BEN KERSHAW BSc Hons, MSc

AN INVESTIGATION INTO PSYCHOLOGICAL DISTANCING AND ITS IMPACT ON EXECUTIVE FUNCTIONING AFTER STROKE

Section A

The Impact of Psychological Distancing on Cool Executive Functioning: A Systematic Review

7,535 (plus 154 additional words)

Section B

The 'Superhero' Tests of Executive Functioning

7,033 (plus 293 additional words)

Overall word count: 15,015

A thesis submitted in partial fulfilment of the requirements of Canterbury Christ Church University for the degree of Doctor of Clinical Psychology

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SUMMARY OF THE MAJOR RESEARCH PROJECT

Section A

Section A is a systematic literature review investigating the broad phenomenon of psychological distancing and its effects on cool executive functioning performance. The extant literature is searched, relevant studies are then reviewed and critiqued to provide an overview of the current research in this novel field. The research question asks, “What impact does psychological distancing have on cool executive functioning performance?”. Gaps in the literature and recommendations for research and clinical practice are discussed.

Section B

Section B is an empirical paper extending the application of psychological distancing theory to a clinical population, namely stroke survivors. The ability to psychologically distance oneself from one’s usual ‘here and now’ perspective may be particularly applicable to those who have experienced stroke. A mixed-methods design was employed to investigate whether creating psychological distance through role-taking impacted stroke survivors’ ‘inhibition’, ‘cognitive flexibility’ and ‘working memory’ performance. Participants also provided qualitative feedback on their experience and thematic analysis was used to build an understanding of how this novel strategy may be applicable to life after stroke.

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THE IMPACT OF PSYCHOLOGICAL DISTANCING ON COOL EXECUTIVE FUNCTIONING: A SYSTEMATIC REVIEW

MAJOR RESEARCH PROJECT

PART A

WORD COUNT: 7535 (plus 154 additional words)

Abstract

Psychological distance is the subjective experience of perceived ‘distance from’ or ‘closeness to’ events or situations. It can be experienced across temporal (soon or later) spatial (close or far), social (similar or dissimilar to oneself) and hypothetical (likely or unlikely) dimensions. Therefore, many ways exist in which one’s psychological distance can potentially be manipulated. Studies to date rarely explore how psychological distance influences cognitive abilities, such as the executive functions, which are widely believed to predict positive outcomes throughout life.

This paper reviewed extant literature investigating the broad concept of psychological distancing and its impact on individuals’ ‘cool’ (affectively neutral) executive function performance. Thirteen studies were reviewed, spanning executive domains of ‘inhibition’, ‘cognitive flexibility’, ‘working memory and attention’, and ‘planning’.

Results indicated that increasing psychological distance may temporarily improve performance, whereas reducing psychological distance may temporarily decrease performance. For non-executive tasks, such as those requiring focused attention, increased psychological distance may be detrimental; a ‘bigger picture’ approach may not benefit tasks where executive control is not required. The discovered body of literature featured limitations pertaining to its rigour, meaning firm conclusions could not be drawn. The studies are critiqued, and research and clinical implications discussed.

Key words: psychological distancing, construal level theory, executive functioning, cognitive performance.

Introduction

There are many psychological factors known to influence cognitive performance, such as mood, stress, motivation and confidence. These dynamic mental processes influence us in ways that, when faced with a task or challenge, can either help or hinder our ability to perform. Even if a biological process occurs (e.g. stress response), it can be assumed that psychological factors, as opposed to more fixed aspects such as natural 'ability', essentially dictate the mindset one approaches tasks with. A construct which has generally received little attention, 'psychological distancing', could offer an opportunity whereby particular mindsets may be able to be induced, ultimately affecting performance. This review aims to bring together two broad concepts from psychology and neuropsychology: 'psychological distancing' and 'cognitive performance', in particular the 'cool' executive functions, to build a better understanding of this field.

