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Exploring factors relating to Post-Traumatic Stress Disorder (PTSD) Symptoms and Mood Problems in People following a Transient Ischaemic Attack (TIA)

Chloe Webb, BSc (Hons)

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Portfolio Abstract

Background: A Transient Ischaemic Attack (TIA), often referred to as a 'mini-stroke', exhibits physical symptoms akin to those experienced during a stroke. However, a key difference is that the physical symptoms of a TIA are said to resolve within a 24-hour period, whereas a stroke can leave individuals with long-term effects. Despite the symptoms of a TIA being transient in nature, the symptoms are frightening, and can leave individuals at a higher risk of experiencing another stroke. Due to the sudden symptoms, a TIA could result in symptoms of Post-Traumatic Stress Disorder (PTSD), and mood problems including anxiety and depression. Limited research has indicated that psychological difficulties may be prevalent post-TIA, however there are currently no routine psychological provisions within aftercare. The evidence base is sparse, with many studies combining diagnoses together, which has made drawing conclusions challenging. The literature alongside models of stress and coping have indicated that factors including coping and posttraumatic cognitions may be important in the development and maintenance of psychological difficulties post-TIA. However, this has not to our knowledge been explored within a UK context.

Aims: The study explored whether PTSD and mood problems were present three-months post-first TIA, and what factors may relate and predict their development.

Method: A cross-sectional quantitative design was used, which included participants from social media and NHS TIA clinics completing a survey (online or via post). Standardised questionnaires were used to measure PTSD, anxiety, depression, coping and posttraumatic cognitions. The data were analysed using correlational analyses, between-groups comparisons, and hierarchical multiple linear regressions.

Results: Fifty-five participants took part, consisting of 23 from social media, and 32 from NHS TIA clinics. Overall, 43.6% of participants met the clinical cut-off

indicative of PTSD, 36.4% for anxiety, and 40% for depression. Factors which significantly related to psychological outcomes included age, fear of a future stroke, avoidant coping, approach coping and posttraumatic cognitions. Regression analyses concluded that greater incidences of avoidant coping was a significant predictor of all psychological outcomes, with the addition of posttraumatic cognitions for anxiety.

Discussion and Impact on Clinical Psychology: Study findings indicate that a large proportion of individuals may suffer with residual psychological difficulties post-TIA, which is going unrecognised. It appears that younger individuals were more at risk, alongside those who employed more avoidant coping strategies, and had a greater degree of posttraumatic cognitions. Outcomes align with psychological models of PTSD, stress, and coping, and could be suitable targets of interventions. The study offers valuable insights into the methodology of conducting research with people who have experienced a TIA, including recruitment methods. Findings aim to inform clinical aftercare pathways within TIA clinics. For example, the potential to integrate training for clinicians on the potential psychological difficulties, targets for intervention, and the possibility of developing a mood screening pathway to help patient recovery and rehabilitation in a psychologically informed manner.

Statement of Contribution

I declare this research is the product of my own original work that has been completed on the Trent Doctorate Course of Clinical Psychology Programme since 2022, when I started the course.

The following table details contributions to the project:

Element	Contributor
Project design	Chloe Webb with supervision from Dr Eirini Kontou, Dr Shirley Thomas and Dr Michael Baliousis
Ethical Approvals	Chloe Webb with supervision from Dr Eirini Kontou
Writing the review of the literature	Chloe Webb with supervision from Dr Eirini Kontou and Dr Shirley Thomas
Recruitment of participants	Chloe Webb, with support from Principal Investigators Tegan Taylor, Rachael Jones and Emma Davis based on NHS sites
Data Collection	Chloe Webb, with support to build the online survey platform from Senior Data Manager Daniel Simpkins based at the University of Nottingham
Scoring Questionnaires	Chloe Webb
Data Analysis	Chloe Webb with supervision from Dr Eirini Kontou, Dr Shirley Thomas and Dr Michael Baliousis.
Write-up	Chloe Webb with supervision from Dr Eirini Kontou, Dr Shirley Thomas and Dr Michael Baliousis.

Chloe Webb (Lead researcher) developed and wrote the research protocol used for the University of Nottingham and the NHS IRAS Ethics Application, parts of which have been included within the final thesis write-up. This work was carried out under the supervision of Dr Eirini Kontou (Primary Supervisor and Chief Investigator), Dr Shirley Thomas and Dr Michael Baliousis (Secondary Supervisors).

JOURNAL PAPER

Exploring factors relating to Post-Traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)

Chloe Webb[a], Dr Eirini Kontou[b*], Dr Shirley Thomas[c] and Dr Michael Baliousis[d]

[a]*Trent Doctorate in Clinical Psychology, University of Nottingham, Nottingham UK*
[b]*School of Medicine, University of Nottingham & Institute of Mental Health, Nottinghamshire Healthcare NHS Foundation Trust, Nottingham UK*
[c]*School of Medicine, University of Nottingham, Nottingham UK*
[d]*School of Psychology, University of Lincoln, Lincoln, UK*

***Corresponding Author at:** *School of Medicine, University of Nottingham & Institute of Mental Health, Nottinghamshire Healthcare NHS Foundation Trust, Nottingham UK. Email address: Eirini.kontou@nottingham.ac.uk*

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Submission guidelines found at:
https://www.tandfonline.com/action/authorSubmission?show=instructions&journalCode=idre20

Implications for Rehabilitation:

- Avoidant coping and posttraumatic cognitions contribute significantly to the development of PTSD and mood problems post-TIA and could be potential areas of intervention.
- PTSD and mood problems are present following a TIA diagnosis. Currently, this appears to be unrecognised and may be impacting recovery.
- Routine mood screening and staff training on the residual psychological effects post-TIA should be considered in NHS TIA clinics to support physical and psychological recovery.
- Findings contribute towards building an evidence base for more psychologically informed, holistic care within TIA clinical care pathways.

Abstract

Purpose: This cross-sectional study investigated whether Post-Traumatic Stress Disorder (PTSD) and mood problems (anxiety and depression) were present up to three-months after a first Transient Ischaemic Attack (TIA). It examined a range of factors associated with, and predictive of, the development of psychological difficulties.

Method: Fifty-five participants recruited from social media and UK-based TIA clinics completed a survey. Validated questionnaires assessed PTSD, anxiety, depression, coping and posttraumatic cognitions, alongside demographic information. Data were analysed through correlational analyses, between-groups comparisons, and hierarchical multiple linear regressions.

Results: 44% of participants reported PTSD symptomatology, 36% indicated anxiety and 40% reported depression. Factors strongly correlated with psychological outcomes included age, fear of a future stroke, avoidant coping, approach coping and posttraumatic cognitions. Regressions showed that avoidant coping was a significant predictor for psychological outcomes, in addition to posttraumatic cognitions for anxiety.

Conclusions: Psychological distress is present following TIA but is currently under recognised. Coping and posttraumatic cognitions appear to have a significant impact on the levels of psychological distress. Future research should explore how distress develops over time, alongside the offer of psychological interventions post-diagnosis. We recommend the implementation of mood screening in TIA clinics, and clinician training to increase awareness of distress post-TIA.

Keywords: Transient Ischaemic Attack, Posttraumatic Stress Disorder, Anxiety, Depression, Multiple Linear Regression, Coping, Posttraumatic Cognitions, Stroke

Introduction

In the United Kingdom (UK), the incidence of first-ever Transient Ischaemic Attacks (TIA) is approximately 50 per 100,000 people per year (National Institute for Health and Care Excellence, 2023)[1]. A TIA may present with the same symptoms as a stroke initially, which are caused by a neurological dysfunction[2], and can lead to sudden symptoms such as unilateral limb weakness, speech and visual disturbances and sensory symptoms (Kim, 2014)[3]. However, a key difference between a TIA and a stroke is the duration of symptoms, as TIA symptoms are said to last less than 24-hours with no evidence of acute infarction, unlike strokes (National Health Service [NHS] UK, 2023). Despite symptoms presenting as short-lasting, TIAs are a medical emergency as they can be an indication of a future stroke (Coull et al., 2004). A retrospective population-based cohort study spanning over 33-years concluded that the risk of stroke was significantly greater after a TIA compared with matched controls who did not have a history of TIA (Lioutas et al., 2021). The risk of stroke increased by 5.9% in 90 days, 7.6% in one year, 16.1% in five years and 20.3% in 10 years post-TIA[4]. It has been hypothesised that approximately 10,000 strokes could be prevented each year if TIAs were treated urgently, and not mistaken as 'a funny turn' (Rothwell et al., 2007), indicating the need to treat TIAs as serious medical events.

Due to the sudden uncontrollable and unpredictable onset of frightening symptoms (such as facial drooping and slurred speech), it has been suggested that TIAs meet the criteria for a traumatic event (Grosse-Holz et al., 2020). Consequently, experiencing a TIA could induce symptoms of Post-Traumatic Stress Disorder (PTSD) (Edmondson et al., 2013) and other psychological problems, such as anxiety and depression (Sackley et al., 2019). PTSD is classified as an anxiety disorder which can occur after exposure to a traumatic event which involves actual or threatened death, major injury, or a threat to someone's physical integrity (Diagnostic and Statistical Manual of Mental Disorders, 5th Edition; American Psychiatric Association, 2013)[5]. Symptoms of

[1] See extended introduction 1.1.1 for further information on epidemiology
[2] See extended introduction 1.1.2 for further information on the definition of a TIA
[3] See extended introduction 1.1.3 for additional information symptoms of a TIA
[4] See extended introduction 1.1.4 for discussion on TIA and the risk of future cerebrovascular events
[5] See extended introduction 1.2.1 for further information on the diagnostic criteria for PTSD

PTSD include intrusive memories and thoughts about the event, changes in mood and cognition, avoidance of stimuli associated with the event, and hyperarousal (American Psychiatric Association, 2013). PTSD has often been viewed as a diagnosis for individuals who have experienced traumatic events including military combat, accidents, or assaults (DiMauro et al., 2014). However, there is a growing evidence base that PTSD can occur after medical diagnoses, such as cancer (Swartzman et al., 2017), myocardial infarction (Jacquet-Smailovic et al., 2021) and strokes (Edmondson et al., 2013)[6].

Research has suggested that PTSD following a stroke is related to poorer quality of life and functional outcomes for individuals (Stein et al., 2018), alongside an amplified fear of a future stroke and pessimistic beliefs about future health (Noble et al., 2011). Additionally, a recent systematic review of 30 stroke/TIA studies concluded that the prevalence of PTSD varied between 2.9% to 71.4%, with a median prevalence of 17.5% (Janssen et al., 2024). However, the review found only three studies which included data from TIA patients, alongside other limitations, such as studies having small samples, attrition bias and grouped diagnoses. Throughout literature, there is a large disparity in the number of research studies exploring the after-effects of TIA compared to stroke, with many studies combining TIA and stroke participants (Kiphuth et al., 2014). The use of mixed samples has made determining the residual psychological problems post-TIA unclear, meaning that the potential impact has been overlooked (Janssen et al., 2024; Moran et al., 2014).

Webb et al.'s (2023) systematic literature review aimed to explore the specific outcomes of TIA patients in relation to PTSD and psychological outcomes. The review found only seven studies reported separate findings on PTSD and other psychological impacts for TIAs, and only three used TIA only samples (Ben Assayag et al., 2022; Dollenberg et al., 2021; Grosse-Holz et al., 2020; Kiphuth et al., 2014; Müller et al., 2021; Utz et al., 2019; Zhou et al., 2022). The prevalence of PTSD in TIA patients across studies was between 4.6% to 29.6%, which is higher than the median prevalence reported in the recent review of combined stroke diagnoses (Janssen et al., 2024). Webb et al.’s (2023) review indicated that people post-TIA had poor psychological

[6] See extended introduction 1.2.2 for further information on the presence of PTSD in physical health conditions

outcomes for depression, anxiety, quality of life, and were reported to use maladaptive coping styles. Additionally, the presence of PTSD appeared to worsen psychological outcomes, such as depression, anxiety and quality of life. All studies in the review were based across Europe and Asia, with no studies exploring a UK context. As healthcare systems are different in the UK, it may indicate differences in the attitudes towards PTSD cross-culturally (Patel & Hall, 2021). Webb et al.'s (2023) review depicts an accurate representation of the current research on TIA and psychological outcomes, and how minimal the quantitative research base is[7].

Few qualitative studies have explored personal experiences of having a TIA, and have suggested that a TIA can result in long-lasting difficulties which negatively affect individuals, including physical, psychological and cognitive challenges (Ebbesen et al., 2025). Ravenhill et al. (2019) conducted a qualitative review and reported that receiving a TIA diagnosis was a frightening experience due to the sudden onset and shock of symptoms, and not often recognising that these were TIA symptoms[8]. After the initial 24-hours, individuals reported psychological effects, mainly centred around anxiety, avoiding certain situations due to the fear of another stroke, and worrying about the impact on their families. Additional psychological effects might be panic, depression, shock, and guilt (Stroke Association, 2014). Studies have investigated these effects in stroke (Schöttke & Giabbiconi, 2015), but TIA patients have been underrepresented. A qualitative study by Turner et al. (2019) identified many TIA patients reported residual psychological, physical, and cognitive impacts that were 'hidden', but impacted significantly on daily life. Individuals post-TIA felt abandoned and felt that they relied more on family and self-management strategies. It was highlighted that a large proportion of Stroke Consultants and GPs lacked awareness of these residual symptoms. Any aftercare offered was medically focused and did not address psychological needs[9]. This may explain why TIA patients report unmet needs and their presenting difficulties remain under recognised in research and clinical practice.

[7] See extended introduction 1.2.3 for further information on PTSD in the context of TIA

[8] See extended introduction 1.3 for further information on lived experiences of TIA

[9] See extended introduction 1.4 for further information on interactions between people affected by TIA and healthcare professionals

Research examining the prevalence of anxiety and depression following TIA and stroke is somewhat unclear due to limited studies and combined samples. Broomfield et al.'s (2014) large scale study with a combined sample of stroke/minor stroke/TIA participants (*N* = 5326) indicated that the incidence of anxiety and depression was similar across diagnoses (for anxiety rates; 15% stroke and 14% TIA/minor stroke, and for depression rates: 11% stroke and 9% TIA/minor stroke). A key limitation of this study was the combination of TIA and minor stroke data, which is problematic since minor strokes can result in some lasting neurological damage and symptoms that persist beyond 24-hours, unlike TIA (Fischer et al., 2010). This makes conclusions on TIA alone difficult to determine. However, other studies have indicated stroke patients' psychological outcomes are worse than TIA patients. For example, a study found that anxiety three-months post-stroke was higher (62%) than three-months post-TIA (29%) (Chun et al., 2018). Moran et al.'s (2014) review of studies which explored anxiety and depression following a TIA or minor stroke concluded that anxiety was observed in 52% of TIA participants two-weeks after ictus, and depression was reported between 7% to 42%. However, another study reported a lower prevalence rate of 21.5% for depression two-months post-stroke (van Mierlo et al., 2015). Collectively, there appears to be a wide variation in prevalence rates reported post-stroke and TIA, which could be due to the fact that studies varied in the length of time that outcome measures were completed after diagnosis (from two-weeks up to 192 weeks), which has made comparing outcomes challenging (Moran et al., 2014). Similarly, Webb et al.'s (2023) review of TIA studies found that studies varied in the timeframe that psychological symptoms were measured, however the most common appeared to be within three-months post-TIA [10]. Research to date has primarily focussed on the longer-term, rather than acute post-stroke and TIA psychological outcomes. Müller et al. (2021) addressed this gap with a mixed diagnosis cross-sectional study, finding that PTSD, anxiety, and depression were prevalent five-days post-event. In addition, Grosse-Holz et al. (2020) recruited participants during acute hospitalisation following a TIA (after physical symptoms had subsided), indicating that acute settings are effective for participant recruitment.

[10] See extended introduction 1.5 for further information on mood problems in physical health conditions

Importantly, the acute psychological wellbeing after a stroke is predictive for future psychiatric difficulties (Müller et al.,2021). Such findings highlight the need for future research to examine the acute phase of strokes to identify early psychological support needs. Overall, the residual psychological symptoms following a TIA are not well researched or understood, which may be exacerbating people's difficulties and hindering recovery.

Despite research indicating TIA patients often present with psychological difficulties akin to stroke, the aftercare services provided are vastly different. The treatment pathway for a TIA in the UK involves a referral to a one-day clinic, whereby patients undertake physical health tests, receive advice on lifestyle changes to reduce stroke risk factors, and discuss medication (NHS UK, 2023). Patients are discharged back to primary care, as in most cases no further medical interventions are required[11]. However, for stroke patients, the treatment options are based within a clear stepped care model (NHS England, 2017), with clear guidance and the inclusion of psychological support within a timely manner (Intercollegiate Stroke Working Party [ISWP], 2023). Post-stoke interventions can also include a hospital admission to a specialised stroke unit and onward community rehabilitation if needed (Clare & Kausar, 2007; NHS UK, 2022)[12]. These differences highlight the disparity between stroke and TIA service pathways, and the potential need for the development of a comparable structure for psychological care pathways.

Importantly, not everybody who experiences a TIA goes on to develop PTSD symptoms and other psychological difficulties (Ebbesen et al., 2025). Studies have concluded that some people post-TIA felt that their TIA had positively influenced their lives through enabling them to develop an appreciation for life (Ebbesen et al., 2025), and acted as a 'wakeup call' to make positive changes (Spurgeon et al., 2012). Researchers propose that differences in an individual's perception of the traumatic event can affect the development of trauma symptomatology (Foa et al., 1999). Cognitive models, such as Ehlers and Clark's (2000) model of PTSD suggest the types of posttraumatic cognitions (namely maladaptive cognitions about the self, others and world) that individuals

[11] See extended introduction 1.6 for further information the challenges in TIA diagnosis

[12] See extended introduction 1.7 for further information on TIA diagnosis, aftercare pathways and how they differ to stroke

have towards the event is an important factor in whether an individual develops and/or maintains PTSD symptoms[13]. Studies have indicated that changes in posttraumatic cognitions preceded changes in PTSD symptomatology throughout treatment, suggesting that posttraumatic cognitions are an underlying mechanism for PTSD development (Schumm et al., 2015)[14]. Strong relationships have been found between maladaptive cognitions and PTSD (Gómez de La Cuesta et al, 2019), and importantly cognitive appraisals have been found to be significant predictors of PTSD symptomatology in stroke (Field et al., 2008; Merriman et al., 2007). However, posttraumatic cognitions have not yet been researched within a TIA only population[15]. In addition to the role of cognitions, The Transactional Model of Stress and Coping (Lazarus & Folkman 1984) suggests that it is the interaction of both cognitions and appraisals alongside how individuals cope with specific events which can result in ongoing psychological difficulties[16]. Coping strategies are often conceptualised into approach coping (e.g., problem solving/ information seeking), depicted as being able to adapt better to stressors, and avoidant coping (e.g. denial/ wishful thinking), often associated with ongoing psychological distress (Holahan et al., 2007).

The role of coping and cognitions in the presence of psychological difficulties following a TIA diagnosis is not well evidenced (Lo Buono et al., 2017). Donnellan et al.'s (2006) review explored coping post-stroke, but overall, no strong conclusions were drawn due to a scarcity of quantitative studies, and studies combining multiple health conditions together. TIA studies which have explored the influence of coping have reported that individuals who displayed more maladaptive, defensive, avoidant and high-anxious coping styles were at greater risk of developing PTSD (Ben Assayag et al., 2022; Dollenberg et al., 2021; Kiphuth et al., 2014). Conversely, research indicates that TIA patients who adopted approach coping strategies, such as activating available resources and spending time with family helped against post-TIA depression (Kindermann et al., 2023). Pro-active coping strategies have also been associated with lower

[13] See extended introduction 1.8 for further information on Ehlers and Clark's (2000) model of PTSD

[14] See extended introduction 1.9 for further information on posttraumatic cognitions and appraisals

[15] See extended introduction 1.10 for further information on posttraumatic cognitions and appraisals in physical health studies

[16] See extended introduction 1.11 for further information on Lazarus and Folkman's (1984) Model

anxiety and depression one-year post-stroke (Welten et al., 2023)[17]. Overall, it appears cognitions and coping have a significant impact on the psychological wellbeing following traumatic events. However, there have been no studies to our knowledge exploring the relationships between coping, posttraumatic cognitions, PTSD, and mood problems in people who have experienced a TIA.

Rationale and Aims

There is a gap in the literature on the psychological effects post-TIA, particularly in reference to PTSD (Webb et al., 2023). TIA patients' needs differ from stroke due to the differences in the transient presentation, therefore, evidence from stroke research cannot be easily generalised. There is limited evidence of significant physical disability among TIA patients, and the majority make a full physical recovery (NHS, 2023). However, this does not appear to extend to psychological recovery, which appears to have more residual effects (Stroke Association, 2022). Factors which appear to be influential in the development and maintenance of difficulties include differences in coping (Ben Assayag et al., 2022; Kiphuth et al., 2014; Thompson et al., 2018), cognitions and appraisals of the event (Garton et al., 2017), alongside demographic factors such as the increased perceived risk of a future stroke (Kiphuth et al., 2014), younger individuals and less social support (Grosse-Holz et al., 2020). Therefore, it is hypothesised that the greatest risk of psychological sequelae is in those who are younger, have an increased fear of future stroke, and those who have greater incidences of posttraumatic cognitions and utilise avoidant coping strategies. If found to be predictors of PTSD and mood problems, coping style and posttraumatic cognitions could become potential intervention targets for TIA patients, whilst also highlighting the need to increase clinician awareness of their impact in TIA clinics. Despite research indicating that PTSD and mood problems may be present after experiencing a TIA, there are no psychological provisions incorporated into TIA aftercare pathways. To our knowledge, this is the first UK-based study that explores PTSD and mood problems following a TIA, and the roles that coping and posttraumatic cognitions may have on their development.

[17] See extended introduction 1.12 for further information on coping in stroke and TIA

The current study aimed to determine:

1. Are PTSD and mood problems (anxiety and depression) present up to three-months post-TIA?
2. What factors relate to PTSD and mood problems three-months post-TIA?
3. What factors may predict the development of PTSD and mood problems three-months post-TIA (with a specific focus on coping and posttraumatic cognitions)?

Methods

Study Design

A cross-sectional quantitative design was used [18]. Data was collected using self-report questionnaires through a single use survey delivered online or by post. The online version of the survey was delivered by REDCap, a secure, web-based application for online surveys (Harris et al., 2009, 2019)[19]. Recruitment was conducted through social media and the NHS. A critical realist epistemological position was adopted by the research team (Bhaskar, 2013)[20].

Ethical Approvals

The study received approval from the University of Nottingham (UoN) Ethics Committee for the social media recruitment strategy (Reference: MHCN-2023-3149-1). For the NHS recruitment strategy, approval was granted by the NHS Research Ethics Committee and Health Research Authority (Reference: 24/SS/0025)[21].

Participants

Participants were adults who had experienced their first TIA within the past three months who were able to provide informed consent and complete questionnaires in English. Three-months was the chosen timeframe in line with prior TIA research (Grosse-Holz et al., 2020; Kiphuth et al., 2014), to limit potential confounding variables, and allow time for participants to be contacted. It was a requirement that survey completion was no sooner than one-week

[18] See extended method 2.1 for further information on the rationale for quantitative methodology
[19] See extended method 2.2 for details on the development of the REDCap survey
[20] See extended method 2.3 for further information on epistemological positioning
[21] See extended method 2.4 for full details on UoN and NHS ethical approvals

post-TIA, to align with TIA service parameters (i.e., rapid discharge and outpatient clinics), to improve participant retention, avoid staff involvement post-discharge, and to allow for an appropriate adjustment period to facilitate more accurate responses. Participants were excluded if they had received a diagnosis of PTSD, anxiety, or depression within the past year, or were currently receiving psychological support. Non-UK residents were excluded as the study focused on those who had experienced a TIA in the UK healthcare system[22]. The target sample was 55 participants to achieve sufficient statistical power for a large effect size to be detected. This target was based on guidance from Field (2017) for up to 12 predictor variables to be included in multiple linear regression (MLR) analysis. A large effect size was the minimum effect of interest to detect mechanisms to inform future TIA pathways, and in line with previous TIA and minor stroke studies reporting large effect sizes (Ben Assayag et al., 2022; Müller et al., 2021)[23].

Recruitment Approaches

A mixed recruitment approach using social media and NHS TIA clinics was employed to maximise recruitment efforts. The use of social media broadened the scope of the study to a national level and helped to capture perspectives across the UK. The study was advertised 11 times through various platforms (e.g., X and Facebook) using a study poster, and through UK-based charities' social media platforms, websites, and newsletters (e.g., Stroke Association and The Brain Charity). For NHS recruitment, two separate TIA clinics located in the Midlands were designated as Participant Identification Centres (PIC)[24].

Variables

Data was collected on sociodemographic and attributional factors, alongside PTSD and mood problems. Sociodemographic factors included employment status, income, educational level, living arrangements, fear of a future stroke, age, sex, and comorbid medical diagnoses. Variable selection

[22] See extended method 2.5.1 for further information on eligibility criteria and rationale

[23] See extended method 2.5.2 for further information initial sample size target

[24] See extended method 2.6 for further information on NHS recruitment and differences in PIC site locations

was influenced by previous stroke research (Ben Assayag et al., 2022; Dollenberg et al., 2021; Goldfinger et al., 2014).

Attributional factors measured included coping, which was operationalised into approach and avoidant coping (Eisenberg et al., 2012) and posttraumatic cognitions. The outcome variables measured included PTSD and mood problems, which were operationalised into anxiety and depression[25].

Questionnaires

Five standardised self-report questionnaires and a demographics form (which included a question about the fear of a future stroke) were used (see Table 1). The questionnaires were selected due to their psychometric properties, brevity, and prior use within stroke and TIA research[26].

[25] See extended method 2.7 for further details and rationale for variable selection

[26] See extended method 2.8.1 for additional information on questionnaire psychometric properties

Table 1.
Selection, Scoring and Justification for Questionnaires Utilised in the Study

Variable	Questionnaire	Scoring	Justification
PTSD	Post-Traumatic Stress Disorder Checklist Specific (PCL-S; Weathers et al., 1994)	17 items scored from 1 to 5 which are summed. Total scores range from 17 to 85, with a higher score indicative of greater PTSD symptomatology. For specialised medical clinics, a cut-off score of 36 is suggested and was used in the current study (Weathers et al., 1994).	Strong psychometric properties (Blanchard et al., 1996; Ruggiero et al., 2003; Weathers et al., 1993). It has been used to measure PTSD symptoms effectively in existing stroke and TIA studies (Ben Assayag et al., 2022; Feely et al., 2023; Garton et al., 2017; Goldfinger et al., 2014; Letamendia et al., 2012; Rutovic et al., 2021; Stein et al., 2018)[27]. Specific version enabled participants to focus on TIA only. Instructs to answer based on the past month, therefore capturing current PTSD symptomatology and not historical.
Anxiety	Generalised Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006)	7 items scored from 0 to 4 which are summed. Total scores range from 0 to 21, with a symptom breakdown of: • Minimal Anxiety (0 to 4) • Mild Anxiety (5 to 9) • Moderate Anxiety (10 to 14) • Severe Anxiety (15 to 21)	Good internal consistency and psychometric properties (Löwe et al., 2008). Used in previous stroke and TIA studies (Bonner et al., 2016; Corrigan et al., 2022; Eccles et al., 2017; Nguyen et al., 2025; Kapoor et al., 2019; Kellett et al., 2014) enhancing the interpretability and generalisability of results. Instructs to answer based on the past two-weeks, therefore assessing current symptoms and not historical.

[27] See extended method 2.8.2 for further rationale for the use of the PCL-S

Variable	Questionnaire	Scoring	Justification
		A recommended cut-off score of 10 was used (Spitzer et al., 2006).	
Depression	Patient Health Questionnaire 8 (PHQ-8 ; Kroenke et al., 2009)	8 items scored from 0 to 4 which are summed. Total scores range from 0 to 24, with a breakdown of: • Minimal Depression (0 to 4) • Mild Depression (5 to 9) • Moderate Depression (10 to 14) • Moderate-Severe depression (15 to 19) • Severe Depression (20 to 24) A recommended cut-off score of 10 was used (Kroenke et al., 2009).	Good internal consistency and psychometric properties (Torre et al., 2023). Utilised in previous stroke and TIA studies (El Husseini et al., 2012) in addition to its full measure of PHQ-9 (Corrigan et al., 2022; Nguyen et al., 2025; Kellett et al., 2014). It has been validated to be a reasonable tool to measure depression in stroke patients (Dong et al., 2022). Selected due to its omission of the suicide and self-injurious behaviour question. This was for ethical reasons due to the online survey design of the study, and the researcher's inability to provide adequate support should a participant score high on the item.
Coping	The Brief Coping with Problems Experienced Inventory (Brief COPE; Carver, 1997)	28 items scored between 1 and 4. Items do not total to an overall score, but load onto 14 different coping facets. Scoring depends on how the questionnaire is used. Prior physical health research informed how scores can be categorised into approach and avoidant coping (Eisenberg et al., 2012) and was used within the current study.	Good psychometric properties (Carver, 1997; DeDios-Stern et al., 2017; Solberg et al., 2023). Participants completed the questionnaire focusing on their TIA to help minimise confounding variables. It has been used in stroke and TIA research, meaning outcomes can be compared to prior studies (Kousar et al., 2023; Minshall et al., 2021; Reverté-Villarroya et al., 2020).

Variable	Questionnaire	Scoring	Justification
		Responses were summed, and means were calculated for approach coping (items 2,7,12,17,14,25,20,24,5,15,10,23) and avoidant coping (items 3,8,4,11,9,21,6,16,1,19,13,26), creating two distinct variables for data analysis. Higher mean scores indicated a participant used more of that coping style[28].	
Posttraumatic Cognitions	The Posttraumatic Cognitions Inventory (PTCI-9; Wells et al., 2019)	9 items scored between 1 and 7. Total scores are the mean of items summed, and range from 1 to 7 with greater scores indicative of the presence of more posttraumatic cognitions (Wells et al., 2019). Total scores were utilised due to inconsistencies in the reliability of sub-category breakdowns (Whiteman et al., 2022)[29].	Strong psychometric properties and correlates with the full version of the questionnaire (Wells et al., 2019; Kooistra et al., 2023). The brief version was used as it contained less items (Foa et al., 1999) to reduce participant burden. Asked participants to answer items thinking about their TIA and no other events. The role of posttraumatic cognitions post-stroke or TIA has not been widely researched, however the PTCI-9 has been found to be suitable in measuring negative cognitions following trauma within clinical practice (Serier et al., 2023; Whiteman et al., 2022; Zhan et al., 2024).

[28] See extended method 2.8.3 for further information on scoring the Brief-COPE and category loadings

[29] See extended method 2.8.4 for further information on PTCI-9 scoring and rationale for using total scores

Study Procedures and Data Collection

NHS Sites

The lead researcher (CW) liaised with clinicians located on NHS PIC sites [30] who provided potential participants with the study details, checked whether they met the study inclusion criteria, and gained Consent-To-Contact (CTC). CTC forms were shared with CW who contacted and sent the survey to the participant through their preferred contact method. Participants who did not meet the study criteria were screened out via a screening questionnaire. For the postal option, participants were sent a paper-based survey with a pre-paid return envelope. Participation in the study was voluntary and participants could withdraw at any time[31]. NHS recruitment took place between August 2024 and February 2025.

Social Media

The study advert contained the QR code and link to the screening questionnaire to check eligibility, for the rest of the survey to then be accessed via REDCap. Social media recruitment took place between March 2024 and January 2025.

Patient and Public Involvement (PPI)

The study was presented during its development phase to the UoN Stroke Research Partnership Group. Feedback on the study was used to inform the design and conduct of the study[32]. The group provided ideas on the format of the CTC form and helpful alterations on the Participant Information Sheet. A discussion on the usability of the survey and having different completion options to suit participants' needs was embedded into the design. The group voiced that TIA patients should not require stroke-specific measures, and that recruitment through TIA clinics was a suitable approach from their experiences[33].

[30] See extended method 2.9 for information on PIC site initiation visits

[31] See extended method 2.10 for further information on data collection

[32] See extended method 2.11 for further information on PPI involvement

[33] See extended method 2.12 for further information on study dissemination plans

Data Analysis

The data was analysed using the Statistical Package for Social Sciences (SPSS) version 29.0. For preliminary analysis, the data was screened for input errors and missing data (Tabachnick & Fidell, 2007) and descriptive statistics were reviewed to explore the presence of PTSD and mood problems [34].

Exploratory two-tailed correlational analysis were conducted to explore which factors related to PTSD and mood problems. Due to concerns regarding the normality of variables, non-parametric Spearman's rho correlational analyses were used. A Bonferroni correction was applied to account for multiple correlations, with the *alpha* level of .002 being used.

Analyses were conducted to explore whether there were differences across groups, including differences of whether PTSD was indicated, between NHS and social media participants, the impact of living arrangements and gender. Non-parametric Mann-Whitney U and Kruskal-Wallis tests were selected due to concerns regarding the normality of variables[35]. A Bonferroni correction was applied to account for multiple comparisons, with the *alpha* level of .003 being used[36].

To explore the impact of coping and posttraumatic cognitions on PTSD and mood problems, hierarchical (MLRs) (Field, 2017) were carried out[37]. Assumption checks according to standard practices for MLR (Field, 2017) were conducted [38], including checks for outliers (including case wise diagnostics, Cooks Distance and Centred Leverage values)[39].

The sample size[40] and data met the assumptions to conduct MLR, although there was uncertainty on whether the variables met the normality assumption. Bootstrapping was applied in an attempt to overcome this and alleviate false discovery rates[41]. Significance levels of *alpha* = .05 with 95% confidence intervals were used. A large effect size was used based on Cohen's *d* (1988) benchmarks and Field's (2017) guidance for MLRs (small = 0.2 - 0.5;

[34] See extended results 3.4 for further information on data screening prior to analysis
[35] See extended results 3.10 for further information on the selection of non-parametric tests
[36] See extended method 2.13 for further information on the use of Bonferroni Corrections
[37] See extended method 2.14 for further information MLR rationale and alternative regression approaches
[38] See extended results 3.5 for further information on MLR assumption checks
[39] See extended results 3.6 for further information on sensitivity analysis and impact of outliers
[40] See extended results 3.7 for further information on sample size in MLR
[41] See extended results 3.8 for further information on robust regression and Bootstrapping

medium = 0.5 – 0.8; large > 0.8), alongside existing TIA and minor stroke studies which have reported large effect sizes (Ben Assayag., 2022).

MLRs with 95% Bias Corrected Accelerated (BCa) bootstrapping applied with 1000 resamples were conducted to examine the impact of predictor variables based on background literature and psychological theory on each outcome variable. Post-regression heteroscedasticity checks were also conducted[42]. See Table 2 for MLR variables and justification.[43]

Table 2.

Multiple Linear Regression Variable Selection and Justification

Outcome Variable	Predictor Variables	Justification
PTSD	Step One: Age, avoidant coping, and posttraumatic cognitions. Step Two: Approach coping and the fear of a future stroke.	Age, avoidant coping, and posttraumatic cognitions have been found to relate to PTSD development in stroke from prior research and theory (Ehlers & Clark, 2000). As approach coping and the fear of a future stroke had been less evidenced quantitatively in TIA, they were added in step two for exploration (Field et al., 2008; Kiphuth et al., 2014; Tang et al., 2022).
Anxiety	Step One: Age, avoidant coping, and approach coping. Step Two: Posttraumatic cognitions.	Age, avoidant coping and approach coping have been evidenced to contribute to anxiety in stroke, but posttraumatic cognitions had been sparsely evidenced and was therefore added in step two for exploration (Herrmann et al., 1997; Kapoor et al., 2019; Stanton et al., 2018).
Depression	Age, avoidant coping, approach coping, and posttraumatic cognitions added in a single step.	All variables had been evidenced in stroke but not TIA, therefore all were added in the same step (King et al., 2002; Park et al., 2006; Teoh et al., 2009).

[42] See extended results 3.9 for further information on post-regression checks

[43] See extended method 2.15 for information on quality appraisal

Results

Sample Characteristics

The study initially recruited 58 participants, 35 from the NHS and 23 from social media. Three NHS participants were excluded due to not meeting study criteria and participant withdrawal [44]. This resulted in a final sample size of 55[45]. Table 3 summarises participant demographics [46].

Table 3.
Participant Demographics

Characteristic	Option	Total *N*
Age	Mean age 66.39 years (*SD* = 12.81)	
Ethnicity	White British	53
	Other White Background	2
Sex	Female	32
	Male	23
Occupation	Retired	23
	Manual Role (e.g., painter decorator, delivery driver, yard operative)	4
	Healthcare Role	5
	Administration	2
	Technician	2
	Artist	1
	Educational Role	2
	Recruiter	1
	Retail	2
	Site Manager	1
	Systems Manager	1
	Off sick	1
	Not provided (optional question)	10
Educational Level	Primary School	3
	Secondary School	22
	College	8
	University	19
	Prefer not to say	3

[44] See extended results 3.1 for additional information on missing data

[45] See extended results 3.2 for further information on recruitment rates

[46] See extended results 3.3 for further details comparing social media and NHS participant demographics

Characteristic	Option	Total *N*
Annual Income (£)	18,000 or below	22
	19,000 to 35,000	9
	36,000 to 50,000	5
	50,000 or above	6
	Prefer not to say	13
Current Living Arrangements	Alone	7
	Cohabiting with Partner	41
	Living with someone else (e.g., other family members such as children)	7
	Supported Living	0
	Nursing Home	0
	Prefer not to say	0
Presence of other medical conditions	No	12
	Yes	43
Rating for the fear of a future stroke or TIA occurring	Not fearful at all	4
	Slightly Fearful	22
	Moderately Fearful	11
	Quite a bit fearful	8
	Very fearful	10

Note. SD = Standard Deviation

Aim One: Indication of PTSD and mood problems up to three-months post-TIA

Means and standard deviations (*SD*) were calculated for the PCL-S, GAD-7, and PHQ-8 to determine the indication of PTSD and mood problems (see Table 4). Overall, 43.6% of participants met the clinical cut-off score indicative of PTSD, 36.4% met the clinical cut-off score for anxiety based on the GAD-7, and 40% met the cut-off for indicative depression based on the PHQ-8.

Table 4.
Descriptive Statistics for PTSD, Anxiety and Depression Scores

Variable	Mean (*SD*)	Subcategories	*N* (%)	*N* (%) met clinical cut off score	*N* Minimum and maximum scores
PTSD (PCL -S)	37.04 (18.36)	PTSD Indicated*		24 (43.6)	Minimum: 17 Maximum: 80
Anxiety (GAD- 7)	7.42 (6.92)	Minimal Anxiety:	26 (47.3)	20 (36.4)	Minimum: 0 Maximum: 21
		Mild Anxiety:	9 (16.4)		
		Moderate Anxiety:	10 (18.2)		
		Severe Anxiety:	10 (18.2)		
Depression (PHQ-8)	8.16 (7.02)	Minimal Depression:	22 (40)	22 (40)	Minimum: 0 Maximum: 24
		Mild Depression:	11 (20)		
		Moderate Depression:	10 (18.2)		
		Moderate to Severe Depression:	8 (14.5)		
		Severe Depression:	4 (7.3)		

Note. Overall *N* = 55; Clinical cut-off scores were: PCL-S = >36 indicative of PTSD symptoms, GAD-7 total scores >10 indicative of anxiety, PHQ-8 total score >10 indicative of depression; **N* = 31 (56.4%) of the overall sample did not meet the clinical cut-off score for PTSD.

Aim Two: Factors associated with PTSD and mood problems

PTSD (PCL-S)

PCL-S scores showed a significant, moderate, negative correlation with age, suggesting that older participants experienced fewer PTSD symptoms.

PCL-S scores showed a significant, strong, positive correlation with the fear of a future stroke*,* avoidant coping, approach coping and posttraumatic cognitions. Correlations suggested that greater incidences of PTSD symptoms were linked to a greater fear of a future stroke, increased avoidant and approach coping scores, and more posttraumatic cognitions.

Anxiety (GAD-7)

GAD-7 scores showed a significant, moderate, negative correlation with age, which indicated that older participants experienced fewer anxiety symptoms.

GAD-7 scores showed a significant, strong, positive correlation with the fear of a future stroke, avoidant coping, approach coping and posttraumatic cognitions. Correlations showed that higher incidences of anxiety symptoms were linked to a greater the fear of a future stroke, elevated avoidant and approach coping scores, and more posttraumatic cognitions.

Depression (PHQ-8 Scores)

PHQ-8 scores showed a significant, strong, negative correlation with age, suggesting that older participants had fewer depression symptoms.

PHQ-8 scores showed a significant, strong, positive correlation with the fear of a future stroke, avoidant coping, approach coping and posttraumatic cognitions. Correlations suggested that higher incidences of depression symptoms corresponded with a heightened fear of a future stroke, higher avoidant and approach coping scores, and more posttraumatic cognitions.

Correlations were conducted to investigate whether relationships were present between the outcome variables. There were significant, strong, positive correlations between all variables. See Table 5 for correlations.

Table 5.
Correlations between PTSD, Anxiety, Depression, Age, Fear of Future Stroke, Approach Coping, Avoidant Coping and Posttraumatic Cognitions

	Age	Fear of future stroke	Avoidant Coping (Brief COPE)	Approach Coping (Brief COPE)	Posttraumatic Cognitions (PTCI-9)	Anxiety (GAD-7)	Depression (PHQ-8)
PTSD (PCL-S)	r_s (53) = -.46, p <.001*	r_s (53) = .63, p <.001*	r_s (52) = .81, p <.001*	r_s (52) = .56, p <.001*	r_s (52) = .74, p <.001*	r_s (53) = .98, p <.001*	r_s (53) = .90, p <.001*
Anxiety (GAD-7)	r_s (53) = -.49, p <.001*	r_s (53) = .69, p <.001*	r_s (52) = .85, p <.001*	r_s (52) = .56, p <.001*	r_s (52) = .72, p <.001*	-	r_s (53) = .92, p <.001*
Depression (PHQ-8)	r_s (53) = -.54, p <.001*	r_s (53) = .56, p <.001*	r_s (52) = .82, p <.001*	r_s (52) = .51, p <.001*	r_s (52) = .71, p <.001*	-	-
Avoidant Coping (Brief COPE)	r_s (53) = -.45, p <.001*	-	-	-	r_s (52) = .72, p <.001*	-	-
Approach Coping (Brief COPE)	r_s (53) = -.25, p = .07	-	-	-	r_s (52) = .36, p = .008	-	-

Note. r_s = Spearman's Rho; * = Significant at the p = .002 level due to Bonferroni correction; Approach and avoidant coping correlations had an *N* of 54 due to an incomplete dataset[47].

Between Group Differences

PTSD Indicative or Not. Significant differences were observed in participants who reported PTSD symptomatology. There was a statistically significant difference in anxiety, as those who reported PTSD symptoms had higher mean GAD-7 scores (mean [x̄] = 13.66, [*SD* 4.83]) compared to those who did not report PTSD (x̄ = 2.61 [*SD* 3.70]). Similarly for depression, those who indicated PTSD symptoms had higher mean PHQ-8 scores (x̄ = 14.38 [*SD* 5.11]) than participants not reporting PTSD (x̄ = 3.35 [*SD* 3.73]).

[47] See extended results 3.11 for additional correlational analysis for NHS sample

Coping outcomes were also significantly different; participants who indicated PTSD symptoms had higher mean approach coping scores ($\bar{x}$ = 29.66 [*SD* 5.39]) compared to those who did not indicate PTSD ($\bar{x}$ = 23.10 [*SD* 7.33]). Participants who indicated PTSD also had higher mean scores for avoidant coping ($\bar{x}$ = 29.66 [*SD* 5.39]) than those without ($\bar{x}$ = 14.93 [*SD* 3.50]). Additionally, those who indicated PTSD had higher mean PTCI-9 scores of 3.37 (*SD* 1.35) compared to 1.46 (*SD* .72) for those not reporting PTSD. Lastly, those who reported PTSD were significantly younger ($\bar{x}$ age = 60.96 years [*SD* 10.94]) compared to those without PTSD symptoms ($\bar{x}$ age = 70.58 years [*SD* 12.73]). See Table 6 for Mann-Whitney and Kruskal-Wallis results.

Comparisons between Social Media and NHS Participants. Significant differences were observed between participants recruited through social media and the NHS. For PTSD, there was a statistically significant difference as social media participants reported higher PCL-S scores ($\bar{x}$ = 45.35 [*SD* 19.29]) than NHS participants ($\bar{x}$ = 31.06 (*SD* 15.37). Depression outcomes were also significantly different, as social media participants had higher PHQ-8 scores ($\bar{x}$ = 11.52 [*SD* 6.58]) than NHS participants ($\bar{x}$ = 5.75 [*SD* 6.39]). A statistically significant difference was observed for age, with social media participants being younger ($\bar{x}$ age = 58.91 years [*SD* 12.09]) than NHS participants ($\bar{x}$ age = 71.75 years [*SD* 10.54]).[48]

There were no statistically significant differences in outcomes across living arrangements (alone, cohabiting with partner or living with others)[49], or between genders.

