informal networks during this transition (Turner et al., 2009).

Future research

Findings of this study highlight a number of possibilities for future research. Firstly, while 71% of the variance in discharge-anxiety was explained in this study, further research may seek to identify factors that explain the remaining variance.

Several potentially important variables (e.g. individuals' coping styles) were not addressed in this study and may have implications for anxiety outcome.

Secondly, it may be useful to validate self-report measures of anxiety in ABI populations. Conspicuously, measures in widespread use (e.g. the HADS) have demonstrated poor sensitivity for anxiety in ABI populations (Sagen et al., 2009).

Third, longitudinal research aimed at investigating anxiety symptomatology throughout the course of inpatient admissions may yield interesting insights. It may be the case that anxiety fluctuates throughout admission or that this peaks when individuals are imminently due to return home. In addition, in the case of the current study, it may be helpful to follow-up participants (particularly those with markedly elevated levels of anxiety); to determine what the natural course of recovery may be

Future studies may also seek to investigate how control and self-efficacy beliefs relate to positive adjustment to ABI or support experiences of successful discharge to the community life. For example, it may be that more anxious individuals have a more realistic appreciation of the difficulties inherent in community living, but that their anxiety prevents them from meeting these challenges successfully, or alternatively that lower levels of anxiety enable individuals to function efficiently in the community. Lastly, somewhat overlooked in the research, is the fact that some individuals experience minimal anxiety prior to discharge. It may be helpful to explore their coping strategies, alongside interventions aimed at targeting discharge-anxiety.

CONCLUSIONS

Findings from the current study suggest that anxiety is prevalent in the lead-up to discharge from inpatient neurorehabilitation to home following ABI and that age, internal health control and self-efficacy beliefs may play an important role in influencing discharge-related anxiety. These findings are consistent with theoretical

models of emotional adjustment following ABI, as well as existing empirical evidence relating to anxiety within the wider context of chronic health conditions. Findings also supplement existing anecdotal accounts (outlined in qualitative research), which suggest that adjusting emotionally to transitions from inpatient care settings to the community and home-life poses a significant challenge for individuals with ABI.

Findings did not elucidate any association between gender, ethnicity or clinical factors (specifically ABI diagnosis and location of brain injury) and discharge-anxiety. Although the cross-sectional nature of the research precludes any inferences about direction of causality, findings nonetheless provide some evidence to suggest that psychological factors (self-efficacy and control beliefs) may exert a stronger influence on discharge-anxiety than neuropathology and that these factors may be important in developing interventions aimed at addressing this phenomenon. However, in view of the limitations of the current study and the early stages of related research, further investigations aimed at replicating and expanding on current findings, are warranted.

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