The concept of 'psychological distancing'

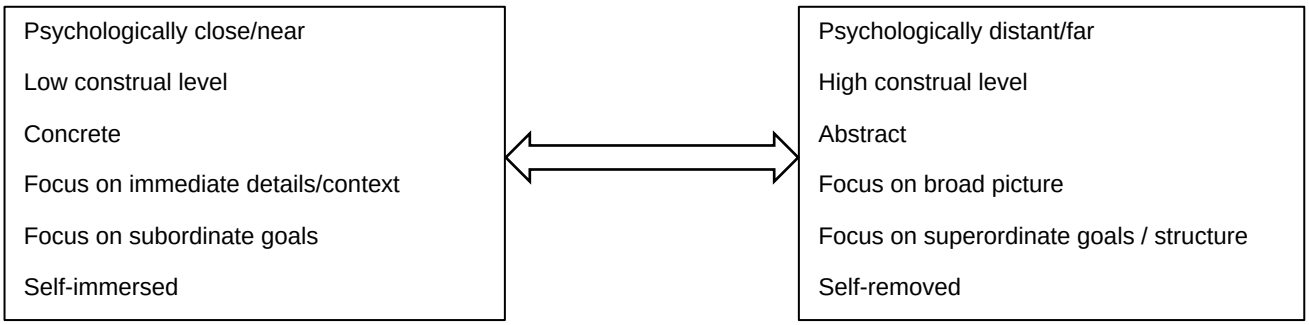
Psychological distance is a *subjective* experience that something is close or far away from the 'self, here and now' (Trope & Liberman, 2010). The impact of psychologically distancing oneself from problems has been found to have emotional benefits. Kross, Ayduk and Mischel (2005) found that mentally representing emotionally difficult experiences abstractly (imagining stepping back from the situation), as opposed to concretely (focusing on the event as if it were occurring there and then), evoked less negative affect. The authors argued that people typically focus on emotional experiences from a 'self-immersed', egocentric perspective, which activates emotionally arousing, 'hot' features and unhelpful ruminations. In contrast, a 'self-

distanced' perspective creates space between the individual and the event, allowing them to focus more on informational, 'cool', features.

Psychological distance and construal level theory

Construal level theory (Trope & Liberman, 2003; Liberman & Trope, 2008) explains how mental distance from our direct and immediate experience of objects or events is created by processing information more abstractly. An object's perceived distance (near/far) from oneself leads to it being naturally construed at a certain level (low/high), and this effect is automatic (Bar-Anan, Liberman, Trope & Algom, 2007). Psychologically 'close' events are represented at a *low* level of construal, which is generally short-term, detailed, focusing on subordinate goals and changes with context. Psychologically 'distant' events are represented at a *high* level of construal, which is generally long-term, captures the 'gist' of the situation, focusing on superordinate, overarching goals (Trope & Liberman, 2010). Viewing a situation from a high level of construal by definition increases one's psychological distance from it, and vice versa. Furthermore, it is not possible to avoid psychological distancing. On some level, we experience a degree of 'distance from' or 'closeness to' all objects and events. The question is whether one is approaching them from a psychologically 'close' (self-immersed) or 'distant' (self-removed) mindset.

Figure 1. Examples of how psychological distance and construal level theory interact on a continuum



Trope, Liberman and Wakslak (2007) proposed that events can be experienced as psychologically close or distant across different dimensions, based on their features of perceived:

- **Time:** events in the distant future are represented in a more abstract, structured manner, whereas events in the near future are more contextualised with more emphasis on immediate features.
- **Space or proximity:** events that appear to be happening physically closer are represented as more concrete whereas events occurring further away are represented as more abstract.
- **Social distance:** the less similar a person is to oneself, the more psychologically distant they seem. For example, the experience of having power over others appeared to increase psychological distance from them (Galinsky, Gruenfeld & Magee, 2003; Smith & Trope, 2006).
- **Hypotheticality:** the perceived likelihood of an event occurring affects how distant it seems. Highly probable events will be perceived at a low (close) level of construal, whereas events which are improbable are perceived at a high construal level (further away).