[48] See extended discussion 4.1 for information on the impact of using Bonferroni Corrections

[49] See extended discussion 4.2 for further discussion on the impact of living arrangements and gender

Table 6.
Between Group Comparison Test Statistics

Groups Compared	Variable	Mann-Whitney or Kruskal-Wallis Output
Indicative PTSD compared to non-indicated PTSD	GAD – 7 Score	(U = 715.00, *z* = 5.86, p <.001, *r* = .79) *
	PHQ-8 Score	(U = 709.50, z = 5.75, p <.001, r = .76) *
	Approach Coping Score	(U = 538.00, z = 3.10, p = .002, r = .42) *
	Avoidant Coping Score	(U = 638.500, z = 4.88, p <.001, r = .66) *
	PTCI-9 Score	(U = 675.00, z = 5.21, p <.001, r = .70) *
	Age	(U = 190.50, z = 3.08, p = .002, r = -.42) *
Social Media compared to NHS Participants	PCL-S Score	(U = 189.50, *z* = -3.05, p = .002, *r* = -.41) *
	GAD – 7 Score	(U = 200.00, z = -2.89, p = .004, r = -.39)
	PHQ-8 Score	(U = 192.50, z = -3.01, p = .003, r = -.41) *
	Approach Coping Score	(U = 216.50, z = -2.45, p = .014, r = -.33)
	Avoidant Coping Score	(U = 198.00, z = -2.79, p = .005, r = -.38)
	Fear of Future Stroke	(U = 224.00, z = -2.56, p = .01, r = -.35)
	Age	(U = 589.50, z = 3.78, p <.001, r = .51) *
Living Arrangements	PCL-S Score	(H (2) = 1.99, p = .37)
	GAD – 7 Score	(H (2) = 1.39, p = .50)
	PHQ-8 Score	(H (2) = .73, p = .69)
Gender	PCL-S Score	(U = 457.50, z = 1.53, p = .13, r = .21)
	GAD – 7 Score	(U = 458.00, z = 1.55, p = .12, r = .21)
	PHQ-8 Score	(U = 463.00, z = 1.63, p = .10, r = .22)

Note. * = *p* = .003

Aim Three: Impact of coping and posttraumatic cognitions on PTSD and mood problems up to three-months post-TIA

Multiple Linear Regressions

Three hierarchical MLRs were conducted as data screening[50] and preliminary analyses suggested that the assumptions of MLR had not been violated. Following a case wise diagnostic test and sensitivity analysis, one outlier of influence and distance was removed due to Cook's Distance and Leverage Values being exceeded[51], and one other participant was removed due

[50] See extended results 3.4 for further information on data screening

[51] See extended results 3.5 for further information on MLR assumption checks

to missing data on the Brief-COPE[52]. Therefore, the total sample size for the MLRs was 53. See Table 7 for MLR models for PTSD, anxiety, and depression.

PTSD

The MLR model containing age, avoidant coping, posttraumatic cognitions, approach coping, and the fear of a future stroke explained 67.2% of the variance in PTSD scores (F (2,47) =22.27, p <.001) and was statistically significant. Step one and step two were significant models (*p* <.001), however the R^2 value did not significantly change between both steps (*p* =.20).

The analysis suggested that avoidant coping was the most influential predictor, followed by posttraumatic cognitions. Avoidant coping was the only statistically significant predictor of PCL-S scores.

Anxiety

The MLR model containing age, avoidant coping, approach coping, and posttraumatic cognitions explained 73.5% of the variance in GAD-7 scores (F (1,48) =36.98, p <.001) and was statistically significant. Step one and step two were significant models (*p* <.001), and the R^2 value did significantly change between both steps (p =.02).

The analysis suggested that avoidant coping was the most influential predictor, followed by posttraumatic cognitions. Avoidant coping and posttraumatic cognitions were the only statistically significant predictors of GAD-7 scores.

Depression

The MLR model containing age, avoidant coping, approach coping, and posttraumatic cognitions explained 69.2% of the variance in PHQ-8 scores (F (4,48) =30.20, p <.001) and was statistically significant.

The analysis suggested that avoidant coping was the most influential predictor, followed by posttraumatic cognitions. Avoidant coping was the only statistically significant predictor of PHQ-8 scores.

Overall, MLRs indicated that greater scores in avoidant coping significantly predicted the presence of PTSD and depression following a TIA.

[52] See extended results 3.1 for further information on missing data

Additionally, it appeared that greater scores in avoidant coping and posttraumatic cognitions significantly predicted anxiety following a TIA.

Table 7.
Hierarchical Multiple Linear Regression Models with 95% Confidence Intervals BCa Bootstrapping for Predictors and PTSD, Anxiety, and Depression

	PTSD	Anxiety	Depression
	ß [Std Error] *(CI)*	*ß* [Std Error] *(CI)*	*ß* [Std Error] *(CI)*
Step One:			
Constant	[12.13] *(-26.72,17.07)*	[3.48] *(14.62, .60)*	[5.68] *(-16.54, 5.06)*
Age	-.05 [.13] *(-.34, .25)*	-.10 [.04*]* *(-.13, .007)*	-.14 [.06] *(-.17, .06)*
Avoidant Coping	**.59 [.47] *(1.10, 2.90)***	**.13 [.10] *(.86, 1.26)***	**.53 [.21] (.27, 1.11)**
Posttraumatic Cognitions	**.28 [1.58] *(.43, 7.26)***	-	.27 [.72] *(.01, 2.83)*
Fear of future stroke	-	-	-
Approach Coping	-	.09 [.08] *(-.17, .14)*	.06 [.08] *(-.09, .24)*
Step Two:			
Constant	[12.22] *(-31.44, 12.77)*	[3.68] *(-17.61, 1.35)*	-
Age	-.03 [.13] *(-.31, .28)*	-.05 [.04] *(-.10, .05)*	-
Avoidant Coping	**.48 [.54] *(.53, 2.64)***	**.65 [.15] *(.49, 1.10)***	-
Posttraumatic Cognitions	.25 [1.82] *(-.29, 7.27)*	**.24 [.58] *(.03, 2.43)***	-
Fear of future stroke	.20 [1.61] *(-.17, 5.63)*	-	-
Approach Coping	.02 [.23] *(-.42, .56)*	.03 [.08] *(-.12, .18)*	-

Note. *ß* = Standardised Beta coefficients; Std Error = bootstrapped standard error; *CI* = confidence intervals (95% bootstrapped); ***CI*s in bold are significant** = $p < 0.05$ and are entirely above 0.

Discussion

This is the first UK-based study to our knowledge to explore whether PTSD and mood problems are present within three-months after a first diagnosis of TIA. The study explored three forms of psychological distress

(PTSD, anxiety, and depression), then investigated their presence post-TIA, and what factors might have related and predicted their development. Our findings showed that 43.6% of individuals who had experienced a TIA reported PTSD symptoms, which is higher than expected based on previous stroke and TIA studies outside of the UK (reported median prevalence of 17.5%; Janssen et al., 2024). Our results are more comparable to studies which use samples of only TIA participants three-months post-diagnosis, where PTSD prevalence rates were up to 29.6% (Webb et al., 2023)[53]. Importantly, findings also indicate that those who present with PTSD symptomatology have poorer outcomes for anxiety and depression. Our results showed that 36.4% of participants reported anxiety, and 40% of participants reported depression, which suggests that people in the early stages post-TIA can experience psychological distress. Previous studies support our observations, which have reported that anxiety was present in 29% of participants up to three-months after a TIA (Chun et al., 2018), and depression up to 42% post-TIA or minor stroke (Moran et al., 2014). However, studies which have combined minor stroke and TIA participants in large-scale samples which include participants with a lifetime history of TIA have reported substantially lower prevalence rates compared to those observed in our study (14% for anxiety and 9% for depression; Broomfield et al., 2014) [54]. In combined stroke diagnoses studies, reports of psychological distress appear to be reduced compared to samples containing only TIA participants. Through focusing on a TIA diagnosis alone, our study provides a clearer picture of the psychological outcomes post-TIA and highlights that PTSD, anxiety and depression are present.

A significant relationship between age and the levels of psychological distress was found, indicating that younger individuals were more likely to exhibit increased distress than older participants post-TIA. This result aligns with the current stroke and TIA literature, which found that younger people were more likely to develop PTSD (Nguyen et al., 2025) and that a younger age was a significant predictor of anxiety (Chun et al., 2018). Such findings could be explained through studies which have indicated that older people prefer self-

[53] See extended discussion 4.3 for further information on PTSD findings in relation to the TIA literature

[54] See extended discussion 4.4 for further information on mood problem findings in relation to the TIA and stroke literature

management strategies to cope with distress, rather than seeking help from healthcare services (Moult et al., 2020). It is suggested that older people may not identify psychological distress as a problem which requires professional support, and they do not want to be stigmatised with a diagnostic label. In addition, Pound et al. (1998) found that older people can minimise the effects of stroke, and normalise strokes as a part of aging. This could explain why older people reported less psychological distress in our study, particularly given the differences in generational attitudes towards mental health (Reynolds et al., 2020). These findings suggest the need for clinicians to be aware of the psychological impacts post-TIA and ask about mood routinely to everybody. It also insinuates the need to monitor younger patients, as they could be more susceptible to developing psychological distress due to the presence of other demands such as returning to work and parenting (Wicht et al., 2022) [55].

Psychological outcomes were strongly associated with a greater fear of a future stroke, and higher incidences of avoidant coping and posttraumatic cognitions. Such findings support Ehlers and Clark's (2000) model of PTSD, as our results indicate that a higher presence of posttraumatic cognitions (e.g. there was something about me that made the TIA happen) has a significant relationship with the presence of PTSD symptoms. Therefore, how people think about their TIA after its occurrence has a significant impact on whether people develop psychological distress. This is a new finding that complements the existing stroke literature as cognitive appraisals have been found to be significant in the development of PTSD symptoms (Merriman et al., 2007). Avoidant coping had a significant relationship with all psychological outcomes, indicating its central role in participants developing PTSD and mood problems post-TIA, further aligning with the existing TIA literature (Kiphuth et al., 2014). It appears that if individuals have greater posttraumatic cognitions and employ more avoidant coping strategies, they may present with greater psychological distress, fitting with the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984).

In relation to approach coping, we found that higher occurrences correlated with psychological distress. In the wider literature on coping,

[55] See extended discussion 4.5 for further information on the effects of age and TIA

approach coping is often related to reduced psychological distress (Kindermann et al., 2023) and is depicted to help individuals cope effectively with stressors (Holahan et al., 2007). One explanation for this unexpected finding could be that participants in our study were still adjusting to their diagnosis as they were up to three-months post-TIA, and the potential protective effects of approach coping may not yet have taken effect in this early stage. This is supported by prior stroke research, whereby pro-active coping strategies were shown to protect against anxiety and depression one-year post-diagnosis, suggesting the approach coping strategies had time to be embedded (Welten et al., 2023). Although both avoidant and approach coping associations were statistically significant, the correlation with psychological distress was substantially stronger for avoidant coping, suggesting it may be a stronger predictor of psychological distress.

Interestingly, we found that those who were recruited through social media had significantly higher scores for PTSD and depression and were on average 13 years younger than the participants recruited through NHS services. This finding could be explained through self-selection bias, in that those who were already struggling may have been more likely to seek support and education following their TIA through online channels and social media (Alarie & Lupien, 2021). The purpose of the study may have therefore resonated more with those on social media, compared to those attending NHS TIA clinics whereby anyone who met the eligibility criteria was invited to participate. This highlights the value of a dual recruitment approach, including both social media and NHS settings as each appeared to engage different participants from the target population. Each participant group may have perceived and coped with their TIAs differently, which resulted in varying degrees of psychological distress. Therefore, our sample collectively captures a range of responses and ways of coping to TIA, providing generalisable results for other populations[56].

The study found that the most consistent predictor of psychological distress was avoidant coping, aligning with previous stroke and TIA research which depicts that maladaptive, avoidant and defensive coping styles are linked with the development of psychological distress (Dollenberg et al., 2021; Kiphuth

[56] See extended discussion 4.6 for further information on the differences between social media and NHS participants

et al., 2014). Additionally, posttraumatic cognitions emerged as a significant predictor for anxiety and was an influential predictor for PTSD and depression, despite it not being significant. Our findings align with psychological models which emphasise the importance of cognitions and coping strategies in response to traumatic or stressful events, and their role in the development and maintenance of PTSD (Ehlers & Clark, 2000) and psychological distress (Lazarus & Folkman, 1984). Notably, approach coping emerged as the least influential predictor in the MLR models, indicating that the use of approach coping strategies does not significantly lead to the development of psychological distress [57].

Our findings are comparable to research exploring psychological adjustment following similar sudden onset physical health issues, such as newly diagnosed seizures (Velissaris et al., 2007). This study suggested that people experience uncertainty and fear that another seizure may occur, and that using avoidant coping strategies such as believing another seizure will not occur, minimisation or viewing themselves as lucky compared to others resulted in poorer recovery outcomes. Such outcomes are similar to those found within our study, in that the fear of a future stroke and higher levels of avoidant coping significantly related to poorer psychological outcomes post-TIA. Within Velissaris et al.'s (2007) study, participants reported shock, fear, confusion, and feeling flawed as a person, however, some participants reported positive changes post-seizure, and viewed it as a ‘wake-up call’. Additionally, they found that those who used more approach coping strategies and emotional support had better psychological outcomes post-diagnosis. These findings slightly differ from our findings, as we found that approach coping and psychological distress were significantly correlated, rather than protecting against distress. Velissaris et al.'s (2007) findings are similar to those reported in qualitative studies of individuals who have experienced a TIA (Ebbesen et al., 2025). Our findings contribute to building an evidence base for sudden onset or transient health problems, and reinforce the notion that coping serves as a key mechanism that can either protect against or exacerbate psychological distress.

[57] See extended discussion 4.7 for further information on findings in relation to psychological models of stress and coping

Importantly, our results indicated that posttraumatic cognitions should be considered in the assessments and evaluation of psychological distress post-TIA, a finding that aligns with existing PTSD research (Startup et al., 2007). The presence of negative posttraumatic cognitions has been found to be important in the development, maintenance and treatment of PTSD in veterans (Serier et al., 2023). Our findings signify that posttraumatic cognitions have an important role within sudden onset physical health diagnoses and may result in individuals having poorer outcomes.

Strengths and Limitations[58]

Due to the novelty of our study, valuable insights can be learnt from the methods utilised, particularly in reference to recruitment. Our dual recruitment approach allowed for participation to be far reaching, using social media to broaden the scope of the research to UK wide, as well as having two NHS sites. Additionally, the study was advertised across multiple channels, including social media platforms, charities, newsletters, and posters in TIA clinics. The versatile approach for participants to complete questionnaires (email, QR and postal) helped to capture a wide range of potential participants, aiding with recruitment, and gaining data from different types of participants (e.g., those without email addresses). PPI feedback was gained for recruitment, questionnaires, and survey completion methods, which strengthened the study design. The study shows that future TIA research needs flexible recruitment methods with postal options remaining important, particularly when recruiting older adults (Peels et al., 2012).

Our cross-sectional, correlational design limits the conclusions about causality in psychological distress following TIA, and findings should be interpreted mindfully. Additionally, we were unable to assess the long-term trajectory of psychological difficulties, as evidence has shown that effects can persist up to one-year post-diagnosis, an important consideration for TIA aftercare (Utz et al., 2019).

The sample size achieved in the study is comparable to existing studies which have explored the psychological effects of a TIA (Dollenberg et al., 2021; Müller et al., 2021) and had sufficient power (Field, 2017). However, the sample is small

[58] See extended discussion 4.8 for further discussion on study strengths and limitations

when contrasted against larger, well-resourced stroke studies (Ben Assayag et al., 2022; Chun et al., 2018; Tang et al., 2022), demonstrating the need for larger scale research in TIA. To potentially increase the sample, the eligibility criteria could have been extended beyond three-months as previous TIA studies have demonstrated (Dollenberg et al., 2021). We decided against this as recruiting people at a later time post-diagnosis could have resulted in more confounding variables. For example, if participants were recruited one-year post-TIA, other traumatic events may have occurred, which may have affected responses on questionnaires (e.g., artificially increasing reported levels of distress on the survey, but not due to TIA).

Participant demographics were limited, with all but two participants being White British, which questions the generalisability of results. The localities that NHS sites covered indicated that the majority of residents were from White backgrounds (Office for National Statistics [ONS], 2021). However, we expected to observe a greater degree of diversity from site one after examining ONS (2021) statistics. Results suggest that the demographics observed in our study may be due to the mixed-recruitment approach. In existing stroke literature, direct comparisons between ethnic groups are limited and often unreported, indicating that the lack of ethnic diversity is not unique to our study (Janssen et al., 2024).

Importantly, whilst our findings provide insights into the psychological distress and the variables which may contribute to its development post-TIA, there are several factors which limit the extent to which they can be generalised to the wider TIA population. Factors include the lack of ethnic diversity in our sample, group differences between NHS and social media participants, service level differences (e.g., social media TIA clinics may have differed vastly from PIC site clinics), contextual factors (e.g., TIA pathways vary depending on locality and resources available), and unmeasured variables (e.g., socioeconomic background and pre-existing mental health conditions). Such factors may influence psychological distress post-TIA, which limits the certainty that findings from the current study can be generalised beyond the study sample.

We used self-report questionnaires to determine the presence of psychological difficulties, which are subjective to the person completing them, and cannot provide a definitive diagnosis of PTSD, anxiety, or depression.

However, the measures included have been used extensively throughout physical health research as screening tools to provide indications of whether psychological distress *may* be present (Edmondson et al., 2012; Kellett et al., 2014). Furthermore, the choice of questionnaires enabled participants' responses to be directly linked to their TIA. For example, the questionnaires instructed participants to answer questions only in relation to their TIA. This helped to ensure that participants completed questionnaires regarding how they coped and thought about their TIA, and not another stressor that had occurred within the timeframe.

Clinical Implications and Future Research[59]

Our results demonstrated that people post-TIA are experiencing significant psychological difficulties, which has previously gone under recognised. There is currently no guidance or support within UK TIA aftercare pathways to help individuals with such residual psychological distress (NHS UK, 2023). The current study highlights the need for all healthcare professionals and people receiving a diagnosis to be aware of the potential ongoing psychological effects. It highlights the need to screen for such difficulties in the early stages post-diagnosis, and signpost TIA patients to relevant services (e.g., self-help, charities, talking therapies, GPs). Stroke aftercare pathways consist of a stepped care model which includes psychological interventions (NHS England, 2017), which is not the case for TIA. Considering that our findings are novel and small-scale within a UK context, we recommend future research continues to build on findings that psychological interventions should start to be considered within TIA aftercare pathways.

The results emphasise the impact of avoidant coping and posttraumatic cognitions on the development of psychological difficulties and could therefore be potential intervention targets in services. Our study findings could help to inform the development of psychological elements into TIA aftercare, somewhat akin to existing national stroke guidelines following the conduction of further TIA studies (NHS England, 2017). Interestingly, PTSD, anxiety and depression were all significantly correlated. This finding suggests that mood screening within TIA

[59] See extended discussion 4.9 for further discussion on clinical implications and future research

clinics could also indicate the presence of PTSD in addition to psychological distress, which is important, as our findings implied that PTSD could negatively impact other psychological outcomes. However, larger scale studies from different TIA contexts need to be carried out to address some of the discussed limitations from our study before changes in TIA services could be proposed.

Our study offers an initial exploration into the psychological effects after a TIA and provides indications for the need for further research into the impact of TIAs. Future research could further expand our understanding of coping and cognitions as key mechanisms and predictors of distress over a longer duration, using a longitudinal mixed-methods approach. Despite there being a small qualitative research base into the effects of a TIA (Crowfoot et al., 2018), there is limited research into how medical professionals view TIAs, for example the minimisation of TIA in contrast to a stroke (Turner et al., 2022). A qualitative study from a UK sample could explore the language that clinicians' use during TIA diagnostic appointments, to help provide insights for potential changes to how clinicians approach patients in TIA aftercare, and help people feel supported. National clinical guidelines recommend that stroke services train staff to recognise and manage post-stroke psychological problems (ISWP, 2023). Similarly, we recommend that small-scale awareness training for staff within TIA services should be trialled to spread awareness of the psychological impact following a TIA, and the value of signposting patients to support. Additionally, a future study on integrating self-help resources for PTSD and mood problems during the initial TIA diagnosis could reveal whether low-level interventions are beneficial for TIA patients' recovery.

Conclusions

Psychological distress in the form of PTSD, anxiety and depression symptoms appear to be present following a TIA diagnosis, however there are currently no psychological provisions routinely included in aftercare. We found that higher incidences of avoidant coping and posttraumatic cognitions appeared important in the development of psychological distress, and the presence of PTSD may lead to greater amounts of anxiety and depression. Our findings begin to improve our understanding of the factors which may predict

people experiencing psychological distress. This will provide valuable insights into the development of possible future low-level psychological interventions to prevent the development of long-standing mental health problems. Results support the need for mood screening to be trialled in TIA clinics, and the potential for psychological care alike to those recommended for stroke to be developed following further research (ISWP, 2023; NHS England, 2017). This study contributes towards building a novel evidence base for psychologically informed care within TIA aftercare and raises awareness for the impact of diagnosis for people affected and their families.

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Data Availability Statement

For data queries, contact the corresponding author.

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EXTENDED PAPER

1. Extended Introduction

1.1 Additional Information on Transient Ischaemic Attacks (TIAs)

1.1.1 Epidemiology

There is limited epidemiological data available on the prevalence and incidence of TIAs across the globe, as the incidence can be difficult to estimate due to other mimicking disorders (Panuganti et al., 2023). In the United States (USA), the incidence estimates for TIA are approximately 110 per 100,000 people, with an estimated overall prevalence rate of two percent (Panuganti et al., 2023). Kokubo (2013) reviewed epidemiological data from past published TIA studies across multiple countries and samples, however much of the studies date back to the 1970s to 1990s as they were longitudinal cohort designs.

In a European-American population in Forsyth (USA), TIA prevalence was 290 (men) and 570 (women) per 100,000 people, of which results indicated that TIAs were more frequent in females, and increased with age (Toole et al., 1996). Results also found that TIA symptoms were greater in African Americans than Caucasians (Toole et al., 1996). In a Japanese sample, the TIA prevalence for a first TIA was 56 per 100,000 people (Ueda et al., 1987), compared to an incidence of 80 per 100,000 people in North-East Italy (Lauria et al., 1996). Another study re-assessed TIA incidence in the North-East of Italy, and found an approximate estimate of 52 per 100,000 people (Cancelli et al., 2011), which was lower than previously estimated. Further, a recent study again aimed to ascertain updated TIA epidemiology figures, as it was hypothesised the incidence rates may have changed due to the consequences of improved identification and treatment of vascular risk factors (Degan et al., 2017). The study reported a crude incidence rate of 35.2 per 100,000 people, and 28.6 per 100,000 people when standardised to the 2011 European population. The incidence peaked in those aged over 85 years in both men and women, and after two years, further events occurred in 23.5% of the sample. This recent study indicated that the incidence of a TIA was reducing, potentially suggesting the effectiveness of preventative strategies for cardiovascular diseases (Degan et al., 2017).

In England and Wales, the TIA incidence rate was reported as 42 per 100,000 people, with middle aged men being 2.6 times more likely to suffer from a TIA. It was reported the incidence rate increased with age, and the overall incidence in men and women was similar (Dennis et al., 1989). In 2025, recent statistics reported that the incidence of first TIA is approximately 50 per 100,000 people per year (National Institute for Health and Care Excellence [NICE], 2025a), which has increased since the previous study in the 1980's. In France, incidence rates of 39 (men) and 33 (females) were reported per 100,000 people, with the mean age of first TIA being higher in women (71.8 years) than men (70.4 years) (Lemesle et al., 1998). These incidence rates were similar to other population studies in Italy, England and Estonia. Recent studies attempted to re-evaluate TIA incidence rates in France, concluding an incidence rate of 81 per 100,000 people with an age-standardised incidence rate of 61 (Béjot et al., 2017), indicating the incidence of TIA has increased and the age of occurrence has decreased. Research has also suggested the recent TIA incidence rate in a Spanish population was 29 per 100,000 people (Díaz-Guzmán et al., 2012).

Collectively, the true incidence of TIAs across the world is difficult to determine due to its transient symptoms, and that often TIAs go undetected by the public due to not understanding the symptoms (Amin et al., 2023). The incidence research appeared inconsistent, with some studies indicating that rates of TIAs are increasing, yet other data has demonstrated a reduction in TIA incidences and admission rates over time (Yu et al., 2017). Such reductions are hypothesised to be attributed to improvements in vascular risk reduction and stroke care (Yu et al., 2017), and an introduction to emergency department protocols which emphasise the need for short-term follow-ups in dedicated TIA clinics (Chang et al., 2018). Furthermore, research has indicated that the rate of TIAs increases with age with older patients presenting with more comorbidities (Navis et al., 2019). Additionally, gender differences are apparent as research has indicated that TIA incidence is currently decreasing more in men than in women (Madsen et al., 2019).

1.1.2 Definition of a TIA

TIAs have been defined as brief episodes of neurological dysfunction from focal cerebral ischaemia not associated with permanent cerebral infarction (Easton et al., 2009). Historically, TIAs have been defined as a sudden, neurological deficit of presumed vascular origin which lasts less than twenty-four hours, an arbitrary time threshold to distinguish stroke and TIA apart in the 1960s (Albers et al., 2002). During the 1960s, it was assumed that the transient symptoms disappeared as no permanent brain injury was observed. In 2002, an adaption to the definition of a TIA was proposed to instead be tissue-based, rather than time-based. TIA was then defined as a brief episode of neurological dysfunction caused by either retinal or focal brain ischemia, with clinical symptomatology lasting less than one-hour without evidence of acute infarction (Albers et al., 2002). This definition has been well received, as the original twenty-four -hour definition was referred to as misleading as many TIA patients with symptomatology lasting less than twenty-four hours did have cerebral infarction (Easton et al., 2009).

In a medical sense, TIAs have been defined as a disruption of blood flow that leads to a lack of oxygen to the brain and can result in sudden symptoms like that of a stroke (National Health Service [NHS] UK, 2023). When a TIA occurs, one of the blood vessels that supply the brain with oxygen-rich blood gets blocked, which leads to an interruption in the blood flow to the brain which results in the symptoms seen during a TIA (Stroke Association, 2024). The blockage can resolve quickly, and the brain's blood supply and flow return to normal (NHS UK, 2023). Whereas in a full stroke the blood flow to the brain is interrupted for longer which can result in greater damage and longer-term problems. In a TIA, it is usually a blood clot that causes the blockage in an individual's blood vessels that has developed somewhere else within the body and has travelled to the brain via the blood supply. Additionally, TIAs can also be caused by air bubbles or fatty material, or in rare cases a small amount of bleeding in the brain referred to as a haemorrhage (NHS UK, 2023).

1.1.3 Symptoms of a TIA

The main symptoms of a TIA are the same as those witnessed in stroke, however these can only last a few minutes to hours, and fully resolve

themselves within a 24-hour window (NHS UK, 2023; Stroke Association, 2024). Noticing the symptoms of a TIA coincide with England Department of Health's (2013) 'ActFAST' campaign, which included spreading awareness of stroke and TIA symptoms, including face (face drooping on one side, the individual being unable to smile, or their mouth or eye dropping); arms (person may not be able to raise both arms and keep them raised due to numbness in one arm); speech (speech may be garbled or slurred, or the individual may not be able to talk at all despite being awake, and present as confused) and time (immediately call emergency services if any symptoms are present). Other potential symptoms include complete paralysis on one side of the body, sudden vision changes (vision loss and blurred vision), vertigo, sickness, dizziness, and issues with balance and swallowing.

1.1.4 TIAs and the Risk of Future Cerebrovascular Events

Across the literature, there are fluctuations in the estimated risk of a future stroke following a TIA, likely because of the variations in study methods (Gupta et al., 2014). Differences include the timing from the TIA onset to recruitment of participants into the study, differences in study criteria, variance in how the TIA has been diagnosed (e.g., different services use different scoring systems such as California or ABCD scores methods [Gupta et al., 2014]), clinical settings [outpatients, inpatients, accident and emergency departments], patient characteristics and the underlying stroke aetiology (Giles & Rothwell, 2007; Johnston et al., 2007).

Studies have indicated that 20% of patients who present in services with ischemic stroke present with a TIA in the hours or days preceding the stroke, and up to 80% of strokes after a TIA are preventable, therefore early diagnosis and treatment is key (Rothwell & Warlow, 2005). The short-term risk of ischemic stroke following a TIA is estimated to be between three to 10% at two days, five percent at seven days, and nine to 17% at 90 days (Giles & Rothwell, 2007; Wu et al., 2007). Other studies have suggested that approximately ten percent of patients who present with a TIA or minor stroke will have a further stroke within the next 90 days, with the highest risk period being the first 24 hours after the TIA occurs (Chandratheva et al., 2009). Recent research has also concluded that amongst patients who had experienced a TIA or minor stroke, there was a

sustained risk of cardiovascular events over a five year period, including a 12.9% risk of acute coronary syndrome or death, and a 9.5% risk of stroke at five years (Amarenco et al., 2018). Although studies vary in the approximate risk of a further stroke, it is clear that experiencing a TIA increases the risk of further cerebrovascular and cardiac events happening, which highlights that TIAs need to be taken as a serious medical emergency.

However, a systematic review of nine studies on patient delay for those with a suspected TIA found that approximately 40% of TIA patients delayed seeking medical attention for more than 24-hours after it occurred (Dolmans et al., 2019). Such reasons included the transient nature of symptoms made patients not seek medical attention, that they did not recognise the symptoms as being a TIA, and the absence of motor symptoms (Dolmans et al., 2019). As seen in certain studies (Chandratheva et al., 2009), the first 24-hours post-TIA is potentially when the risk of another stroke is high, and therefore not seeking medical attention during this time could increase the chances of another stroke. It is therefore paramount that greater emphasis is placed on spotting the symptoms of a TIA, and its link with strokes.

1.2 Post-Traumatic Stress Disorder (PTSD)

1.2.1 Diagnostic Criteria for Post-Traumatic Stress Disorder (PTSD)

PTSD is a mental health condition that can occur following very stressful, frightening or distressing events (NHS, 2022). The Diagnostic and Statistical Manual (DSM) of Mental Disorders (5th Ed.; American Psychiatric Association, 2013) is a diagnostic instrument which defines the criteria of symptoms required for someone to be diagnosed with PTSD.

The criteria include:

A. Exposure to actual or threatened death, serious injury or sexual violence in one or more of the following ways: direct experience, witnessing it, learning about it, and experiencing repeated to extreme exposure to aversive details of traumatic events (e.g., first responders or police).
B. Presence of one or more of the following intrusion symptoms: recurrent, involuntary and intrusive distressing memories of the event; recurrent distressing dreams where the content or affect of the dream relate to the

event; dissociative reactions (flashbacks) whereby the person feels the event is recurring; intense or prolonged psychological distress at exposure to internal or external cues that resemble an element of the event; marked physiological reactions to cues that resemble an aspect of the event.

C. Persistent avoidance of stimulus associated with the event (including avoidance of distressing memories, thoughts or feelings associated with the event, and/or avoidance of external reminders (people, places, activities, situations or objects) associated with the event.
D. Negative alterations in cognitions or mood associated with the traumatic event, evidenced by two or more of the following: inability to remember important elements of the event; persistent and exaggerated negative beliefs or expectations about one's self, others or the world; persistent, distorted cognitions about the cause or consequences of the event that lead to blaming the self or others; persistent negative emotional state; diminished interest or participation in significant activities; feelings of detachment from others; persistent inability to experience positive emotions.
E. Marked alterations in arousal and reactivity associated with the event evidenced by one or more of the following: irritable behaviour and angry outbursts with little or no provocation; reckless or self-destructive behaviours; hypervigilance; exaggerated startle response; problems with concentration; sleep disturbances.
F. Duration of the presence of B, C, D and E is longer than one-month.
G. The disturbances cause clinically significant distress or impairments in social, occupation or other areas of functioning.
H. The disturbances are not due to physiological effects of substances or other medical conditions.

1.2.2 Presence of PTSD in Physical Health Conditions

Many studies have investigated the impact of PTSD itself on physical health problems (Ryder et al., 2018), but there is a growing evidence base for health conditions causing or resulting in PTSD presentations. A recent systematic literature review of 39 studies exploring myocardial infarction (MI)

found that the occurrence of an acute cardiac event was likely to contribute to the development of PTSD (Jacquet-Smailovic et al., 2021). According to the studies within the review, PTSD prevalence following an MI was around 17.1% (Bluvstein et al., 2013), which was almost twice as high as the PTSD prevalence rates in the general population in the USA at 8.7%. The review also concluded that post-MI PTSD had negative repercussions on an individuals' social life, alongside mental and physical health. Individuals with PTSD symptoms reported reduced quality of life, difficulties returning to work, less enjoyment in social situations, and suffered more with somatic and psychological distress (Jacquet-Smailovic et al., 2021).

Similarly, a recent meta-analysis of 11 studies explored the prevalence of PTSD in cancer survivors (Swartzman et al., 2017). The results found that the relative likelihood of PTSD among cancer survivors was 1.66 times compared to controls. The review also emphasised that the DSM-V no longer includes medical illness as a potential traumatic event, however the review determined that cancer survivors did have an increased likelihood of developing PTSD.

PTSD post-stroke has received greater research attention, with the conduction of a recent systematic review including 30 studies on 4320 individuals (Janssen et al., 2024). Results concluded that PTSD prevalence ranged between 2.9% to 71.4%, with a weighted median prevalence of 17.5% (Janssen et al., 2024). However, the review included studies with multiple samples, of which the prevalence of PTSD was further broken down into 13.8% in ischemic stroke, 4.6% in TIA, 6.5% in intracerebral haemorrhage, and 37.1% in subarachnoid haemorrhage. Interestingly, they discovered that the weighted median prevalence was different based on the method of PTSD assessment, with 17.8% for self-report questionnaires and 4.0% on PTSD interviews, indicating that self-report methods may in fact over-report the indication for PTSD. The review also indicated that the prevalence was higher at three-months (24.7%) compared to beyond 12-months (17.8%). This outcome suggested that people post-stroke reported a greater severity of PTSD symptoms three-months after the stroke compared to one-year. From the methodological quality assessment, the review highlighted that almost half the

studies had small sample sizes and concerns with attrition bias, however, did use standardised PTSD assessment tools.

Within Janssen et al.'s (2024) review, three studies had samples which included TIA. Prevalence rates for PTSD following a TIA ranged from 4.6% to 29.6%, concluding with a median prevalence rate of 4.6%. Positively, TIA has been separated within the review which often is not the case within the stroke literature, however with the review encompassing many types of strokes, there is an issue that the TIA statistics may be underreported in the presence of other diagnoses. Janssen et al.'s (2024) review highlights the evidence base for post-stroke and TIA PTSD is growing. A prior meta-analytic review of post-stroke PTSD from Edmondson et al. (2013) included only nine studies, and estimated the rate of developing PTSD post-stroke or TIA was 23% within one-year, and 11% after one-year. Furthermore, another systematic review for post-stroke PTSD reviewed 20 studies which found the frequency of PTSD ranged from three percent to 31%, with a weighted proportion of 16.5% (Tang et al., 2022), therefore similar to Janssen et al.'s (2024) review. However, it remains a concern that TIA is consistently incorporated into stroke studies, and therefore interpreting outcomes for TIA specifically are difficult to determine.

Throughout stroke, TIA and mixed studies, there is variation in the follow-up times that psychological distress is measured after the event has occurred, as explored in Janssen et al.'s (2024) review. Across the 30 studies included, initial points of assessment and subsequent follow-ups ranged from one-month (Favrole et al., 2013; Liyanage-Don et al., 2021), three months (Dollenberg et al., 2021; Grabowska-Fudala et al., 2018), to up to one year and beyond (Ben Assayag et al., 2022; Kronenberg et al., 2021; Sembi et al., 1998).

For TIA population based studies, the majority of the timeframes were within a three-month period (Webb et al., 2023). Studies in stroke which explore psychological distress in the acute recovery phase (less than one-month) are sparse (Müller et al., 2021). Only two studies have recruited stroke and TIA participants within the acute phase from hospitals or clinics, once the initial physical symptoms have subsided (Webb et al., 2023). For example, Müller et al. (2021) assessed stroke/TIA patients five days after the stroke occurred, and Grosse-Holz et al. (2020) approached potential participants during acute

hospitalisation. Additionally, studies which utilise longer follow-up periods often utilise data from previous or linked research trials and therefore cannot assess individuals during the early diagnostic stage (Ben Assayag., 2022; Goldfinger et al.,2014). This gap in the current literature signals that additional research should be conducted to capture the acute psychological impact of a TIA diagnosis.

1.2.3 PTSD in the context of TIA

A systematic literature review sought to determine the presence of PTSD post-TIA and its effect on individuals outcomes, without the presence of stroke and other health conditions (Webb et al., 2023). In total, only seven studies comprising of 446 TIA patients met the reviews inclusion criteria whereby quantitative data (including PTSD and other psychological outcomes) for TIA patients could be extracted (Ben Assayag et al., 2022; Dollenberg et al., 2021; Grosse-Holz et al., 2020; Kiphuth et al., 2014; Müller et al., 2021; Utz et al., 2019; Zhou et al., 2022). The included studies were published between 2014 to 2022, and therefore provided an up-to-date impression on what the outcomes following a TIA are. Interestingly, in TIA only studies, sample sizes were reasonably large, for example 108 (Kiphuth et al., 2014), 72 (Grosse-Holz et al., 2020) and 84 (Utz et al., 2019) compared to when TIA samples are part of a mixed sample (131 [Ben Assayag et al., 2022], 18 [Dollenberg et al., 2021], 32 [Müller et al., 2021], 12 [Zhou et al., 2022]).

The prevalence rates for PTSD post-TIA ranged from 4.6% to 29.6%. However, it was observed that PTSD prevalence rates appeared higher in studies which had TIA only samples, of which only three out of the seven studies were (Grosse-Holz et al., 2020; Kiphuth et al., 2014; Utz et al., 2019). Studies which reported higher prevalence rates of PTSD also scored higher on the quality appraisal conducted within the review. Out of the seven studies, three (Dollenberg et al., 2021; Grosse-Holz et al., 2020; Kiphuth et al., 2014) reported the differences in outcomes between TIA patients who presented with PTSD symptoms and those who did not. It was found those with PTSD symptomatology had poorer outcomes in domains such as depression, anxiety, quality of life and higher incidence of maladaptive coping strategies. Across certain studies, scores on the severity for anxiety and depression were at least

double in those with PTSD symptomatology compared to those without (Grosse-Holz et al., 2020; Kiphuth et al., 2014). Mental quality of life (QoL) was reduced in those presenting with PTSD (Dollenberg et al., 2021; Grosse-Holz et al., 2020; Kiphuth et al., 2014), alongside using a greater degree of maladaptive coping strategies (Dollenberg et al., 2021; Kiphuth et al., 2014).

Additionally, research has found that medication non-adherence in those after a stroke or TIA is three-times more likely in individuals presenting with PTSD symptoms compared to those without (Kronish et al., 2012). Liyanage-Don et al. (2021) has supported these findings, as stroke and TIA patients with PTSD symptoms reported feeling anxious about taking their medication. Patients reported that they would often skip medications to avoid thinking about their stroke or TIA, highlighting that the presence of PTSD could result in TIA patients having poorer outcomes and recovery due to feeling unable to engage in aftercare and stroke prevention advice. Overall, the limited evidence has indicated that PTSD is prevalent following a TIA, and that its presence can negatively impact other areas of functioning, in addition to poorer adherence to aftercare advice.

1.3 Lived Experiences of a TIA

The impact of a TIA has been explored qualitatively, however similar to the quantitative literature, it is limited as most studies recruit both people after TIA and minor stroke, making it difficult to decipher the experiences of people only experiencing a TIA (Crowfoot et al., 2018). A systematic review of four qualitative studies by Ravenhill et al. (2019) explored the experiences of a TIA and found that responses to TIA symptoms, diagnosis and management varied. For some people, the transient nature of TIA symptoms created a feeling that there was no immediate cause for concern and were dismissive of their TIA, whereas others were aware of the symptoms feeling unusual which induced worry to seek medical help. After the TIA was diagnosed, some patients accepted the need to correctly take medication and make lifestyle changes, however some did not. Some participants felt fatigue was a significant issue which impacted on their daily living long term. People also highlighted the psychological effects of a TIA, with the fear of future stroke feeling overwhelming and persistent over time. Anxiety impacted daily living and

sometimes restricted people's ability to enjoy life. Ravenhill et al.'s (2019) review highlighted the after-effects of a TIA, however like the quantitative literature it was difficult to determine if any of the studies inadvertently recruited stroke patients and not solely TIA. Additionally, there was large variance in the timeframe for recruitment, for example one study in the review recruited people up to 25 years post-TIA diagnosis, and therefore such a time delay is likely to have impacted the validity of findings due to nature of memory and recall (Kamara & Singh, 2012).

In an attempt to increase knowledge in the experiences individuals had post-TIA, a recent qualitative study consisting of 15 TIA patients illustrated that people had lasting challenges following a TIA, which significantly impacted daily life four months post-diagnosis (Ebbesen et al., 2025). The difficulties reported included physical, psychological, and cognitive challenges which negatively affected the social lives of participants. All participants in the study experienced the TIA as a life-changing, serious event which had impacted parts of their life. Participants reported altered temper, reduced concentration, memory, and language difficulties. Participants reported that returning to work was challenging and felt they were not performing as they usually would. Additionally, participants reported feeling the paradox between being told the symptoms would be short-lasting and resolve, but felt that was not what occurred in reality as they still experienced tiredness, headaches and increased sensitivity to light. This paradox made participants feel overwhelmed and like they could not cope as they were not informed of the potential long-lasting effects after their TIA diagnosis. Some participants felt they had changed as a person since the TIA and felt that their future would be impacted by it in a work and social capacity. Most participants felt worried about their futures, feeling in a constant state of alertness if they noticed symptoms like their TIA symptoms. Furthermore, Kindermann et al.'s (2023) study found that TIA patients reported physical (including side effects to medications, dizziness, fatigue), emotional (including depressive symptoms, feeling like a failure, feeling set-back from achieving their goals and powerlessness) and cognitive impairments (including difficulties in concentration, forgetfulness and inattention).

Although most participants in Ebbesen et al.'s (2025) study reported that they had experienced a new worry in their lives, they also shared that time was a healing factor and some individuals reported a new perspective on their life. They felt that the impact of their TIA on everyday life decreased as time passed, but overall, felt that the TIA had a marked negative influence on their daily life. Conversely, some participants described their TIA as somewhat positive, in that it changed their ways of living, so it became less stressful and strenuous, and reported feeling a deeper appreciation for life and a reprioritisation of certain parts of their lives. Other qualitative studies exploring experiences of a TIA found it was more positively reframed, such as viewing the event as a fortunate warning sign to change their lifestyle, and adopt secondary prevention measures (Gibson & Watkins, 2012). Certain individuals also compared themselves to others who were more severely affected by stroke and felt ‘lucky’, or compared themselves to cardiac patients which made them feel somewhat better (Hillsdon et al., 2013). Some studies have also shown that some individuals post-TIA believe that ill health is unavoidable and that TIAs ‘just happen’ (Hillsdon et al., 2013), or view them as ‘a wakeup call’ to redefine priorities and take back control of their life (Spurgeon et al., 2012).

The concept of people indicating positive changes following traumatic events is often referred to as posttraumatic growth, which can include individuals reporting an increased appreciation for life, closeness in relationships, recognition of personal strengths and positive changes in their priorities after the event (Tedeschi & Calhoun, 2004). Kindermann et al.'s (2023) study explored posttraumatic growth following a TIA, which found that the majority of people reported at least one positive change they had made as a consequence of the event. This included individuals taking part in more self-care behaviours, such as slowing down, allowing themselves to take breaks, making healthy changes to their lifestyles and learning how to ‘say no’ to people. Some participants also reported feeling a greater sense of value in their relationships and had developed an increased awareness of spirituality and valuing things more in general.

From the literature, it appears that most people view TIAs as having longer-term impacts than professionals originally implied in many different

facets (mood, cognition, fatigue, daily living, and quality of life). However, it also appears that not all individuals who experience a TIA perceive the event in this way. Instead, some view it as either neutral or more of a positive event to instigate change which actually improved their lives (Crowfoot et al., 2018). Therefore, it appears that having a TIA can result in a multitude of outcomes depending on how the individual has responded to the event.

1.4 Interactions between people affected by TIA and Healthcare Professionals

Research has indicated that healthcare professionals lack the knowledge and ability to support patients with mental health and psychological wellbeing after a TIA (Turner et al., 2019; Turner et al., 2022). Turner et al.'s (2019) qualitative study explored patients and healthcare professionals' experiences of the residual problems after a TIA or minor stroke, and their experiences of follow-up care. The study found that Nurses and Allied Health Professionals within TIA clinics were usually aware of the residual impacts that can occur following a TIA and minor stroke, however they were often under-recognised by certain healthcare professionals, including Consultants and GPs. To these professionals, depression was often reported to be a consequence of other residual problems, such as anxiety or fatigue which then 'snowballs into depression', or instead viewed difficulties as an exacerbation of pre-stroke psychological problems. Nurses and allied healthcare professionals recognised that such residual psychological difficulties could impact on patients returning to work, however other disciplines were sceptical about the impact of the TIA or minor stroke with some Consultants being inclined to view it as an 'excuse to stop working'. The study interestingly found that healthcare professionals often underestimated the impact that TIAs and minor strokes had on patients' lives. However, some were seen to acknowledge the wider impact that a TIA had on patients' daily living, such as managing household finances and driving restrictions. Turner et al.'s (2019) study also highlighted the variations in follow-up care that is provided across different organisational structures. TIA patients reported that they largely felt abandoned and alone post-discharge. Patients stated that information about their diagnosis and increased stroke risk was mainly provided during the acute stage of their TIA and was inadequate, too

medical, generic, and not personalised to them. Patients felt that follow-up care from Consultants and GPs was mainly medically focussed, and some Consultants reported feeling they lacked skills to address the holistic needs of patients.

From Turner et al.'s (2019) study, it was apparent that GPs and Consultants lacked a general knowledge of the residual problems people may experience following a TIA or minor stroke. Due to this, TIA/minor stroke participants reported that they often relied on informal support, such as family and friends to provide both practical and emotional support, alongside managing their symptoms alone. Additionally, healthcare professionals reported that they lacked awareness of what wider support was available for patients after discharge. Similarly, Crowfoot et al.'s (2018) review of qualitative studies reported that people after TIA or minor stroke had experienced professionals telling them that they should be grateful that they only had a minor cerebrovascular event, alongside other negative interactions including misdiagnosis, premature discharge, or even blaming them for its occurrence due to lifestyle factors (such as being overweight or a smoker). In reference to aftercare, Ebbesen et al.'s (2025) qualitative study on TIA patients' experiences found that most patients reported limited contact with the hospital post-discharge, and were instead referred back to the care of their GP. TIA patients felt that consultations with their GPs were solely focussed on secondary prevention, and not on their overall emotional wellbeing despite sharing this was what they had struggled with the most during the aftermath. Most participants did not feel they could discuss concerns about their future and mental wellbeing with any healthcare professionals, and instead struggled alone. Some participants described feeling a lack of trust and confidentiality as they consulted a different GP at each visit. Additionally, participants stated that when they had shared concerns with their GP, they did not feel they were met with empathy and instead felt stigmatised and misunderstood. Collectively, the literature indicates that TIA patients' experiences of healthcare professionals in both the acute and aftermath stages of a TIA diagnosis is mixed. Patients have reported feeling unheard or misunderstood, or not safe enough to share how they are coping.

In order to further explore how healthcare professionals viewed TIA and minor strokes and their aftercare provisions, further qualitative research was conducted by Turner et al. (2022). It was found that the role of the professional and their perceived knowledge of the patients' needs influenced their approach. For example, Consultants thought that their role was placed in follow-up clinics for acute stroke management, and interpreting imaging and investigations. Whereby GPs felt their role was more centred around stroke prevention through medications and lifestyle management (e.g., blood pressure monitoring). It was found both Consultants and GPs were passive in their approaches and relied heavily on patients raising any concerns independently and viewed TIAs generically as 'transient events'. Contrastingly, Nurses and Allied Health Professionals were seen to be active in their approach and holistic in understanding patient's support needs. Regarding residual impairments, it was found that Consultants rarely addressed effects such as fatigue, psychological and cognitive problems due to a lack of knowledge and confidence in how to address them. Despite GPs lacking understanding on such problems post-TIA and minor stroke, they stated some awareness of what holistic consequences could generally be present. Allied healthcare professionals and Nurses reported feeling confident in their ability to address residual needs and were able to tailor their approaches to suit the patient in a person-centred manner. Unfortunately, TIA patients often have limited access to Nurses and Allied Healthcare Professionals, as it is often highly dependent on the context, locality and healthcare sector a patient is based in (Ebbesen et al., 2025).

Interestingly, a mixed-methods scoping review exploring what information patients regard as important following a stroke found that patients and caregivers were primarily interested in treatment, stroke aetiology and personalised information about what caused their stroke (Helbach et al., 2025). Information for changes to daily living, rehabilitation, prognosis, and social participation were regarded as less important. This has been observed in other physical health conditions, such as cancer, of which reviews indicated that a patient's information needs changed over time (Jo et al., 2019). For example, information needs around emotional support and prognosis are seen to become more important during rehabilitation in the post-stroke phase (Helbach et al.,

2025). Therefore, it is important that healthcare professionals understand what sorts of information TIA patients might find helpful during different phases of their recovery (from acute phase to rehabilitation).

In summary, it appears that the care following a TIA varies significantly depending on the professionals involved, their knowledge and understanding of residual impacts of a TIA, and what the service remit is. It appears that TIA patients' needs can be overlooked and regarded as transient, however this does not seem to be the case for psychological symptoms (Kellett et al., 2014). It is indicated that some patients may choose to not share their difficulties with professionals due to a feeling of mistrust. This is important to consider given there are currently no routine psychological care provisions in TIA aftercare, and with the risk of a future stroke being increased following a TIA (Chandratheva et al., 2009), patients need to be able to actively engage with stroke-prevention aftercare.

1.5 Mood Problems in TIA, Stroke and Other Physical Health Conditions

Anxiety and depression appear to be common effects following frightening physical health events, such as acute cardiac problems (Murphy et al., 2020), congestive heart failure (Zahid et al., 2018), cancer (Pitman et al., 2018) and strokes (Broomfield et al., 2014). Murphy et al.'s (2020) research explored the impact of acute cardiac events in a sample of 911 patients across different time points to determine the longevity of anxiety and depression symptoms. It was found that anxiety rates were as high as 43% at the time of the event, 28% after two to four months, and 27% six to 12 months after. Depression rates were somewhat lower, with 22% at the time, 17% after two to four months, and 15% up to 12-months after. Such frequency rates indicate that anxiety and depression are present after an acute cardiac event which reduces over time, however, can still remain high. Conversely, research in congestive heart failure patients who had been diagnosed for more than six-months found depression rates to be higher, as within a sample of 170 people, 60% had depression, with 58% being moderate to severe (Zahid et al., 2018). In long-term health conditions such as cancer, it has also been shown that anxiety can be prevalent between 12% to 25% of cancer patients (Brintzenhofe-Szoc et al., 2009), with some studies demonstrating that anxiety prevalence can increase

as time passes (Kuhnt et al., 2016; Mehnert et al., 2014). Similarly, depression has been found to affect approximately one in four individuals with cancer (Hartung et al., 2017), and is observed in any phase of the illness progression (Niedzwiedz et al., 2019). Collectively, it appears that mood problems in the form of anxiety and depression are indicated in different physical health illnesses, whether it be single events (such as myocardial infarctions) or longer-term conditions such as cancer and heart failure.

It seems logical to suggest that anxiety and depression could be indicated following a stroke or TIA, as there are similarities with other diagnoses in that the initial event is frightening, alongside the long-term impact on health. Many studies have utilised varying study designs to explore the prevalence and occurrence of anxiety and depression following a stroke, to which it appears that mood problems are common (Chun et al., 2018; Robinson & Jorge, 2016; Wright et al., 2017). For example, Almhdawi et al. (2021) found that out of a sample of 153 stroke patients, the overall percentage of post-stroke depression from mild to extremely severe symptoms was 74.5%, and the percentage of those with post-stroke anxiety from mild to extremely severe symptoms was 52.9% (minimum four-months post-diagnosis). Therefore, results indicate that a large percentage of patients experience depression and anxiety following a stroke.

To date, most of the stroke literature for anxiety and depression has mixed samples including stroke, minor stroke and TIA. Therefore, making conclusions for each type of stroke and the severity of psychological outcomes is inconclusive. Moran et al. (2014) conducted a systematic review of 31 studies across multiple countries (Europe, North America, and Asia) which examined fatigue, psychological and cognitive impairment following a TIA and minor stroke. The prevalence of depression was reported in 10 studies (which measured depression after many different time points [from four weeks to 198 weeks]), whereby most studies reported depression symptoms to be high within one-month of the event and decreased between six-weeks to three-months. The frequencies of depression ranged between six percent to 42% across the studies. Only one study separated minor stroke and TIA outcomes, of which there was no significant difference in scores between them (Brittle, 2012). The

prevalence of anxiety was measured in only two studies, whereby one observed anxiety frequencies of 52% for TIA and 65% for minor stroke 14 days after the event, which was significantly different to controls (Brittle, 2012). The other study reported 24% of the sample suffered with anxiety 12-months after a minor stroke (Bruggimann et al., 2006). Reporting similar outcomes for depression, Carnes-Vendrell et al.'s (2019) study combined minor stroke and TIA and found 35.36% of patients were initially diagnosed as suffering with post-stroke depression at baseline (10-days after ictus), which dropped significantly after 12-months to 11.42%. Further research suggested that post-stroke depression is one of the most prevalent psychiatric complications following an acute stroke (Ayerbe et al., 2013; Robinson & Jorge, 2016), and that almost 30% of stroke and TIA patients have the presence of post-stroke depression symptoms (Müller et al., 2021). It is also indicated that post-stroke depression can remain prevalent several weeks after the ictus occurred (Schöttke et al., 2020). Systematic literature reviews have indicated that anxiety can present in approximately 24% of individuals following a stroke or TIA (Campbell Burton et al., 2013). This figure was subsequently updated in a further review which found the mean frequency of post-stroke anxiety to be 33.5% (Wright et al., 2017).

Kellett et al.'s (2014) research supported the previously discussed findings, in that 106 people who had experienced a TIA or minor stroke scored significantly lower on activities of daily living than controls, alongside clinically significant levels of fatigue (41%), anxiety (31%) and depression (28%), confirming that people have residual impairments and high levels of distress. However, for much of the research, TIA data could not be extracted. Broomfield et al.'s (2014) large-scale cross-sectional study did report TIA data on 1,247 patients, whereby 14% had definite anxiety symptoms and 9% had definite depression symptoms. Interestingly, these scores were similar to the stroke cohort of 4,079 patients, of which 15% had definite anxiety symptoms and 11% had definite depression symptoms. Such findings suggest that TIA and minor or full stroke patients have comparable outcomes, however the aftercare services and recognition in healthcare sectors are vastly different. Table 8 aims to synthesise and organise the principal psychological findings from quantitative research, allowing for clearer comparison across different stroke populations.

Webb et al.’s (2023) systematic review found that across seven studies whereby TIA outcome data was able to be extracted, participants scores for anxiety and depression indicated that there was greater distress in TIA participants than those with myocardial infarction (Dollenberg et al., 2021) but less so than in stroke (Dollenberg et al., 2021; Müller et al., 2021). Kiphuth et al.'s (2014) study (which was a TIA only sample) concluded that out of 108 TIA patients, 19.4% met the clinical cut-off score indicative for anxiety, and 9.3% met the clinical cut-off for depression. However, interestingly, it appeared that the presence of PTSD worsened these outcomes, as those meeting the clinical cut-off indicative for PTSD had higher anxiety prevalence (43.8% compared to non-PTSD at 9.2%) and depression prevalence (12.5% compared to non-PTSD at 7.9%). Grosse-Holz et al.'s (2020) research in another TIA only sample confirmed such findings, as the median scores for distress on self-report measures for anxiety, depression and peritraumatic dissociation were higher in PTSD compared to those who did not meet the clinical cut-offs for PTSD. Webb et al.’s (2023) review indicated that TIA patients who were suffering from PTSD symptomatology had poorer outcomes for anxiety, depression, and quality of life than those without, indicating it could be a potential intervention target. Overall, the literature base for physical health conditions, and specifically stroke, minor stroke and TIA, indicate that mood problems are present following the event.

Table 8.
Summary of Quantitative Psychological Findings Across Stroke Populations

Stroke Population	Psychological Outcomes		
	PTSD	Anxiety	Depression
Stroke (all severities including TIA)	Janssen et al. (2024): Systematic literature review which included 30 studies post-stroke (all types). Prevalence of PTSD ranged from 2.9% to 71.4% (weighted median prevalence of 17.5%). Tang et al. (2022): Systematic review of 20 studies reported PTSD frequency ranged from 3% to 31% (weighted proportion of 16.5%). Zhou et al. (2022): Longitudinal observational study of 274 participants. 241 stroke participants were included, of which 8.3% met the PTSD threshold. 12 TIA participants were included, of which 8.3% had minor PTSD symptoms after 3 months. Ben Assayag et al. (2022): Mixed diagnosis observational cohort study including 436 participants. There were	Almhdawi et al. (2021): Sample of 152 stroke patients (minimum 4 months post-stroke) reported mild to extremely severe anxiety prevalence was 52.9%. Bruggimann et al. (2006): 24% participants reported anxiety 12 months after a minor stroke. Campbell Burton et al. (2013): Systematic literature review reported anxiety can present in up to 24% people post stroke/TIA. Wright et al. (2017): Systematic literature review reported mean frequency for anxiety post-stroke was 33.5%. Broomfield et al (2014): Cross-sectional study whereby 15% of stroke participants (*N* = 4079) and 14% of TIA participants (*N* = 1247)	Almhdawi et al. (2021): Sample of 152 stroke patients (minimum 4 months post-stroke) reported mild to extremely severe depression prevalence was 74.5%. Müller et al. (2021): 30% of stroke and TIA patients presented with depression symptoms post-stroke 5-days post ictus. Moran et al. (2014): Systematic literature review of 31 studies reported prevalence rates of 6% to 42% across studies. Broomfield et al (2014): Cross-sectional study whereby 11% of stroke participants (*N* = 4079) and 9% of TIA participants (*N* = 1247) reported definite post-stroke depression (at least 1 year post stroke).

	305 stroke participants, of which 13.77% met the PTSD threshold. 131 TIA participants were included, of which 4.6% met the PTSD threshold within 12 months. Dollenberg et al. (2021): Mixed diagnosis cross-sectional study including 112 participants who experienced their stroke event up to 5 years ago. Overall PTSD prevalence was 23.2%. There were 40 stroke participants, of which 40% met the PTSD threshold. 16.7% of TIA participants (*N* = 18) met the PTSD threshold. 13% of myocardial infarction (MI) (*N* = 54) participants met PTSD threshold. Müller et al. (2021): Mixed cross-sectional study including 53 participants. 20 stroke participants were included, of which 10% met the PTSD threshold. 32 TIA participants were included, of which 6% met the PTSD threshold after 5-days post ictus. Edmondson et al. (2013): Meta-analytic review of 9 studies. The	reported definite post-stroke anxiety (at least 1 year post stroke). Chun et al. (2018): 62% anxiety prevalence rate 3 months after a stroke, compared to 29% 3 months post-TIA. Dollenberg et al. (2021): Mixed diagnosis cross-sectional study including 112 participants who experienced event up to 5 years ago. 14.8% of MI participants, 16.7% TIA participants, and 30% stroke patients scored above the clinical cut-off for anxiety. Maaijwee et al. (2014): 23% participants (*N* = 511) with TIA (*N* = 186) and stroke (*N* = 325) met threshold for anxiety, on average a decade after the stroke occurred. 23.1% of TIA participants reported anxiety symptoms compared to 23% for stroke.	van Mierlo et al. (2015): 21.5% prevalence rate for depression 2 months post-stroke. Dollenberg et al. (2021): Mixed diagnosis cross-sectional study including 112 participants who experienced their stroke event up to 5 years ago. 13% of MI participants, 33.3% TIA participants, and 50% stroke patients scored above the clinical cut-off for depression. Maaijwee et al. (2014): 16.8% participants with TIA and stroke met threshold for depression, on average a decade after the stroke occurred. 12.1% of TIA participants reported depressive symptoms compared to 19.5% for stroke.

	estimated rate of developing PTSD was 23% in 1 year, and 11% after 1 year. Goldfinger et al. (2014): 18% of mixed stroke and TIA participants (*N* = 535) reported post-stroke PTSD up to 5 years later. Merriman et al. (2007): 30.7% of stroke participants (*N* = 102) met the PTSD symptoms threshold after 12 months post-stroke. 45.5% reported no PTSD symptoms, 28.7% moderate, 12.9% moderate to severe, and 3% severe symptoms.		
TIA and Minor Stroke (mixed samples)		Kellett et al. (2014): Out of a sample of 106 participants, 31% reported post-stroke/TIA anxiety approximately 6 weeks post-stroke. Brittle et al. (2012): Compared anxiety between TIA and minor stroke. Reported prevalence rates of 52% for TIA, and 65% for minor stroke 14 days after the event.	Carnes-Vendrell et al. (2019): 35.36% participants were diagnosed with post-stroke depression 10-days after ictus, which dropped to 11.42% 1 year later. Kellett et al. (2014): Out of a sample of 106 participants, 28% reported post-stroke/TIA depression approximately 6 weeks post-stroke.

TIA only	Webb et al. (2023): Systematic literature review of 7 studies whereby TIA data could be extracted. PTSD prevalence rates ranged from 4.6% to 29.6%. Grosse-Holz et al (2020): TIA only cohort study including 72 participants. 24.6% met the PTSD threshold after 3 months. Kiphuth et al. (2014): TIA only cross-sectional study including 108 participants. 29.6% met the PTSD threshold after 3 months. Utz et al. (2019): Cohort follow-up study including 84 participants. 8.3% had probable PTSD 1 year after the TIA occurred.	Kiphuth et al. (2014): TIA only cross-sectional study including 108 participants. 19.4% participants scored above clinical cut-off for anxiety 3 months later.	Kiphuth et al. (2014): TIA only cross-sectional study including 108 participants. 9.3% participants scored above clinical cut-off for depression 3 months later.

1.6 Challenges in TIA Diagnosis

There are diagnostic challenges when determining whether someone has experienced a TIA, as often the symptoms and initial signs of a TIA have subsided by the time an initial assessment with a medical professional occurs (Sheehan et al., 2009). There is no 'test' to tell if someone has had a TIA, but moreover the medical professional relies heavily on the patient's account of their experience and medical history, alongside the physical tests (e.g. blood pressure, scans) (Nadarajan et al., 2014). Historically, clinicians have correctly classified ten to 49% of patients with a true TIA and misclassified 31% to 55% with non-cerebrovascular transient symptoms as a TIA, potentially explaining some of the variation in epidemiological and incidence rates for TIA. Often, patients attending a TIA clinic will have experienced a mimic and not a TIA. There are many causes of transient neurological symptoms which could mimic the symptoms of a TIA, resulting in a wide variety of alternative diagnoses (e.g., migraines, functional anxiety, viral illness, Bell's Palsy, and syncope; Nadarajan et al., 2014). To demonstrate the presence of mimics, in a London stroke service out of 1532 patients who attended the TIA clinics, 1148 (75%) had definite or possible TIA, 46 (3%) had a minor stroke, and 338 (22%) had a mimic TIA (Nadarajan et al., 2014). This highlights the need for cautious and careful diagnosis when a patient presents with symptoms of a TIA, as if patients were misdiagnosed it could put them at an increased risk of future stroke (Giles & Rothwell, 2007).

1.7 TIA Diagnosis and Clinical Aftercare Pathways: How they differ to Stroke

If someone suspects they are having, or have experienced a TIA, they should be assessed by a medical professional imminently (NICE, 2025b). Following an initial assessment (e.g., through the GP or attendance to Accident and Emergency [A&E] departments), the individual will be instructed to take aspirin to prevent a further stroke (NICE, 2025b). They are then referred to a specialist stroke and TIA clinic for further examinations and tests to help decipher whether they have had a TIA, what may have caused it, and the next

steps (NHS UK, 2023). Tests are mainly centred on physical health to check for increased risk factors which may have caused the TIA, such as blood pressure (hypertension can lead to increased risk of TIAs), blood tests (to check for high cholesterol and diabetes), electrocardiogram (ECG; to detect any abnormal heart rhythms as atrial fibrillation can increase TIA risk), carotid ultrasound (an ultrasound scan to show if there is narrowing or any blockages present in the arteries to the brain) and brain scans (e.g. MRI) are sometimes conducted if other tests have not clearly determined the cause of the TIA (Stroke Association, 2024).

In terms of treatment following the successful diagnosis of a TIA, it depends on an individual's circumstances (e.g., age and previous/current medical history) to what medical professionals will recommend to patients (NHS UK, 2023). All the aftercare is centred on physical health and recovery and preventing a further TIA or stroke recurrence. Lifestyle changes are explored with patients, such as advocating for a low-fat healthy diet, regular exercise, stopping smoking and reducing alcohol consumption. Medication options are explored, such as aspirin, antiplatelets, and anticoagulants to reduce the chances of future blood clots, alongside blood pressure medications and statins for high cholesterol if they were flagged as a cause of the TIA. Additionally, in some circumstances a carotid endarterectomy surgery is recommended following a TIA, which removes part of the lining of the carotid arteries (main blood vessels that supply the head and neck) if they are significantly narrowed due to a fatty deposit build-up which makes the blood flow to the brain more difficult (known as atherosclerosis) (NHS UK, 2023). All treatments correspond with identified risk factors known to contribute to a TIA occurring (Kokubo, 2013). Patients are then discharged back to the care of their GP and expected to implement the recommendations given following the TIA clinic. Currently, there is no guidance concerning the psychological impact following a TIA, which has been sparsely evidenced thus far (Carnes-Vendrell et al., 2019).

This is starkly different to the aftercare provisions to support individuals' post-stroke. For example, The Integrated Life after Stroke Support (ILASS) model provides practice guidance on the support services that need to be provided to patients, which include practical, emotional and social support to

patients affected by a stroke to rebuild their lives, independence, and reduce the risk of future stroke (Stroke Association & NHS England, 2023). This guidance has been incorporated into the National Stroke Service Model and National Model for an Integrated Community Stroke Service. The model discusses the need for personalised care, personalised information provisions, post-stroke reviews, communication support, returning to work rehabilitation, peer support, carers support and importantly emotional support. The ILASS model depicts that stroke key workers should play a role in the emotional and psychological support pathway to help with wellbeing and mental health for stroke patients. The model discusses how support should be integrated in psychological support pathways including specialist clinical and neuropsychological mental health services. Despite TIAs having mention within the ILASS model, the format is mainly tailored towards stroke services.

There is national guidance in place within stroke services, whereby a stepped care model approach is recommended (NHS England, 2017). A stepped care approach aims to offer patients within services the psychological care they need using a hierarchical approach, depending on their needs and presentation. This includes offering simpler inventions first, and then progressing to more complex or specialist interventions if it is clinically indicated. Level one interventions are the first step, which describes 'sub-threshold problems' which can be common to most people following a stroke. This may include people presenting with generic difficulties with coping and perceived consequences to a person's lifestyle and identity. Mild and transitory symptoms of mood or cognitive disorders which have minimal impact on engagement in rehabilitation and recovery services fit within this level. The psychological support indicated within level one includes helping with adjustment, exploring the impact of the stroke, sharing information, goal setting and identifying psychological difficulties. Recommended methods of delivery include peer support, befriending services, and stroke specialist staff. Level two of the model refers to mild to moderate symptoms of impaired mood or cognition that affect rehabilitation (NHS England, 2017). This level of care may comprise of brief psychological intervention based on goal setting, problem solving, support with adjustment, psychoeducation, motivational interviewing or

groupwork. Interventions should be delivered by a member of the stroke staff team, an Assistant Psychologist or Neuropsychologist under the supervision of a Clinical Psychologist. Level three is the highest level of intervention and refers to those who present with severe and persistent disorders of mood or cognition. Individuals at this level may require suicide risk assessment, pharmacological treatments, and require specialist intervention due to resistance to treatment in levels one and two. Interventions at this level would be delivered by a Clinical Psychologist with an expertise in stroke, Neuropsychologist, or Psychiatrist. Similar guidelines by the Intercollegiate Stroke Working Party (ISWP) (2023) highlight that psychological care such as emotional support and wellbeing should be provided through the stroke team. The guidelines highlight that people should be assessed for mood changes and problems with thinking and memory, and a range of support should be offered if it is clinically indicated. This should include information and advice on mood and emotions post-stroke, psychological treatment, or medication. Such guidelines are in place as anxiety and depression are common following a stroke, and psychological support can help with recovery.

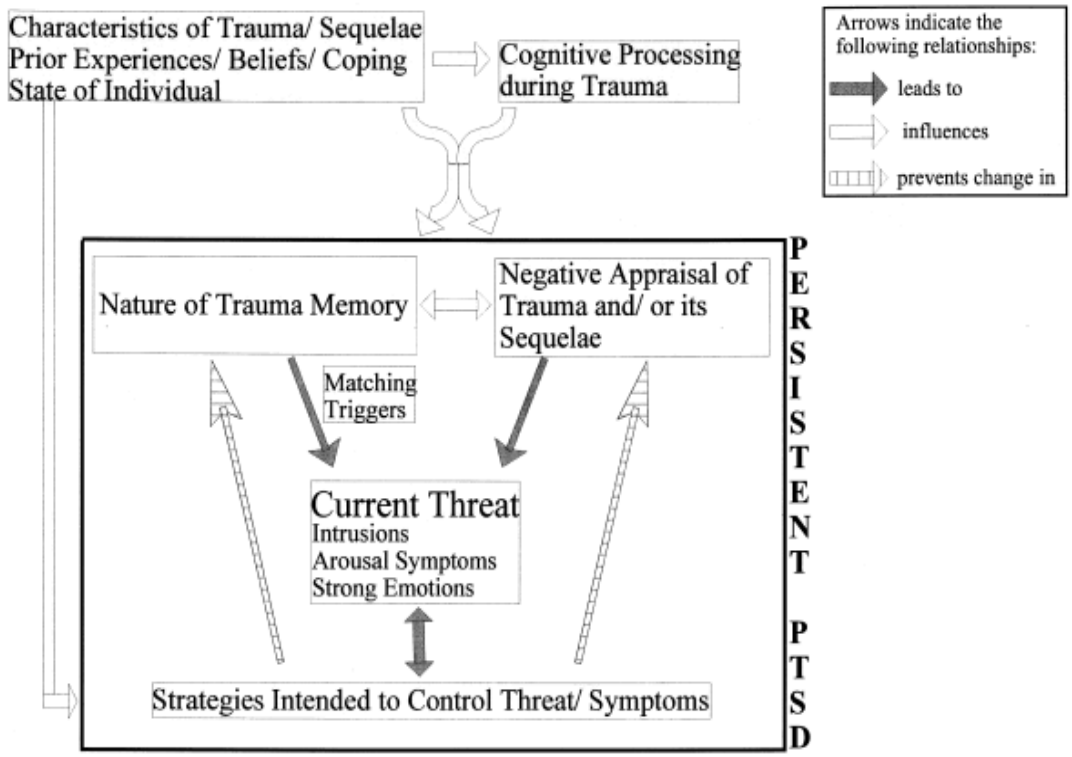
There are currently no psychological provisions within the TIA pathways within the UK, unlike within stroke pathways despite the initial symptoms presenting similar. A clear stepped care model has been presented to support individuals following a stroke which involves specialist intervention, tailored rehabilitation and intervention from clinical psychology and psychiatry (Kneebone, 2016), however there is nothing comparable currently for TIA. Although some literature speculates that many people post-TIA have no long-lasting physical effects (NHS UK, 2023), growing evidence supports findings that people suffer with long term impacts following a TIA in the form of physical or clinical problems, functional impairments, cognitive problems and reduced quality of life (Spurgeon et al., 2012). A survey through the stroke association also uncovered that over 60% of people felt their TIA had affected them emotionally, and felt vulnerable, less confident, anxiety, shock, guilt, and worried that they were going to have another TIA or stroke (Stroke Association, 2014). Such findings therefore indicate the need to recognise the residual psychological impacts after the 24-hour TIA symptom time frame.

1.8 Ehlers and Clark's (2000) Psychological Model of PTSD

Following a traumatic event, many people will experience some of the symptoms of PTSD in the immediate aftermath (American Psychiatric Association, 2013). A large proportion of people will recover within a few weeks or months; however, it is observed that for some individuals, symptoms can persist for a much longer duration (Ehlers & Clark, 2008). For these individuals, often occupational and social functioning are impaired, and they will be more likely to seek treatment or support for PTSD symptoms (Ehlers & Clark, 2000). Ehlers and Clark's (2000) model of PTSD draws on previous theorist's accounts of PTSD and puts forward a cognitive-based model to explain the development and maintenance of PTSD symptomatology. Not everybody who experiences a medical emergency and a traumatic event goes on to develop PTSD (von Känel et al., 2011), which is also the case for individuals who have experienced a TIA (Webb et al., 2023). Conversely, in some cases some people go on to experience posttraumatic growth following a TIA (Kindermann et al., 2023). This indicates there are changes in how the event has been processed or perceived between those who develop PTSD symptomatology, and those who do not.

Ehlers and Clark's (2000) model suggest that persistent PTSD occurs only if individuals process the traumatic event or its sequelae in a manner that produces a sense of serious current threat. It proposes two processes that contribute to this. Firstly, that there are individual differences in how individuals appraise the trauma and/or its sequelae, and secondly that there are individual differences in the nature of the memory for the event, and its link with an individual's other autobiographical memories. The model depicts that once the perception of current threat is activated, it is accompanied by other re-experiencing symptoms and intrusions. It claims that the perceived threat also results in a series of cognitive and behavioural responses that are used in an attempt to reduce the perceived threat and distress in the short-term. However, these strategies prevent any cognitive change, and therefore maintain PTSD symptoms. Ehlers and Clark's (2000) model is pictured in Figure 1.

Figure 1.
Ehlers and Clark's (2000) Model of PTSD



Ehlers and Clark's (2000) model indicate that those with persistent PTSD are not able to view their trauma as a 'time-limited event' that does not have overall negative effects on the future. The model proposes that such individuals have idiosyncratic negative appraisals of the event and/or its sequelae that result in a common effect of creating a sense of current threat. The threat can be either internal (such as a threat to how someone views themselves, for example as a capable human being who will go on to achieve life goals), or external (such as the world is too dangerous). The model suggests that there are many types of appraisals of the traumatic event which can result in a sense of current threat. These include people overgeneralising from the event and then perceive normal activities as more dangerous. People may exaggerate the likelihood of another catastrophic event occurring more generally or might attribute traumatic events happening to them opposed to others (such as "bad things only happen to me"). Appraisals like these may generate both situational fears, but also avoidance which then maintains the overgeneralised fear (e.g., not driving again following a road traffic accident). Furthermore, appraisals

about how somebody felt or behaved during the event can also have longer-term threatening effects (e.g., if somebody during a sexual assault became aroused, they may interpret this as an indication they maybe wanted the assault to happen which results in them feeling repulsed toward themselves).

Various negative idiosyncratic appraisals of the sequelae of the event can also produce a sense of current threat, and result in persistent PTSD symptoms. These include interpreting one's own PTSD symptoms, interpreting how others reacted after the event, and appraisals of how the trauma might affect other areas of life (e.g., financial consequences). Symptoms including intrusive memories and flashbacks, irritability and lack of concentration are common experiences following a traumatic event. However, if someone does not appraise these symptoms as a normal element of recovery, they might instead interpret them as signs they have 'permanently changed in a negative way', or as threats to their physical and mental wellbeing. These types of appraisals maintain PTSD symptoms by directly producing negative emotions (e.g., anxiety and depression) through encouraging people to use dysfunctional coping strategies, which have the paradoxical effect of exacerbating PTSD symptoms. For example, if following a TIA someone was experiencing intrusive memories of the event, they may appraise this as they are 'losing control of their mind', and instead use active thought suppression to push this out of their mind. However, this type of thought suppression usually means the thought will be more likely to reoccur (Najmi & Wegner, 2008). Generally, people with persistent PTSD will experience a variety of negative emotions due to different types of appraisals being activated at different times.

In addition to the types of cognitions and appraisals an individual may have had following a traumatic event, the nature of how the trauma memory is encoded and stored within long-term memory is also important (Ehlers & Clark, 2000). Autobiographical memories can be retrieved in two ways (Brewin et al., 1996), one being through higher-order meaning-based retrieval strategies (such as your first day in a new job). Another way is via direct triggering by stimuli that were associated with the event (e.g., a certain smell or sound). Autobiographical events are normally integrated into an autobiographical memory knowledge base that is organised according to personal time frames

and themes (Conway & Pleydell-Pearce, 1997). This elaboration enhances the initial retrieval route and inhibits the second. When an autobiographical memory enters into a person's consciousness, it comprises of specific information about the event as well as general information about the lifetime period the event occurred in, and information about the event in general. The model suggests that in PTSD, a key problem is that the trauma memory is poorly elaborated and not integrated properly into its context in place, time, information and other autobiographical memories (Siegel, 1997). This theory aids in explaining why people sometimes struggle with intentional recall of the event, the 'here and now' element (as the memory has no context of time or place, therefore resulting in a sense of current threat) and the absence of connections to other information.

Ehlers and Clark's (2000) model also incorporates the impact of maladaptive behavioural strategies and cognitive processing styles. It suggests that when those with PTSD perceive a serious current threat and experience PTSD symptoms, they attempt to control the sense of threat using various strategies. Which strategies people employ is linked with the person's appraisals of the trauma and/or sequelae, and their beliefs on how to deal with the trauma in the best possible way. These strategies are labelled as 'maladaptive' as they maintain PTSD through either producing PTSD symptoms, preventing someone changing their negative appraisals, or preventing change in the nature of the trauma memory. Examples of maladaptive strategies include:

- Thought suppression: Occurs when someone attempts to push thoughts about the trauma from their mind, which instead increases the unwanted intrusive memory.
- Selective attention to threat: When someone is paying greater attention to cues of threat, leading to more intrusions and emotions related to the trauma.
- Safety behaviours: Actions people take to prevent or reduce possible future traumas.
- Actively avoiding thinking about the event: An individual may try to keep their mind busy with other thoughts, tasks, or behaviours, or avoid

thinking about the event in an emotional way. People may also use alcohol or substances to block out memories.

- Avoiding reminders of the event: Someone may avoid visiting a certain place or doing a certain task linked to the event, which prevents the person being able to correct their initial appraisals.
- Rumination: Somebody may ruminate about the event and what happened and think about what they could or should have done to prevent it.

Ehlers and Clark's (2000) model considers the characteristics of the trauma, someone's previous experiences or beliefs, and their current state. These include the duration and predictability of the event and whether someone has prior experiences of trauma, and what coping strategies they employed to cope. Prior beliefs may also have an impact (e.g., how someone viewed themselves), and what state they are in at the time of the event (e.g., had they consumed alcohol and arousal levels).

In addition to cognitions and appraisals, the model proposes that stimulus to stimulus (S-S) and stimulus to response (S-R) associations are strong for the traumatic event. This in turn makes triggering memories of the event or emotional responses by associated stimulus more likely. Ehlers and Clark's (2000) model suggest that associative learning helps a person to make predictions about what events may happen next, and that in PTSD presenting certain stimuli that were present during or shortly after the event can become associated with the prediction of threat or danger. Additionally, associative memory retrievals are often cue-driven and not intentional by the individual. This means that the person may not be aware of what triggers them to re-experience the traumatic event, or aware that their emotional response is due to their trauma memory being activated. If someone cannot identify what the source of their re-experiencing symptoms are, it can make it difficult for the person to learn that there is no current danger when they are exposed to triggers.

In summary, Ehlers and Clark's (2000) model of PTSD combines the concepts of identifying threat-based cognitions, beliefs about the self, others,

the world and how they link to behaviours. Following a traumatic event, individuals can employ maladaptive coping strategies, such as thought suppression, avoidance, safety behaviours and selective attention. These strategies prevent opportunities for someone to change problematic appraisals, the nature of the trauma memory and the paired associations present (Ehlers & Clark, 2000). The model emphasises both cognitions and behaviours contribute to the presence of someone's difficulties following a traumatic event.

1.9 Posttraumatic Cognitions and Appraisals

Negative posttraumatic cognitions, namely in the form of maladaptive cognitions about the self, others and the world have been researched as one of the mechanisms that can result in the development and maintenance of PTSD (Dunmore et al., 1999). From Ehlers and Clark's (2000) model of PTSD, it proposes that rigid thinking about both the self and the world before any traumatic events can increase a person's vulnerability to developing PTSD as they may struggle to integrate the traumatic event into their existing schemas (Foa & Rothbaum, 2001). Extensive research has shown that negative posttraumatic cognitions can differentiate those who have been exposed to trauma who recovery naturally, compared to those who develop PTSD symptomatology (Dunmore et al., 1999), the severity of symptoms (Karl et al., 2009), and how chronic symptoms persist (Dekel et al., 2013). Emotional processing theory suggests that negative posttraumatic cognitions can disrupt trauma processing, and lead to individuals deploying maladaptive coping strategies. Such strategies then make it difficult for the individual to gather evidence which goes against their trauma-related fears, and have a natural reduction in PTSD symptoms (Foa & Rothbaum, 2001). Studies which have explored changes in posttraumatic cognitions have indicated that alternations in these cognitions' can drive a reduction in PTSD symptoms, making it an essential element to treatment (Brown et al., 2019).

1.10 Posttraumatic Cognitions and Appraisals from the Physical Health, TIA, and Stroke Literature

There has been research across various physical health diagnoses on the impact of posttraumatic cognitions. In spinal cord patients, negative

cognitions about the self and the world (but not self-blame) were associated with a greater severity of PTSD symptoms (Agar et al., 2006). Similar outcomes have been found in cancer patients, whereby negative cognitions about the self and world observed one-month following initial diagnosis were associated with the severity of PTSD symptoms after six-months (Kangas et al., 2005). The impact of cognitions and appraisals has been explored minimally in stroke studies, and not at all to our knowledge in TIA specifically. A systematic review of 20 stroke studies found that negative appraisals or perceived high risk of another stroke recurrence was associated with PTSD severity (Tang et al., 2022). A study which explicitly explored cognitions following a stroke concluded that negative cognitions about the self and the world positively correlated with PTSD severity both cross-sectionally and at a three-month follow-up (Field et al., 2008). Regression analysis also confirmed that negative cognitions about the self was a significant predictor within the model. However, self-blame cognitions were unrelated to PTSD severity across time. Collectively these findings indicate that posttraumatic cognitions are an important element to whether individuals go on to both develop or maintain PTSD symptomatology following a frightening physical health diagnosis. However, due to the transient nature of physical symptoms within a TIA, the evidence from spinal cord, cancer and stroke cannot be completely generalised, and therefore requires further exploration.

1.11 Lazarus and Folkman's (1984) Transactional Model of Stress and Coping

Lazarus and Folkman's (1984) Transactional Model of Stress and Coping proposes that an event by itself is not a stressor, but instead events can only be stressors after they have been appraised as threatening or harmful by an individual. Therefore, the model depicts that stress involves an interaction between the person and their environment. Stress is then experienced depending on how a person has appraised their ability to cope, and the resources that are perceived to be available.

If there is an imbalance between the appraisal, the demands of a situation, and the persons perceived ability to cope, a stress response will be triggered. The model proposes that there are three types of appraisals, being primary,

secondary and re-appraisal. The primary appraisal occurs when the stressor is encountered, and can be perceived as irrelevant, positive, or stressful. An individual will judge whether the situation or event is a threat, and if the demands are greater than the perceived resources available, they may identify the situation or event as threatening or harmful. If the resources an individual has are greater than the demands, then the situation or event may not be perceived as a threat, but instead a challenge. Secondary appraisals involve the evaluation of one's capacity to cope with the stressor or event and analyse which coping strategies would be effective or suitable to employ. This can involve the appraisal of both personal resources (e.g., one's own resilience) and social resources (e.g., social support) (Lazarus & Folkman, 1984). Re-appraisal refers to the repetition of evaluating and modifying one's perceptions that were made during the primary and secondary appraisals as the situation evolves, which could result in the stressor being re-appraised as irrelevant. The model suggests that it is the appraisal process which determines which coping strategies an individual will then utilise.

Coping strategies refer to the specific efforts, (both behavioural and cognitive) that people can use to deal with, tolerate, reduce, or minimise stressful events (Lazarus & Folkman, 1984). Approach focussed coping strategies involve an individual facing and dealing with the stressor and the emotions that may arise from it. These may be problem-focussed, which involves active efforts to fix or remove the problem, and emotion-focussed, which involves someone changing how they think or feel about the problem, particularly if it is unchangeable (Folkman, 2008). The other type of coping strategies are referred to as avoidant-focussing coping, which involves an individual attempting to escape the stressor or their emotional response to the event (Folkman, 2008). Approach coping has been related to individuals having improved outcomes in the long-term than avoidant coping, which is suggested to temporarily reduce psychological distress, but does not involve the person resolving or adapting to the stressor (Carver et al., 1989).

1.12 Coping in Stroke and TIA Studies

The impact of coping strategies has been explored in stroke and modestly in TIA. Donnellan et al.'s (2006) review sought to determine the effect of coping

post-stroke, however there were minimal conclusions that could be drawn due to limited studies which incorporated coping as part of the adaptation process following a stroke. The review also concluded that definitions of coping were varied across research, therefore generalising findings was difficult. Since Donnellan et al.'s (2006) review, limited studies have developed our understanding of the impact of coping strategies on the psychological difficulties following a stroke and TIA. Ben Assayag et al.'s (2022) observational cohort study of TIA and stroke patients found that high-anxious and defensive coping styles were associated with a 6.66 times higher risk of developing post-stroke PTSD compared to low anxious or repressive coping strategies. Dollenberg et al.'s (2021) study whereby TIA data could be separated found that adaptive coping had significant effects on PTSD, depression, and anxiety, with participants reporting PTSD displaying higher rates of maladaptive coping, and adaptive coping was negatively related to anxiety and depression. Similarly, Kiphuth et al.'s (2014) study of TIA participants found that those who reported PTSD symptoms scored significantly higher on negative coping scales, and that those who used maladaptive coping strategies were at a 1.2 times higher risk of developing PTSD. Across the stroke and TIA research, it appears that coping style has a substantial influence on whether patients develop psychological distress, aligning with the mechanisms proposed by The Transactional Model of Stress and Coping (Lazarus & Folkman, 1984). The model integrates both the importance of cognitions and appraisals (alike to Ehlers and Clark’s (2000) model of PTSD) following a stressful event, and what impact they may have on the coping strategies an individual may go on to use to cope following the event.

2. Extended Methods

2.1 Rationale for Quantitative Methodology

At present, there is sparse quantitative evidence from specific studies focusing on TIA and the residual emotional impacts on people affected and their families (Moran et al., 2014; Webb et al., 2023). There has however been qualitative research into the real-life experiences of individuals post-TIA, and the different impacts on their physical and emotional well-being (Crowfoot et al., 2018). Ravenhill et al.'s (2019) review of four qualitative studies indicated how subjective the experience of a TIA diagnosis can be, and that there should not be a ‘one size fits all’ treatment. It concluded that people frequently experienced psychological difficulties post-TIA, and that many were left feeling confused or unaware of the importance of secondary prevention for future cardiovascular events. Interestingly, some individuals reported that the TIA acted as a catalyst to make healthier lifestyle changes. Others reported they lived in anxiety at the worry of a future stroke occurring, compared to others who viewed it as ‘just one of those things’.

Qualitative studies have reported that personal experiences of a TIA can be varied, however much of the research has been idiographic and explored specific participants’ unique experiences (Crowfoot et al., 2018). To date, there has not been a quantitative study investigating the psychological difficulties in a UK TIA only sample. The benefit of a quantitative approach allows for us to examine patterns at scale, beyond the idiographic. Quantitative findings would be useful in exploring the differences in how people perceive, and cope following a TIA, and leave less subjectively in the findings to then inform services in a clear manner.

It was felt that a quantitative approach would allow us to develop an initial understanding of the psychological outcomes post-TIA at scale, which could then be built on further in the future. It was felt that using regression analyses could begin to determine what might predict increased levels of PTSD, anxiety, and depression to inform potential changes in TIA aftercare.

2.2 Development of REDCap Online Surveys

2.2.1 REDCap Survey Software

The software selected for the online survey platform was REDCap (Research Electronic Data Capture) as it was approved and preferred by the UoN. REDCap is a secure web-based platform designed to support data capture for research studies (Harris et al., 2009). It provides an intuitive interface for the valid capture of data, and audit trials for tracking data manipulation. REDCap also has automated export procedures for seamless data downloads to statistical software packages (e.g., SPSS) and has procedures for data integration and interoperability with external sources (Harris et al., 2019).

REDCap is advanced in its design features, such as the use of calculated fields, auto-validation, branching logic, missing data codes and survey stop functions. A Senior Data Manager based at the UoN supported CW to create the online surveys and assist with using the full extent of REDCap's functionality. REDCap also allowed for projects to be duplicated and modified, in addition to having access to different 'arms' of projects. Due to REDCap's advanced functionality and in-house support facilities, REDCap was used to build the online survey over other platforms (e.g., Microsoft Forms). As there were two recruitment strategies within the study, REDCap allowed for the surveys to be split, but still accessed under the same account by the researcher. Therefore, there was a survey 'arm' for the social media strategy, and a second 'arm' for the NHS strategy. Both surveys were similar, however there were some minor differences.

2.2.2 Social Media version of the survey

The lead researcher (CW) initially began working with the Senior Data Manager on creating the social media arm of the survey on 12th January 2024. The survey was developed using the documents approved by the UoN's Ethics Committee. The screening questionnaire used calculated fields to determine whether a participant met the eligibility criteria. If so, participants were then required to enter their contact details to be sent the remainder of the survey through email. For participants who were not eligible, they were informed via a pop-up and were unable to progress further with the survey. Participants were

emailed a unique link to access the rest of their survey. Using the missing field's function, participants were unable to progress to the next stage of the survey if they had missed a question, which minimised the amount of missing data. The demographics questionnaire used calculated fields to ensure that participants were over 18 years old, and also used a mix of tick boxes, dropdown options and free text answers. For the standardised measures used within the study, the REDCap system was able to calculate participants' answers (e.g., calculate scores and 'moderate anxiety' on the GAD-7).

2.2.3 NHS version of the survey

For the NHS arm of the survey, the format and questionnaires were very similar to the social media arm, with a few minor adjustments to how it operated in line with the NHS Ethics protocol. Differences included within the screening questionnaire, participants needed to state which location they had consented from (either site one or two) to enable the researcher to accurately understand PIC site recruitment numbers. As there were study posters with self-participation QR codes, it also enabled PIC site identification in case anybody completed the survey without the researcher directly emailing them personally. The wording in the introduction page was also amended to state they had been selected to participate due to being seen in the TIA clinic (not self-selecting through social media). Coding was applied to work around the one-week post-TIA inclusion criteria, as some participants may have been seen in clinic the same day their TIA occurred. To mitigate this, the survey was coded to give participants the option of when to complete the survey (from immediately to one-week later). This was implemented in an attempt to be as inclusive as possible, and not lose potential participants for being seen before the one-week cut-off date. The NHS arm allowed for paper-based surveys to be uploaded onto the online system through segregating them into their own group. This allowed the researcher to manually input their responses from the paper-based surveys and upload a copy of their signed consent form. This then allowed study data to be collated together.

2.2.4 Mitigation of Fraudulent Participants

Within research, there is a risk that participants may take part in studies despite not meeting the eligibility criteria, attempt to 'sabotage' the research, or

when there is an incentive on offer (e.g., vouchers or monetary reimbursement for time), attempt to exploit the research for personal gain (Kumarasamy et al., 2024). Due to the target sample of 55 participants, it was deemed that monetary incentives would neither be sustainable, nor feasible within the limited research budget. Additionally, overall participant burden was considered low, and therefore incentives were deemed unnecessary. The Senior Data Manager provided guidance on how to mitigate fraudulent participation, which was implemented at every stage of the online survey design. Throughout the online element of the study and survey design, ethical guidelines for internet-mediated research were considered (British Psychological Society [BPS], 2021a).

To mitigate the risk of fake or fraudulent participants and bots, there were several gates put into place. REDCap was chosen as the survey software due to its ability to add additional blocks and branches to prevent false data, whilst remaining user-friendly for participants. To verify participant authenticity, some identifiable information (including first and last name, email address, telephone number and address) was collected. This process aimed to prevent participants from putting in fake contact information, and if a false email address was entered the email confirmation for the next step of the survey would bounce back. The lead researcher also screened the data for any inconsistencies in the first and last name, and the email address. To prevent multiple submissions from the same individual, a block was put in place so the email address could only be used once. The screening questionnaire presented each question on a different page, with inclusion and exclusion criteria interspersed with no backwards navigation to prevent fake participants from changing their answers to gain access to the survey. Eligible participants were required to agree to take part in the research, and an automated survey link was sent to their chosen email address to complete the questionnaires. This also asked for their first and last name again, highlighting any inconsistencies. A CAPTCHA to prevent bots was also utilised. The date the participant completed on the survey was automated and hidden from participants and therefore, could not be changed.

2.3 Epistemological Stance

Epistemological positioning relates to the philosophical framework that researchers use to understand how knowledge is acquired, and how certain

assumptions and beliefs about reality are developed (Willig, 2012). Positioning varies across disciplines, for example in medical research trials, a positivist stance is often adopted which relates to the notion that knowledge is built from objective observations that occur within reality. Conversely, some researchers adopt a social constructivist approach which largely draws on how individuals make sense of information, and that knowledge is acquired through a socially constructed process and therefore not necessarily in line with objective reality. Somewhat in-between these positions stands the critical realism stance, which conveys that individuals will experience a reality, however it cannot be stated this is 'true reality' as the socio-cultural experiences had by participants will affect how they respond to queries within the research (Maxwell, 2012).

It is important that researchers reflect on their own epistemological positioning as most elements of the research process, including the developmental phases, conduction and data analysis will be affected by the biases and assumptions that the researcher holds (Chamberlain, 2015). The critical realist stance assumes that there can be multiple perspectives of the same reality (Bhaskar, 2013) which has been shaped by somebody's past experiences, cultural and societal influences and opinions. This stance aligned with the previous literature on TIA and stroke, and how the same experience of having a TIA can be perceived and coped with very differently depending on the person. The research team was mindful that quantitative measures and the questions within them can be interpreted differently depending on the individuals' personal experiences, and how this could potentially impact participants' responses. There is also the concern of social desirability bias and questionnaire validity issues for example, and therefore to believe that the questionnaires used with the study are 'true reality' would be potentially too narrow. However, there is the assumption from the researchers that the questionnaires used were accurate to gain a level of knowledge and understanding about people's experiences of TIA. With these factors in mind, the research adopted a critical realist stance (Bhaskar, 2013).

2.4 Ethical Approvals and Considerations

2.4.1 Social Media Recruitment Strategy

The study abided by the ethical regulations outlined in the UK Policy Framework for Health and Social Care Research (Health Research Authority [HRA], 2023) and the BPS Code of Human Research Ethics (BPS, 2021b). Researchers planned to recruit participants via two methods, which were online using social media and through NHS TIA clinics. Ethical approval for social media recruitment was initially sought, and the study was granted approval from The Mental Health and Clinical Neurosciences Ethics Subcommittee from the UoN on 4th January 2024 (Appendix A). No Amendments were submitted throughout the study duration.

2.4.2 NHS Recruitment Strategy

For the NHS recruitment strategy, ethical approval was initially submitted for a Proportionate Ethics Review by the Proportionate Review Sub-Committee on 20th February 2024. However, it was deemed that a full Research Ethics Committee (REC) review was required due to the nature of the research (Appendix B). The Lead Researcher (CW) and Primary Supervisor (EK) attended the REC Meeting with the South East Scotland Research Ethics Committee (REC Reference: 24/SS/0025) via Microsoft Teams on 6th March 2024, whereby the study was granted Provisional Opinion. Required amendments were made, with additional information sought from the REC on 8th April 2024. The study was granted favourable opinion by the REC on 11th April 2024 (Appendix C). HRA approval was granted on 16th April 2024 (Appendix D).

During the IRAS and NHS Ethics process, the research team applied for the study to be adopted by the National Institute for Health and Care Research (NIHR) Clinical Research Network (CRN) to assist with NHS site recruitment. However, this application was declined on 19th February 2024 due to the study not meeting the eligibility criterion of ‘open competition’ (Appendix E). This was because the study received funding from Health Education England (HEE) through the Doctorate in Clinical Psychology Programme and this wasn’t deemed sufficient as part of their eligibility criteria. This decision was appealed; however, the outcome remained the same.

2.4.3 NHS Ethics Amendments

Three amendments were made throughout the entirety of the study. All amendments were non-substantial, and no study-wide review was necessary. These are listed below:

- April 2024: Site One was added as a Participant Identification Centre (PIC) site to improve attainment of study sample target.
- May 2024: Site Two was added as a PIC site to improve attainment of study sample target.
- July 2024: Typographic edit to Consent-to-Contact (CTC) form header and footer to new UoN logos.

2.4.4 NHS Trust Site Research and Development (R&D) Department Approvals

Following NHS Ethical Approval, approval was sought from the original participating site's NHS Trusts Research and Development (R&D) Department. However, the initial PIC site's R&D Department declared that they would be unable to facilitate the study due to the study not being CRN adopted. The site's feasibility was discussed between the research team and the original Principal Investigator (PI), however the final decision to label the PIC site as unfeasible was made on 20th May 2024. During the discussions regarding the feasibility of the site, the researchers were proactive and approached other potential PIC sites. It was therefore declared this site was a non-feasible site, and R&D approvals were never sought from the research team.

A PI based at Site One was approached to participate as a PIC site, and they agreed they had capacity without CRN adoption. Approval through the NHS Trust R&D Department was granted on 28th June 2024.

A PI based at Site Two was approached to participate as a PIC site for the study, and agreed they had capacity for the study without CRN adoption. Approval through the NHS Trust R&D Department was granted on 13th June 2024.

For detailed timelines on the ethics processes, NHS site R&D approvals, recruitment and survey development, see Appendix F.

2.4.5 Informed Consent and Consent-to-Contact Forms

Due to two recruitment strategies, two versions of the Participant Information Sheet (PIS) and consent form were developed. One for social

media (Appendix G) and one for the NHS (Appendix H) as the formatting and information requirements were slightly different for each. Both PISs clearly stated that participation was voluntary and declining to participate would not result in any penalisation or changes in care. The PIS detailed the researcher's contact details in case participants wanted any further information.

For social media recruitment, participants who clicked the survey link or scanned the QR code from online social media platforms were required to read the PIS and tick to confirm. Participants who were eligible for the study through the screening questionnaire (Appendix I) and left their contact details were then automatically emailed a unique survey link to sign the consent form (Appendix J) and complete the demographics form (Appendix K) and the rest of the questionnaires (Appendix L). Participants were emailed a copy of their signed consent form and the PIS to keep for their personal records.

For NHS recruitment, CTC forms (Appendix M) were used to identify potential participants. CTC forms included study details and eligibility criteria and asked for potentially eligible participants to provide their contact details (name, contact number, address and email) and their preferred contact method. Leaving CTC details was entirely voluntary, and participants were told it would not impact their care in any way. CTC forms were collected through liaising with staff on both NHS sites. CTC forms were predominately used due to the eligibility criteria requiring participants to be at least one-week post-TIA, and ensured they had a chance to process their TIA to enhance the validity of participant responses. The lead researcher (CW) was then able to contact participants who had left their CTC details and gain full informed consent (Appendix N) if they chose to participate in the full study.

The unique online survey link to complete the survey was not sent until informed consent had been obtained. For participants who opted to complete the survey by post, the screening questions, PIS, and consent forms were included alongside the questionnaires with a pre-paid return envelope to minimise participant burden.

2.4.6 Confidentiality and Right to Withdraw

Confidentiality of participants was maintained throughout the study. To access data from the online surveys through the REDCap system database,

user rights were required to be allocated from the Senior Data Manager. The only people given access to this was CW and the Chief Investigator (EK). Personal login and passwords were required to access the REDCap system data. For paper-copies of surveys completed via post, data was stored securely at the UoN in a locked filing cabinet.

During data analysis, personal identifiable information was removed (names, addresses, contact numbers and email addresses) and participants were assigned a unique participant number. CW made a separate confidential record of the participant's name, date of birth, email address, phone number and unique participant number, to permit identification of all participants enrolled in the study. This was in case additional follow-up was required, for the study results to be shared if requested, or if a participant requested their data to be withdrawn from the study.

Within the PIS, it was made clear that participants had the right to withdraw from the study at any time. It was stated that if participants had already completed and submitted their questionnaires, they needed to inform the researcher within one month as by that time their data may have already been used for data analysis. Participants were informed that any data collected would not be erased, however it would not be included in the final data analysis. One participant withdrew their data from the study after completing the survey.

The REDCap platform saved participants data as they progressed through the questionnaires. Therefore, if a participant no longer wished to participate and they closed their browser, it saved their data up until that point.

2.4.7 Data Protection

The Data Protection Act (2018) and General Data Protection Regulation (2018) principles were abided by throughout the study. Online survey data was initially stored on REDCap, a UoN approved survey software, which required specific permissions to be granted to allow access. Only the researchers (CW and EK) and the Senior Data Manager were given access. When the data was exported to excel for analysis, it was stored on the researchers (CW) UoN secure OneDrive and was password-protected.

2.4.8 Risk of Adverse Events

There were no disadvantages or risks to taking part anticipated throughout the study. The PIS outlined that some of the questionnaires asked questions relating to stress, emotions and trauma responses following a TIA, which could have resulted in uncomfortable feelings. At the end of the PIS, contact details of mental health support and stroke specific services were provided in case a participant felt that they needed extra support after the survey. This included specific contact details, methods of support and telephone opening hours. For participants recruited through the NHS TIA clinics, a letter was sent to their GP to inform them of their engagement in the research which was requested by the REC Committee. Participants were also signposted to their GP should they have required extra support. To limit participant distress, the PHQ-8 (Kroenke et al., 2009) was utilised which removed the suicide risk item, eliminating the concern of safeguarding if a participant were to score highly on that specific item.

2.4.9 Participant Compliance

Compliance was assessed by the researcher (CW) on whether the participant was willing to consent and return questionnaires. For questionnaires which were returned with missing information or not returned within two weeks, the researcher sent a reminder and offered appropriate support for completion or answer any queries. This ensured a higher level of compliance with questionnaire completion and aided with missing data. For questionnaires which remained incomplete, they were still appropriately included in the analysis. Online questionnaires required all questions to be answered before the participant could progress to the next section, which successfully helped to minimise missing data.

After the survey had been shared, if no response had been received within two weeks the lead researcher re-contacted the participant. This enabled the researcher to understand any concerns with completing the survey, or if people no longer wished to engage. On some occasions, if the participant was re-contacted, they would go on to complete the survey. If no response was gained, it was assumed the participant no longer wished to engage in the study and they were not approached again.

Upon receiving two of the postal questionnaires, there was some data missing on the questionnaires. For one participant, the researcher was able to

contact them to gain this missing information, however for the other they were unable to.

2.4.10 Data Protection, Management and Storage

Each participant was assigned a unique participant identification number, for use on study forms and the electronic database.

All study forms were treated as confidential documents and held securely in accordance with regulations. The lead researcher held a separate confidential record of the participant's name, date of birth, email address, phone number and participant study number, to permit identification of all participants enrolled in the study, in case additional follow-up was required. Access to the study data was restricted to the lead researcher, the Chief Investigator and the Senior Data Manager.

The Data Protection Act (2018) principles were followed throughout the duration of the study. Any paper study forms were held securely, in a locked facility at the University of Nottingham. All computer held data including the study databases were stored securely on the lead researchers UoN Onedrive, and were password protected.

In compliance with the ICH/GCP guidelines, regulations and in accordance with the UoN's Code of Research Conduct and Research Ethics, the lead researcher and Chief Investigator maintained all records and documents regarding the conduct of the study. After the study completion, all study records will be stored by administration staff at the UoN. These will be retained for at least 7 years or for longer if required.

2.5 Sample

2.5.1 Eligibility Criteria

Inclusion Criteria. Individuals were eligible to take part in the study if they met the below criteria:

- Aged 18 or above (no upper age limit).
- First TIA diagnosis.
- Must have experienced a TIA within the last three-months.
- At least one-week after the TIA.
- Able to read and write to a level of English, not requiring an interpreter.

- Provide informed consent.

Exclusion Criteria. Individuals were excluded from the study if they:

- Received a confirmed diagnosis of PTSD, anxiety, or depression within the past year.
- Currently receiving psychological treatment or intervention for PTSD, anxiety, or depression, excluding medication.
- Residing outside the UK.

The research team decided that only participants who had experienced their first TIA would be eligible for the study to prevent confounding variables which may have resulted from previous TIAs or strokes. The three-month window was agreed within the research team in line with existing TIA studies, and through consulting with the patient and public involvement (PPI) group. This was to limit the potential for confounding variables which could be present after the TIA (e.g., the longer the duration the higher the probability that further stressful or traumatic events might occur), and to provide enough time for the staff within TIA clinics to identify people, and for CW to contact participants.

The requirement that survey completion was no sooner than one-week after the TIA occurred was implemented due the nature of the PIC sites TIA clinic pathways (e.g. rapid discharge and outpatient clinics). Having a minimum of one-week since diagnosis allowed for an adjustment period for patients (i.e., not asking people to complete a survey on the day of their TIA to limit additional stress, and to maintain integrity of participant responses). It also allowed NHS staff in clinics to identify potential participants and collect Consent-to-Contact details before discharging them (which is frequently within the first week back to the care of the GP from discussions during Site Initiation Visits). Using a cut-off of longer than one week may have also increased staff burden as staff would have needed to contact patients post discharge. Recruiting within one week of diagnosis aligned with established clinical routines of TIA outpatient clinics, thereby facilitating higher recruitment rates, and supporting pathways for the early identification of psychological distress during the acute phase of TIA. Previous studies have recruited successfully in a similar timeframe and

approach within stroke populations (Müller et al., 2021; Grosse-Holz et al., 2020). Despite the criteria for PTSD outlining symptoms should usually be present for at least one-month, we acknowledge that we were screening for PTSD symptomatology (not diagnosing) during this acute phase whereby individuals are asked to make changes, with the aim to highlight the needs of individuals during this timeframe.

The decision to focus only on UK data was made as much of the existing research is across Europe, and the researchers wanted to focus only on TIAs within the UK health system.

2.5.2 Sample Size and Effect Size

There are variations in sample sizes within the stroke and TIA published literature for studies using correlational and regression models. Sample sizes vary from 53 (Müller et al., 2021) to 135 (Teoh et al., 2009), with much of the literature which has very large sample sizes using pre-existing datasets which are from large-scale stroke patient data (Ben Assayag et al., 2022; Goldfinger et al., 2014).

For multiple linear regression (MLR), there is debate over how to determine sample size, for example it has been suggested that for valid results within a regression, 10 participants per predictor variable is required (Stevens, 2013). Field (2017) argues such rules are too simplistic and pervasive, and the sample size required should instead depend on the size of the effect that is trying to be achieved and the power. Field's (2017) sample size guide was utilised instead of conducting a specific G*Power calculation as it was more inclusive of various study methods, which fit in line with the exploratory nature of the current study, rather than rigid power calculations used for trials or experiments.

For the current study, a large effect size was the minimum effect of interest due to the limited existing research in the field of TIA, and the feasibility of recruiting early post-TIA. Additionally, the study aimed to focus on mechanisms that could be strong enough to be detected to inform future TIA pathways and psychological provisions and have a practical real-world application (not just statistical significance). Previous TIA and minor stroke studies which have explored PTSD, anxiety, depression, and coping styles have

reported large effect sizes (Ben Assayag et al., 2022; Müller et al., 2021). Collaboratively, this resulted in a large effect size being selected for the current study.

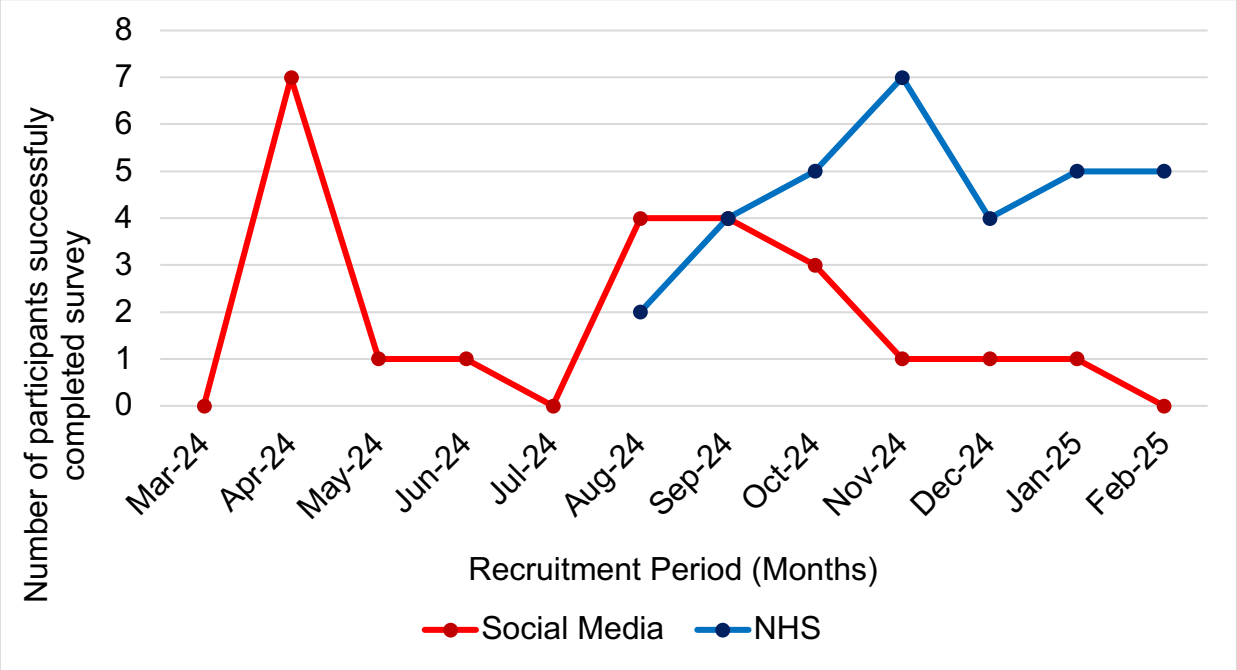
For the current study's sample size calculation/target, guidance from Field (2017) was utilised as it provided clear guidance on sample (*N*) sizes for multiple linear regression analysis to achieve a high level of statistical power. Field (2017) states this guidance was developed using information and data resulting from pre-existing G* power calculations. Guidance from Field (2017) documents pre-calculated *N* size targets based on G* Power, and clearly states the sample size required to achieve a high level of power using Cohen's *d* (1988) benchmark of 0.8 for the model to be significant overall (i.e., r^2 not zero). Field's (2017) guidance utilises the values of R^2 = 0.02 (small), 0.13 (medium) and 0.23 (large) which correspond to benchmarks for Cohen's (1988) *d* effect sizes. Cohen's (1988) benchmarks were used in developing Field's (2017) guidance for *N* size for MLRs, including small (*d* = 0.2 – 0.5), medium (*d* = 0.5 – 0.8), and large (*d* = > 0.8) effects. Field's (2017) guidance suggested for up to 12 predictor variables for a large effect size to be detected, an *N* of 55 would suffice.

During the initial development stages, it was planned to recruit from a TIA clinic based in a large hospital site located in the Midlands. From discussions with the original site PI, it was stated that approximately 124 TIA patients attended TIA clinics on a monthly basis. The researcher aimed to recruit approximately 50% (due to dropouts, non-engagement, not meeting the eligibility criteria and timeframes) over an approximate six-month recruitment period. This originally meant that approximately 372 participants could have been available for the study. By additionally advertising the study through social media, it was hoped to increase the availability of participants and broaden the sample further to UK wide. Consequently, the research team initially aimed to recruit a minimum of 55 participants over a six-to-12-month recruitment timeframe from a single PIC site.

However, as discussed, the original PIC site withdrew their participation due to limited recruitment capacity without CRN adoption. Further discussions regarding this were held in the research team, and a further two NHS sites (PIC

sites one and two) were identified and agreed as PIC sites. These sites were smaller but different geographically than the original PIC site, and therefore the number of TIA patients which were attending clinics was reduced. In an attempt to boost and aid recruitment, Site Initiation Visits (SIVs) were carried out by the lead researcher (CW), and communication was well maintained throughout the recruitment phase. The recruitment period spanned for a year across NHS sites and social media to compensate for changes as well as delays in PIC sites. See Figure 2 for an overview of recruitment numbers over the 12-month recruitment period.

Figure 2.
Eligible Recruitment Timeline over 12-month Timeframe (March 2024 – February 2025)



Note. Social media recruitment began March 2024. NHS recruitment began August 2024 due to the process of gaining NHS ethics and NHS Trust Research and Development Approvals.

2.6 Recruitment

2.6.1 Selection of a Mixed Recruitment Approach

Due to the lack of quantitative research within the UK, it was difficult to determine what the most effective method of recruitment would be. In addition, if only NHS sites were used it may have led to results only reflecting a small geographical area of the UK. This resulted in a mixed recruitment approach being used in an attempt to maximise reach of the study, and also achieve as

close to the minimum sample size possible. This included recruitment from both social media channels and NHS TIA Clinics.

2.6.2 Social Media Recruitment

As ethical approval was granted first through university ethics (Reference: MHCN-2023-3149-1), social media recruitment started on 22/03/2024, with the final advert posted on 24/01/2025. CW contacted Facebook Groups for people who had experienced a stroke or TIA and gained permission from group administrators to share the study details to group members. The study poster (Appendix O), study eligibility details and survey links and QR codes were shared in the below Facebook Groups:

- Young Stroke Survivors Support Group
- Stroke Survivor Chat Group
- Stroke Survivors U.K.
- T.I.A. Stroke
- Stroke Survivors UK, partners, and supporters
- Stroke Rehabilitation
- Stroke Survivors
- Stroke Survivor Support Group
- Stroke Survivors UK
- Stroke Awareness and Support
- TIA, Mini-Stroke and Stroke Survivors
- TIA Chat Group

The study was advertised a total of 11 times across the different Facebook Groups (different groups were advertised at different times to avoid overloading members). The study advert was tweeted 10 times on X and was retweeted by research supervisors and academics within the stroke research community. Stroke charities were also approached for support with online recruitment. An application for support was sent to Stroke Association on 20/02/2024 and was subsequently advertised on their research webpage and stroke forum on 09/04/2024. The Brain Charity was also approached on 04/09/2024, and the study was advertised on their Facebook and X on 13/09/2024. The study was also advertised in the Winter edition newsletter of a

larger research project on Optimising Pathways of Psychological Care After Transient Ischaemic Attack and Minor Stroke (OPTIMISE; https://institutemh.org.uk/research/projects-and-studies/optimise/1909-news), which was sent out in December 2024 and included the study details and QR participation code. OPTIMISE is a separate research project which focuses on improving the emotional and cognitive support for people after a TIA or minor stroke, who send out quarterly newsletters to those on their mailing list (academics, NHS services and potential participants) focusing on research updates. All social media participants chose to complete the survey, and nobody was directly approached.

2.6.3 NHS Recruitment

For NHS recruitment, CTC forms were crucial in reaching eligible participants. For Site One, the Stroke Research Nurse and Co-PI of the project identified potentially eligible participants in the TIA clinics. For participants who consented to be contacted, their details were obtained by the PI based within the TIA clinic, and then passed onto the research team every three weeks. The researcher then contacted the participant by sending them study details in accordance with their preferred method of contact. All participants had time to consider before participating in the study. The TIA clinic staff checked whether those who had completed CTC forms had received a diagnosis of a TIA. Study posters (Appendix P) were also placed in TIA clinics in both PIC sites.

For Site Two, Healthcare Assistants (HCAs) collected CTC details from patients who attended the TIA clinics. The HCA explained study details to the potential participant, and whether they would consent for a researcher to contact them in the future for their participation. Those who consented completed a CTC form, which the HCA filed away in a folder in a secure office until the researcher collected them from clinics (approximately once a month). The researcher then contacted the participant by sending them study details and the online survey link or a questionnaire pack if they opted for postal completion. For participants who did not receive a diagnosis of a TIA, their CTC forms were destroyed by the HCA before they were passed onto the research team.

Across both sites, participants completed a screening questionnaire to determine eligibility. For online participants, if eligible then they received an email with a unique survey link to sign the consent form and complete the study questionnaires. Participants were emailed a copy of their signed consent form and the PIS to keep for their personal records. Participants who opted to participate by post, received all study documents at once. This approach was considered cost-effective and efficient for the researcher and participants. A difference on the NHS consent form was that participants were required to provide their GP details so the researcher could notify their GP by letter of their involvement as requested by the HRA REC Committee (Appendix Q).

2.6.4 Differences in PIC Site Locations

The Office for National Statistics (ONS, 2023) data was examined to determine the published differences in terms of demographics and social indicators between sites one and two. The employment rate for adults aged 16 to 64 years was lower for both sites (site one was 70.3% and site two was 64.4%) than the average median rate of 76.8% across all local authorities. The claimant count was a lot higher for site one (7.6%) than site two (4%) compared to the median average of 3.2%. Sites were similar in terms of gross disposable income (£16,987 for site one and £17,016 for site two), however both were below the median average of £21,359. In relation to education, both sites were similar statistics for those who had no qualifications (11.7% for site one and 10.6% for site two), both higher than the median average of 6.6%. For health and lifestyle statistics, site two had a lower-than-average percentage of adults who smoked cigarettes (6.9%) compared to the median average (11.4%), however site one had a higher percentage at 14.7%. Obesity prevalence was similar for both sites (31.1% for site one and 35.4% at site two), but both were higher than the median average of 26.8%. Importantly for the current study, the preventable cardiovascular mortality rate per 100,000 people was higher for both sites (45.8 for site one and 44.1 for site two) than the median average of 28.6. Life satisfaction reports were similar for both sites (7.3 out of 10 for site one and 7 out of 10 for site two) and were in line with the median average of 7.5 out of 10. From the statistics, both sites had higher obesity rates and

preventable cardiovascular mortality rates, and site one had a much higher smoking prevalence, all known risk factors for a TIA occurring.

For ethnicity diversity, the ONS (2021) census statistics showed that the area which site one covered was 60.6% White, 21.2% Asian, Asian British or Asian Welsh, 9.3% Black, Black British, Black Welsh, Caribbean or African, 5.3% for mixed or multiple ethnic groups and 3.6% from any other ethnic group. In comparison, site two statistics were 91.1% White, 1.6% Asian, Asian British or Asian Welsh, 1.2% Black, Black British, Black Welsh, Caribbean or African, 1.6% for mixed or multiple ethnic groups and 0.4% from any other ethnic group. Therefore, it appears that site one's TIA clinic would have had a greater number of people from diverse background than site two based on the demographic data available.

In terms of the differences between the site one and two and the TIA clinics, CW visited sites to understand both sites set-up, of which there were stark differences. For site one, there was a designated space within the stroke service for TIA patients, with a separate waiting area and a place to sit comfortably away from the rest of the stroke wards and hospital. There were also designated Stroke Research Nurses, who facilitated research projects on stroke and TIA and were familiar with conducting research and participant recruitment. Site two however, had no designated area for TIA patients, and instead had a series of chairs on the busy stroke ward in a corridor. Therefore, patients may have to wait in the presence of stroke patients or other emergencies occurring. The TIA clinic room also moved a series of times during the current study, meaning there was no stability in terms of where TIA patients were seen. The site is not an active research site for studies which are not CRN adopted, and there were no Stroke Research Nurses available to assist with recruitment.

2.7 Rationale for Variable Selection

Through examining the literature base in stroke, TIA, and other medical conditions, as well as research in general PTSD, anxiety and depression, it was clear that certain variables were of interest to explore further within a TIA context. Such research therefore guided and influenced which variables were

explored in the current study, and which variables were included in the correlational and MLR analyses.

It appeared that age had a significant impact on whether individuals developed PTSD symptoms, in that younger people were more at risk within stroke and TIA populations (Grosse-Holz et al., 2020; Kiphuth et al., 2014), as well as in the general population (Pless Kaiser et al., 2019). It seemed that older ages (Garton et al., 2017) and partnership acted as protective factors against PTSD after a stroke and TIA (Goldfinger et al., 2014). Sex appeared to be of significance, as it was found females had significantly higher amounts of PTSD symptoms than males following a stroke (Nguyen et al., 2025; Tang et al., 2022). Living arrangements were also found to be important, with TIA patients who had less social support being more likely to develop PTSD symptoms (Grosse-Holz et al., 2020), however other studies found support did not make a difference (Tang et al., 2022). Coping style has been indicated to be significant in PTSD symptom development, as seen in stroke literature, maladaptive coping was linked with PTSD (Kiphuth et al., 2014), and that avoidant coping positively correlated with future PTSD symptoms (Thompson et al., 2018). Additionally, negative cognitive appraisals (Tang et al., 2022) and greater negative trauma cognitions appeared to result in more PTSD symptoms (Garton et al., 2017). A regression study in a stroke population also found that posttraumatic cognitions explained a significant amount of the variance of PTSD symptoms, with negative cognitions about the self emerging as a significant predictor (Field et al., 2008). The perceived high risk of recurrence of another stroke was also associated with PTSD (Tang et al., 2022). There have been no studies to our knowledge that have reported on the impact of approach coping following a stroke or TIA on PTSD outcomes.

Age appears to be of importance in anxiety development post-stroke, with younger people being more susceptible (Chun et al., 2018; Kapoor et al., 2019) alongside females (Broomfield et al., 2014). For depression post-stroke, non-depressed participants were significantly older, reported lower stroke severity, were more often male, and were more likely to exercise regularly than depressed participants (Teoh et al., 2009). It appeared females were significantly more likely to present with higher levels of depression (Almhdawi et

al., 2021). Avoidant coping has been positively associated with the development of anxiety (Gillespie, 1997), whereas approach coping has shown a negative association (Herrmann et al., 1997). Coping style appears to play an important role in predicting depression post-stroke (van Mierlo et al., 2015). Studies have found that individuals who use more avoidant coping strategies have been observed to present with greater depression symptoms post-stroke (Andersson & Finset, 2000; King et al., 2002). Overall, there is not much research on approach coping in stroke, but in cancer patients it has been found that approach coping resulted in fewer depression symptoms (Stanton et al., 2018). In relation to posttraumatic cognitions and appraisals, in congestive heart failure participants it was found that appraisals of one's illness as being threatening was a strong predictor of greater depression symptoms (Park et al., 2006). From both literature and theory, variables that were selected within the current study included age, living arrangements, sex, coping style, posttraumatic cognitions, as well as exploratory variables such as employment status, level of education and income. Variables were based on prior research and the theoretical underpinnings of both Ehlers and Clark's (2000) and Lazarus and Folkman's (1984) psychological models.

There were other variables which appeared to be of interest that were beyond the scope of the current study. These included: locus of control for depression post-stroke (Thomas & Lincoln, 2006); sleep disturbances and cognitive impairments for anxiety (Pearson et al., 2023); a family history of mood disorders for depression (Mitchell et al., 2017); and memory capacity, alcohol consumption and personality types post-stroke (Nguyen et al., 2025). Such variables could be explored in further TIA research in future studies.

2.8 Additional Information on Questionnaires

2.8.1 Psychometric Properties of Questionnaires

The PTSD-Checklist Specific (PCL-S; Weathers et al., 1994) has demonstrated strong psychometric properties, with estimates of internal consistency (Cronbach's alpha [α]) ranging between .94 (Blanchard et al., 1996) to .97 (Weathers et al., 1993). Test-retest reliability has been reported as 0.96 at two to three days and .88 at one-week after the traumatic event (Blanchard et

al., 1996; Ruggiero et al., 2003). Studies have also shown the PCL-S has positive correlations with other PTSD measures, including the Clinician Administered PTSD Scale, with a strong correlation of .93 (Blanchard et al., 1996).

The Generalised Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006) has good internal consistency (α = 0.8; Löwe et al., 2008). The Patient Health Questionnaire 8 (PHQ-8; Kroenke et al., 2009) also demonstrated good internal consistency for the UK population (α = 0.878) and across Europe (Torre et al., 2023).

The Brief Coping with Problems Experienced Inventory (Brief-COPE; Carver, 1997) has demonstrated good internal consistency (α = 0.55 – 0.75; DeDios-Stern et al., 2017) and construct validity (Solberg et al., 2023). Similarly, the Posttraumatic Cognitions Inventory (PTCI-9; Wells et al., 2019) has demonstrated strong internal consistency (α = 0.80 – 0.87). It also correlates strongly with the full version of the measure in veterans (*rs* = 0.90 - 0.96) and civilians (*rs* = 0.91 - 0.96; Wells et al., 2019), alongside those who have been exposed to childhood trauma (Kooistra et al., 2023).

2.8.2 Further Rationale for the use of the PCL-S (Weathers et al., 1994) and Clinical Cut-off Scores

The version of the PTSD-Checklist Specific (PCL-S) (Weathers et al., 1994) corresponding with the DSM-IV (American Psychiatric Association, 1994) was used in the current study as at the time of designing the study and gaining ethical approvals, there was minimal research demonstrating the newer version (PCL-5; Weathers et al., 2013) being reliably used within stroke and TIA research. The PCL-S has been used more than other self-report PTSD questionnaires (Janssen et al., 2024) in stroke and TIA research studies (Ben Assayag et al., 2022; Feely et al., 2023; Garton et al., 2017; Goldfinger et al., 2014; Letamendia et al., 2012; Rutovic et al., 2021; Stein et al., 2018). Only two published studies had used the PCL-5 in stroke research at the point of study development (Liyanage-Don et al., 2021; Pedowitz et al., 2021). Therefore, it was deemed appropriate to utilise the PCL-S in the current study so results from prior stroke and TIA studies could be compared, as the literature base was already limited.

Since gaining approvals and recruitment of participants, further studies have been published in stroke using the PCL-5 (Chang et al., 2024; Palmisano et al., 2024; Renati et al., 2025). Research has confirmed that there is a high degree of comparability and consistency between the PCL-S and the PCL-5, and strong indications they are measuring the same constructs (Blevins et al., 2015). Additionally, the guidance for using the PCL-S suggests specific clinical cut-off scores depending on the population being assessed. This guidance was used for the current study, as it recommended a clinical cut-off score of 36-44 for a setting of specialised medical clinics, of which TIA clinics were thought to fit. Guidance stated to use scores on the low end of the range if the goal was to screen for PTSD symptoms, which was an aim for the current study. The clinical cut-offs for the general population were 30-35, and for speciality mental health clinics was 45-50 (Weathers et al., 1993). A clinical cut-off score of 36 was therefore selected for the current study. Furthermore, additional research is required to obtain comparable clinical cut-offs for the PCL-5. Instead, the PCL-5 utilises a global cut-off score of 31-33 irrespective of the population being explored. Using such cut-offs in the current study therefore may have overestimated the indication of PTSD symptoms as there are no researched cut-offs for specialised medical clinics. Additionally, the formatting of the scale changed with the PCL-5 (more items and different rating scales), meaning the same cut-offs would not have been able to be used. It was therefore deemed overall, the PCL-S was the best choice of measure to assess for the presence of PTSD symptoms.

2.8.3 Brief-COPE (Carver, 1997) Category Loadings

The Brief-COPE (Carver, 1997) consists of 28 items which map onto 14 facets of coping (active coping, planning, positive reframing, acceptance, humour, religion, use of emotional support, using instrumental support, self-distraction, denial, venting, substance use, behavioural disengagement and self-blame). The measure can be scored and interpreted in different ways, including the breakdown of emotion, problem and avoidant focussed coping styles (Dias et al., 2012; Poulus et al., 2020). Studies have also indicated the outcomes can be broken down into avoidant and approach coping (Eisenberg

et al., 2012), and the presence of maladaptive coping strategies (Kiphuth et al., 2014).

For the current study, avoidant and approach coping was chosen to limit the number of variables measured, and it had been shown to be useful in prior physical health research into the effects of coping (Eisenberg et al., 2012). Research appears to use the terms avoidant coping and maladaptive coping interchangeably, as the loading of items on the questionnaire appear the same (Kiphuth et al., 2014). Guidance from Carver et al. (1989) and Eisenberg et al. (2012) breaks down the individual coping facets into two categories:

Approach Coping:

- Active coping (items 2,7)
- Positive reframing (items 12,17)
- Planning (items 14,25)
- Acceptance (items 20, 24)
- Seeking emotional support (items 5,15)
- Seeking informational support (items 10,23)

Avoidant Coping:

- Denial (items 3,8)
- Substance use (items 4, 11)
- Venting (items 9,21)
- Behavioural disengagement (items 6,16)
- Self-distraction (items 1,19)
- Self-blame (items 13,26)

Two coping facets map onto both approach and avoidant coping types (humour [items 18,28] and religion [items 22,27]) and were therefore excluded from the total scores. The items on the questionnaire are on a four-point Likert scale, between one and four. During data analysis, the items for each coping style were summed (approach coping = total scores for items 2,7,12,17,14,25,20,24,5,15,10,23, and avoidant coping = total scores for items 3,8,4,11,9,21,6,16,1,19,13,26). From the totals, the mean scores were then calculated for approach and avoidant coping. Higher scores indicated an increased frequency and use of avoidant or approach coping strategies

following a TIA. It was then approach and avoidant coping coded in the manner described which was inputted into correlational analysis, and the MLRs.

2.8.4 Posttraumatic Cognitions Inventory (PTCI-9; Wells et al., 2019) Scoring

The PTCI-9 (Wells et al., 2019) is a shortened version of the original 36 item self-report measure (Foa et al., 1999) of posttraumatic cognitions. There is evidence of a three-factor structure of the PTCI breaking down into negative cognitions about the self, world, and self-blame, however evidence has been inconsistent and queries the validity of using the subscales alone (Sexton et al., 2018; Whiteman et al., 2022). The PTCI-9 contains nine items from the original scale which were researched to be the highest loading items for each subscale (Wells et al., 2019). Total scores are the mean of all nine items, with total scores ranging from one to seven, with higher scores indicating a higher degree of posttraumatic cognitions. Due to queries on the validity of the subscales, the total score was used within the current study to measure posttraumatic cognitions. In addition, due to the sample size it reduced the number of individual variables measured to ensure the study was sufficiently powered.

2.8.5 Fear of a Future Stroke Question

The fear of a future stroke was measured using a question embedded within the survey asking participants ‘How would you rate your fear of a future stroke or TIA occurring?’. Responses ranged on a five-point Likert scale, from ‘not fearful at all’ (one) to ‘very fearful’ (five). Scores for this question were totalled, and higher scores indicated the participant had a heightened fear of another stroke or TIA occurring. This question was developed by CW specifically for this study; however, its structure was informed from existing TIA studies whereby similar questions have been asked (Kiphuth et al., 2014). Aycock et al. (2019) reviewed studies which have asked participants in stroke studies the perceived risk of a future stroke question (not physical risk, of which calculators have been developed by medical professionals, such as the $ABCD^2$ Score), as there is currently not a standardised tool which has been developed. Across studies, questions ranged from ‘yes or no’ responses, to rating a perceived risk out of 100, with the majority of studies using questions which included multiple choice options on a Likert scale, alike to the current study. It

was deemed this method would assist in gaining a general understanding of how fearful participants felt about a future stroke occurring.

2.9 Site Initiation Visits

For NHS recruitment and local R&D department approvals, site initiation visits (SIVs) were conducted at both PIC sites. Site two SIV took place on 27/06/2024 and was facilitated by CW and Chief Investigator. The study details were shared with TIA clinic staff, including HCAs, the on-site PI and Stroke Consultants. Feedback was gained which resulted in small adaptations being made to ensure recruitment suited the service, which did not deviate from ethical approvals. Site one SIV took place on 11/07/2024, which was facilitated by CW. The SIV included sharing and discussing all study details with local PI's and Stroke Research Nurses. Feedback was again collected on the feasibility of the recruitment on site. The green light for both sites to begin recruitment was given on 15/07/2024.

2.10 Data Collection (Social Media and NHS)

For social media, data was collected using the online survey platform REDCap. This was to make it as easy as possible to complete, as the survey was created to screen eligibility of participants, and automatically send consent forms and the questionnaires. Participants did not need to contact the researcher, unless they wished to. In total, there were 23 eligible participants who successfully participated in the study from social media.

For NHS data collection, participants were offered to complete the survey through REDCap or post. This was to be as accommodating as possible, with the recognition that individuals who have experienced a TIA can often be elderly, and perhaps may struggle with the online nature of the survey or may not have an email address. Having two options for survey completion assisted with the reach and inclusivity of the study. In total, 35 participants were recruited from the NHS TIA clinics. 33 participants were from site one, (although three participants were excluded), and two were recruited from site two. Participants opting for the postal option sent back survey documents to the UoN Administration office based at the university. The documents were shared with

CW to upload the documents onto the REDCap system, with the physical paper-based copies filed appropriately at the UoN.

In total, the study successfully recruited 23 participants from social media and 32 from the NHS TIA clinics resulting in an overall sample of 55. The completion method split was 40 participants opted for the online option, and 15 for paper-based completion.

2.11 Patient and Public Involvement

Patient and Public Involvement (PPI) is an important element in research planning, design, and conduction. It includes actively involving both patients relevant to the research area, in addition to the public throughout the research process to make sure the proposed study is useful and needed, and that the methods are feasible for the participant group (De Simoni et al., 2023).

CW presented the study during its development phase to the UoN Stroke Research Partnership Group on two separate occasions. The group consisted of stroke survivors, carers and professionals who work with stroke researchers at UoN. The purpose of the group is to ensure that stroke research conducted locally involves stroke patients and carers and is informed by their needs and wishes.

In July 2023, a lay summary was presented to the group's monthly meeting. The feedback gained was that the group felt the purpose of the study was important, and that more psychological support and assessment within TIA is needed. The group gave some helpful advice on how having multiple methods of completing the questionnaires would be helpful to capture a range of participants, which informed the reasoning for online and postal options. The group agreed that recruiting participants from within the hospital would be appropriate, and that in the past they have been approached whilst in hospital to take part in research and they perceived it as positive. The group felt that the questionnaires would need to be set out in a simple, easy to read format

In November 2023, the participant facing materials were shared with the group. The feedback deemed the documents were fit for purpose but gave some critique on wording and the layout of the CTC form. Feedback from both meetings has been used to further inform the design and conduct of this study (see Appendix R).

Weblink to Nottingham Stroke Research Partnership Group: https://www.nottingham.ac.uk/research/groups/strokenottingham/partnership.aspx

2.12 Planned Dissemination of Results

Upon the thesis completion, there is a plan to disseminate the key findings to both NHS sites, and charities (e.g., Stroke Association and Brain Charity). Lay summaries will be produced for broader audiences and findings will be available to anyone interested upon request. Participants who consented to be contacted with study outcomes will also be updated.

The researcher also plans to update and share study outcomes with the UoN PPI group on the findings. Due to the study being initially advertised in the OPTIMISE newsletter, results will be disseminated through the same newsletter to those subscribed to the mailing list, namely people with lived experience of TIA/stroke, researchers, and clinicians. The researcher plans to disseminate study findings in conferences such as The Organisation for Psychological Research in Stroke (OPSYRIS) or UK Stroke Forum Annual Conference, as well as publish the research in a relevant academic journal.

2.13 Bonferroni Corrections

Conventionally, a criterion value of $p < .05$ relates to the chance of a Type I error (detecting a false positive significant result) being 5%. However, commonly when conducting statistical tests, multiple comparison tests will be carried out using the same data set, which increases the chance of a Type I error being made (Field, 2017). This is referred to as a familywise error rate.

In attempt to combat familywise error rates, the level of significance on statistical analyses can be adjusted to ensure the overall Type I error rate across the comparisons remains at $p < .05$. This is known as a Bonferroni Correction, whereby a more stringent criterion value is utilised in statistical tests to determine significance rather than the usual $p < .05$. This is done by dividing the original alpha level ($p < .05$) by the number of comparisons being made. For the current study, many comparisons were made within the correlational

analysis. In total, 22 correlational comparisons were explored, therefore the alpha level of .05 was divided by 22 to result in a new *alpha* value of .002.

Similar for the comparison between group tests, a Bonferroni Correction was applied to limit the chance of a Type I error. In total, 19 comparison tests were carried out (Mann-Whitney U and Kruskal Wallis), meaning the new *alpha* value was .003.

There is debate regarding the use of Bonferroni Corrections during data analysis, as although it helps to limit Type I errors as discussed, it can also have the opposite effect in increasing the probability of making a Type II error, or a false negative (Field, 2017). From discussions within the research team and considering literature around the use of applying a Bonferroni Correction, due to the number of comparisons made in the study it was decided a Bonferroni Correction would be applied. The study has presented the statistical analysis and how the Bonferroni Corrections were calculated to allow readers to also consider results if Bonferroni Corrections were not applied.

2.14 Data Entry Methods for Multiple Linear Regression (MLR) Analysis

Within MLR, there are a variety of methods of which to build the regression model (Field, 2017). Often in studies, data on many potential predictor variables will be gathered, however care needs to be taken when choosing which of these predictors to enter into the model as the estimates presented in the output depend on the variables put into the model, and the order they are entered. Predictors should be based on theoretical evidence, rationale or prior research which indicate that the predictor is important (Field, 2017).

It is recommended that hierarchical regression methods should be used where possible, which is where predictors are based on past work to decide how to enter them into the MLR model (Field, 2017). A different method of entry is whereby all predictors are forced into the model in the same step simultaneously, with no decision about the order being made. A data entry method generally not recommended is stepwise regression, whereby predictors are added or removed from the model one at a time based on the significance of their contribution in an attempt to identify the most impactful variables for predicting an outcome (Field, 2017). This method can be forward selection,

whereby the model begins with no predictors and adds the most significant predictor through correlational analysis with the outcome variable and adds them at each step. Another method is backward elimination, whereby the model starts with all the predictors and removes the least significant predictor at each stage (Field, 2017). The reason such methods are frowned upon is because stepwise regression can have biased coefficient estimates, which can lead to inflated Type I error rates, and may select variables that are statistically significant due to chance within the dataset. This may mean the outcomes are not generalisable out of the context of that study.

From the literature and rationale regarding MLR model creation and data entry, a hierarchical entry method was selected for the current study due to an existing understanding of psychological theories around coping, cognitions, and psychological distress, however there were limited findings in a TIA context. Hierarchical methods therefore allowed for careful selection of variables, in a manner which fit the aims of the research and study exploration.

2.15 Quality Appraisal

Throughout each stage of the current study (including research rationale, study development, selection of questionnaires, recruitment approaches, data analysis and the write-up of findings), the lead researcher used a quality assessment tool. The Critical Appraisal Skills Programme (CASP, 2024) checklist for quality of cross-sectional studies enabled CW to assess the quality of the study and how it was reported across the journal and extended paper. See Appendix S for completed CASP document.

3. Extended Results

3.1 Missing Data

Due to the programming of the REDCap survey (i.e., participants were unable to progress through the survey if there were any missing responses) it meant that there was no missing data for participants who opted to complete the survey online.

For postal paper-based surveys, important parts of the questionnaires (e.g., titles, timeframes to consider answering the questions, noted that pages were double sided) were highlighted, and a note which asked participants to ensure they had answered all questions. In the final dataset used for data analysis, only two paper-based surveys were returned incomplete. Participants who did not return the questionnaires fully completed were contacted by phone, however one participant could not be reached. This participant's data was not used within the MLRs as they had 13 items missing on the Brief-COPE questionnaire.

3.2 Recruitment Rates

3.2.1 Overall Recruitment

Overall, a total of 58 participants were successfully recruited to the study, however two were excluded due to not meeting the full study eligibility criteria (one had exceeded the three-month time frame, and it was not the other participants first TIA), and one person withdrew consent. This resulted in 55 participants being included in the final data analysis.

3.2.2 Social Media

For the social media recruitment strategy, as all study participation took place through REDCap, data was available for those who had clicked on the survey but chose to not complete it. For social media recruitment, the recruitment rate was 14.37% (see Table 9 for social media recruitment information).

Table 9.
Social Media Recruitment Breakdown

Social Media		
		N (%)
Eligible	Completed the full survey	23 (14.37)
	Met eligibility/screening criteria but abandoned the rest of survey – did not complete survey.	16 (10)
Reason		
Not Eligible	Abandoned Screening Questions (unsure of eligibility)	51(31.88)
	Did not met study criteria:	70 (43.75)
	Met one exclusion criteria	*40 (57.14)*
	Met two exclusion criteria	*23 (32.86)*
	Met three exclusion criteria	*5 (7.14)*
	Met four exclusion criteria	*2 (2.86)*

3.2.3 NHS Sites

For NHS recruitment, data collection consisted of REDCap, emailed and postal surveys. Recruitment for site one is presented in Table 10, and recruitment for site two is presented in Table 11. It is unknown to the research team the exact number of participants invited to take part, only the number of CTCs received. A total of 13 participants chose to complete the survey through REDCap but abandoned it, therefore the NHS site they were recruited from was unable to be determined.

For site one, there were a total of 62 surveys sent (22 email and 40 postal) to potential participants, of which 33 completed the survey, resulting in a completion rate of 53.23%. Therefore, the overall successful completion was 30 (discounting non-eligible participants), which resulted in a 48.39% completion rate.

For site two, the overall number of surveys sent to potential participants was 11 (eight email and three postal). Two participants completed the survey

through REDCap, resulting in a 18.18% completion rate. Overall NHS completion rate was 43.84%.

Table 10.
Recruitment Breakdown for NHS Site One

Site One		
		N
	Reason	
Eligible	Total Number of CTC's shared with the research team	64
	Completed survey through QR code on poster (CTC not received as participant completed independently)	1
	Survey Completed via Online/Emailed invite	13
	Survey Completed via Postal Invite	16
	Eligible to participate but chosen to not complete survey	2
Not Eligible	Reason	
	Emailed survey – no response	7
	Posted Survey – no response	21
	Screened out as participant did not meet study criteria (could determine from this NHS site)	5
	Unable to contact (no address or email)	2
	Withdrew from research	1

Note. Overall numbers do not total due to the option of self-completion through the QR code. Therefore, conversion rates were calculated based on number of surveys sent and how many were successfully completed; CTCs = consent to contact forms from research site.

Table 11.
Recruitment Breakdown for NHS Site Two

Site Two		
		N
Eligible	Reason	
	Total Number of CTC's shared with the research team	11
	Survey Completed via Online/Emailed invite	2
	Survey Completed via Postal Invite	0
	Eligible to participate but chosen to not complete survey	2
Not Eligible	Reason	
	Emailed survey – no response	3
	Postal Survey – no response	3
	Screened out as participant did not meet study criteria (could determine from this NHS site)	1

3.2.4 REDCap vs Postal Completion Rates

Across both NHS sites, there were a total of 30 online surveys sent to participants via email, of which 15 were successfully completed and one participant completed the survey via QR code. This resulted in a completion rate of 50% of emailed surveys by the researcher. There were a total of 43 postal surveys sent, of which 16 were successfully completed, resulting in a 37.21% completion rate.

3.3 Comparison of Social Media and NHS Participant Demographics

Due to the study utilising two recruitment strategies of social media and NHS, further exploration was conducted to explore the differences in demographics between participants. Table 12 contains social media participants information, and Table 13 presents NHS participants information.

Social media participants were approximately 13 years younger on average than the NHS sample. Within the NHS sample, there was a more even split between males and females who took part compared to social media whereby the sample was predominantly females. Ethnicity was similar in both (majority White British). A much greater proportion were retired in the NHS sample. In terms of education comparisons, much of the NHS sample were educated to secondary school level, whereas the majority of the social media sample were university educated. Both samples were similar in that most were living with a partner, and a higher proportion had comorbid medical conditions.

Table 12.
Demographic Information for Social Media Participants

Characteristic	Option	Total *N*
Age (in years)	*M* = 58.91 (*SD* = 12.09)	
Ethnicity	White British	21
	Other White Background	2
Sex	Female	18
	Male	5
Occupation	Retired	4
	Administration	2
	Heath or Medical Related	5
	Role	1
	Artist	1
	Delivery Driver	1
	Recruiter	1
	Sales Assistant	1
	Stock Controller	1
	Systems Manager	1
	Teaching Assistant	5
	Not Provided (as was optional)	
Educational Level	Primary School	0
	Secondary School	3
	College	4
	University	15
	Prefer not to say	1
Annual Income (£)	18,000 or below	8
	19,000 to 35,000	4
	36,000 to 50,000	4
	50,000 or above	4
	Prefer not to say	3
Current Living Arrangements	Alone	2
	Cohabiting with Partner	15

Characteristic	Option	Total *N*
	Living with someone else (e.g., other family members such as children)	6
Presence of other medical conditions	No	3
	Yes	20
Rating for the fear of a future stroke or TIA occurring	Not fearful at all	0
	Slightly Fearful	7
	Moderately Fearful	5
	Quite a bit fearful	4
	Very fearful	7

Table 13.
Demographic Information for NHS participants (Sites One and Two)

Characteristic	Option	Total *N*
Age (in years)	*M = 71.75* (*SD* = 10.54)	
Ethnicity	White British	32
Sex	Female	14
	Male	18
Occupation	Retired	19
	Decontamination technician	1
	Exams Officer	1
	Field Technician	1
	Off sick	1
	Operations manager	1
	Painter and Decorator	1
	Site manager	1
	Yard Operative	1
	Not provided (question was optional)	5
Educational Level	Primary School	3
	Secondary School	19
	College	4
	University	4
	Prefer not to say	2
Annual Income (£)	18,000 or below	14
	19,000 to 35,000	5
	36,000 to 50,000	1
	50,000 or above	2
	Prefer not to say	10
Current Living Arrangements	Alone	5
	Cohabiting with Partner	26
	Living with someone else (e.g., other family members such as children)	1

Characteristic	Option	Total *N*
Presence of other medical conditions	No	9
	Yes	23
Rating for the fear of a future stroke or TIA occurring	Not fearful at all	4
	Slightly Fearful	15
	Moderately Fearful	6
	Quite a bit fearful	4
	Very fearful	3

3.4 Screening Data prior to Data Analysis

Tabachnick and Fidell (2007) provide guidance for researchers on how to screen data effectively before conducting any formal analysis. Screening data to attempt to resolve any issues is a fundamental step within the analysis process, as it protects the integrity of the statistical outputs from the analyses carried out.

Prior to formal data analysis, the dataset was checked for data entry errors as the SPSS data file was exported from REDCap. Therefore, the lead researcher (CW) checked the outputs, and ensured that the data had been exported in a format whereby analysis could be accurately executed. Three participants' complete datasets were compared between REDCap and SPSS to check that the items from the questionnaires and responses matched. Descriptive statistics were also examined to check the scores were in the expected ranges to help flag any errors.

The dataset was then screened for missing data, of which due to Redcap's functionality was kept to a minimum. REDCap exports the total complete dataset, including non-eligible participants and those who abandoned the survey before or after screening. The dataset was streamlined to only include eligible participants who consented and completed the study. In total, there were 215 participant records, of which 58 were successfully completed by participants. The dataset was also screened to check participant eligibility, of which two participants who completed the survey via post were deemed non-eligible from the study's inclusion criteria. One postal participant also withdrew their consent after sending their survey to the researchers. Therefore, three participants' data was removed. For the one participant with missing data on the Brief-COPE, their scores for approach and avoidant coping were not included

within analyses. Outliers were screened for, detected, and removed from analysis appropriately.

3.5 Assumptions of Multiple Linear Regression

Guidance from Field (2017) and Osborne and Waters (2002) was sought for guidance on screening data for MLR assumptions so the regression models could be accurately built and interpreted.

3.5.1 Distribution of Data

Data was visually inspected for normal distribution using histograms and normality curves for each predictor variable (age, avoidant coping, approach coping, posttraumatic cognitions and the fear of a future stroke). Histograms for each dependent variable (PTSD [PCL-S], anxiety [GAD-7] and depression [PHQ-8]) were also inspected. See Figures 3 to 10 for histograms with normality curves for each variable.

Visual inspection of histograms suggested that age, fear of a future stroke and approach coping had normal distributions. However, histograms for avoidant coping, and posttraumatic cognitions suggested positive skews. All dependent variables had positive skews, meaning the sample reported slightly fewer symptoms of PTSD, anxiety and depression than a normal distribution would expect.

Figure 3.
Histogram and Normality Curve for Age

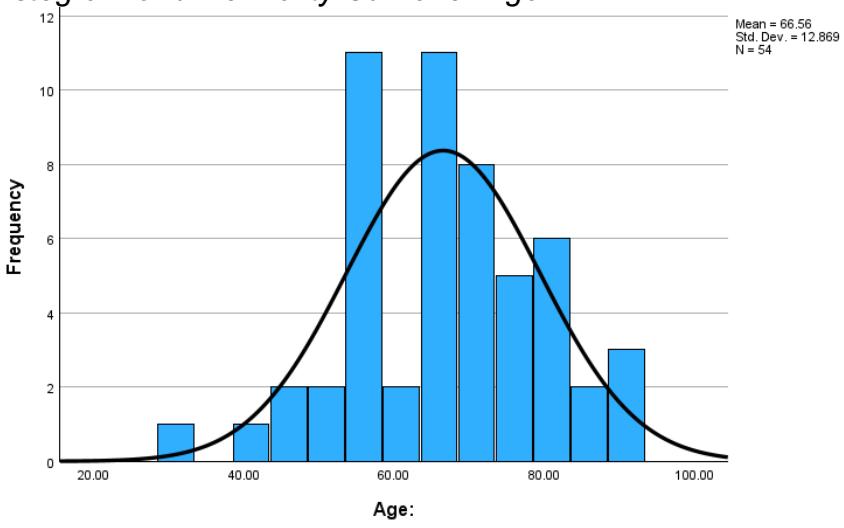


Figure 4.

Histogram and Normality Curve for the Fear of a Future Stroke

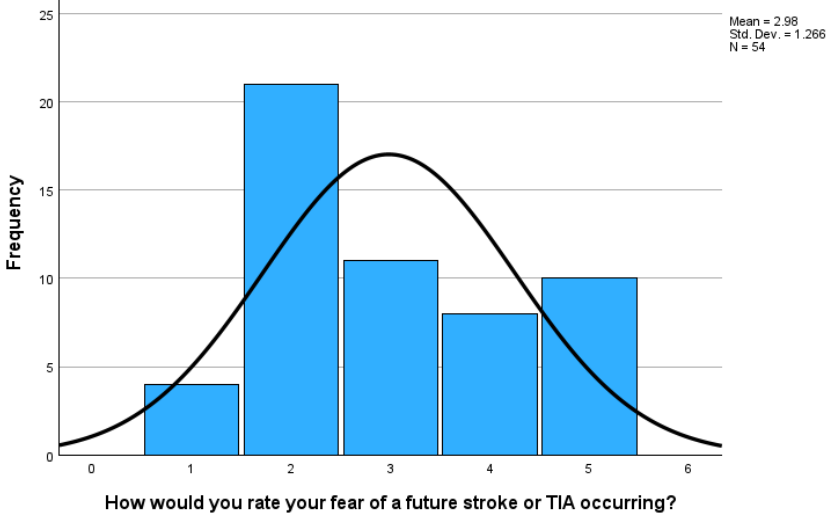


Figure 5.

Histogram and Normality Curve for Approach Coping

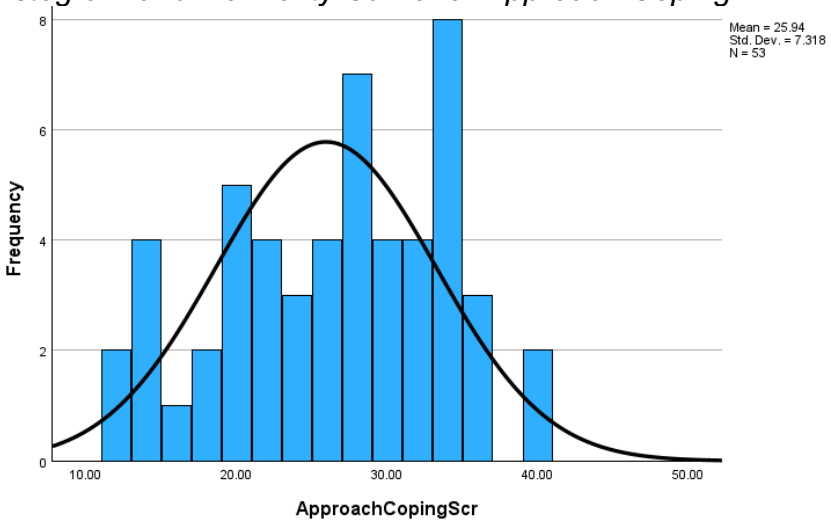


Figure 6.
Histogram and Normality Curve for Avoidant Coping

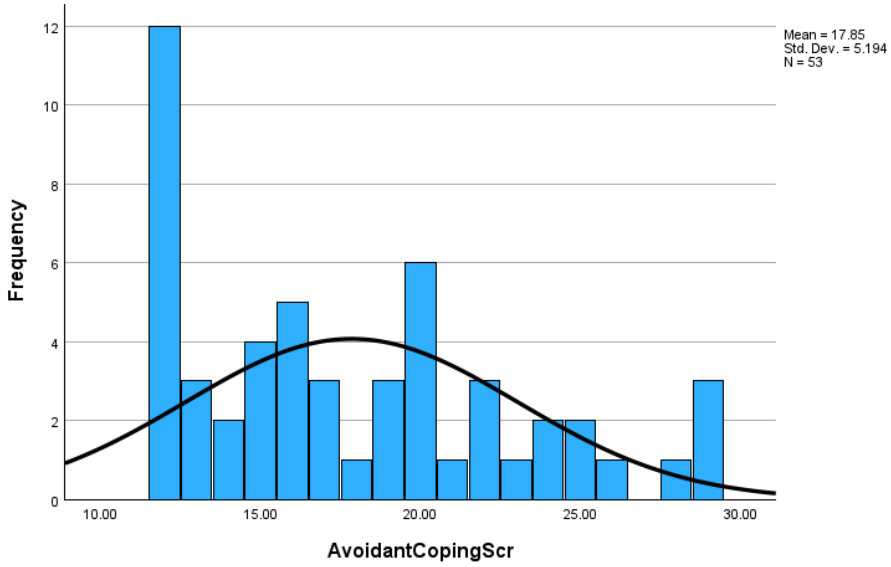


Figure 7.
Histogram and Normality Curve for Posttraumatic Cognitions

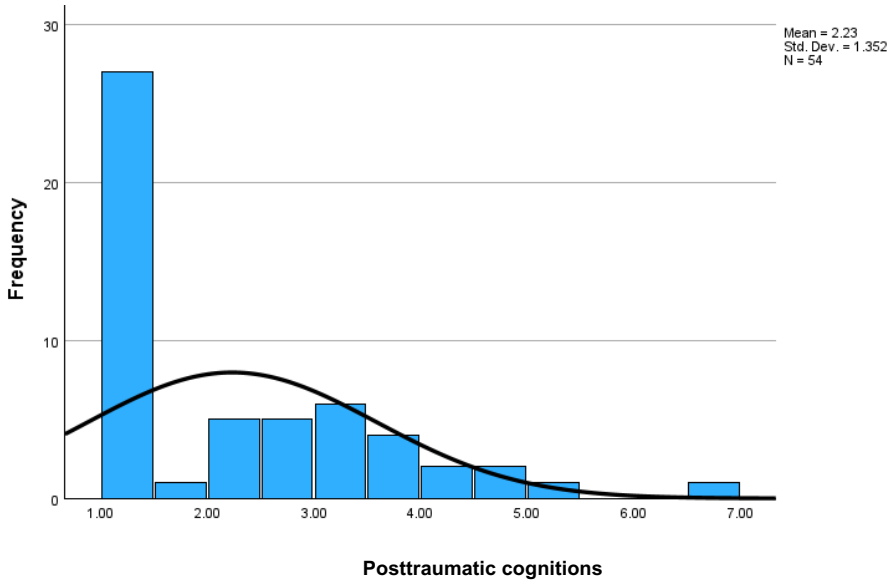


Figure 8.

Histogram and Normality Curve for PTSD

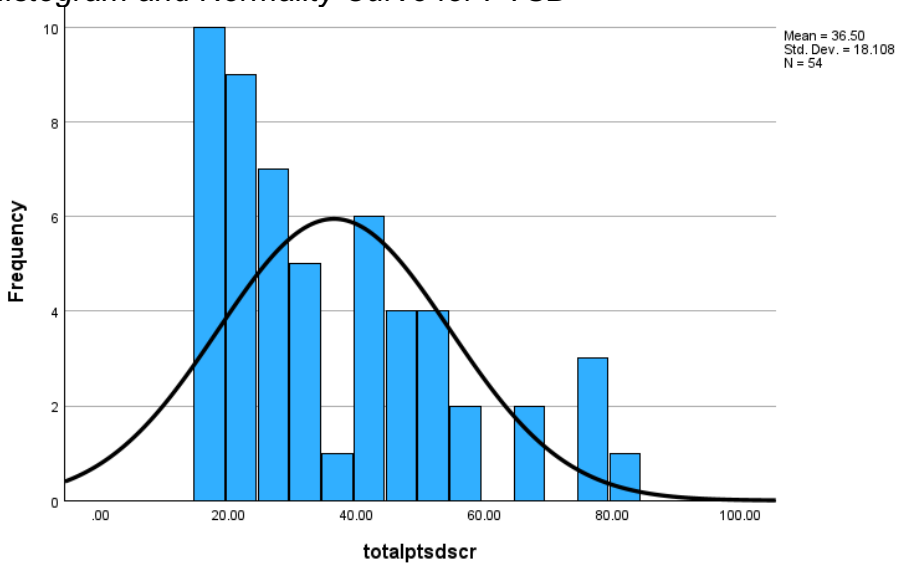


Figure 9.

Histogram and Normality Curve for Anxiety

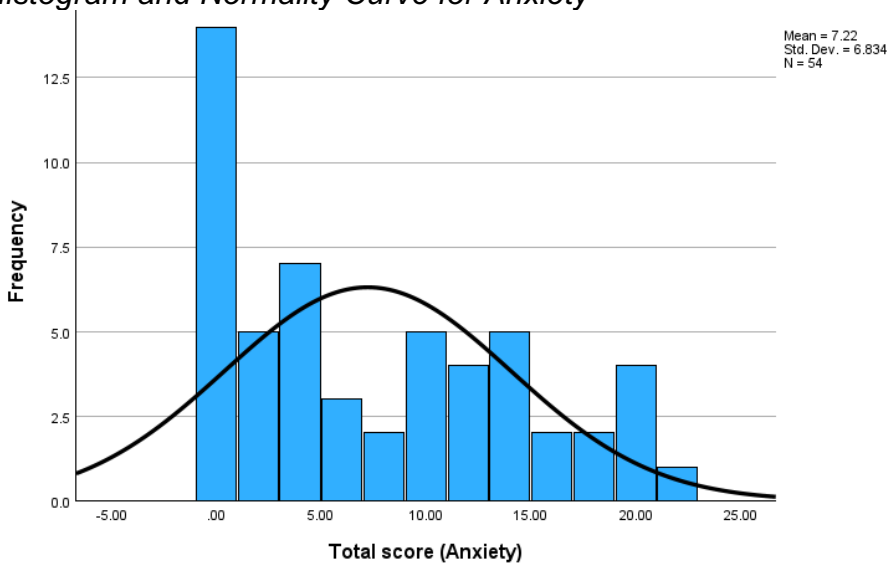
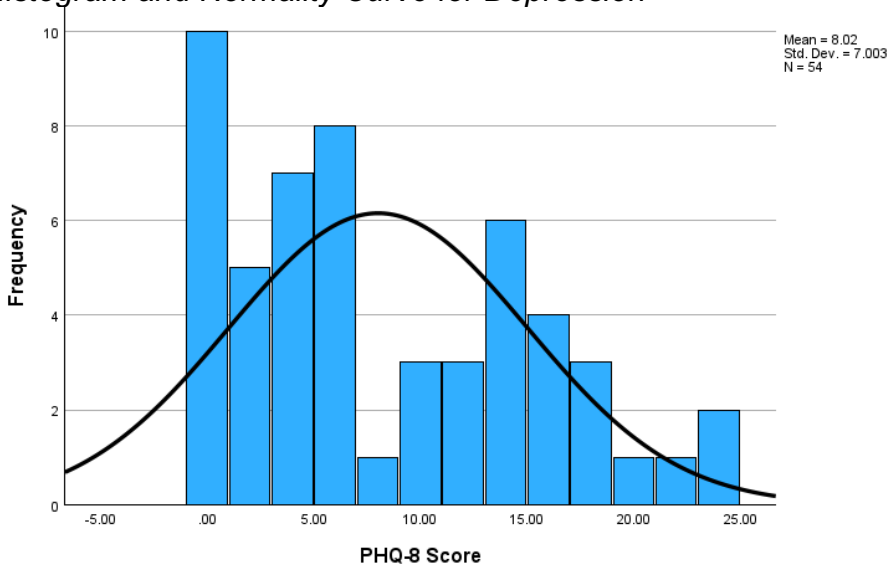


Figure 10.
Histogram and Normality Curve for Depression



Kolmogorov-Smirnov (K-S) and Shapiro-Wilk Tests allow for further statistical examinations for the distribution within data. K-S and Shapiro-Wilk tests compare the scores in the sample to a normally distributed set of scores with the same mean and SD (Field, 2017). Despite the histograms providing a clear indication of normality, further analysis was conducted as a precaution. See Table 14 for K-S and Shapiro-Wilk values for key study variables.

Table 14.
Kolmogorov-Smirnov (K-S) and Shapiro-Wilk Statistics for variables within the MLRs

	Kolmogorov-Smirnov		Shapiro-Wilk	
	Statistic	Sig.	Statistic	Sig.
Age	.07	.20	.99	.82
Fear of future stroke	.25	<.001*	.86	<.001*
Approach Coping (Brief-COPE)	.09	.20	.97	.18
Avoidant Coping (Brief-COPE)	.13	.03*	.91	<.001*
Posttraumatic cognitions (PTCI-9)	.23	.003*	.85	<.001*
PTSD (PCL-S)	.15	<.001*	.87	<.001*
Anxiety (GAD-7)	.16	.002*	.89	<.001*
Depression (PHQ-8)	.17	<.001*	.91	<.001*

Note. * p <0.05

The variables' age and approach coping were non-significant at the $p < .05$ level, indicating that the distribution of the sample was not significantly different from a normal distribution. However, PCL-S, GAD-7, PHQ-8, avoidant coping, fear of a future stroke and PTCI-9 score were all significant, meaning the distribution in the sample was significantly different to that of a normal distribution. These statistics were cohesive with the histogram and normality plots. It has been argued that the assumption of normality is not required for multiple regression to provide coefficients that are unbiased and consistent, presuming the other assumptions for MLR are met (Williams et al., 2013). It is also suggested that predictor variables do not need to meet the normality assumption within MLR (Dancey & Reidy, 2007). Therefore, it was deemed MLR remained a suitable analysis despite some of the predictor variables not being normally distributed.

3.5.2 Linearity

For MLR, the predictor variables should be related in a linear manner to the outcome/dependent variables (Osborne & Waters, 2002). If the relationship between the independent and dependent variable is not linear, it is suggested the results of the regression may under-estimate the true relationship. This could increase the chance of a Type II error for that specific predictor, or in multiple regression could increase the risk of a Type I error and overestimate other predictors that share the variance. One way of detecting whether a relationship is linear is through inspection of scatterplots, which was conducted for the current study. Scatterplots between variables supported the finding that all predictors had a linear relationship with the outcome variables, and therefore met the assumption of linearity for MLR (see Appendix T for outputs). Linearity was further confirmed with significant correlations between predictor and outcome variables. All variables (age, fear of future stroke/TIA, approach coping, avoidant coping and posttraumatic cognitions) were continuous variables, which is also a requirement for MLR (Field, 2017).

3.5.3 Outliers

Outliers can have a large influence on regression analysis and the outcomes reported. Outliers can be outliers of distance (which refer to data

points with large residuals) or outliers of influence (data points which can inappropriately influence the regression line). To check for outliers by distance, a Casewise Diagnostics table was examined which flagged one participant (participant 28) as an outlier as they had a large, standardised residual. To check for outliers by influence, figures for Cook's Distance and Centred Leverage Values were examined. For one participant (participant 28), the Cooks Distance and Leverage values were exceeded. Upon inspection of outliers, the same participant was flagging as an outlier by distance and influence (participant 28). This participant was therefore removed from the MLR analysis following a sensitivity analysis, as it was confirmed the outlier was having significant influence over the regression outputs.

3.5.4 Multicollinearity

An important assumption for MLR is to check that there is no multicollinearity between predictors in the model, which refers to when there are strong correlations between predictors (Field, 2017). It is important to check for MLRs that predictor variables are not strongly correlated, as it could suggest that the variables are measuring similar relationships, meaning it can be difficult to draw conclusions for individual predictors and their impact. Field (2017) recommends that multicollinearity can be assessed through reviewing Variance Inflation Factor (VIF) and tolerance statistics. VIF statistics above 10 and tolerance statistics below .1 are deemed problematic (Bowerman & O'Connell, 1990; Myers, 1990). In the current study, VIF figures for each variable were reviewed whereby no predictors had VIF values above 10 or tolerance values below .1 (VIF values ranged from 2.99 to 1.26, and the tolerance statistics ranged from .33 to .79), meaning the multicollinearity assumption was met for MLR.

3.5.5 Homoscedasticity

Homoscedasticity relates to the variance of errors being the same across all levels of the predictor variables. It is suggested that slight heteroscedasticity has little effect on the significance of the model, but when heteroscedasticity is prominent it can result in a distortion in findings and lead to a greater chance of a Type I error (Tabachnick & Fidell, 1996). To meet the homoscedasticity assumption, residuals should be equally distributed along the regression line. If

the residuals are not, it can suggest there is something else occurring surrounding the underlying distribution of the data, and linear regression may not be suitable. To check this assumption for the current study, residual plots were reviewed using scatterplots. For each variable, the scatterplots produced a clear cloud of residuals with no clear pattern, demonstrating the residuals were equally distributed in relation to the predicted value. Therefore, the data met the homoscedasticity assumption for MLR.

3.6 Sensitivity Analysis

As discussed in section 3.5.3, one participant was flagged as an outlier by both distance and influence. To examine the effect the participant was having within the MLRs, sensitivity analyses were conducted whereby regressions for each dependent variable were ran both including and excluding the outlier, and the coefficient outputs were reviewed. This was carried out as outliers can significantly impact the results of MLRs, and skew the coefficients in a manner whereby the results are no longer reliable (Wang, 2021).

3.6.1 PTSD

The MLR model with the outlier removed indicated that the predictors (age, fear of a future stroke, approach coping, avoidant coping and posttraumatic cognitions) explained 67.2% of the variance in PCL-S scores, with avoidant coping being the only significant predictor. When the outlier was included, the variance increased to 68.7%, with avoidant coping remaining the only significant predictor.

3.6.2 Anxiety

The MLR model with the outlier removed indicated that the predictors (age, fear of a future stroke, approach coping, avoidant coping, and posttraumatic cognitions) explained 73.5% of the variance in GAD-7 scores, with avoidant coping and posttraumatic cognitions being significant predictors. When the outlier was included, the variance remained 73.5%, however avoidant coping was the only significant predictor.

3.6.3 Depression

The MLR model with the outlier removed indicated that the predictors (age, approach coping, avoidant coping and posttraumatic cognitions) explained

69.2% of the variance in PHQ-8 scores, with avoidant coping being a significant predictor. When the outlier was included, the variance dropped to 67.9%, with avoidant coping remaining the only significant predictor.

From reviewing the outputs from the sensitivity analysis, it seemed the outlier was influencing the sample results, particularly for anxiety. The participants' individual results were reviewed to examine whether their scores made clinical sense, and whether they were representative of the overall population. It was deemed within the research team that participant 28 scored higher on the PTCI-9 questionnaire than other participants (reported more posttraumatic cognitions), and therefore did not appear to fit with the majority of the sample. Due to such doubts, it was decided participant 28 would be excluded from the MLRs due to their influence on the results, as bootstrapping assumes the sample is representative of the target population.

3.7 Sample size for MLR

The study reached a sample size of 55 participants included in the final data analysis, with a sample of 53 for the MLRs due to missing data. According to Field's (2017) guidance on 40 participants being sufficient for four to five predictors, the study therefore met the minimum sample size for the MLR to be viable. Additionally, as there were significant effects found within the MLRs, it signifies that there was enough power to detect effects, meaning that the study was sufficiently powered (Field, 2017).

3.8 Robust Regression and Bootstrapping

Field (2017) provides guidance relating to if there is doubt over whether the dataset meets all the required assumptions for MLR. As discussed, there were concerns over whether the data met the normality assumption, of which if the MLR was conducted without acknowledging this, it may have potentially invalidated significance tests, confidence intervals and the overall generalisation of the model (Field, 2017). To overcome this issue, bootstrapping can be utilised to generate confidence intervals and *p*-values. For the current study, bootstrapping with 95% bias corrected confidence intervals (BCa) was applied to each MLR. These bootstrapped confidence intervals and *p*-values mitigate

deviations from the assumptions of normality, and therefore give an accurate estimate of the population.

3.9 Normality of Residuals Post-Regression Check

Within a regression, the residuals should be approximately normally distributed with a mean around zero. However, if residuals are highly skewed then it could indicate the regression line does not fit the data well. To check the normality of residuals (heteroscedasticity check), histograms of residuals and P-P plots (determining whether residuals closely follow the line within the P-P plot) for each MLR were inspected. All histograms and P-P plots indicated all variables showed an approximate normal distribution of residuals (see Figures 11 to 13). This confirms that the outputs from the MLR can be interpreted to be valid, robust and allow for reliable and accurate conclusions to be drawn.

Figure 11.
Normality of Residuals Check for PTSD (Histogram and P-P plot)

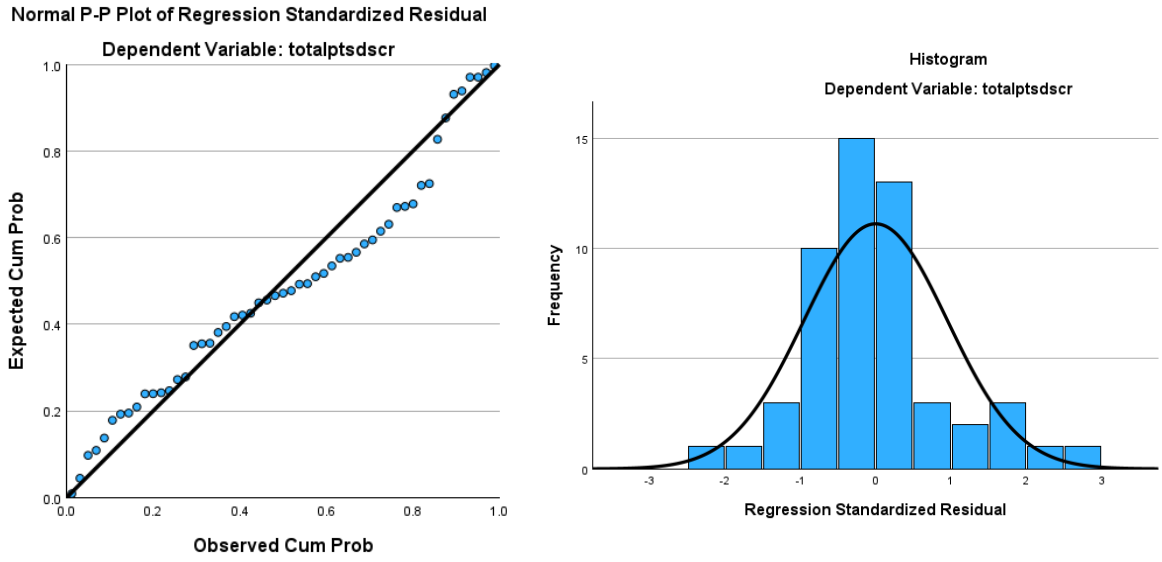


Figure 12.
Normality of Residuals Check for Anxiety (Histogram and P-P plot)

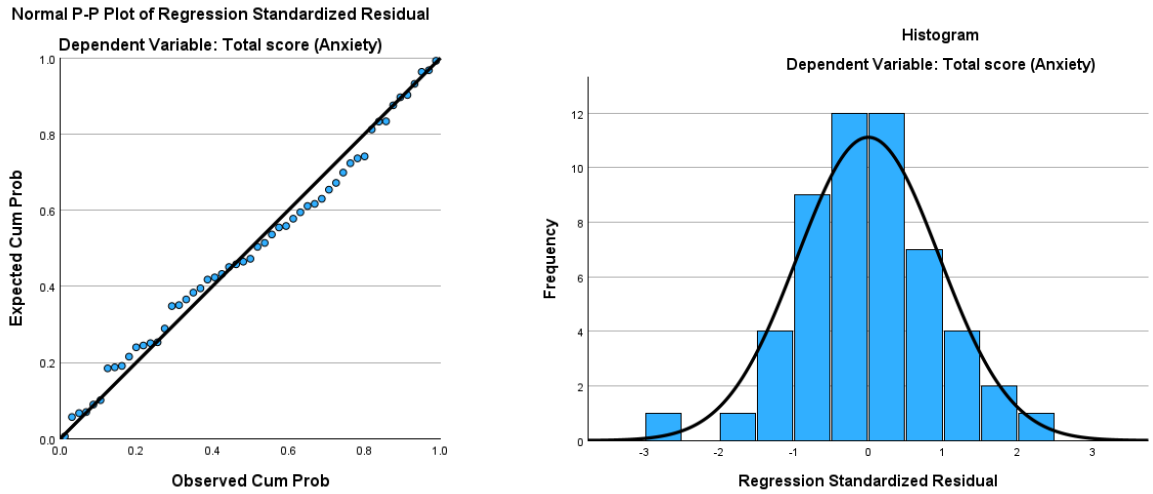
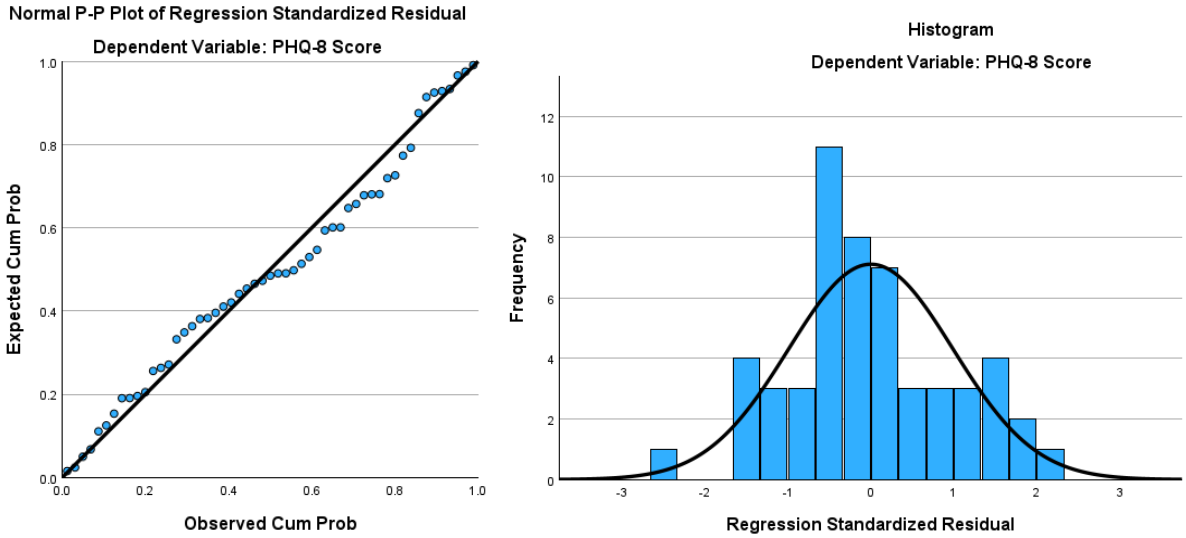


Figure 13.
Normality of Residuals Check for Depression (Histogram and P-P plot)



3.10 Selection of Non-parametric over Parametric Tests

Prior to conducting correlational analyses, data checks were conducted to determine whether MLR was an appropriate analysis method. Throughout the process, checks for normality and outliers were carried out which flagged concerns with normality of data for all variables but age and approach coping. Pearson's correlation is a parametric statistical test, a test whereby certain assumptions need to be met for the output to be reliable. Such assumptions include that the data needs to be interval or ratio level, both the independent

and dependent variables need to be normally distributed, alongside no extreme outliers. As the dataset did not meet such assumptions, a non-parametric alternative of Spearman's Rho was selected instead as the test is subject to less stringent assumptions than Pearson's (Field, 2017).

Similarly, for the between-groups analyses, the dataset had already been screened to determine MLR assumptions. Independent *t*-tests are parametric statistics, and have similar assumptions to Pearson's parametric test, including normal distributions for both groups of data. As the data was not normally distributed, non-parametric alternatives of Mann-Whitney and Kruskal-Wallis tests were conducted.

3.11 Further exploration of NHS Participant's Psychological Outcomes

Through examining descriptive statistics, the social media participants were on average thirteen years younger than those recruited via the NHS. As discussed, this finding may have been the result of social media participants self-selecting to complete the study due to already experiencing a greater severity of psychological distress. Additionally, the recruitment method of using social media may have consequently attracted a younger demographic of participants, in addition to self-selection with a greater degree of psychological distress. With this consideration, there is a potential confounding variable whereby the outcome that younger ages related to greater psychological distress may have been driven by the social media recruitment strategy, rather than the true effect of age alone.

Despite a mixed recruitment approach aiming to mitigate such effects and provide a more overall generalisable sample, further exploratory Spearman's correlational analysis was conducted to consider the impact of age and recruitment strategies on psychological outcomes. Separate correlational analysis on the NHS sample was carried out and compared against the outcomes reported for the overall sample. As observed between Tables 5 and 15, the outcomes for the NHS participants are markedly similar to those reported for the sample overall. The strength of all correlations was comparable for both NHS and the overall sample, however the outcome for PTSD and age was significant at the .05 *alpha* level, rather than .002 if a Bonferroni correction

was applied. The correlation between age and approach coping was also significant for the NHS sample, but not the overall sample. Additionally, the correlation between post-traumatic cognitions and avoidant coping was significant at the .05 level, which was not detected in the overall sample results. See Table 15 for correlation outputs. Importantly, these findings should be interpreted with caution as the overall number of statistical analyses has increased. This therefore raises the risk of Type I errors, and extreme cases will be more influential on the outputs.

Table 15.
NHS Correlation Outputs

	Age	Fear of future stroke	Avoidant Coping (Brief COPE)	Approach Coping (Brief COPE)	Posttraumatic Cognitions (PTCI-9)	Anxiety (GAD-7)	Depression (PHQ-8)
PTSD (PCL-S)	r_s (30) = -.49, p = .005**	r_s (30) = .56, p <.001**	r_s (29) = .82, p <.001**	r_s (29) = .65, p <.001**	r_s (30) = .75, p <.001**	r_s (30) = .92, p <.001**	r_s (30) = .92, p <.001**
Anxiety (GAD-7)	r_s (30) = -.56, p <.001**	r_s (30) = .59, p <.001**	r_s (29) = .88, p <.001**	r_s (29) = .69, p <.001**	r_s (30) = .74, p <.001**	-	r_s (30) = .94, p <.001**
Depression (PHQ-8)	r_s (30) = -.54, p <.001**	r_s (30) = .50, p <.003*	r_s (29) = .87, p <.001*	r_s (29) = .68, p <.001*	r_s (30) = .75, p <.001*	-	-
Avoidant Coping (Brief COPE)	r_s (29) = -.51, p <.004*	-	-	-	r_s (29) = .70, p <.001**	-	-
Approach Coping (Brief COPE)	r_s (29) = -.47, p = .007*	-	-	-	r_s (29) = .37, p = .04*	-	-

Note. r_s = Spearman's Rho; * Significant at p = .05 alpha level; **Significant at p = .002 with a Bonferroni correction applied.

4. Extended Discussion

4.1 The impact of Bonferroni Corrections

Due to the number of correlations and comparisons made within the analyses, Bonferroni Corrections were applied in an attempt to mitigate against Type I errors (Field, 2017). However, the downside of using this conservative approach in exploratory research alike to our study is that applying Bonferroni Corrections and using a more stringent *alpha* value can result in potential effects being missed (a Type II error) (Field, 2017). By exploring whether any of the correlations or group comparisons would have been significant if Bonferroni Corrections were not applied, it may signal relationships which should be considered for future TIA research.

For the correlational analyses, an *alpha* value of .002 was used. If an *alpha* value of .05 was used, a positive moderate correlation would have been significant between approach coping and posttraumatic cognitions. No other correlations would have been impacted. This suggests that further exploration into the relationship between approach coping and posttraumatic cognitions may highlight an additional relationship that was not detected in our study.

For the between-group analyses, an *alpha* value of .003 was used. If an *alpha* value of .05 was used, more differences would have been observed between social media and NHS participants. There would have been significant differences in GAD-7 scores, approach coping, avoidant coping, and the fear of a future stroke. These outcomes signify that there were perhaps more differences in how those recruited through different methods responded and coped with their TIA than it seemed with the application of Bonferroni Correction. However, it was decided that the application of Bonferroni Corrections would increase the robustness and validity of outcomes as many comparisons were being made. These differences could be explored further in future research, to determine why those within NHS settings respond differently to those on social media.

4.2 No impact of Living Arrangements or Gender

Interestingly, there were no statistically significant differences in psychological outcomes between those living alone, cohabiting with a partner, or living with others (e.g., family members). Within the limited research base, within existing stroke, TIA and physical health studies, the level of social support and living arrangements have been found to have an impact on outcomes. For example, it was found that people post-TIA who had less social support were more likely to develop PTSD (Grosse-Holz et al., 2020), and low social support was associated with post-stroke depression (Taylor-Piliae et al., 2013; White et al., 2014). The research on whether marriage impacted post-stroke PTSD was mixed, as a systematic review could not draw firm conclusions (Tang et al., 2022). From cardiac patient research, it was found that living alone was an important risk factor for depression (Murphy et al., 2020), loneliness was a significant factor in those with congenital heart disease (Kovacs et al., 2009), and depression was predicted by living without a partner in congestive heart failure patients (Zahid et al., 2018). Studies from other physical health conditions suggest that the impact of living alone or loneliness may have translated to outcomes from our study, however this was not the case. This could be due to the fact that physical health symptoms for TIAs are transient, and often do not leave any long-lasting physical health issues like stroke or congestive heart failure (NHS UK, 2023). Therefore, this may explain why living alone had no impact on outcomes, as participants were not relying on others to assist as much with mobility or doing certain tasks which stroke patients may struggle with due to longer-lasting physical impairments (Nguyen et al., 2024). However, it is important to recognise that living alone, cohabiting with a partner, or living with others is not directly the same or comparable to perceived social support. For example, it may be that those living alone may have been receiving support from elsewhere (outside of the home) and therefore could explain the lack of significance in the results.

There were also no significant differences in psychological outcomes between males and females. Alike to the living arrangements literature, this is interesting as research into physical health outcomes often concludes that there are gender differences present. Following a stroke, studies have suggested that

females have higher levels of post-stroke PTSD (Nguyen et al., 2025; Tang et al., 2022) and are more likely to experience anxiety (Broomfield et al., 2014) and depression (Almhdawi et al., 2021). Within the current study's final sample, there was a fairly even proportion of males and females, and therefore opportunity for gender differences to be observed. However, like the living arrangement outcomes, perhaps the differences in the temporary nature of a TIA suggests that certain outcomes from physical health studies whereby physical impairments last for a longer duration are not generalisable to TIA patients.

4.3 Prevalence of PTSD compared to TIA Literature

The current study found that 43.6% of participants experienced PTSD within three-months of their first TIA diagnosis. Interestingly, this indicative percentage is higher when compared to the existing TIA literature (Webb et al., 2023). As a comparison, an observational cohort study which included 131 TIA participants concluded that 4.6% of the sample met the PTSD threshold within 12 months (Ben Assayag et al., 2022). This appears to be much lower than the PTSD indicated in our study, however it was 12-months after ictus opposed to three-months in the current study. Another study comprising of 84 TIA participants found that 8.3% of the sample had probable PTSD after 12-months (Utz et al., 2019), which is almost double Ben Assayag et al.'s (2022) finding, however still lower than ours at 43.6%. Interestingly, a cross-sectional study which investigated 18 TIA participants between three-months to five years after the TIA occurred found that 16.7% met the PTSD threshold (Dollenberg et al., 2021). The fact this study had such a wide inclusion parameter of time since the TIA occurred made it difficult to determine where their findings fit in comparison to our study, and the existing TIA PTSD literature base.

Few studies have used the same timescale of three-months as was used in the current study. Kiphuth et al.'s (2014) study of 108 TIA participants found that 29.6% met the PTSD threshold after three-months. Similarly, Grosse-Holz et al. (2020) studied 61 TIA participants and found 24.6% met the PTSD threshold after three-months. These findings are more in line with our results, however 43.6% remains substantially higher than what is observed in other studies. This could potentially be explained by the fact that much of the other

research has been conducted in European countries, whereby the healthcare and TIA pathways may differ from a UK sample. Also, our study used a dual recruitment approach, whereby other TIA research has consistently recruited from healthcare settings or used data from larger scale stroke studies. The fact that our study has exclusively examined TIA participants within a set time frame using different recruitment approaches highlights that perhaps participants who may be struggling with PTSD symptoms are being missed in other studies due to a single recruitment approach. Interestingly, a study which examined outcomes after five days of the TIA found that 6% of the sample (*N* = 32) met the PTSD threshold, which is low considering it was so soon after diagnosis (Müller et al., 2021).

From the limited evidence base, it appears that the longer the duration since the TIA occurred, the lower the prevalence of PTSD symptoms appears. However, this is not always the case, as a study by Müller et al. (2021) found that only five days post-diagnosis the prevalence rates were lower compared to a study exploring prevalence 12-months later, whereby levels of PTSD were expected to have reduced (Utz et al., 2019). The current study suggests that when TIA participants are studied individually over a fixed time frame of up to three-months following a first diagnosis and are recruited via both social media and the NHS, PTSD symptoms may be more prevalent than the existing literature indicates. Previous studies seem to lack consistency in the time frames from when the participants TIA occurred and assessment of symptoms, whether they are combined stroke studies, and how PTSD is measured (Webb et al., 2023). For example, the current study used the PCL-S self-report measure, whereas other studies such as Dollenberg et al. (2021) have used 'gold-standard' approaches to diagnose PTSD, such as The Clinically Administered PTSD scale (Weathers et al., 2013). Other studies, such as Müller et al. (2021), have used much shorter and brief PTSD scales within stroke and TIA research such as the primary care level PTSD screening scale. There is disparity in the level of detail that certain measures use to explore symptoms and whether they can diagnose PTSD. This can make generalising results for PTSD post-TIA challenging. The results of this study can raise awareness of

this issue and propose further explorations into PTSD following a TIA is considered in the future.

4.4 Prevalence of Mood Problems compared to TIA and Stroke Literature

Findings from this study showed that 36.4% of participants reported symptoms of anxiety, and 40% reported symptoms of depression. Such results are comparable with those found in the existing TIA literature (Chun et al., 2018; Moran et al., 2014); however, minor stroke is often included in such prevalence rates which can make comparisons challenging. A systematic review of psychological outcomes after a TIA and minor stroke found that depression rates were reported to be between six to 42% across studies after six to 198 weeks after the cerebrovascular event (Moran et al., 2014). Depression rates observed in the current study are in line with the higher prevalence rate reported by Moran et al. (2014), however their timeframe of up to 198 weeks post-TIA is substantially wider than the three-month window used in this study. Therefore, the range of six to 42% may be explained by the large timeframe that symptoms were assessed post-TIA, whereby the current study assessed outcomes from one-week up to three months, potentially explaining the higher indication of depression symptoms. Similarly, a study by Carnes-Vendrell et al. (2019) which combined diagnoses of TIA and minor stroke reported 35.6% of participants had indicative depression 10-days after their initial stroke symptoms, and depression rates reduced to 11.42% after one-year. Carnes-Vendrell et al.'s (2019) study indicates depression rates may be similar to those observed in the current study soon after the event, which may reduce over time. However, due to the cross-sectional design of the current study, it is difficult to infer how such outcomes can manifest over time. For anxiety, one study observed anxiety in 52% of a TIA sample within two-weeks after a first time TIA diagnosis, which is more than reported in our study (Brittle, 2012). Interestingly, a study found that 24% of a sample of 49 participants reported anxiety 12-months after a minor stroke (Bruggimann et al., 2006). Kellett et al.'s (2014) study (which again combined TIA and minor stroke) found that 28% of the sample reported symptoms of depression, and 31% reported anxiety within six weeks after the event occurred. Much of the mood literature has combined TIA

and minor stroke together, which makes comparing findings to our TIA only study with a narrow timeframe difficult, similar to the PTSD outcomes.

A study of TIA participants found that 19.4% reported anxiety, and 9.3% for depression three-months post-diagnosis (Kiphuth et al., 2014). It is noted that their prevalence rates were lower than those reported in the current study for a similar timeframe after diagnosis. Kiphuth et al.'s (2014) sample included a higher number of participants (*N* = 108) but when compared with the sample recruited here, it appears that there are similarities in terms of demographics such as mean age and gender split. Their study recruited people who were admitted to a stroke unit within a hospital setting (compared to TIA clinics in our study), determined an ABCD2 score (estimates the risk of a future stroke) and conducted brain scans on the sample to ensure they had not had a mild stroke. Due to resources, such precautions were unable to be conducted by researchers in the current study. Kiphuth et al. (2014) only used email to send questionnaires to participants, whereas various methods including mail, QR and post were used in the current study. They also screened for disability and excluded anybody who met the threshold for a suspected disability due to their TIA occurring, which was not carried out in the current study. It appears that the screening and overall scale of Kiphuth et al.'s (2014) study was larger than our study.

This may explain why Kiphuth et al. (2014) observed a lower prevalence of anxiety and depression due to the very stringent criteria that was used in order to be included in the study (103 participants were excluded for analysis), compared to four to five overall in our study. Using stringent criteria for future TIA studies is important, however it is imperative the study and screening method aligns with the researcher's resource levels (e.g., if no capacity to conduct brain scans, utilise TIA clinics to determine diagnosis instead, as was conducted in the current study).

The fact that there are contrasting findings in the literature provides evidence that experiencing a TIA can result in varied outcomes given the demographics, location, service and recruitment approach. It also highlights the benefits of exploring different presentations (stroke, minor stroke and TIA)

separately, as it results in clearer more concrete conclusions to inform the future of services, and individual diagnostic pathways.

4.5 Age and Younger Strokes and TIAs

Throughout the correlations that were conducted, it was found that age had significant strong negative correlations with PTSD, anxiety and depression. Such results indicate that younger individuals have higher instances of psychological problems following a TIA. These outcomes align with studies which have explored the influence of age in stroke and TIA participants. For example, research has found that younger people were more at risk of PTSD following a stroke or TIA (Grosse-Holz et al., 2020; Kiphuth et al., 2014), and that old age was protective against PTSD following a stroke (Garton et al., 2017). This is also the case in the literature base for anxiety (Chun et al., 2018; Kapoor et al., 2019) and depression (Teoh et al., 2009).

Overall, studies are not consistent with what constitutes a 'younger person'. A cut-off of 48 years for women and 53 for men has been proposed (Takeshita et al., 2021), whereas another study recommended a cut-off of 50 years old for both (Siriratnam et al., 2020). The reports that younger people have poorer outcomes is interesting, as stroke outcomes in younger people are generally more favourable than older patients (in terms of functional outcomes and lower short-term mortality) (Ekker et al., 2018; Maaijwee et al., 2014). Although, it is important to consider that a TIA and stroke are different diagnoses, of which the physical symptoms of TIA are short-term in nature in comparison to a stroke (NHS, 2023). Younger stroke patients might in fact face a higher instance of psychological concerns about their future and risk of another cerebrovascular event occurring again in their 'active' period of life, namely in a family, societal and work sense (Maaijwee et al., 2014). Studies which have explored the longitudinal impacts of strokes on younger people have highlighted a variety of problems they face, including: fatigue (Maaijwee et al., 2014); cognitive impairments (Pinter et al., 2019); fear of another stroke occurring (Yoon et al., 2021); anxiety and depression (Kapoor et al., 2019; Maaijwee et al., 2016); loss of work or employment (Aarnio et al., 2018), sexual dysfunctions (Bugnicourt et al., 2014); familial conflicts; social isolation; a decrease in their life role; mobility concerns; self-esteem issues and impaired

self-efficacy (Gurková et al., 2023). Prior to the age of 50, people may face different pressures, in terms of family roles, occupation and expectations, which could explain that despite often having a better prognosis than older people, psychologically they struggle more. Supporting this notion, a study found that 90-days following a stroke, midlife stroke survivors faced disability and did not experience better quality of life, despite having better functional outcomes compared to older people (Lisabeth et al., 2018). Overall, there has been more research exploring the relationship between age and stroke than for TIA, however there are some similarities that can be drawn.

A recent scoping review of nine studies concluded that those which have compared health related quality of life between younger and older stroke patients have so far resulted in inconsistent findings (Gurková et al., 2023). The studies included have employed different outcome measures, and the follow-up timescales have varied which could explain the inconsistencies. Disease-specific health related quality of life between young and old patients was consistently reported to be higher 12-months after their initial stroke in younger participants, and that younger people reported a higher level of self-care and functional outcomes (Lannin et al., 2017; Lisabeth et al., 2018). However, post-stroke depression, anxiety and fatigue have been shown to be relevant factors which continue to lower health related quality of life in younger people (Gurková et al., 2023).

Importantly, the research base for younger people experiencing a TIA compared to older people is sparse, with age being included in study variables however has not been the focus of research. In future TIA studies, age could be considered in combination with other variables, rather than in isolation. TIAs are different to strokes due to the transient nature, and most people following a TIA do not experience long-lasting changes to their physical health (NHS UK, 2023). Therefore, despite some of our findings being consistent with those seen in stroke, results cannot be generalised completely due to the differences in physical implications between a TIA, stroke and other physical health diagnoses.

4.6 Differences between Social Media and NHS participants

4.6.1 Psychological Outcomes

There were significant differences in PTSD and depression between those recruited through social media and NHS TIA clinics. Through comparing the mean scores, it appears that social media participants scored significantly higher and within clinical ranges for PTSD and depression, whereby NHS participants' mean scores did not meet the clinical cut-offs. This is an interesting finding, as it signals that overall, those recruited through social media are scoring higher for psychological distress than those from the NHS, and if the overall sample was NHS only, it may have changed the outcomes of the study. It may indicate that social media participants' responses might have potentially shifted the outcomes of the study to conclude that there are greater degrees of psychological distress present following a TIA than is reported within studies that solely recruit through healthcare settings. However, the use of a dual recruitment approach was used in an attempt to recruit a broader sample and capture a range of responses that could be generalisable to different populations.

4.6.2 Demographics

Participant demographics were compared to explore if there were any differences between those recruited through social media and those through the NHS. Social media participants were significantly younger (approximately 13 years) than NHS participants. From examining other demographics, the age difference perhaps explains that a much higher proportion of NHS participants were retired than through social media, as more of the participants would have been at retirement age. Interestingly, a higher proportion of participants in both groups reported an annual income of £18k or below, however social media had more of an even spread of responses, whereas the majority of NHS participants were in that category. Again, this could be explained through a greater proportion of NHS participants being retired. The presence of other medical conditions was similar between social media and NHS participants (majority reported they had other medical conditions), and the most common living arrangement across both was cohabiting with a partner. Education was different, as the majority of the social media participants were educated to

university level, whereas most of NHS participants were educated to secondary school level. It appears that other than age and education levels, the demographics between social media and NHS participants were similar. This strengthens the results of the study, as it provides an overview of the impact of a TIA from different samples, however demographically they are similar, and results can be generalised to both general and healthcare settings.

Studies which have explored social media use in older people have indicated that age was negatively associated with the likelihood of social media use (Hutto et al., 2015). Some of the reasons that older people (in this study age 50 and above) provided for not using social media were privacy and security concerns, the complexity of social networking sites and technology, and an overall lack of interest or access to technology. It seems that many social media networking sites are targeted at younger people, those who are single, or those with certain political or religious affiliations (Hutto et al., 2015). A study explored the reasons why older people may be motivated to use social media, which concluded that the main reason for using social media was to stay connected with family (51.1%), staying in touch with friends (22.7%), acquaintances (11.6%), colleagues (10.7%) or connecting with people they have not met (3.9%). However, some research has found that the number of older adults who use social media has dramatically increased (Zickuhr & Madden, 2012). Within our study, we advertised the study through specific stroke and TIA groups via Facebook. If research indicates that older people mainly use social media to connect with family, there is a likelihood they will not be members of the Facebook groups we advertised in. This could perhaps explain the age difference between both social media and NHS participants.

A scoping review of 30 studies which contrasted whether social media or traditional methods was more effective for participant recruitment concluded that 12 studies found social media to be more effective (Topolovec-Vranic & Natarajan, 2016). It was suggested that social media was effective in recruiting hard-to-reach populations, and for observational studies. Conversely, only two studies found that participant demographics were comparable between social media and traditional methods, whereas 12 did not. Across certain studies within the review, it was observed that social media recruited different levels of

ethnic diversity, younger participants, and higher educational levels compared to traditional methods. This is important to consider, and further emphasises the value of a dual recruitment approach as was used within our study.

4.7 Results Mapping onto Models of PTSD and Coping

The results from the correlational analyses found that psychological outcomes, avoidant coping and posttraumatic cognitions were significantly positively related. Similarly, the final MLR models found that avoidant coping was a significant predictor of PTSD, anxiety and depression, alongside posttraumatic cognitions being a significant predictor for anxiety. Importantly, not everyone in the sample experienced PTSD or mood problems. Results indicated that those who adopted more avoidant coping strategies and higher incidences of posttraumatic cognitions had poorer outcomes, and higher rates of psychological distress.

These results support Ehlers and Clark's (2000) model of PTSD, which depicts that individuals can have idiosyncratic appraisals of the event or its sequelae which result in the perception of current threat. These can be internal, for example items on the PTCI-9 relate to the perception that the event (the TIA) happened because of the way they acted, that someone else would not have gotten into their situation, that there was something about them that made the event (TIA) happen, and that they no longer have a future or have anything good happen to them. Alternatively, cognitions can be external, for example PTCI-9 items related to other people cannot be trusted, that they cannot rely on others, or they are not what they seem. Ehlers and Clark's (2000) model indicates that if an individual has cognitions like these following the traumatic event, it can result in PTSD symptoms persisting. Emotional processing theory also suggests that the presence of posttraumatic cognitions can disrupt trauma processing occurring correctly (Foa & Rothbaum, 2001). Therefore, the fact that posttraumatic cognitions significantly correlated with all outcomes and was a significant predictor of anxiety highlights its importance in the development of psychological distress following a TIA. These results align with studies exploring posttraumatic cognitions and appraisals in stroke research (Tang et al., 2022), alongside a study whereby negative cognitions about the self and world positively correlated with PTSD severity after three-months (Field et al., 2008).

Alongside cognitions, Ehlers and Clark (2000) also highlight the importance of maladaptive behavioural strategies people employ in an attempt to control the sense of current threat that they experience through their cognitions of the event. Ehlers and Clark (2000) termed maladaptive strategies to include thought suppression, avoidance, safety behaviours and rumination. Specific items on the Brief-COPE questionnaire related to avoidant (often termed maladaptive) coping strategies. For example, items related to themes of people trying to say the event [their TIA] is not real and refusing to believe it had happened, using alcohol or substances to get through it, giving up attempting to deal with it [TIA], turning to work or activities to take their mind off it, or blaming themselves for it happening. The fact that participants in our study who scored higher on avoidant coping had poorer outcomes, and avoidant coping was a significant predictor for all outcomes supports the model, and how avoidant coping can exacerbate and maintain PTSD symptomatology.

Study findings also support Lazarus and Folkman's (1984) Transactional Model of Stress and Coping, which states that it is the initial appraisal process of a stressful event which determines which coping strategies an individual will employ in an attempt to cope. Results showed that avoidant coping and posttraumatic cognitions had a strong positive relationship, which supports the model's notion that if more posttraumatic cognitions are present, the individual then adopts greater avoidant coping strategies. The fact there was no significant correlation between approach coping and cognitions suggests that it is the avoidant coping strategies in particular that maintain PTSD and mood problems following a TIA. Additionally, the group comparison results highlighted that participants who met the PTSD cut-off had significantly higher levels of avoidant coping and posttraumatic cognitions than those who did not meet the PTSD cut-off. This further supports the notion that both models from Ehlers and Clark (2000) and Lazarus and Folkman (1984) put forward. Furthermore, our findings align with the coping TIA literature, which has found that TIA participants who adopted defensive, maladaptive coping strategies were at a greater risk of developing PTSD (Ben Assayag et al., 2022; Dollenberg et al., 2021; Kiphuth et al., 2014).

4.8 Strengths and Limitations

4.8.1 Recruitment Strategy

An incentive, such as a voucher or entry into a prize draw was not offered to encourage participants to engage in the study. Studies will often pay or offer an incentive for participants to take part in studies to aid recruitment. Within randomised control trials (RCTs), it was found that a lack of reward or recognition were some of the identified factors which have resulted in poor participation rates within RCTs (Ross et al., 1999). Furthermore, a review has recommended that monetary incentives are an effective strategy for recruiting to studies (Treweek et al., 2013), and that they are ethically acceptable and can be termed as a recognition of a participant's contribution, time and effort. On the other hand, other studies have found that using financial incentives have not statistically improved response rates (Arundel et al., 2020).

A recent systematic review concluded that there was a significant increase in the number of consents and response rates when monetary incentives were used (Abdelazeem et al., 2022). However, this was for RCTs which are often more time consuming and strenuous than cross-sectional designs, which was used in the current study. Despite there being positives using incentives to gain greater participation or attrition, the literature has noted some drawbacks. These include that using monetary incentives can result in more participants from lower socioeconomic backgrounds being recruited, and those participants might rely on incentives as a source of direct income, which may influence their decision on whether to engage in the study (Resnik, 2015). Conversely, this could also increase participation rates of sub-groups that are often under-represented in studies and surveys which could be viewed as a positive effect (Nicolaas et al., 2019). It is suggested that incentives may change how a participant responds or change the demographics of the study which could impact the study outcomes and generalisability overall. Research has indicated that incentives tend to have larger effects in postal surveys (Singer et al., 1999), and that prize draws can help to improve responses and reduce drop-out on web-surveys (Tuten et al., 2004).

Due to the research indicating that incentives can aid recruitment for web and postal surveys, the use of incentives (prize draws and £5 gift vouchers)

were discussed during the study development phase; however, it was deemed unfeasible due to the designated research budget available. It was also discussed during the development of the online survey with the senior data manager, that often incentives can attract fraudulent participants due to potential financial gain, or prospects of winning a prize (Kumarasamy et al., 2024). From the results of studies which have explored incentives, it may have been that using an incentive could have boosted recruitment significantly to achieve beyond the minimum target sample. However, the strategy used in the current study was effective in recruiting to the target sample without incentives. This indicates that participants in the current study were motivated by more than incentives or financial gain, for example personal relevance, interest in the topic area or a desire to contribute to research. This has resulted in a higher level of data quality, as it engaged participants who were more likely to respond thoughtfully and thoroughly in the survey. It is therefore a strength that the study achieved a substantial sample size and power without the use of incentives, and signals both reliability and validity of responses.

4.8.2 NHS Participant Demographics compared to ONS Statistics

The NHS participant demographics are relatively similar compared to what was reported as the local demographics according to the Office for National Statistics data (ONS, 2023). As the ONS data is for adults, and the majority of the sample were above the age of 65 years, employment data could not accurately be compared. The mean average disposable income according to ONS data across both site one and two was approximately £17k, whereby the majority of the participants in our study reported an annual income of 18k or below, which corresponded with the local statistics. Similarly, most of NHS participants (59.38%) were educated to secondary school level and 9.38% to primary school level, whereby ONS statistics suggest that site localities have a mean of 11.15% of the population have no qualifications. It appeared on certain demographics that the NHS participants' demographics aligned with the ONS data available.

The majority of the sample were recruited from site one (*N*=30). According to the ONS (2021) census statistics, the ethnic diversity for where site one resides is different from the diversity observed in the final sample. The

NHS sample in our study were all White British, however the local data suggests that 60.6% of the population are White. Therefore, it was expected that a greater degree of ethnic diversity would have been seen in our sample. This difference raises questions on whether there was a lack of ethnic diversity being seen within the TIA clinics, whether those who were non-White were less likely to be asked to participate due to the inclusion criteria of needing to complete the questionnaires in English, or whether non-white participants chose to not complete the survey despite being approached. We do not have accurate data for this, however future research recruiting participants from TIA clinics should explore this further to determine if ethnicity is a factor which contributes to recovery post-TIA. In addition, ethnic diversity is not reported in other TIA studies exploring PTSD and psychological impacts, further supporting the need for this to be examined (Dollenberg et al., 2021; Grosse-Holz et al., 2020; Kiphuth et al., 2014) .

4.8.3 Narrow Study Eligibility Criteria

A strength of the study is that the study eligibility criteria were quite stringent, in that it required participants to be within three-months of a first TIA diagnosis. Using this timeframe allowed for an accurate analysis of how people after a TIA were presenting soon after their diagnosis, without the effects of previous TIAs or stroke present. Many studies do not specify whether their sample was first time TIA or whether they had experienced prior cerebrovascular events (Dollenberg et al., 2021; Kiphuth et al., 2014; Müller et al., 2021). Using first time diagnosis helped to capture the initial responses following a TIA diagnosis, and not unintentionally measure any other variables which may have impacted participant's responses. Using a three-month cut-off since the TIA occurred also helped minimise the chances of other traumatic or stressful events occurring, which may have changed how participants responded.

Additionally, the exclusion criteria meant that those with an existing diagnosis of PTSD, anxiety or depression (i.e., already had a diagnosis at the point at which their TIA occurred), or those receiving psychological treatment were unable to participate. This is a strength, as if we had recruited participants who met this criterion, it may have artificially shifted the results. For example,

those engaging in therapy may have reported less psychological distress due to receiving support which may not have been the case if they were not engaging in an intervention. Similarly, if we recruited participants with an existing diagnosis of PTSD or mood problems before their TIA occurred, it would have been challenging to determine whether psychological distress was due to the TIA (which was what the study intended to measure), or instead due the original reasons for their existing diagnosis. Without this exclusion criterion, it may have also increased the severity of outcomes for psychological distress, which would have led to unreliable results as psychological distress scores might have been artificially elevated, but not due to the TIA. Although it meant that some potential participants were screened out, using such criteria allowed for an accurate and valid depiction of how individuals struggle psychologically following a TIA.

4.8.4 Recruitment and Attrition Rates

Our study assists with future TIA research through exploring different recruitment approaches, through both social media and NHS, alongside different methods of survey completion (online and postal). For social media recruitment, 14.37% of participants successfully completed the survey compared to 31.88% who abandoned the screening. For NHS recruitment, both online and postal options were available. Across both sites, the online completion rate was 50% and the postal completion rate was 37.21%. The findings indicate that for social media recruitment, there was a much higher degree of dropouts or participants screened out compared to NHS participants. This may have been because the staff based within the TIA clinics had spoken to the participant about the study to gain CTC, which may have influenced participants' likelihood to respond and complete the survey. Whereas for social media completion, there was no direct contact with the researcher or a staff member, so perhaps individuals did not have the same commitment. Research has indicated that the rate of dropouts is often much higher for web-based surveys compared to postal versions (Eysenbach, 2005).

Therefore, having a postal option made up a large proportion of the overall sample which would have been lost if it was online only completion. The online option was a smoother delivery option, with automated links, data management and cost-effectiveness from a researcher and participant

perspective (Hochheimer et al., 2019). However, if the study had only relied on online and/or social media, the attrition rate would have been poor, and the minimum sample size would have not been met. The recruitment rates indicate that despite social media having the ability to reach a wide breadth of participants, the attrition rates are lower than when participants were recruited through TIA clinics. It seems that a hybrid approach of online and postal surveys can minimise attrition rates and achieve the target sample size. As previously discussed, a voucher incentive may have improved attrition rates, however its introduction may have shifted the sample demographics in a manner which was not valid. For example, we might have recruited participants from a single demographic or the presence of an incentive could have affected participants' responses to the questions (Treweek et al., 2013).

4.8.5 Robust Survey to Recruit Valid Participants

Barriers were put in place to prevent fraudulent or fake participants from completing the online survey to achieve reliable, valid survey responses and results. For NHS participants, as they were recruited from TIA clinics, we can be confident that they had a definite diagnosis of first time TIA. However, as social media participants were not seen by a clinician based within a TIA clinic, it may have increased the probability for individuals who had not experienced a TIA to complete the survey. Not using incentives would have deterred fraudulent participants, as there was no financial gain to be had through completing the survey. However, there are individuals who choose to complete surveys to intentionally sabotage research (Davies et al., 2024). Fraudsters or imposter participants often refer to individuals or bots who take advantage of online surveys by deliberately providing false responses. They may sign up multiple times (often to gain financial incentives) which can invalidate and falsify results of the study, introduce bias and interfere with attempts to recruit participants who actually meet the study criteria (Chandler et al., 2020; Dupuis et al., 2019).

Multiple methods were considered to prevent fraudsters from engaging in the study (Davies et al., 2024). This included the use of an initial pre-screening questionnaire which excluded people who did not meet eligibility and meant that they could not access the study survey. Also, email addresses could only be used once, so if someone attempted to complete it multiple times for

sabotage purposes they could not. During the data screening process, all data was screened for signs that it may have been a fraudulent participant (e.g., names not corresponding to email addresses), however there were no participants highlighted to be of concern. This indicates that the survey was made to have sufficient blocks in place to deter fraudulent participants, and the responses gained are an accurate representation of people's psychological outcomes following a TIA.

4.8.6 Additional Variables that were not Explored

There were some relationships or effects that were not able to be explored within the scope of the study, and therefore limit the extent that findings can be generalised to the entirety of the TIA population. These included whether the presence of comorbid medical conditions, employment status, income and educational level influenced participants outcomes for psychological distress. Such variables have been shown to be of importance in the development of psychological distress post-stroke. Lower income levels have been linked with increased PTSD risk (Nguyen et al., 2025), and shown to predict PTSD after a TIA or stroke (Goldfinger et al., 2014). Financial strain has also been shown to be a predictor for anxiety and depression in cardiac patients (Murphy et al., 2020). Lower levels of education have also been linked to PTSD risk in post-stroke (Nguyen et al., 2025), and a study found that stroke patients who reported less education scored higher for PTSD (Bruggimann et al., 2006). Medical comorbidities has mixed findings, with a systematic review of stroke patients concluding that medical comorbidity was not associated with PTSD (Tang et al., 2022), however other research has reported that a greater number of comorbidities was associated with increase PTSD symptomatology following a stroke or TIA (Goldfinger et al., 2014). Despite the current study collecting information on such variables, we needed to be cautious of the number of variables explored due to the sample size obtained, and not lose statistical power because of the increased number of variables. Further exploration could be conducted to determine whether certain elements of these variables influence psychological outcomes following a TIA.

The current study contributes to growing an evidence base on factors which relate to psychological distress post-TIA. However, it is acknowledged

that other variables which were not measured or considered (as discussed above) may have impacted the findings, and therefore caution should be made when generalising to the wider population of people who have experienced a TIA. The majority of the participants in the study were recruited from one NHS TIA clinic, and as discussed in section 2.6.4, how TIA clinics and pathways are commissioned and facilitated varies between clinics. For example, site one had a dedicated TIA clinic space and waiting area, whereas site two's TIA waiting room was in a corridor on a stroke ward. Therefore, the results of the current study may not be completely generalisable to TIA clinics across the UK, as such differences cannot be accounted for. Additionally, the offer of support varies greatly between different localities and areas of the UK, a variable which was not able to be considered in the current study. There were also significant differences between sub-groups within the study, for example NHS participants being older, with a higher proportion being retired, and differed in educational backgrounds. Although recruiting a mixed sample assisted with greater variability in the sample in an attempt to enable outcomes to be generalised to a more diverse population (i.e., not recruited from one area of the UK), caution is still needed when generalising study findings.

4.9 Clinical implications and Future Research

4.9.1 Feasibility of NHS recruitment

There was a stark difference between the number of potential participants approached, and those who completed the study between site one and site two. Despite both sites being NHS TIA clinics with somewhat similar demographics (ONS, 2023), the research staff based on the sites were different. At site one where the majority of the sample were recruited, there was a dedicated Stroke Research Nurse who was familiar with recruiting participants for both small- and large-scale stroke research trials. As the site was research active, the importance of research was valued and communication with the research team was frequent. The TIA clinics were also set-up separate from the stroke ward, meaning the Stroke Research Nurse could explain the study to patients. However, site two was not generally research active and did not have Stroke Research Nurses based on site, alongside more winter and bed pressures for staff on the ward. This meant consequently that staff based in the

TIA clinics did not have capacity to approach as many potential patients, as they were called to other commitments. Learnings can be made from our study for future TIA studies, such as determining the feasibility of how research active the site generally is, whether there are dedicated research staff based there, and also when in the year to recruit (perhaps not during the winter period). Additionally, the initial PIC site that was proposed for our study was deemed unfeasible when the study was declined to be adopted by the CRN. When considering which site to base future research at, it should be considered whether the site usually only recruits to CRN adopted, large scale studies opposed to smaller-scale exploratory studies.

4.9.2 Significant Variables to inform Psychological Support, Changes, or Interventions in TIA Services

The results of the study highlighted that avoidant coping and posttraumatic cognitions were significant predictors of psychological distress following a TIA. This information could help to begin the rationale, development, and implementation of various types of support to help patients throughout their TIA diagnosis and rehabilitation. For example, if TIA patients were aware of how avoidant coping strategies, such as the refusal to believe that their TIA has happened, using alcohol or substances to cope, or using distraction and turning to work or activities to take their mind of their TIA, they may be able to notice if they are using maladaptive coping strategies which might exacerbate their difficulties. This information could be shared within the TIA clinic, either through psychoeducation through staff or via a self-help leaflet. Similarly, if TIA patients are aware of the impact that certain posttraumatic cognitions can have on the development of psychological distress, it may result in noticing when they are experiencing certain cognitions and seek further help from their GPs or other healthcare professionals involved in their care. For example, clinicians within the initial TIA diagnosis appointment could talk to patients about cognitions which may arise and communicate how they may affect their psychological wellbeing. This could include explaining that if someone thinks that the TIA happened because of the way they responded or thinks that someone else would not have gotten into their situation (indicating self-blame), it might lead to poorer psychological recovery. This may also result in more people seeking

support from their GP for psychological help if they have noticed similar cognitions. These propositions fit in line with our results, as well as psychological models of psychological distress and coping (Ehlers & Clark, 2000; Lazarus & Folkman, 1984). We suggest that avoidant coping and posttraumatic cognitions are considered within future psychological support for people following a TIA, either through discussions with clinicians, self-help, signposting to the GP if they recognise avoiding coping or posttraumatic cognitions present, or the manifestation of PTSD or mood problems. We acknowledge that there is very limited research in the field of TIA and the psychological impact, and our study is relatively small-scale. Therefore, our study findings act as growing the evidence base to inform future TIA studies, to eventually propose more significant changes to TIA service structures and provisions.

Findings also suggested that age was a significant factor in the development of psychological distress, with individuals who were younger experiencing greater levels of distress. This finding could indicate that extra caution should be considered by clinicians within TIA clinics to understand that younger people may be at a greater risk of struggling with PTSD or mood problems. For example, studies from the stroke literature have reported that younger people experience a negative impact on their identity, roles, relationships, social and occupational wellbeing, ability to drive and return to work, in addition to family and caring responsibilities (Ibrahim et al., 2024).

Clinical implications of the current study should involve starting to encourage clinicians to think about the possible psychological difficulties that could be present post-TIA, and in the future explain the increased risk of psychological difficulties patients and offer signposting to relevant services should the person wish to have more information. It has been found in qualitative studies that TIA and minor stroke patients experienced both Consultants and GPs as passive in their approaches, and felt that they relied heavily on the patient raising any concerns (Turner et al., 2022). Therefore, it is evident that further development is needed in recognising psychological distress, especially for those who might be at greater risk of such difficulties. This could be carried out in the form of qualitative research, such as exploring

different professionals' viewpoints on TIA (e.g., GPs, Consultants, Nurses, and Healthcare Assistants) and the difficulties they perceive people to exhibit post-TIA, and whether this aligns with people's experiences. Such research could help inform how staff working within TIA clinics approach diagnosis, support, and aim to improve patient experience and psychological wellbeing.

Overall, our study highlighted that individuals following a TIA may be struggling psychologically, of which is going unnoticed, and results can raise awareness for patients and their families. Clinicians also need to be aware of this possibility and be prepared to communicate with patients that having PTSD, anxiety or depressive symptoms can occur after a TIA, and explain options if they want support. The study findings indicate the beginnings of developing a mood screening pathway in TIA clinics to determine what proportion of patients diagnosed meet the clinical threshold for PTSD and mood problems. Study findings support the notion that information on post-TIA psychological difficulties and where to seek further support (i.e., signposting information) should be shared with the person who has experienced the TIA, their family if applicable, and their GP. Through additional research in this area, it could result in the development of a psychological care pathway to support those who may experience some distress following a first-time diagnosis.

For stroke services, there are clear guidelines that fit within a stepped care model to help support individuals post-stroke with psychological difficulties (ISWP, 2023; NHS England, 2017). These guidelines highlight that psychological difficulties post-stroke should be targets for low level psychological interventions from all clinicians working within stroke services. Additionally, guidelines recommend that screening for mood and cognitive disturbances occurs within six weeks of the stroke, and follow-ups at six and 12 months. Our findings help to highlight the need for larger scale studies across different TIA services, provisions, and localities to explore the psychological impacts of TIA, and in the future integrate psychological care guidelines to support people in recovery from a TIA who may be at risk of a future stroke.

4.9.3 Psychological Interventions in TIA Services

Psychoeducation can help to provide people with information and support to enable them to cope with the physical and psychological effects of a

health condition (Lukens & McFarlane, 2004). Kontou et al. (2021) conducted a scoping review of 15 RCTs to determine whether psychoeducational interventions were an effective method of providing education and support following a TIA or minor stroke diagnosis. Results stated that interventions included education on exercise and lifestyle, improving self-management and enhancing secondary prevention. The studies varied in who delivered the interventions, ranging from Stroke Nurses, GPs and Nurse Educators, and were delivered in various ways including telephone based counselling and motivational interviewing. In terms of effectiveness, there were improvements in knowledge, self-efficacy and a reduction in future cerebrovascular events across studies. This supports that psychoeducational interventions are effective in secondary prevention, as TIAs increase the risk of a further stroke (Lioutas et al., 2021). Kontou et al.'s (2021) review in combination with results from the current study indicate that psychoeducational interventions based on PTSD and mood would be beneficial to people following a TIA and could help with rehabilitation.

Furthermore, to bridge the gap in psychological provisions post-TIA, a protocol for a feasibility RCT has been developed with the view for a group psychoeducational intervention to be trialled post-TIA and minor stroke (Kontou et al., 2020). The protocol proposes the integration of a group programme based on providing education, social and psychological support within six months post-diagnosis. Should the RCT findings indicate that the intervention is acceptable and applicable, it could further support the need for greater psychological provisions post-TIA. Further studies should seek to trial the integration of a low-level PTSD or mood intervention, to determine its feasibility and effectiveness for people post-TIA. In regards to time frames, a study by Suh et al. (2025) examined healthcare records from NHS Talking Therapies in England. Findings reported that stroke patients who attended talking therapy services a year or more post-stroke were less likely to be able to recover from anxiety or depression than those seen within six-months of their stroke occurrence. This signals that clinicians working within stroke and TIA services need to screen for anxiety and depression symptoms and refer patients to their

GP or primary care for psychological support as early as possible to achieve the most effective outcomes.

Alike the outcomes from the current study, Turner et al. (2022) recognised that people who had experienced a TIA had unmet needs and felt abandonment after discharge. Consequently, a feasibility study was conducted whereby a theoretically informed Nurse-led structured follow-up, four weeks after TIA or minor stroke, was trialled to identify and address patients' needs in a proactive manner (Turner et al., 2025). Health professionals were provided training to deliver the follow-up intervention, which included information on the potential needs following a TIA or minor stroke, what the consequences in a health and social context might be, how to identify and address unmet needs, and what resources are available to patients. A mixed-methods process evaluation using patient outcome measures and interviews found that people benefited from the intervention through the support they received, which they would not have got through routine TIA clinic pathways. The follow-up included referrals or signposting to support services, information and education, actionable advice, reassurance, and normalisation of recovery. It was found that the follow-up was valued by both patients and clinicians in identifying unmet needs, and that a follow-up intervention was feasible. This feasibility study demonstrates the value of an intervention to support TIA patients shortly after diagnosis. From our outcomes, it could be proposed that training for clinicians on the psychological difficulties that may be present following a TIA could be trialled. Additionally, a small-scale trial intervention study, similar to Turner et al.'s (2025) study could be proposed to determine how psychological support could be integrated into current TIA pathways. Additionally, qualitative studies have shown that TIA patients' experiences of support vary significantly depending on the healthcare professional involved (Turner et al., 2019). For future research, the creation of a training package for all clinicians working with TIA patients could be developed, alongside exploring its impact on staff's understanding of psychological recovery post-TIA and patient experiences.

5. Critical Reflection

In this section, I will reflect on the research process from the beginning stages of choosing a project, to data analysis and the write-up of the study. Throughout, I will discuss and reflect on the challenges that arose along the way, and how I was able to navigate and overcome them.

5.1 Reflections on Quantitative and Doctoral Research

At the beginning of the Doctorate in Clinical Psychology Training programme, I did not particularly view myself as a researcher, nor feel especially confident. Although I had completed a quantitative dissertation project during my undergraduate psychology degree, I felt somewhat worried about my research abilities stepping up to doctorate level, and the added complexity and standards that were required. Additionally, for my undergraduate project I did not need to design the study, apply for ethics, nor recruit through the NHS, and therefore did not feel I had many skills in these areas. However, I did enjoy conducting research and during my Assistant Psychologist role attempted to undertake interventional research in the form of trialling a psychoeducational trauma stabilisation group within a forensic setting. Therefore, going into the study selection and development phase filled me with both apprehension alongside some excitement on how the project would develop.

Despite having conducted a quantitative project before, statistics and mathematics is not a domain that I classed as a strength. Therefore, during the study development phase I attempted to somewhat ‘swerve’ the project to take more of a qualitative stance, in an attempt to avoid needing to face statistics and engage with SPSS again. However, during the early research supervisions, my research supervisors and I discussed how there was very minimal quantitative research within the field of TIA, and how the research that has been conducted has been largely qualitative. Therefore, the gap in the research was in demonstrating that psychological difficulties are prevalent for people following a TIA, using standardised, statistical measures to then inform future research. Throughout these early supervisions, I felt anxious about how I was going to cope with the data analysis and statistics. I shared this with my research

supervisors, who supported me to view conducting a quantitative study as a positive challenge, and an opportunity to grow and develop my skills within research.

Over the duration of the project, to now having completed the data analysis and write-up, I have noticed a change within myself and my confidence in conducting research. During the data analysis phase, I remember feeling unsure how my thesis was going to come together, and like I was unsure of the different assumptions and stages of MLR. However, I now feel that I have been able to face my initial apprehensions of statistics and learn extensively through the support of my supervisors. I have enjoyed taking ownership and being the lead on my project and feel that I have been able to immerse myself in it over the three years of training in comparison to the one-year dissertation at undergraduate level. I feel proud that my project is clinically relevant, and I believe that the outcomes of the study will contribute to the currently minimal TIA literature base and highlight the unmet needs of individuals. Conducting this project has shown me the value of research within NHS and clinical settings, and how important research is in driving or creating change for service pathways. I would now say that research is a part of my role as a Clinical Psychologist, and I feel that my confidence in designing and conducting research has grown. I hope that after training I will continue to grow my research skills and challenge myself.

5.2 Selection of a Research Topic

At the beginning of my doctorate journey, we were provided with a list of potential projects and research ideas to choose from. We were encouraged to reach out to the named research supervisors who had an interest in that topic area and have initial exploratory meetings with them to discuss the scope of the projects. Whilst examining the projects suggested, I was drawn to those that were neuropsychology related, and how they linked with psychological wellbeing. I have always had a keen interest in neuropsychology, as during my undergraduate degree I volunteered for a brain injury charity, and my dissertation was around the effects of Transcranial Brain Stimulation on motor control. Furthermore, throughout my previous roles as an Assistant Psychologist I had a keen interest in working within individuals who had

experienced trauma, and those who presented with symptoms of PTSD. It was important to me to undertake a project that I was passionate about, and that I would remain motivated and engaged in throughout the three years, with the challenges and hurdles that would inevitably occur during the process. Additionally, I wanted to choose a project that I felt was clinically important and had the potential to positively impact those accessing services, and clinical practice or service provisions in the future. When I met with my primary supervisor, it was clear that she had immense passion for working clinically within stroke and TIA services and had conducted many studies within the field. Hearing about her passion and drive for growing the research base within the area of TIA motivated me even further to choose my project. My project has developed from the initial study put forward within the project list provided at the start of training. The original study idea was exploring the prevalence and predictors of fatigue, mood and cognitive problems following a TIA. However, as discussed, a keen interest of mine in a clinical sense is the presentation and development of PTSD symptoms following stressful or traumatic events. Through early discussions within the research team, the project grew and was shaped around PTSD and mood problems to fit with both my interests, but also the very minimal research base that existed for TIA and PTSD. I found this prospect of shaping research exciting, and consequently has grown my passion for neuropsychology and how it fits with psychological problems, and the value that conducting research can bring.

Over the course of the project, I think it has been important to have a supervisory team who have been passionate about my project, as well as knowledgeable in conducting research within the clinical area of stroke and physical health. Through their connections, we have been able to identify suitable research sites that would have been significantly harder without my supervisor's existing reputation and expertise in the field. This has impacted my research journey in a positive way, as when hurdles with ethics, sites and recruitment arose, they were supportive yet provided suitable guidance to help me overcome them.

5.3 Ethics

To maximise recruitment given the limited timeframe of the Doctorate programme, my supervisory team recommended applying for both UoN and NHS ethics. I recall feeling somewhat overwhelmed by the prospect of this, as I had no prior experience of applying for NHS ethics and had heard 'horror stories' from prior Trainee Clinical Psychologists about the length of time it can take and being severely criticised at the REC committees.

I found the NHS ethics process incredibly time consuming and repetitive, and I remember being quite frustrated as there was a lot of back-and-forth communication between the Sponsor to ensure the documents and protocol were suitable before submitting to IRAS. I was incredibly proactive with this communication and 'chasing' if required as I was determined to gain NHS ethics as quickly as possible so I could begin recruitment. I found the REC review meeting somewhat stressful, and they asked rather detailed questions about certain choices I had made. However, I was relieved when their main request was to include sending a letter to every NHS participant's GP in case they sought support during participation in the study, and some tweaks to study documents. There was a lot of monitoring and chasing throughout gaining approvals from the NHS Trusts research and development departments, and responsibility to ensure everything required had been organised. Throughout training, I think my skills in managing competing demands has developed, as I was maintaining my thesis approvals alongside other demands from the course (such as placements and academic assignments), which I know will be useful within my future career. I feel that I have learnt a significant amount regarding how to navigate the NHS ethics and trust site approvals, which will come in useful in my future career as a Clinical Psychologist within NHS services, and if I choose to engage in research through sites.

5.4 NHS Site Visits

After approvals were granted, I was responsible for conducting site initiation visits (SIVs) to set the study up 'on the ground' at the sites. For site two, I did the SIV jointly with my primary supervisor who was based at the site. I remember feeling daunted by this, as I had not experienced conducting a SIV before, and how to best pitch my ideas to gain staff's trust, and not feel like we

were putting more workload or responsibility on them. At this SIV, Stroke Consultants and Doctors were present, to which I felt anxious as I was pitching ideas from a psychological perspective to a very medically minded group of professionals. However, all staff were on board with the study and could see the benefits of the research. Unfortunately, site two was not very forthcoming with recruitment for the study. I felt disappointed and deflated by this, as I had attended the site on multiple occasions to talk to staff about any issues with the study, and how I could support them with recruitment. My supervisor and I had many discussions about this, and how it was quite surprising how despite her presence at the site it did not have much of an impact on recruitment.

Conversely, the SIV at site one was conducted by myself as my supervisor was unable to attend. I remember feeling apprehensive about doing this alone, however afterwards felt accomplished and excited about my research. Staff were on board with the study and saw the value in smaller scale projects needing to be supported within the NHS. Although I only attended the site once and nobody from the research team was based on the site, the Principal Investigator (PI) was great with communication and kept me updated regarding recruitment. My experiences of recruitment from different sites has made me reflect on future research at NHS sites, and to take into account how research active they are, and whether staff have the capacity or drive to engage in studies.

5.5 Development of a Complex Survey

Following being granted UoN ethics, I needed to decide on an online survey platform so the study could recruit those via social media, as well as NHS participants' who opted for online completion. Despite having conversations within research supervision on options (e.g., Microsoft Forms), the UoN's chosen platform was REDCap and therefore we opted for this for the study. When I met with the Senior Data Manager, he was very confident and competent in survey development and execution, which was a skill set I did not feel I had. I had never made an online survey for research purposes before, however throughout the development process I learnt a significant amount about how to code surveys, how to mitigate against fraudulent participants, and what sorts of preventative blocks to put in place. In total, I had 13 meetings with

the Senior Data Manager to develop both the social media and NHS elements of the survey. From this experience, I hope I can use my skills in robust survey building to conduct online research post-qualification or assist other researchers in survey development.

5.6 Smaller-Scale Projects not Prioritised

During the early stages of the project, we agreed for a large-scale site with TIA clinics who saw a greater number of patients to be the single PIC site. Through my primary supervisors' connections, a Stroke Consultant was approached and agreed to be the PI at the PIC site in July 2023. Due to the size of the NHS site, there was originally only going to be one NHS site for the study. However, as the study development progressed, it appeared the PI and NHS site were under the impression that the study was going to be adopted by the CRN. Although it was requested through the NHS ethics application that the study be considered for CRN adoption, this was declined due to the study being funded through Health Education England. The PI encouraged us to appeal this, however it remained a rejection. It was at this point that the PI shared that they would not be able to recruit to the study due to the lack of CRN adoption, and that there were larger scale studies based on the site which took priority. At this point in the process, I felt anxious, upset, and worried about what recruitment would look like for the project. The site was deemed unfeasible formally in May 2024, which was much later than the original start date of opening the study to NHS recruitment of March 2024. It was during this process that sites one and two were approached to be PIC sites for the study. Reflecting on the process having successfully completed study recruitment and achieving the targeted sample size, it has highlighted to me how smaller-scale exploratory, or doctorate projects may not be viewed as important or prioritised as larger scale, funded and CRN adopted studies. This saddens me, as there needs to be a level of equitability in research for less studied participant groups or research questions to be explored, to then provide evidence for larger funded projects to be commissioned. If I were to conduct a similar study in the future, I would seek approval from multiple PIC sites from the beginning in case a site became unfeasible to avoid the panic of finding another site and delaying recruitment. I would also have a conversation about recruitment without CRN

adoption early in study development, to prevent similar circumstances occurring again.

5.7 Sustaining Recruitment Efforts

During study development, we decided to have a dual recruitment approach of using both social media and NHS TIA clinics to try and recruit as many participants as possible. I was under the impression at the beginning of the study that recruitment would be somewhat steady due to having two avenues, however I was surprised when recruitment was significantly slower than expected. Due to the original PIC site being deemed unfeasible, it delayed the NHS recruitment from what we had originally planned for. After going through approvals for sites one and two, the ‘green light’ to start NHS recruitment was not given until July 2024. As seen in Figure 2 (recruitment timeline), recruitment over both social media and NHS was sporadic. For example, in April 2024 there were 7 participants recruited through social media, whereas in May and June there were only two collectively. I ensured I was proactive in posting the study on Facebook groups and X in an attempt to boost recruitment, however I felt deflated by the slow recruitment coupled with the consistent advertisement.

For NHS recruitment, it was slow however progressed each month once the sites were actively recruiting. For example, in August 2024 only two participants were recruited, doubling to four in September, and increasing again in subsequent months. There was a lot of communication with the PI based at site one, and I ensured to send out surveys as soon as I obtained CTC forms from the site. I found the process of recruitment anxiety provoking, deflating, and tiring. However, on reflection I feel proud of myself to keep being proactive with recruitment to eventually achieve the minimum sample size we initially aimed for of 55. I feel it has taught me that research requires a patient, pro-active and resilient approach, with the ability to maintain good communication with sites and participants. I will take this forward beyond clinical training, and into research propositions in the future.

5.8 Time Consuming Postal Surveys

It was decided during the study development phase from discussions with the PPI group that we would be flexible with how participants completed the surveys. This included the choice of online (through REDCap or QR code), or paper-based by post. However, something I did not anticipate was that a large proportion of participants would opt for the postal option. Therefore, when a substantial number of participants selected to complete the survey by post, it meant I spent a large amount of time printing, collating questionnaires, getting stamps and envelopes and sending the surveys out. I also then needed to manually input responses onto REDCap when participants sent in the surveys which took time, alongside writing and sending notification letters to every NHS participant's GP. In hindsight, I perhaps could have pre-prepared survey packs, so they were ready to post. However, as discussed, I did not know how many I would need as I had not anticipated needing to collate so many. Furthermore, it was disheartening that often no responses were given for the postal surveys that were sent. A total of 43 postal surveys were sent, and only 16 were completed and sent back. This is something I have learnt about research and response rates, and to expect this in future research. Despite the fact it would have been easier on me in terms of time allocation as a researcher to have online as the only survey option, it would have meant the minimum sample would not have been met, and potentially having an underpowered study. This process can help inform researchers seeking to conduct research within the field of TIA as online survey research is moving towards online only completion, as a large demographic of people would have been missed if that approach was taken. This is a consideration I will make in future research and weigh up options depending on the client group and research aims.

5.9 Impacts on my Clinical Practice

Despite the study design being quantitative, and that I did not speak to participants about how they interpreted their responses, I feel that the outcomes of the study have changed my practice as a Trainee Clinical Psychologist. During the write-up phase, I had a clinical placement within a physical health service, which included individuals who had experienced strokes or brain injuries. The fact that up to 40% of people from our study reported PTSD and

mood problems has made me more aware of the potential longer-term psychological effects that physical health diagnoses can have. Particularly in the context of a TIA whereby the narrative in services from medical professionals is that symptoms are transient and therefore have no lasting effects or impacts on people. The results of our study show that this is not the case, and that despite physical health symptoms subsiding, we as healthcare professionals within the NHS need to be more proactive and aware in asking people how they are feeling psychologically, and not act in a passive manner. As a clinician working in the NHS, I have been more aware of asking people about their understanding of physical health diagnoses or events (like a TIA) to allow them the opportunity to share how they feel. I have also found that I have engaged in more conversations with professionals about the impacts of TIAs that are unseen, and how large the impact might be. I have spoken with clinical supervisors and wider members of multi-disciplinary teams about the need to see beyond typical screening measures for mood. We as clinicians need to be aware of the potential trauma that can surround transient or long-term physical health conditions, and ensure we communicate with people in services in a trauma-informed way.

5.10 Epistemological Positioning

In comparison to my undergraduate dissertation project whereby a positivist stance was taken, I have found that adopting a critical realist positioning aligned with my own beliefs about ‘knowledge’ in the world. Despite quantitative research being more objective through the significance of results and *alpha* values, I realise that each participant will have interpreted and experienced their TIA differently. This will depend on their previous history, the circumstances how and where their TIA occurred, their socio-demographic circumstances, how the diagnosis was conveyed, the healthcare professionals involved and their overall outlook on the world. These changes will have affected how each participant engaged and responded to the questionnaires used in the study. Although I recognise that the questionnaires used will give a strong indication on how participants coped, perceived, and managed their TIA, I have also reflected on what we have not asked within the study, and what may be missing that quantitative research cannot measure as effectively as

qualitative studies. This includes the context around participant responses, the ability to query responses which may have felt out of place, and to find out more on why they responded in the manner they did. I find myself being curious about such questions, however, I recognise that within the scope of the study these routes were not able to be explored.

5.11 Concluding Remarks and Reflections of my Research Skills

Through the process of writing this critical reflection, I feel proud of the work I have completed, the time I have dedicated and the challenges I have faced. The process has helped me to see that despite feeling that a project might be difficult or not quite fitting with your perceived skill set (e.g., statistics in my case), with determination, grit, and support from those around you, it is possible. Completing this study has vastly developed my understanding and confidence in developing project ideas, designing studies, navigating NHS and university ethics applications, recruitment challenges, quantitative data analysis and writing research at a doctoral level standard. I have learnt the value of PPI engagement within research, and how important it is to consult with those with lived experience on the ideas and methods researchers propose. I felt like the PPI group helped to uncover blind spots (e.g., flexibility of how to complete the survey) during the study development phase, which I will take forward for future projects. I am grateful to the NHS sites and my participants for allowing me to be able to contribute to the unmet psychological needs of those who have experienced a TIA, and to contribute to a topic area in which research is minimal. I have developed as both a researcher and clinician throughout this process, and I hope the skills I have learnt will help me in conducting future research as a qualified Clinical Psychologist.

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Appendices

Appendix A: Ethical approval letter from University of Nottingham



DPAP Committee: 04/01/2024
Supervisor: Dr Eirini Kontou
Applicant: Miss Chloe Webb
Project ID: 3149

Project Title: "Exploring factors relating to Post-traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)"

Dear Chloe,

The committee is pleased to confirm that the above study now has approval on the basis of your application and any subsequent clarifications. You must conduct your research as described in your application, adhere to all conditions under which the ethical approval is granted, and use only materials and documentation specified in your application.

If you need to make any changes (for example to extend your data collection timeframe, change the mode of data collection, or the measures being used), you must create and submit an Amendment Form. To do this, select the 'Create Sub Form' option from the Actions Menu on the left-hand side of the page in the online system and then select 'Amendment Form'.

With best wishes

Dr Jen Yates and Dr Katy Jones

Chair of the MHCNS Ethics Subcommittee

Appendix B: No opinion letter from proportionate REC review

HSC Business Services Organisation

INVESTORS IN PEOPLE® We invest in people Silver

Health and Social Care Research Ethics Committee B (HSC REC B)

20 February 2024

Miss Chloe Webb
University of Nottingham
B18, B Floor, Yang Fujia Building
Jubilee Campus, Nottingham
NG8 1BB

Dear Miss Webb

Study title:	**Exploring factors relating to Post-traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)**
REC reference:	**24/NI/0031**
Protocol number:	**23072**
IRAS project ID:	**338709**

The Proportionate Review Sub-Committee of the Research Ethics Committee reviewed the above application on 19 February 2024.

Ethical issues

The Sub-Committee felt that this application had material ethical issues and that a review at a full REC meeting is required in order to give an opinion on the study for the following reasons:

1. The Sub-Committee noted that whilst the validated questionnaires are regularly used in this population, they are not routinely used in the early stages following a Transient Ischaemic Attack (TIA). The Sub-Committee further noted that the researchers have adapted the questionnaire set to take out the suicide questions that are asked in one of the surveys. Members commented that some participants may be psychologically impacted by the TIA, either directly or indirectly. Although the Sub-Committee did not consider the questionnaires to be highly sensitive, it highlighted the vulnerable nature of the participant group as a result of a very recent TIA and the lack of ongoing support.

2. The Sub-Committee highlighted that the Participant Information Sheet provides signposting information to support resources should a participant experience any distress. However, it noted the absence of a detailed plan to manage any potential distress, or reference that any concerns raised would be managed using the routine procedures in place for patients attending the clinics.

3. The Sub-Committee was concerned by the uncertainty around the use of ID numbers. It noted that each participant will be assigned a study identity code number for use on study forms, other study documents and electronic database. The documents and database will also use their initials and email address. Each participant will also be assigned a participant number for identification purposes. The Sub-Committee noted that the investigator will make a separate confidential record of the participant's name, date of birth, email address, phone number and Participant

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Office for Research Ethics Committees Northern Ireland (ORECNI)
Lissue Industrial Estate West, 5 Rathdown Walk, LISBURN, BT28 2RF
Tel: (028) 95 361400 **General Email:** info.orecni@hscni.net

Study Number to permit identification of all participants enrolled in the study in case additional follow-up is required.

In the Statement of Confidentiality section of the Protocol, the Sub-Committee noted that such medical information may be given to the participant's medical team and all appropriate medical personnel responsible for the participant's welfare. If information is disclosed during the study that could pose a risk of harm to the participant or others, the researcher will discuss this with the Chief Investigator and where appropriate, report accordingly.

The Sub-Committee highlighted that any disclosure would mean identifiable information is required by the researcher. There is no indication of what the criteria or threshold is for reporting to the clinical team, and the process for how this would be managed is unclear.

4. Members commented that research data may be digital or paper based. Whilst they recognised that the RedCap system is considered secure, there is no consideration of data breach risk for the surveys or processes in place if data is breached. Given the potential sensitive nature of the information included in the questionnaires, the Sub-Committee considered that a data breach procedure should be established.

5. The Sub-Committee was concerned that the study had not yet received Clinical Research Network (CRN) adoption to aid with recruitment. The Sub-Committee acknowledged that the application outlines the recruitment processes "if" CRN adoption is accepted, and "if" the study does not receive CRN adoption. If not adopted, the researcher will need to collect the details of potential participants who completed a consent to contact form through regular communication with the clinical team and for them to attend the clinics. The researcher will directly contact potential participants via email or letter using the details which they have been provided with from the patient. The Sub-Committee was concerned that there were too many uncertainties as the recruitment process has not yet been confirmed. It noted that contracts would be required to enable researchers to be present in the clinic and to liaise with clinicians about potential diagnostic issues. The Sub-Committee considered that this could be resolved by seeking consent from participants to discuss their results with the clinical team.

Arrangements for further review

We have arranged for your application to be reviewed by a full REC.

The REC now appointed to review your application is:

South East Scotland REC 01 – 06 March 2024

You will be given further details of the meeting at which your application is to be reviewed. We will send on copies of all paperwork relating to this application to the above REC on your behalf.

An ethical opinion on the application will be given within 60 days of receipt of a valid application by this Committee.

Appendix C: NHS Ethical approval letter

Lothian NHS Board

South East Scotland Research Ethics Committee 01

2nd Floor, Waverley Gate
2-4 Waterloo Place
Edinburgh
EH1 3EG
www.hra.nhs.uk

Enquiries to: Sandra Wyllie
Email: Sandra.Wyllie@nhslothian.scot.nhs.uk

Please note: This is the favourable opinion of the REC only and does not allow you to start your study at NHS sites in England until you receive HRA Approval

11 April 2024

Dr Eirini Kontou
University of Nottingham
School of Medicine
AU1, Mental Health & Clinical Neurosciences, Jubilee Campus
NG8 1BB

Dear Dr Kontou

Study title:	**Exploring factors relating to Post-traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)**
REC reference:	**24/SS/0025**
Protocol number:	**23072**
IRAS project ID:	**338709**

Thank you for your letter of 09 April 2024, responding to the Research Ethics Committee's (REC) request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Good practice principles and responsibilities

The UK Policy Framework for Health and Social Care Research sets out principles of good practice in the management and conduct of health and social care research. It also outlines the responsibilities of individuals and organisations, including those related to the four elements of research transparency:

1. registering research studies
2. reporting results
3. informing participants
4. sharing study data and tissue

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Headquarters
Waverley Gate
2-4 Waterloo Place
Edinburgh EH1 3EG
Chair Professor John Connaghan CBE
Chief Executive Calum Campbell
Lothian NHS Board is the common name of Lothian Health Board

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or NHS management permission (in Scotland) should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All research should be registered in a publicly accessible database and we expect all researchers, research sponsors and others to meet this fundamental best practice standard.

It is a condition of the REC favourable opinion that **all clinical trials are registered** on a public registry before the first participant is recruited and no later than six weeks after. For this purpose, 'clinical trials' are defined as:

- clinical trial of an investigational medicinal product
- clinical investigation or other study of a medical device
- combined trial of an investigational medicinal product and an investigational medical device
- other clinical trial to study a novel intervention or randomised clinical trial to compare interventions in clinical practice.

A 'public registry' means any registry on the WHO list of primary registries or the ICMJE list of registries provided the registry facilitates public access to information about the UK trial.

Failure to register a clinical trial is a breach of these approval conditions, unless a deferral has been agreed by the HRA (for more information on registration and requesting a deferral see: Research registration and research project identifiers).

Where a deferral is agreed we expect the sponsor to publish a minimal record on a publicly accessible registry. When the deferral period ends, the sponsor should publish the full record on the same registry, to fulfil the condition of the REC favourable opinion.

If you have not already included registration details in your IRAS application form you should notify the REC of the registration details as soon as possible.

Where the study is registered on ClinicalTrials.gov, please inform deferrals@hra.nhs.uk and the Research Ethics Committee (REC) which issued the final ethical opinion so that our records can be updated.

Publication of Your Research Summary

We will publish your research summary for the above study on the research summaries section of our website, together with your contact details, no earlier than three months from the date of this favourable

opinion letter. Where a deferral is agreed, a minimum research summary will still be published in the research summaries database. At the end of the deferral period, we will publish the full research summary.

Should you wish to provide a substitute contact point, make a request to defer, or require further information, please visit: Research summaries - Health Research Authority (hra.nhs.uk)

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

After ethical review: Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study, including early termination of the study
- Final report
- Reporting results

The latest guidance on these topics can be found at Managing your approval - Health Research Authority (hra.nhs.uk)

Ethical review of research sites

NHS/HSC sites

The favourable opinion applies to all NHS/HSC sites taking part in the study, subject to confirmation of Capacity and Capability (in England, Northern Ireland and Wales) or management permission (in Scotland) being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS/HSC sites

I am pleased to confirm that the favourable opinion applies to any non-NHS/HSC sites listed in the application, subject to site management permission being obtained prior to the start of the study at the site.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Copies of materials calling attention of potential participants to the research [NHS Study Advert Exploring factors which relate to PTSD and Mood Problems post-TIA v1.0 date 31.01.24]	1.0	31 January 2024
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Evidence of Cover - Liability Insurance]		27 June 2023
GP/consultant information sheets or letters [GP Notification Letter v1 26.03.24]	1.0	26 March 2024
Interview schedules or topic guides for participants [Online Survey Framework v1.0 31.01.24]	1.0	31 January 2024

IRAS Application Form [IRAS_Form_09022024]		09 February 2024
Non-validated questionnaire [Screening Questionaire]	1.0	31 January 2024
Non-validated questionnaire [Demographic Collection Form w tracked changes - v1.1 14.03.24]	1.1	14 March 2024
Other [Delegation Log]	1.0	31 January 2024
Other [Patient and Public Involvement Feedback]		12 November 2023
Other [Evidence of Cover - Professional Indemnity]		08 August 2023
Other [Principal Investigator CV]		13 November 2023
Other [UoN Ethics Approval Letter]		04 January 2024
Other [RedCap Survey Intro Page]	1.0	14 March 2024
Other [HRA Assessment Points]		14 March 2024
Other [REC Changes Table 26.03.24]		26 March 2024
Participant consent form [NHS CONSENT FORM Exploring factors which relate to PTSD and Mood Problems post-TIA v1.3 date 08.04.24]	1.3	08 April 2024
Participant information sheet (PIS) [NHS Participant Information Sheet PDF w tracked changes Exploring factors which relate to PTSD and Mood Problems post-TIA v1.3 date 08.04.24]	1.3	08 April 2024
Research protocol or project proposal [PROTOCOL - clean version - Exploring factors which relate to PTSD and Mood Problems post-TIA v2 date 26.03.24]	2.0	26 March 2024
Summary CV for Chief Investigator (CI) [CV Eirini Kontou November 2023]	1.0	01 November 2023
Summary CV for student [CW CIRRICULUM VITAE]		18 December 2023
Summary CV for supervisor (student research) [CV Michael Baliousis102023]		10 February 2023
Summary CV for supervisor (student research) [CV Shirley Thomas]		21 December 2023
Validated questionnaire [The Brief Coping with Problems Experienced Inventory (Brief-COPE; Carver, 1997)]		
Validated questionnaire [Generalized Anxiety Disorder Scale (Spitzer et al., 2006)]		
Validated questionnaire [Patient Health Questionnaire –8 (PHQ-8) (Kroenke & Spitzer, 2002)]		
Validated questionnaire [PTSD Checklist Specific (Weathers et al., 1994)]		
Validated questionnaire [The Post-traumatic Cognitions Inventory (PTCI-9; Wells et al., 2019)]		

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: Quality assurance - Health Research Authority (hra.nhs.uk)

NHS
Lothian

HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities– see details at: Learning - Health Research Authority (hra.nhs.uk)

IRAS project ID: 338709 Please quote this number on all correspondence

With the Committee's best wishes for the success of this project.

Yours sincerely

Lucy Kershaw

Dr Lucy Kershaw
Chair

Email:sandra.wyllie@nhslothian.scot.nhs.uk

Enclosures: "After ethical review – guidance for researchers"

After ethical review guidance for sponsors and investigators – Non CTIMP Standard Conditions of Approval]

Copy to: Mr Ali Alshukry

Lead Nation England: approvals@hra.nhs.uk

Appendix D: HRA Approval letter

Ymchwil Iechyd a Gofal Cymru
Health and Care Research Wales

NHS
Health Research Authority

Dr Eirini Kontou
University of Nottingham
School of Medicine
AU1, Mental Health & Clinical Neurosciences, Jubilee Campus
NG8 1BB

Email: approvals@hra.nhs.uk
HCRW.approvals@wales.nhs.uk

16 April 2024

Dear Dr Kontou

HRA and Health and Care Research Wales (HCRW) Approval Letter

Study title:	**Exploring factors relating to Post-traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)**
IRAS project ID:	**338709**
Protocol number:	**23072**
REC reference:	**24/SS/0025**
Sponsor	**University of Nottingham**

I am pleased to confirm that **HRA and Health and Care Research Wales (HCRW) Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

Please now work with participating NHS organisations to confirm capacity and capability, in line with the instructions provided in the "Information to support study set up" section towards the end of this letter.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?
HRA and HCRW Approval does not apply to NHS/HSC organisations within Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report (including this letter) have been sent to the coordinating centre of each participating nation. The relevant national coordinating function/s will contact you as appropriate.

Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non-NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?

The standard conditions document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **338709**. Please quote this on all correspondence.

Yours sincerely,

Michael Pate
Approvals specialist

Email: approvals@hra.nhs.uk

Copy to: *Mr Ali Alshukry*

Appendix E: CRN Adoption decline and appeal

From [redacted] on behalf of Portfolio Applications Team
Date: Friday, 15 March 2024 at 11:15
To: Eirini Kontou (staff) <mczek@exmail.nottingham.ac.uk>
Cc: sponsor <sponsor@nottingham.ac.uk>, Support Study East Midlands <supportmystudyeastmidlands@nihr.ac.uk>, [redacted]
Chloe Webb <msxcw15@exmail.nottingham.ac.uk>
Subject: Re: For Information: IRAS ID [338709] – NIHR CRN Portfolio Eligibility Decision

> You don't often get email from portfolio.applications@nihr.ac.uk. Learn why this is important

Good morning Eirini,

Thank you for your email. I'm afraid that Health Education England funding is not automatically eligible for support because it is not administered by central government and regional government awards are geographically restricted and do not fulfil the open competition criteria for eligibility.

For more information about the Eligibility Criteria for NIHR Clinical Research Network (CRN) Support, access the following link. Additional information can be found in the supporting Frequently Asked Questions.

If you believe that the study has funding that meets the Eligibility Criteria please supply evidence of this funding in order to appeal the decision.

Kind regards,

[redacted]

CRN Research Delivery | CRN National Coordinating Centre (CRNCC) | NIHR Clinical Research Network (CRN)

NIHR | National Institute for Health and Care Research

e. portfolio.applications@nihr.ac.uk
a. 21 Queen Street, Leeds, LS1 2TW

We would really appreciate you taking 5-10 minutes to tell us about your experience of working with us. Providing this feedback will help us to understand how we can improve our service to you. Please click here to complete our survey: https://leeds.onlinesurveys.ac.uk/tell-us-about-your-experiences-of-working-with-the-clinica-2



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On Thu, 14 Mar 2024 at 20:46, Eirini Kontou <Eirini.Kontou@nottingham.ac.uk> wrote:

[redacted]

Sorry for late reply here – I work part-time on supervising this research project as Chief Investigator for one of our NHS-funded/HEE clinical psychology trainees, Chloe Webb.

[redacted] Is it possible to appeal now?

This project is completed as part of the Trent Doctorate Programme in Clinical Psychology, funded by Health Education England. This study will be supporting the evidence-base for a wider portfolio of research on this topic area (the focus of my NIHR Clinical Lectureship).

Apologies as unfamiliar with the process of appealing for portfolio adoption. Any advice would be appreciated.

Many thanks for your consideration.

Bw

Eirini

Dr Eirini Kontou

Assistant Professor

HEE NIHR ICA Clinical Lecturer

AU1, Mental Health & Clinical Neurosciences, School of Medicine

University days: **Monday, Tuesday & Friday (DClinPsy)**

Please note on my clinical days I have no access to this email

Working flexibly so I sometimes send emails outside of typical working hours. I don't expect a response to my emails outside your working hours.

From: [redacted] **On Behalf Of** Portfolio Applications Team
Sent: Monday, February 19, 2024 10:05 AM
To: Eirini Kontou (staff) <mczek@exmail.nottingham.ac.uk>
Cc: sponsor <sponsor@nottingham.ac.uk>; Support Study East Midlands <supportmystudyeastmidlands@nihr.ac.uk>; [redacted]
Subject: For Information: IRAS ID [338709] – NIHR CRN Portfolio Eligibility Decision

> You don't often get email from portfolio.applications@nihr.ac.uk. Learn why this is important

Good morning,

RE: IRAS [338709] - [Exploring factors which relate to PTSD and Mood Problems post-TIA]

Following a review of the study details you have provided, we are writing to inform you that unfortunately your study is not eligible to receive NIHR Clinical Research Network (CRN) support. This decision was based on the reason given in the table below. The table also indicates the stage which your application has reached.

Key steps in determining eligibility	**Status of check**	**Comments**
Is there a research question?	Check complete	Yes
Is the research going on in the NHS, social care or public health?	Check complete	Yes
Is the study funded?	Check not satisfied	No funding evidence has been supplied with the application, but the IRAS form indicates that no application for external funding will be made and that the research is being completed in partial fulfilment of a Doctorate in Clinical Psychology.

		Funding administered by UK universities does not meet the open competition criteria (see below).
Has the funding been awarded in open competition?	Check not satisfied	The research funds were not awarded as a result of open competition across England. UK universities, colleges and local healthcare organisations (including NHS Trusts) do not fulfil the criteria for NIHR non-commercial Partner status, since funding does not meet the open competition requirement as the funding organisation is the same as the organisation that receives the funds. Studies funded by these organisations are therefore not eligible for NIHR Clinical Research Network support.
Has the study had appropriate peer review?	Check not yet completed	
Is the study of clear value to the NHS, social care or public health?	Check not yet completed	
Does the study take account of the priorities, needs and realities of the NHS, social care or public health?	Check not yet completed	

Should you wish to make a formal appeal, you may do so in writing within 10 working days of this e-mail. Please send your response to portfolio.applications@nihr.ac.uk addressing the issue raised in the table, with evidence if appropriate. Your appeal will be checked against the same criteria by which it was originally reviewed. Should your appeal be successful the study will continue through the eligibility process, from the stage that it has already reached. Appeals received after 10 working days will not be considered.

If your study has not yet received Health Research Authority (HRA) Approval then your application will continue; should you have any questions about HRA Approval, contact the HRA at hra.approval@nhs.net.

[redacted]

Portfolio Eligibility

NIHR | National Institute for Health and Care Research

Appendix F: Ethics, NHS R&D department, recruitment, and survey development timelines

Ethics Process Timeline	
Stage	**Date**
University of Nottingham Ethics Approval Process for Social Media Recruitment	
Ethics form submitted to Mental Health and Clinical Neurosciences Research Ethics Sub-Committee	21/12/2023
Ethics approval granted	04/01/24
NHS IRAS Ethics Approval Process	
Initially submitted to Sponsor at the University of Nottingham	19/12/23
Re-submitted to Sponsor to remove non-NHS recruitment strategy (to split the ethics processes)	03/01/24
Amendments required between researcher and Sponsor before submission through IRAS	Between 03/01/24 – 07/02/24
Submitted through IRAS and Sponsor and supervisor signatures approved	09/02/24
Proportionate REC Review	19/02/24
Outcome letter of Proportionate REC Review – Outcome 'No Opinion – Full REC Review required'	20/02/24
Full REC Review meeting with South East Scotland Sub-Committee	06/03/24
Outcome of Full REC review – Outcome 'Provisional Opinion – Amendments required'	13/03/24
Amendments from REC review addressed and submitted to IRAS	04/04/24
Outcome of resubmitted documents – Outcome 'Minor additional amendments required'	08/04/24
Additional amendments from REC committee addressed and resubmitted through IRAS	09/04/24
Final REC Approval granted – Outcome 'Favourable Opinion'	11/04/24
Approval from HRA granted	16/04/24
Study rejected by Clinical Research Network	19/02/24
Appeal made to NIHR for CRN rejection	14/03/24
Final rejection from CRN	15/03/24
NHS Trust Research and Development (R&D) Approval Processes	
Original PIC site: Non-Feasible Site	
Principal Investigator (PI) Agreed to take part in the study	28/07/23

Liaison between lead researcher (CW), Primary Supervisor and PI regarding PIC site feasibility	Between 19/02/24 and 16/04/24
PI took study to local R&D meeting to gauge feasibility to be PIC site without CRN adoption	03/03/24
Meeting with CW, Primary Supervisor and PI to discuss and decide feasibility of Site being a PIC site	22/03/24
Local Information Pack with IRAS documents sent to Trust R&D Department	20/05/24
Formal rejection from Trust due to capacity issues without CRN adoption – PIC Site removed from study	20/05/24
Site One	
PI identified and agreed to take part in study	22/03/24
Amendment to add PIC site submitted and approved through IRAS	29/04/24
Local Information Pack with IRAS documents sent to Trust R&D Department	29/04/24
Additional information requested from R&D department	08/05/24
Additional information sent to R&D department	09/05/24
Approval granted by Site 3 R&D department	28/06/24
Approvals granted to begin recruitment on site 3	28/06/24
Site Initiation Visit conducted by researcher	11/07/24
Green Light letter sent to site 3 to begin recruitment	12/07/24
Site Two	
PI identified and to take part in study	22/05/24
Contact made with Site 2 R&D department to send initial feasibility documents	24/05/24
Amendment to add PIC site submitted and approved through IRAS	29/05/24
Local Information Pack with IRAS documents sent to Trust R&D Department	30/05/24
Approval granted by Site 2 R&D department	13/06/24
Site Initiation Visit conducted by researcher and CI	27/06/24
Approvals given to begin recruitment on site	09/07/24
Green Light letter sent to site 2 to begin recruitment	16/07/24

Recruitment Timeline	
Social Media	**Date**
Launched on social media (X and Stroke related Facebook Groups)	22/03/24
Re-advertised on Facebook groups (staggered between different groups at different timepoints)	28/03/24 16/04/24 17/05/24 27/06/24 22/08/24 05/09/24 20/09/24 25/10/24 19/12/24 24/01/25
Retweeted via X (also re-tweeted by supervisors and other academics)	28/03/24 17/05/24 27/06/24 22/08/24 04/09/24 25/10/24 19/12/24
Emailed to The Stroke Association Charity for research support	20/02/24
Posted on The Stroke Association Research webpage and stroke forum	09/04/24
Approached The Brain Charity for research support	04/09/24
Posted on The Brain Charity's Facebook and X page	13/09/24
Stroke OPTIMISE Newsletter	Sent out on: 11/12/24
Site 1	**Date**
Recruitment started on site	15/07/24
Discussions between researcher and PI to discuss study recruitment	Between 01/08/24 – 28/08/24
Eligible participants identified (active recruitment period)	Between 02/09/24 – 31/01/25
Study ended and recruitment stopped	31/01/25 - (last participant completed survey February 25)

Site 2	Date
Recruitment started on site	15/07/24
Discussions between researcher, Primary Supervisor and TIA clinic staff for study recruitment	Between 01/08/24 – 08/08/24
Eligible participants identified (active recruitment period)	Between 22/08/24 - 31/01/25
CW (lead researcher) visits to site to liaise with TIA Clinic staff and collect consent to contact forms	29/08/24 03/10/24
Study ended and recruitment stopped	31/01/25

REDCap Survey Development

Social Media Strategy	Date
Initial meeting with Senior Data Manager to discuss project	12/01/24
Survey development Meetings with Senior Data Manager to develop the online survey	19/01/24 25/01/24 02/02/24 09/02/24 16/02/24 08/03/24
NHS Strategy	**Date**
Continuing to develop the original survey but amending to suit NHS recruitment strategy	03/05/24 10/05/24 13/06/24 21/06/24 02/07/24 20/09/24

Eligible Recruitment Numbers

Recruitment Source	Month											
	2024										2025	
	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Social Media	0	7	1	1	0	4	4	3	1	1	1	0
NHS – Site 1						1	4	5	7	4	5	5
NHS – Site 2						1	0	1	0	0	0	0

Appendix G: UoN participant information sheet

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PARTICIPANT INFORMATION SHEET

STUDENT RESEARCH PROJECT ETHICS REVIEW
Mental Health and Clinical Neurosciences
Version: 2.0 **Date:** 02.01.24

Project Title: Exploring factors relating to Post-traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)

Student: Chloe Webb (chloe.webb1@nottingham.ac.uk)

Supervisor/Chief Investigator: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)
Co-Supervisors: Dr Shirley Thomas (mczst2@exmail.nottingham.ac.uk) and Dr Michael Baliousis (mbaliousis@lincoln.ac.uk)

Ethics Reference Number: MHCN-2023-3149-1

We would like to invite you to take part in a research study about exploring the psychological impact of having a Transient Ischaemic Attack (TIA). Before you begin, we would like you to understand why the research is being done and what it involves for you.

What is the purpose of this study?

This study aims to explore which factors may contribute to someone experiencing Post-Traumatic Stress Disorder (PTSD) symptoms and mood problems (namely anxiety and depression) after a TIA. This study is being carried out for educational purposes by a student on the Doctorate of Clinical Psychology Programme, and the findings will be written up as part of a dissertation.

Why have I been invited?

You have been invited because you responded to the advert for the study on social media. We are inviting people who have experienced their first TIA within the past 3 months living in the United Kingdom.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, we will ask you to provide consent through an online consent form. You may change your mind about being involved at any time or decline to answer a particular question. You are free to withdraw at any point before or during the study without giving a reason. If you withdraw during the study, we will no longer collect any further information about you or from you. However, we will keep the information about you that we have already obtained as we are not allowed to tamper with study records and this information may have already been used in some analyses and may still be used in the final study analyses. To safeguard your rights, we will use the minimum personally identifiable information possible.

What will I be asked to do?

If you choose to take part, you will be asked to complete 5 self-report questionaries and a demographics form which asks you questions in relation to your TIA. The questionnaires are short and easy to complete and will take no more than 30 minutes to complete. The questionnaires

include questions about your mood, how you coped with your TIA, how you thought about it, as well as demographic questions such as your age, employment status and living arrangements.

You will only need to complete these questionnaires once. Questionnaires will be sent out by an emailed online survey. You will then complete the questionnaires and the answers will be saved. That will be the end of your participation.

Will the research be of any personal benefit to me?

There is no direct benefit to you from taking part, but the information we get from this study may help to understand the experiences of those who have experienced a TIA in more detail. Currently, the psychological impact of a TIA is not well understood. Findings have the potential to raise awareness of which factors may contribute to people having PTSD symptoms and mood problems after a TIA, which could potentially be targeted for support or intervention.

Are there any possible disadvantages or risks in taking part?

We don't expect there to be any disadvantages or risks to taking part. It will involve you giving up time to complete the questionnaires, which will be in total up to 30 minutes. The questionnaires will be completed online, which may result in some fatigue from looking at the screen, of which we would encourage you to take a break should you experience discomfort. The questionnaires ask questions relating to stressors, trauma responses and emotional changes following a diagnosis of TIA, which may evoke some uncomfortable feelings for you. Should you wish to have further support, there are relevant organisations signposted at the end of this information sheet.

What will happen to the information I provide?

To ensure confidentiality, only the research team will have access to your data. The information you provide will be kept strictly confidential. All your data will be anonymised through the use of unique identifiers. Any information with your personal data on will be stored securely on the University of Nottingham's electronic system, and a password-protected encrypted USB device. Participants will be identified by a participant number only. Your individual data will not be disclosed or identifiable in the results of the study.

The information that you provide will be used to write a thesis for the fulfilment of the Doctorate of Clinical Psychology Qualification, and may also be used to write academic papers to be published in peer-reviewed journals and in presentations at conferences.

We will follow ethical and legal practice and all information will be handled in confidence. Under UK Data Protection laws, the University is the Data Controller (legally responsible for the data security) and the Chief Investigator of this study (named above) is the Data Custodian (manages access to the data). This means we are responsible for looking after your information and using it properly. Your rights to access, change or move your information are limited as we need to manage your information in specific ways to comply with certain laws and for the research to be reliable and accurate. To safeguard your rights, we will use the minimum personally–identifiable information possible. You can find out more about how we use your information and read our privacy notice at: https://www.nottingham.ac.uk/utilities/privacy.aspx

We would like your permission to use anonymised data in future studies, and to share our research data (e.g., in online databases) with other researchers in other Universities and organisations both inside and outside the European Union. This would be used for research in health and social care. Sharing research data is important to allow peer scrutiny, re-use (and therefore avoiding duplication of research) and to understand the bigger picture in particular areas

of research. All personal information that could identify you will be removed or changed before information is shared with other researchers or results are made public.

The data collected for the study will be looked at and stored by authorised persons from the University of Nottingham who are organising the research. They may also be looked at by authorised people from regulatory organisations to check that the study is being carried out correctly. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty. At the end of the project, all raw data will be kept securely by the University under the terms of its data protection policy after which it will be disposed of securely. The data will not be kept elsewhere.

If you have any questions or concerns, please don't hesitate to ask. We can be contacted before and after your participation at the email addresses above.

If you would like to be contacted once the study is complete and has been published to look at the findings, please inform the researcher.

What if there is a problem?

If you have any queries or complaints, please contact the student's supervisor/chief investigator in the first instance. If this does not resolve your query, please write to the Administrator: MS-MHCNS-Ethics@exmail.nottingham.ac.uk and the Administrator will pass your query to the Chair of the Committee.

If you remain unhappy and wish to complain formally, you should then contact the Faculty of Medical and Health Sciences Ethics Committee Administrator, Faculty Hub, Medicine and Health Sciences, E41, E Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH or via E-mail: FMHS-ResearchEthics@nottingham.ac.uk

We believe there are no known risks associated with this research study; however, as with any online activity, the risk of a breach is always possible. We will do everything possible to ensure your answers in this study will remain anonymous.

Thank you for taking the time to read this information sheet.

Sources of support

If you feel you would like extra support following your completion in this study, you can contact the below organisations:

Stroke Association: 0303 3033 100 and helpline@stroke.org.uk. Offer support by telephone, email and social media. Telephone lines open Monday – Friday (9am-5pm) and Saturday (10am-1pm).

Different Strokes: 0345 130 7172 or 01908 317 618 and info@differentstrokes.co.uk. Offer support by telephone, email and social media.

Think ahead stroke: 01942 824 888 and info@think-ahead.org.uk. Offer support by telephone, email and social media. Telephone lines open Monday – Friday 9am – 5pm.

Samaritans: 116 123 and jo@samaritans.org. Offer support by telephone, email, online chat function, social media, through letter writing and face to face. Telephone lines open 24 hours a day.

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Mind: 0300 123 3393 or info@mind.org.uk. Offer support by telephone, email, online chat function and social media. Telephone lines open Monday – Friday 9am – 6pm (except Bank Holidays).

Alternatively, you can contact your **GP**.

Appendix H: NHS participant information sheet

University of Nottingham
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Participant Information Sheet

(**Final Version**:1.3 **Date:** 08.04.24)

IRAS Project ID: 338709

Title of Study: Exploring factors relating to Post-traumatic Stress Disorder (PTSD) Symptoms and Mood Problems in People following a Transient Ischaemic Attack (TIA)

Name of Chief Investigator: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)

Student/Local Researcher: Chloe Webb (chloe.webb1@nottingham.ac.uk)

Co-Supervisors: Dr Shirley Thomas (mczst2@exmail.nottingham.ac.uk) and Dr Michael Baliousis (mbaliousis@lincoln.ac.uk)

We would like to invite you to take part in a research study about exploring the psychological impact of having a Transient Ischaemic Attack (TIA). Before you begin, we would like you to understand why the research is being done and what it involves for you.

What is the purpose of the study?

This study aims to explore which factors may contribute to someone experiencing Post-Traumatic Stress Disorder (PTSD) symptoms and mood problems (namely anxiety and depression) after a TIA. This study is being carried out for educational purposes by a student on the Doctorate of Clinical Psychology Programme, and the findings will be written up as part of a dissertation.

Why have I been invited?

You are being invited to take part because you have either consented to be contacted from the TIA clinic, spoke with NHS staff about the study, or responded to the study advert. We are inviting people who have experienced their first TIA within the past 3 months living in the United Kingdom.

Do I have to take part?

No. It is up to you to decide whether or not to take part. If you do decide to take part, we will ask you to provide consent through a consent form. You may change your mind about being involved at any time or decline to answer a particular question. You are free to withdraw at any point before or during the study without giving a reason. If you withdraw during the study, we will no longer collect any further information about you or from you. To safeguard your rights, we will use the minimum personally identifiable information possible. This would not affect your legal rights.

What will happen to me if I take part?

If you choose to take part, you will be asked to complete 5 self-report questionaries and a demographics form which asks you questions in relation to your TIA. The questionnaires will take no more than 30 minutes to complete. The questionnaires include questions about your mood, how you coped with your TIA diagnosis, what you thought about it, as well as demographic questions such as your age, employment status and living arrangements.

You will only need to complete these questionnaires once. Questionnaires will be sent out by an emailed online survey or post according to your preference. You will then complete the questionnaires and return them to the researcher the same way you received them. That will be the end of your participation. Should you wish to return them via post, a pre-paid envelope will be provided when needed.

Expenses and payments

Participants will not be paid to participate in the study.

What are the possible disadvantages and risks of taking part?

We don't expect there to be any disadvantages or risks to taking part. It will involve you giving up time to complete the questionnaires, which will be in total up to 30 minutes. The questionnaires may be completed online, which may result in some fatigue from looking at the screen, of which we would encourage you to take a break should you experience discomfort. The questionnaires ask questions relating to stressors, trauma responses and emotional changes following a diagnosis of TIA, which may evoke some uncomfortable feelings for you. Should you wish to have further support, there are relevant organisations signposted at the end of this information sheet.

What are the possible benefits of taking part?

There is no direct benefit to you from taking part, but the information we get from this study may help to understand the experiences of those who have experienced a TIA in more detail. Currently, the psychological impact of a TIA is not well understood. Findings have the potential to raise awareness of which factors may contribute to people having PTSD symptoms and mood problems after a TIA, which could potentially be targeted for support or intervention.

What happens when the research study stops?

Your data will be incorporated with other participants data to help give an overall picture of the results.

What if there is a problem?

If you have a concern about any aspect of this study, you should email the researchers who will do their best to answer your questions. The researchers' contact details are given at the end of this information sheet. If you remain unhappy and wish to complain formally, you can do this by contacting the Patient Advice and Liaison Service (PALS) for the NHS trust whereby your TIA clinic is situated.

[redacted]

In the event that something does go wrong, and you are harmed during the research, and this is due to someone's negligence then you may have grounds for a legal action for compensation against the University of Nottingham but you may have to pay your legal costs. The normal National Health Service complaints mechanisms will still be available to you.

How will we use information about you?

The University of Nottingham are the sponsor of this study. This means we are responsible for looking after your information and using it properly.

We will need to use information from you for this research project.

This information will include your initials, name and contact details including email address, telephone number and address. Your date of birth will be collected to ensure you are eligible for the study (i.e., ensure you are over 18 years old) and for reference should you wish for us to notify your GP of your participation in the study. People will use this information to do the research or to check your records to make sure that

the research is being done properly. If you agree we will also keep your contact details to send you the findings of the study and/or to contact, you about participating in future research studies.
People who do not need to know who you are will not be able to see your name or contact details. Your data will have a participation code number instead, which will be linked to your demographics collection form and questionnaires.

We will keep all information about you safe and secure.

Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study.

We may share our research data with researchers in other Universities and organisations, including those in other countries, for research in health and social care. Sharing research data is important to allow peer scrutiny, re-use (and therefore avoiding duplication of research) and to understand the bigger picture in particular areas of research. Data shared in this way will be anonymised.

What are your choices about how your information is used?

- You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have.
- We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.

Where can you find out more about how your information is used?

You can find out more about how we use your information

- reading our privacy statement https://www.nottingham.ac.uk/utilities/privacy/privacy-information-for-research-participants.aspx
- at www.hra.nhs.uk/information-about-patients/
- our leaflet available from www.hra.nhs.uk/patientdataandresearch
- by asking one of the research team
- by sending an email to chloe.webb1@nottingham.ac.uk or eirini.kontou@nottingham.ac.uk

What will happen if I don't want to carry on with the study?

Your participation is voluntary and you are free to withdraw at any time, without giving any reason, and without your legal rights being affected. If you withdraw we will no longer collect any information about you or from you. If you wish to withdraw your data, you must let the researcher know by email **within 1-month** of completing the survey. After this point, your data may have been used in data analysis, and may be unable to be identified to be withdrawn. All of your data (including personal details and questionnaire responses from either the online survey platform or paper copies **will not used** in the final data analyses. If you decide to withdraw from the study the researcher will note your decision, and no further information will be collected, nor will you be contacted again. Data cannot be erased as it should be possible to recreate a participant's participation up to their point of withdrawal. To safeguard your rights, we will use the minimum personally-identifiable information possible.

Involvement of the General Practitioner (GP)

We would like to inform your GP that you are taking part in this study. This is to ensure should you wish to contact them following participation in this study, they have been notified. You will be asked to provide

your GPs surgery name and address in the consent form. A standard letter will subsequently be sent to your GP informing them of your participation.

What will happen to the results of the research study?

The information that you provide will be used to write a thesis for the fulfilment of the Doctorate of Clinical Psychology Qualification, and may also be used to write academic papers to be published in peer-reviewed journals and in presentations at conferences.

Who is organising and funding the research?

This research is being organised by the University of Nottingham and is being funded by Health Education England (HEE).

Who has reviewed the study?

All research in healthcare is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable ethical opinion by South East Scotland Research Ethics Committee 01.

Thank you for taking the time to read this information sheet.

Further information and contact details

Researcher: Chloe Webb (chloe.webb1@nottingham.ac.uk)
Chief Investigator: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)

Sources of support

If you feel you would like extra support following your completion in this study, you can contact the below organisations:

- **Stroke Association: 0303 3033 100 and** helpline@stroke.org.uk. Offer support by telephone, email and social media. Telephone lines open Monday – Friday (9am-5pm) and Saturday (10am-1pm).
- **Different Strokes:** 0345 130 7172 **or** 01908 317 618 and info@differentstrokes.co.uk. Offer support by telephone, email and social media.
- **Think ahead stroke:** 01942 824 888 and info@think-ahead.org.uk. Offer support by telephone, email and social media. Telephone lines open Monday – Friday 9am – 5pm.
- **Samaritans:** 116 123 and jo@samaritans.org. Offer support by telephone, email, online chat function, social media, through letter writing and face to face. Telephone lines open 24 hours a day.
- **Mind:** 0300 123 3393 or info@mind.org.uk. Offer support by telephone, email, online chat function and social media. Telephone lines open Monday – Friday 9am – 6pm (except Bank Holidays).
- Alternatively, you can contact your **GP**.

Appendix I: Screening questionnaire

Screening Questionnaire
Final Version: 1.0 **Date:** 31.01.24

This questionnaire will be also converted to an online format using university-approved software (RedCap)

Please complete the below screening questions to ensure you meet the criteria for the study. Please highlight 'YES' or 'NO'.

- **Are you aged 18 or over?** YES / NO
- **Do you live in the United Kingdom?** YES / NO
- **Is this your first TIA?** YES / NO
- **Have you had a TIA within the past 3 months?** YES / NO
- **Has it been at least 1 week since your TIA occurred?** YES / NO
- **Have you received a diagnosis of a mood disorder (such as post-traumatic stress disorder, anxiety, or depression) within the past year?** YES / NO
- **Are you currently receiving psychological treatment or intervention for any mood disorders (excluding any medications)?** YES / NO
- **Can you read and write in English without the need for a translator?** YES / NO

Appendix J: UoN consent form



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School of Medicine
University of Nottingham
Medical School
Nottingham
NG7 2UH

Participant Consent

Interactive form for online consent

STUDENT RESEARCH PROJECT ETHICS REVIEW
Mental Health and Clinical Neurosciences
Version: 1.0 **Date:** 01.12.23

Project Title: Exploring factors relating to Post-traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)
Researcher: Chloe Webb (chloe.webb1@nottingham.ac.uk)
Supervisor: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)
Ethics Ref: MHCN-2023-3149-1

Have you read and understood the Participant Information Sheet?	☐Yes ☐No
Do you agree to take part in completing questionnaires about the impact of a TIA on your psychological wellbeing?	☐Yes ☐No
Do you know how to contact the researcher if you have questions about this study?	☐Yes ☐No
Do you understand that you are free to withdraw from the study without giving a reason?	☐Yes ☐No
Do you understand that once you have taken part it may not be technically possible to withdraw your data?	☐Yes ☐No
Do you give permission for your data from this study to be shared with other researchers in the future provided that your anonymity is protected?	☐Yes ☐No
Do you understand that non-identifiable data from this study including quotations might be used in academic research reports or publications?	☐Yes ☐No
I confirm that I am 18 years old or over	☐Yes ☐No

By selecting 'Yes', I indicate that I understand what the study involves, and I agree to take part. I consent to take part in this research study.	☐Yes ☐No

Appendix K: Demographics collection form



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School of Medicine
University of Nottingham
Medical School
Nottingham
NG7 2UH

Demographic Data Collection Form

Final Version 1.1 Date: 14.03.24

This questionnaire will be converted to an online format using university-approved software (RedCap).

Participant Details:

Name:
Contact details: Telephone number; Address, Email address.

Personal Details:

Date of birth:
Age:
Gender: Male; Female; Transgender; Non-binary, option for 'prefer not to say'
Ethnicity: White; Black, Black British, Caribbean or African; Asian or Asian British, Mixed or multiple ethnic groups; Other ethnic group; prefer not to say (Informed from ONS website)
Occupation: Free text which is optional.
Level of Education: Primary school; Secondary school; College; University; option for 'prefer not to say'
Annual Income: Between 18k or below; 19 – 35k; 36 – 50k, 50k or above; option for 'prefer not to say'.
Living Arrangements: Alone; cohabiting with partner; living with someone else (e.g., other family members such as children); supported living; nursing home; option for 'prefer not to say'.

Medical information:

Approximate date of the TIA:
Length of time after the TIA you sought medical help:
Do you have any other medical conditions?
How would you rate your fear of a future stroke or TIA occurring? Likert scale: 0 being 'no fear at all' and 5 being 'very fearful'.

Appendix L: Questionnaires included in survey and the order

Online Survey Framework
Final version 1.0, Date: 31.01.24

For the online survey version, all questionnaires will be converted to an online format using university-approved software (RedCap).

All standardised questionnaires will be inputted in the exact format they were published in.

For participants who contact the researcher:
The participant information sheet and screening questionnaire will be shared by email with the participant. Should they wish to participate, the following will be sent (in this order) via an online survey link.

1. Consent From
2. Demographics collection form
3. Post-traumatic Stress Disorder Checklist Specific (PCL-S; Weathers et al., 1994)
4. Generalised Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006)
5. Patient Health Questionnaire 8 (PHQ-8 ; Kroenke et al., 2009)
6. The Brief Coping with Problems Experienced Inventory (Brief-COPE; Carver, 1997)
7. The Post-traumatic Cognitions Inventory (PTCI-9; Wells et al., 2019)

For participants who use the QR code from the poster:
Information and questionnaires will be presented in this order.

1. Participant Information Sheet
2. Screening questionnaire
3. Consent From
4. Demographics collection form
5. Post-traumatic Stress Disorder Checklist Specific (PCL-S; Weathers et al., 1994)
6. Generalised Anxiety Disorder 7 (GAD-7; Spitzer et al., 2006)
7. Patient Health Questionnaire 8 (PHQ-8 ; Kroenke et al., 2009)
8. The Brief Coping with Problems Experienced Inventory (Brief-COPE; Carver, 1997)
9. The Post-traumatic Cognitions Inventory (PTCI-9; Wells et al., 2019).

Appendix M: NHS Consent-to-contact (CTC) form

School of Medicine
University of Nottingham
Medical School
Nottingham
NG7 2UH

Participant Consent to Contact Form

(Final Version: 1.1 **Date:** 12.07.24)

Title of Study: Exploring factors relating to Post-traumatic Stress Disorder (PTSD) Symptoms and Mood Problems in People following a Transient Ischaemic Attack (TIA)

IRAS ID: 338709

Name of Researcher: Chloe Webb (Chloe.webb1@nottingham.ac.uk)
Chief Investigator/Supervisor: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)

We would like to inform you of a research project being carried out by researchers at the University of Nottingham. The project is exploring whether those who have experienced a Transient Ischaemic Attack (TIA) go on to experience symptoms of Post-Traumatic Stress Disorder (PTSD) and mood problems (namely anxiety and depression), and what factors might make it more or less likely. The study will involve completing 5 self-report questionnaires and a demographics form and will take no more than 30 minutes to complete.

To explore this, we need to recruit those who:

- Have experienced their first TIA within the last 3 months
- Have not had a diagnosis of PTSD, anxiety, or depression within the past year
- Are not currently having psychological intervention for PTSD, anxiety, or depression
- Are at least one week after the TIA occurred
- Aged 18 years and older and live in the UK

If you think you meet the above and would like to be contacted by the research team about this study, please complete and sign the form below and give it back to the member of staff who gave this to you or use the pre-paid envelopes provided. A copy of the Participant Information Sheet and poster is provided should you want to read more about the study before we contact you.

Should you be willing to provide consent and complete the questionnaire now, please inform the person who gave you these details. Thankyou for your time.

Completing this form does not commit you to taking part in the study.

****

I agree that I may be contacted by a member of the University of Nottingham about the above research study:

Name:_____**Date:** _____ **Signature:** _____

Telephone: _____ **E-mail:** _____

Preferred contact method: Email, Phone or Post

Address:_____

2 copies: 1 for contactee, 1 for the project notes

Appendix N: NHS consent form

School of Medicine
University of Nottingham
Medical School
Nottingham
NG7 2UH

University of Nottingham
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Participant Consent Form
(Final Version: 1.3, Date: 08.04.24)

Title of Study: Exploring factors relating to Post-traumatic Stress Disorder (PTSD) Symptoms and Mood Problems in People following a Transient Ischaemic Attack (TIA)

IRAS Project ID: 338709

Student/Name of Researcher: Chloe Webb (chloe.webb1@nottingham.ac.uk)
Chief Investigator/Supervisor: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)

	Please tick the box
1. I confirm that I have read and understand the information sheet version number 1.3 dated 08.04.24 for the above study and have had the opportunity to ask questions.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without my medical care or legal rights being affected. I understand that should I withdraw then the information collected so far cannot be erased and that this information may still be used in the project analysis.	☐
3. I understand that data collected in the study may be looked at by authorised individuals from the University of Nottingham, the research group and regulatory authorities where it is relevant to my taking part in this study. I give permission for these individuals to collect, store, analyse and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential.	☐
4. I understand that the answers to the questionnaires will be kept anonymous and will be used in the final study write up and dissemination.	☐
5. I understand that the information collected about me will be used to support other research in the future and may be shared anonymously with other researchers.	☐
6. I understand my GP will be informed of my participation in this study. Please provide GP details (Surgery name and address) _____	☐
7. I agree to take part in the above study.	☐

I would like to be contacted with the results of the research (OPT-IN). YES ☐ NO ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent	Date	Signature

2 copies: 1 for participant and 1 for the project notes

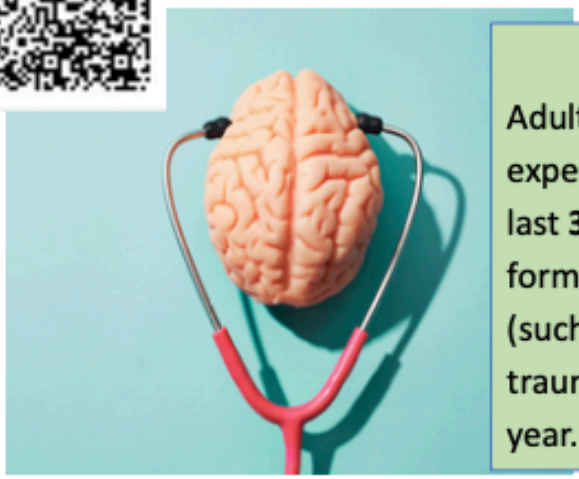
Appendix O: UoN study poster

Survey link:
https://cdss.nottingham.ac.uk/redcap/surveys/?s=H9XW39YWN9XHLHR4

Version: 2.0 Date: 02.01.24
Ethics Reference: MHCN-2023-3149-1

WE NEED YOU!

Research on the psychological impact following a Transient Ischaemic Attack (TIA)



Who can take part?

Adults living in the UK who have experienced their **first TIA** within the last **3-months** and have **not** had a formal diagnosis of a mood problem (such as anxiety, depression, or post-traumatic stress disorder) in the past year.

What is the study for?

We are exploring whether experiencing a TIA leads to people having post-traumatic stress disorder and mood problems and trying to find out what factors might make it more or less likely. The study has the potential to highlight the unmet needs of people who have had a TIA.

What would I have to do?

You would complete **5 self-report questionnaires and a demographics form,** asking questions about yourself, such as how you felt after your TIA, what you thought, and how you coped. They will take no more than 30 minutes to complete.

Contact us!

University of Nottingham
UK | CHINA | MALAYSIA

Thank you for reading this information.
Please scan the QR code or contact the researcher to take part.
Chloe Webb: **chloe.webb1@nottingham.ac.uk**

Appendix P: NHS study poster

University of Nottingham
UK | CHINA | MALAYSIA

WE NEED YOU!

Research on the psychological impact following a Transient Ischaemic Attack (TIA)



Who can take part?

Adults living in the UK who have experienced their **first TIA** within the last **3-months** and have **not** had a formal diagnosis of a mood problem (such as anxiety, depression, or post-traumatic stress disorder) in the past year.

What is the study for?

We are exploring whether experiencing a TIA leads to people having post-traumatic stress disorder and mood problems and trying to find out what factors might make it more or less likely. The study has the potential to highlight the unmet needs of people who have had a TIA. This study is part of an educational project.

What would I have to do?

You would complete **5 self-report questionnaires and a demographics form,** asking questions about yourself, such as how you felt after your TIA, what you thought, and how you coped. They will take around no more than 30 minutes to complete.

Contact us!

Thank you for reading this information.

To take part, please speak to the NHS staff within the TIA clinic for a consent to contact form, scan the QR code, or contact the researcher directly - Chloe Webb: **chloe.webb1@nottingham.ac.uk**

Exploring factors which relate to PTSD and Mood Problems post-TIA – NHS Study Advert, IRAS ID: 338709, Final Version: 1.0 Date 31.01.24

https://cdss.nottingham.ac.uk/redcap/surveys/?s=9WXY37KNN9CRDJRE

Appendix Q: GP notification letter

School of Medicine
University of Nottingham
Medical School
Nottingham
NG7 2UH

University of Nottingham
UK | CHINA | MALAYSIA

GP Notification Letter
(Final Version: 1.0, Date: 26.03.24)

Date:
Dear: *[Insert GP Name]*
Re: *[Insert patient name and Date of Birth]*

Study: Exploring factors relating to Post-traumatic Stress Disorder (PTSD) Symptoms and Mood Problems in People following a Transient Ischaemic Attack (TIA)

Your patient, [*insert name*] has kindly agreed to participate in the above study. We wish to investigate the psychological impact of having a Transient Ischaemic Attack (TIA), and what factors may contribute to Post Traumatic Stress Disorder and mood problems following a TIA.

I am writing to notify that your patient is taking part in the research and has requested for you to be informed. They are eligible due to having had a diagnosis of a Transient Ischaemic Attack.

If the patient becomes distressed due to the study, we may advise them to consult you, and so, it is important that you are aware of their participation.

I am enclosing a copy of the information sheet for your reference, however if you have any queries or require further information, please do not hesitate to contact the research team on the details below:

Student/Name of Researcher: Chloe Webb (chloe.webb1@nottingham.ac.uk)
Chief Investigator/Supervisor: Dr Eirini Kontou (Eirini.kontou@nottingham.ac.uk)

Yours Sincerely,

Chloe Webb
Lead Researcher and Trainee Clinical Psychologist

Appendix R: Feedback letter from Patient and Public Involvement: UoN Stroke Research Partnership Group

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

astroke

Nottingham Stroke Research Partnership Group

School of Medicine
University of Nottingham
Room WD3188, West Block, QMC
Derby Road
Nottingham NG7 2UH

Tel 07970 555001

Lay Chairs: Mr Philip Johnson, Dr Fred Higton
Joint Academic Chairs: Professor Nikola Sprigg, Dr Niki Chouliara

Chloe Webb
Trainee Clinical Psychologist
Trent Doctorate in Clinical Psychology
Division of Psychiatry & Applied Psychology
University of Nottingham
YANG Fujia Building, B Floor
Jubilee Campus
Wollaton Road
Nottingham NG8 1BB

Chloe.webb1@nottingham.ac.uk

Cc: Eirini.kontou@nottingham.ac.uk

4 August 2023

Dear Chloe

Nottingham Stroke Partnership Group Meeting – 31 July 2023
Does Coping affect Post-Traumatic Stress Disorder (PTSD) and Mood Problems in People after a Transient Ischaemic Attack (TIA) – Chloe Webb

Thank you for presenting the above research study to the Nottingham Stroke Research Partnership Group on 31 July. We trust you appreciated the feedback during the meeting.

Please find attached notes from the group discussions and further feedback received after the meeting for your information going forward. The group asks that you consider all the feedback and particularly that their observations are taken into account for the future study design.

There may be further feedback from the group once they've reviewed the questionnaires circulated after the meeting.

Should you require clarification on any of the points raised in the attached appendix or would like the opportunity to respond to further questions raised, please do not hesitate to contact Helen Taylor. H.taylor@nottingham.ac.uk / 07970 555001

Yours sincerely,

Helen Taylor
On behalf of the Nottingham Stroke Research Partnership Group

Encl: Feedback from discussions at meeting

Confidential
For NSRPG review – November 2023
Does Coping affect Post-Traumatic Stress Disorder (PTSD) and Mood Problems in People after a Transient Ischaemic Attack (TIA) – Chloe Webb

Lay Summary

Post-traumatic Stress Disorder (PTSD) is an anxiety disorder which can occur after exposure to trauma. It can be followed by ongoing symptoms, which include re-experiencing and changes in mood and thinking. There is growing evidence that PTSD can occur after medical diagnoses, but currently, there is minimal research into the impact of PTSD and psychological effects following a Transient Ischaemic Attack (TIA).

A TIA is caused by a temporary blockage of blood supply and oxygen to the brain. The initial symptoms are like a stroke, which can include limb weakness and sensory and speech changes. The symptoms of a TIA appear to go away within 24 hours, unlike a stroke where symptoms can be longer-lasting. Despite this, a TIA is a frightening experience. In TIA services, patients will attend a one-day clinic, get physical health tests and advice relating to lifestyle, and are often discharged with no further support. However, stroke patients often receive further care, which can include inpatient stays and psychological support. However, research has indicated TIA patients do have longer-lasting psychological aftereffects, which include symptoms of PTSD, anxiety, and depression.

At present, the research on TIA and what may contribute to such ongoing psychological distress is sparse. It is indicated that how people think about the event, and their coping style may be important factors.

The researchers are interested in:
• Do people experience PTSD symptoms and mood problems after a TIA?
• What factors relate to the development of PTSD symptoms and mood problems after a TIA?

If we can identify which factors contribute to the development of psychological distress, it could lead to targeted psychological interventions being incorporated into services and raise awareness that patients have longer-lasting symptoms.

We plan to recruit at least 55 participants from TIA clinics and social media to complete self-report questionnaires. Questionnaires will be completed once and take 30 - 45 minutes to complete. The study is funded by the University of Nottingham.

Commented [CW1]: The answer to this, based on Kiphuth et al. (2014), is that some (~30%) do

Feedback from NSRPG
12 November 2023

TG - I've taken a look through Cloe Webb's documents and I must say I can't really find anything to criticise. In fact I feel she has done a very good job. But, I feel obliged to make some comment.

In the 'possible disadvantages and risks…' section of the Participant Information Sheet I was surprised to see that she mentions the risk of discomfort from viewing a screen if questionnaires are filled in on line. I guess this is rarely pointed out and many, if not most, people would think it too trivial to mention. I liked the fact it is mentioned; the fact that such a trivial risk is mentioned would reassure me that no more substantial risk is likely to have been overlooked.

The second line of the Lay Summary ends—include re-. \I regard this as an awkward line break. I think the remedy is to force a line break after the word include which will result in:

…symptoms, which include
re-experiencing…

The only other part I had any issue with was the bulleted list in the 'What will Happen to Me if I take Part' section.
The second bullet ending — 17 questions, and the fifth a sixth bullets ending — 28 questions and — 9 questions respectively are easily understood.
But I am not clear what the first number refers to in the other bullets which have: 7 — 7and 9 — 9 questions.

I have just one more comment: I think the section at the bottom of the Consent to Contact Form is too cramped to easily fill in the requested contact information. You would require neater handwriting than mine. And if there are only two choices of contact method you could have two boxes with just one to be ticked to indicate preferred method.

To gain the extra space needed could you reduce the size of the University and NHS logos at the top of the page?

Confidential
Appendix: Stroke Research Partnership Group – 31 July 2023 Meeting Feedback from Group

Does Coping affect Post-Traumatic Stress Disorder (PTSD) and Mood Problems in People after a Transient Ischaemic Attack (TIA) – Chloe Webb, Clinical Psychologist

First year clinical psychologist on doctorate programme based at Universities of Nottingham and Lincoln. Joint role where we have placements in Adult Clinical Mental Health teams, learning disability services, child placements doing psychological therapy. The other half of role is research including into PTSD and TIA.

Project is looking at whether PTSD is prevalent after a TIA and whether or not that affects anxiety and low mood in patients and if how someone copes with PTSD has an impact. Looking for a target where we can intervene with services.

A Transient Ischaemic Attack (TIA) is caused by a temporary blockage of blood supply and oxygen to the brain. The initial symptoms are like a stroke, which can include limb weakness and sensory, speech and vision changes. It's said that the symptoms of a TIA go away within 24-hours, unlike a stroke where symptoms can be longer lasting. Despite this, a TIA is a traumatic, frightening experience, and can be an indication of a person having another stroke.

In TIA services, patients will attend a one-day clinic, get physical health tests and advice relating to lifestyle, and often discharged with no further support. They are expected to cope and return to everyday life. However, stroke patients often receive further care, which can include inpatient stays and psychological support. Research has indicated TIA patients do have longer-lasting after-effects, which have included symptoms of anxiety, depression, and post-traumatic stress disorder (PTSD).

As an area it's under-researched. Stroke and TIA are combined together often in research, so it's difficult to see what the impact of a TIA is for patients because it's combined with other diagnoses. Because a TIA is very sudden in nature it can be very frightening for people, but enough to induce PTSD in patients, so it could be under-recognised.

Up to one in 5 people after TIA meet the threshold for PTSD, so quite high. Important area that's not researched at all.

Through another literature review project has found that patients who had a TIA and have PTSD their psychological outcomes are worse – higher rates of anxiety and low mood and maladaptive coping style leading to a reduced quality of life.

Coping refers to thoughts and behaviour changes which come from how a person manages stress. Different coping styles include problem, emotion, and avoidant – focussed coping. It's been found coping impacts outcomes in stroke patients; however, it's unclear, and has not been specifically looked at in TIA.

How someone copes with a TIA might be the link between whether someone interprets a TIA as a traumatic event might prevent psychological difficulties later down the line.

Plan to measure through self reported questionnaires anxiety, low mood, coping and PTSD levels.

If found that PTSD relates to mood, and coping style affects this, it would raise awareness that patients have unnoticed longer-lasting psychological symptoms. This could lead to more psychological interventions into services.

For the study (funded by the University of Nottingham), we plan to recruit around 78 participants from TIA clinics to complete questionnaires relating to mood, PTSD and coping

style. Questionnaires will be completed once and take approximately 45-minutes to complete.

Study is interested in:

- Is PTSD experienced by TIA patients?
- Are PTSD and mood problems related?
- Does coping style make a difference?

Questions for the group:

1. How do you think questionnaires would be best completed?
2. How do you think is the best way to get people involved in the study? E.g., online, adverts, nurses asking in TIA clinics?
3. Idea of looking earlier in the patients journey to assess whether how people think about the TIA affects whether patients develop PTSD. Do you think this would be more useful than focusing on after the TIA?

Observations from NSRPG

RG – Are you trying to find out if they have PTSD? What type of questions?
Questionnaires that have been validated already and used in primary care to measure four different areas.

RG – A clinical psychologist would have a checklist to refer to to ask the patient and help them make a diagnosis?
PTSD questionnaire has 17 questions on a scale from not at all or all the time eg trigger reminded you of the TIA. After completing, you get a score and then if someone meets a cut off for PTSD symptoms that would indicate if they meet a diagnosis or not. More an indicator rather than a formal diagnosis.

FH - What treatments do you have depending on the results? If someone is shown to have a traumatic event, how do you treat it?
A: If we found that a lot of TIA patients meet the PTSD cut off that would highlight there is a need that's not currently being focused on in services at all. It could lead to interventions for education about why a TIA might cause someone to have anxiety and PTSD response after. Highlighting the need to inform interventions, because for TIA there is nothing. Could determine a gap. More about highlighting the need to inform interventions.

AP – Good idea. Good to get as much psychological support and assessment as possible. In terms of completing the form, I think you should ask the person filling the form in. They may not want to do with family members or other people around them or they may be completely happy with that. But I think it's finding out how it's best for them to do it. So ask the question is my advice. Or they may need a member of staff to support them with it.

I had no psychological assessment or support and nor did the people within the hospital either even after a stroke. I don't think there's enough psychological support or emotional support going forward for people having a stroke or TIA. I think to have it after TIA is important but also think it needs to go more into wards for full stroke as well. I saw that people couldn't access other services because of their depression and anxiety they were feeling. They were unable to engage in physiotherapy or other therapies and treatments because of their low mood and depression.

AP - In terms of filling in the form ask What's best for you?

AP - Important throughout all stroke services.

CW - After care for both TIA and stroke is focused heavily on physical side and often the psychological element is a bit neglected. Definitely an area that needs more research.

CW - Ties into how best to recruit patients. Questionnaires posted to return in prepaid envelope? Email link with auto response? Client preference depending on how they feel comfortable completing it - to use the best method.

AP - May be over phone for some people as well. Otherwise there is a whole demographic of people who don't use tech.
A: Yes. I would not want to make it inaccessible for lots of people. I need to be as flexible as possible.

RG – If you attend a GP with low mood you can self refer via GP to CBT or talking therapy (eg Just Talk).
Can self refer via the GP if feeling low mood. But also for some who are feeling low and really anxious it might prevent them from making that step to go to the GP and ask for help. In the first place if we can try to help people are the earliest point we can it might stop ongoing or further anxiety or low mood.

SB – mental health services for older people. I became very conscious of was the amount of unrecognised cognitive change. I agree the whole aspect of anxiety and PTSD is very important. At some point you need to think about and listen to carers as well about mild cognitive impairment post TIA because that has quite a powerful influence on anxiety and depression as well.
A: Yes. I think there may be another trainee doing more research on the cognitive side as well. It is something to bear in mind through recruitment.

NC - When were you planning to evaluate after TIA? At what stage after a TIA do you plan to send out questionnaires?
A: Plan to go through NHS ethics Sept / Oct and once that's been approved start recruiting asap. In terms of how long after the TIA diagnosis, we will try to account for people who had anxiety, low mood or PTSD before the TIA. That could impact the results after. We will try to catch people in the scale of 3 months since their TIA. And allow for 1 week after to account for the initial shock to the TIA. If we did a PTSD measures on the day it's probably not going to be very accurate. Try to be as flexible as possible but not leaving it too long afterwards.

Recruitment – how best to go about it? [redacted] has recruitment officers who would go into the TIA clinics and would tell people about the ongoing research that's happening and inform them of the study. Best to have adverts around. Self refer to study? Nurses speaking about study?
FH - Recruitment people are quite good. People in hospital recently were very effective in recruiting. They would bring round available research projects and asked patients one-to-one if they want to be involved. It was very effective.
I will use them to try to spread awareness about it and then contact people to inform them more about it.
FH – It would useful to inform them / have details on the stroke ward.

HT – if more moderate to severe stroke survivors, questionnaires would need to be set out differently to be more accessible. Mentioned because trauma after stroke was touched on in the discussions.

FH – would yours include minor strokes?
A: We're focusing just on TIA so this was part of the rationale for using those measures, because most TIA patients can complete non-adapted measures. These are published online. I would try to make them more user friendly.

Questionnaires:
BRIEF COPE – Coping strategies
PCL-S - PTSD
GAD-7 - Anxiety
PHQ-9 – Mood

Post meeting observations
TG - My first thought was that although I could decode PTSD, I don't really understand how PTSD is diagnosed. It must surely be rather more than anxiety and depression. Taking a look at the questionnaire(s) will presumably teach me what this involves. I would still have liked a short paragraph near the beginning of the lay summary defining PTSD in this

context. The first paragraph describes TIA; a second paragraph similarly describing PTSD would be useful.

There was a little discussion of when after a TIA a person might be approached to complete a questionnaire. My thought was that soon after a TIA the person might well feel too tired to complete a long (~ 45 minute) questionnaire. This seems to me to be a classic example of Catch-22 —the persons experiencing poor mood, anxiety and depression being both the group which might be expected to have the most to gain from any intervention and the least likely to fill in the diagnostic questionnaire. My TIA was quickly overlain by a full-blooded Stroke exactly seven days later.

HT - Time to complete questionnaires – would this lead to survey fatigue?
Would a psychologist be available to go through the questionnaires together?
Would carers be involved?
Could project be expanded beyond TIA as people who've had a stroke are likely to have similar after-effects?
Do you have a process in place for referral if respondents are high on PTSD measures (or anxiety/low mood scales)?
Are resources in referral services such as IAPT available? What if wait lists are lengthy?
What if patients can't afford private psychotherapy?
Have you liaised with any psychotherapy services for study design?

GR (virtual) - My husband didn't have a TIA but I think some people who experience them would be concerned about having another or an actual stroke so help in learning how to deal with this 'fear' would be desirable.

HT - I have a friend who experienced a haemorrhagic stroke in February with left side paralysis/weakness, visual impairment and some incontinence, who was making fairly positive progress with physiotherapy at home. He had a TIA in early August which his wife and visitors witnessed. He temporarily couldn't find the right words, his eyes looked glazed and he got hot. By the time he was taken to [redacted] his speech had returned and he wasn't showing any of those symptoms. A CT scan didn't show any further problems. He was referred to the TIA clinic where a TIA was confirmed. I think he and his wife and his visitors found the experience traumatising and it will have made them more nervous that there is potential for further episodes.

Summary
Group felt this is an important research study
Group agree more psychological support and assessment is needed
Listen to carers as well about mild cognitive impairment
CW will aim to make questionnaires more user friendly
Recruitment via [redacted] TIA clinics, stroke ward staff agreed
Questionnaires method to be flexible – ask what best suits patients
If respondents meet the PTSD threshold, consider signposting to treatment
Group would welcome a 6-monthly update and offer advice as study progresses

Action: Circulate questionnaires for group to review and respond HT

Helen Taylor
On behalf of NSRPG
July 2023

Appendix S: Completed CASP checklist to guide design and write-up

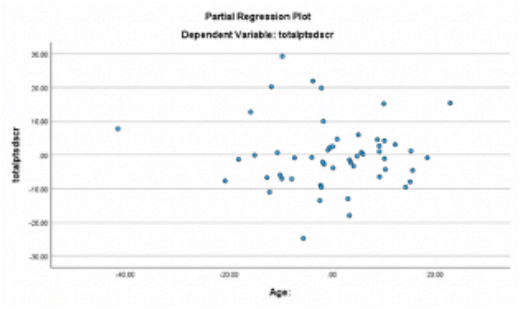
Section A: Are the results valid?	
1. Did the study address a clearly focused issue?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: *A question can be 'focused' in terms of* • *the population studied* • *the risk factors studied* • *is it clear whether the study tried to detect a beneficial or harmful effect* • *the outcomes considered*	
2. Did the authors use an appropriate method to answer their question?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: • *Is a descriptive/cross-sectional study an appropriate way of answering the question* • *did it address the study question*	
3. Were the subjects recruited in an acceptable way?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: *We are looking for selection bias which might compromise the generalisability of the findings:* • *Was the sample representative of a defined population* • *Was everybody included who should have been included*	
4. Were the measures accurately measured to reduce bias?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: *Look for measurement or classification bias:* • *did they use subjective or objective measurements* • *do the measurements truly reflect what you want them to (have they been validated)*	
5. Were the data collected in a way that addressed the research issue?	☒Yes ☐ No ☐ Can't Tell

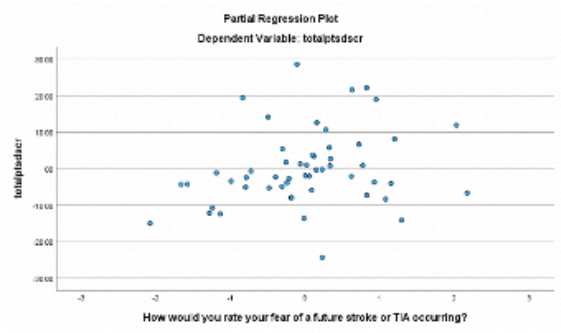
CONSIDER: • *if the setting for data collection was justified* • *if it is clear how data were collected (e.g., interview, questionnaire, chart review)* • *if the researcher has justified the methods chosen* • *if the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews were conducted?)*	
6. Did the study have enough participants to minimise the play of chance?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: • *if the result is precise enough to make a decision* • *if there is a power calculation. This will estimate how many subjects are needed to produce a reliable estimate of the measure(s) of interest.*	
7. How are the results presented and what is the main result?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: • *if, for example, the results are presented as a proportion of people experiencing an outcome, such as risks, or as a measurement, such as mean or median differences, or as survival curves and hazards* • *how large this size of result is and how meaningful it is* • *how you would sum up the bottom-line result of the trial in one sentence*	
8. Was the data analysis sufficiently rigorous?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: • *if there is an in-depth description of the analysis process* • *if sufficient data are presented to support the findings*	
9. Is there a clear statement of findings?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: • *if the findings are explicit* • *if there is adequate discussion of the evidence both for and against the researchers' arguments* • *if the researchers have discussed the credibility of their findings* • *if the findings are discussed in relation to the original research questions*	
10. Can the results be applied to the local population?	☒Yes ☐ No ☐ Can't Tell

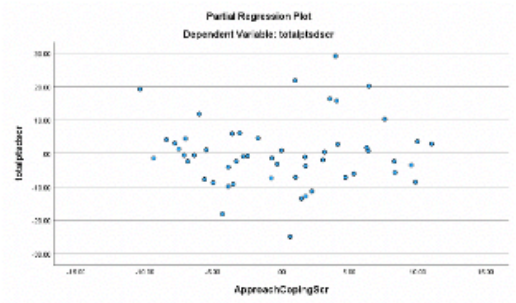
CONSIDER: • *the subjects covered in the study could be sufficiently different from your population to cause concern.* • *your local setting is likely to differ much from that of the study*	
11.How valuable is the research?	☒Yes ☐ No ☐ Can't Tell
CONSIDER: • *one descriptive/cross-sectional study rarely provides sufficiently robust evidence to recommend changes to clinical practice or within health policy decision making* • *if the researcher discusses the contribution the study makes to existing knowledge (e.g., do they consider the findings in relation to current practice or policy, or relevant research-based literature?)* • *if the researchers have discussed whether or how the findings can be transferred to other populations*	

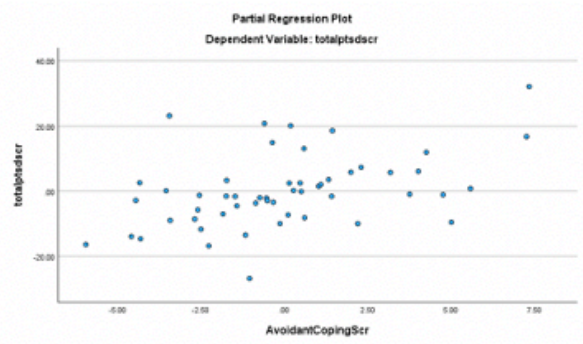
Appendix T: Scatterplot outputs for MLR assumptions

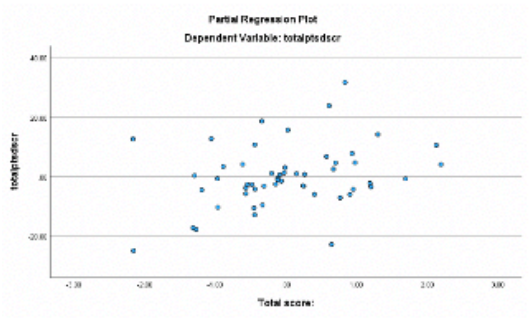
PTSD and predictors (age, fear of a future stroke, approach coping, avoidant coping and posttraumatic cognitions)



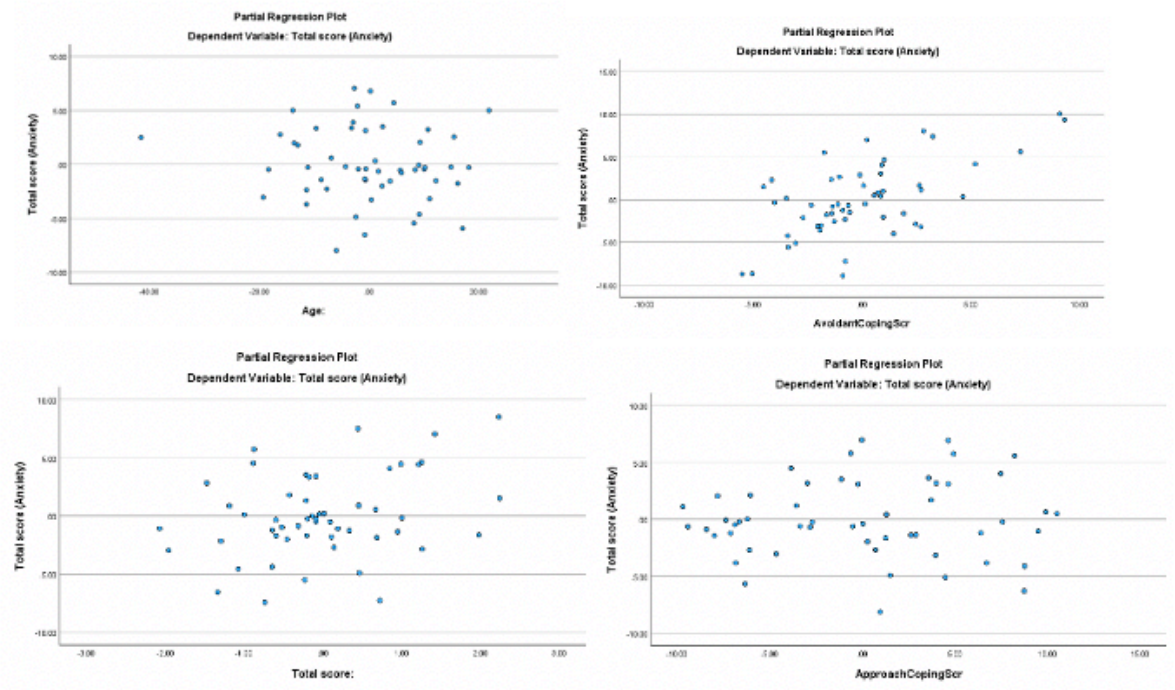




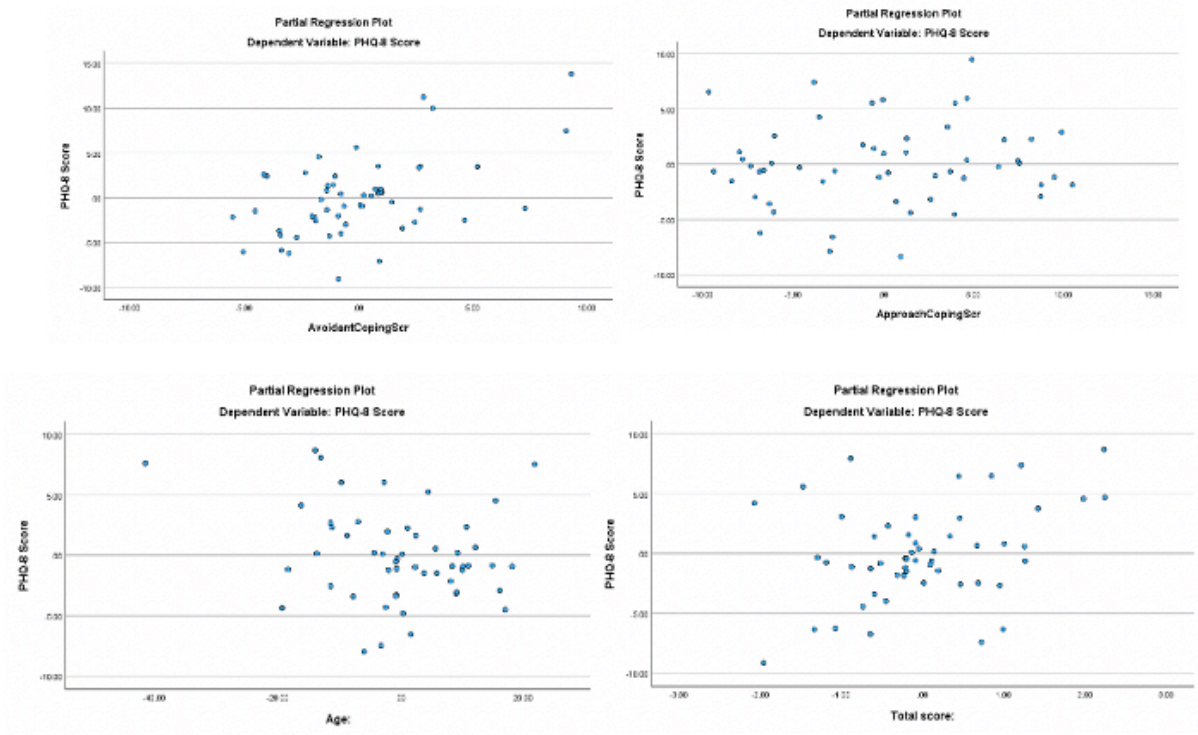




Anxiety and predictors (age, avoidant coping, approach coping and posttraumatic cognitions)



Depression and predictors (age, avoidant coping, approach coping and posttraumatic cognitions)



Appendix U: Disability and Rehabilitation journal guidelines

https://www.tandfonline.com/action/authorSubmission?show=instructions&journalCode=idre20

POSTER

Exploring factors relating to Post-Traumatic Stress Disorder (PTSD) and Mood Problems in People following a Transient Ischaemic Attack (TIA)

Chloe Webb, Dr Eirini Kontou, Dr Shirley Thomas & Dr Michael Baliousis
Trent Doctorate in Clinical Psychology

Background

- TIA and stroke may initially present with similar sudden, frightening symptoms[1].
- TIA increases the risk of a future stroke[2].
- Physical symptoms of a TIA are said to resolve within a 24-hour period[1].
- Minimal research has indicated that there can be ongoing residual psychological effects, including Post-Traumatic Stress Disorder (PTSD)[3] anxiety and depression[4] post-TIA.
- Studies often combine stroke, minor stroke and TIA diagnoses together which has made drawing conclusions challenging.
- Although research has indicated people experience psychological difficulties akin to stroke following TIA[5], recovery pathways and provisions are vastly different[6]. Within the UK, there are no psychological provisions, unlike stroke which has clear stepped care guidelines[7].
- Psychological needs post-TIA are potentially going unrecognised, and inadequate support is in services.
- Psychological models hypothesise individuals who develop psychological problems is due to the cognitions and appraisals individuals have in response to the event[8], alongside how they cope[9].
- Maladaptive and avoidant coping strategies have been found to be significant factors in the development of psychological difficulties post-stroke and TIA[10,11]. The role of cognitions has been less evidenced, but significant in post-stroke PTSD[12].
- Understanding what factors influence the development psychological distress post-TIA is important to establish unmet need, influence clinical pathways, and uncover potential targets for interventions.

Aims

- Are PTSD and mood problems (anxiety and depression) present three months post-TIA?
- What factors relate and predict the development of PTSD and mood problems following a TIA (focus on coping and posttraumatic cognitions)?

Method

Design

- Cross-sectional quantitative design
- One-time survey completion via online or post
- Data collected on employment, income, education, living arrangements, fear of future stroke, age, sex, comorbid medical conditions, coping, posttraumatic cognitions, PTSD, anxiety and depression.

Participants

- Dual recruitment approach – social media and NHS TIA clinics
- Adults residing in the UK who had experienced their first TIA in past three months, at least one-week post-diagnosis, able to consent and complete survey in English, did not have a prior diagnosis of PTSD, anxiety or depression, nor were receiving psychological support.

Questionnaires

- PTSD: PCL – Specific[13]
- Anxiety: GAD – 7[14]
- Depression: PHQ-8[15]
- Coping: Brief-COPE[16]
- Posttraumatic Cognitions: PTCI-9[17]

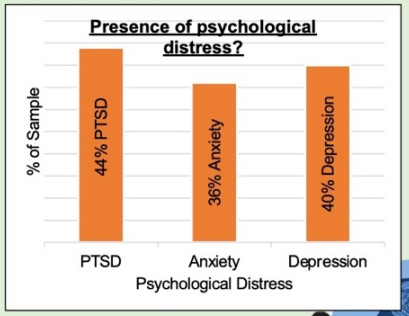
Analysis

- Descriptive Statistics
- Correlations and between group analyses
- Hierarchical multiple linear regressions

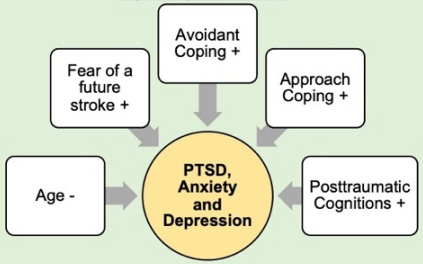
Results

Fifty-five participants took part.

Presence of psychological distress?



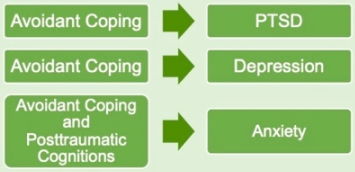
What significantly related to psychological distress?



What impact did PTSD have?

Those with **PTSD had poorer outcomes** for anxiety and depression, had higher levels of avoidant and approach coping and PTCI-9 scores, and were significantly younger.

What Predicted of Psychological Distress?



Discussion

- First UK study to our knowledge to explore PTSD and mood problems post-TIA.
- Psychological distress (PTSD, anxiety and depression) appears to be present, however there is currently no psychological provisions routinely included in TIA aftercare.
- Higher levels of avoidant coping and posttraumatic cognitions were important in the development of psychological distress, aligning with psychological models of PTSD and coping.
- Findings provide insight into potential targets for low-level psychological interventions that could be incorporated within recovery pathways. This could prevent the development of long-standing mental health problems in TIA patients.

Clinical Implications and Future Research

- The need for routine mood screening in TIA clinics.
- Rationale for a large-scale study to develop further evidence for a psychological care pathway to be developed in TIA, similar to stroke guidelines[7].
- Clinicians working within TIA clinics to be provided training on the psychological impact of a TIA. Such knowledge could assist clinicians in making suggestions for further support (e.g., GP, talking therapies or helplines).
- Longitudinal study to build on findings for coping and posttraumatic cognitions and explore how people cope over time.
- Raises awareness of the impact of TIA diagnosis for people affected and their families.
- The need for qualitative research on clinicians' views on TIAs and their aftereffects to inform service pathways.
- Trial intervention study exploring the impact of including self-help resources for PTSD and mood problems to determine if low-level interventions would be beneficial[18].

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