Distancing using construal levels

Altering psychological distance involves changing the level at which an event is construed (Liberman, Trope & Stephan, 2007), and this can be achieved in numerous ways. Stephan, Liberman and Trope (2010) found that students were more polite when giving advice to students they believed were from another city, as opposed to being situated in a nearby building (spatial distance). Manipulating temporal distance, Henderson, Trope and Carnevale (2006) found participants who believed they would be negotiating in one months' time, as opposed to the next day, negotiated more offers and better outcomes for all parties. Fiedler, Jung, Wanke and Alexopoulous (2012) systematically analysed the relationships between the four domains mentioned, finding they positively correlated with each other. Although the concept of construal levels can appear complex, their findings suggested this group of dimensions, at least, share the underlying stable construct of psychological distance.

A commonly used method of priming individuals with an abstract or concrete mindset is asking *'how or why'* questions, based on the 'mindset-induction' manipulation (Freitas, Gollwitzer & Trope, 2004). Individuals are asked to think of *why* (i.e. abstract process) or *how* (i.e. concrete process) to *'improve and maintain health'*. Participants provide four answers which increase or decrease their level of abstraction. For example, "Why improve and maintain health?" – "to be fitter" – why? – "to feel better", and so on. The premise is that focusing on increasingly abstract (or concrete) answers primes one to approach tasks with an abstract (or concrete) mindset.

Psychological distancing, and the level of abstraction at which we perceive situations, can theoretically be manipulated in several ways. Current research has highlighted a range of diverse methods whereby individuals perform tasks while being encouraged to distance themselves from their immediate, self-immersed perspective. This process has been shown to affect a number of outcomes relating to how we function day-to-day.

Distancing through role-taking

Role-taking is another example of how psychological distance is manipulated. Individuals transcend their direct experience of themselves by temporarily 'becoming' someone else. White and colleagues (2016b) asked 4-6 year olds to take the role of either: 'themselves' (self-immersed), 'third-person' (increased distance) and 'exemplar other' (furthest distance). They were then asked to engage in a 'boring' task for as long as they liked while also having the option to stop and play a more attractive, 'fun' game. It was found that as psychological distance increased, time spent (perseverance) on the boring task increased, and this change was statistically significant between situations. Taking a distanced perspective appeared to help children control their urge to switch to something more fun and taking the more 'distal' roles seemed to strengthen this effect. Brown, Cockett and Yuan (2019) also demonstrated that actors, when speaking as a fictional character as opposed to themselves, showed reductions in brain activity (fMRI). They theorised that this deactivation-driven process perhaps represented a temporary 'loss of self' and suggested there may be a neurological basis to the distancing effect of role taking.

Distancing through identifying with others

Like role taking, identifying with another may enable individuals to create psychological distance between themselves and tasks. For example, clothing or outfit (and its symbolic meaning) may also affect how we think and behave by binding us to certain perceived characteristics. Frank and Gilovich (1988) found that in sport, wearing the colour black increased aggression and penalties conceded. Impartial observers also perceived teams in black kits to be more 'malevolent' and rated them as more aggressive, suggesting there may be a 'self-fulfilling prophecy' effect. Lopez-Perez, Ambrona, Wilson and Khalil (2016) also found that participants identifying the tunic they wore as 'nursing scrubs' reported higher empathic concern and offered more help in a punctual scenario than those who identified it as a 'cleaner's apron'. To extend this idea, the symbolic meaning behind *items* we use may also bring performance benefits. For instance, Lee, Linkenauger Bakdash, Joy-Gaba and Profitt (2011) found that amateur golfers performed better at putting when they believed the club they were using had been owned by a recently successful professional. They reported perceiving the hole as larger, and successfully holed more putts, than those who had no such beliefs about the golf club. It seems that identifying with another and their perceived characteristics or skills can temporarily influence individuals' self-concept, affecting their thinking, actions and ultimately, performance.

Virtual Reality (VR) studies have also shown that our perception of the body we inhabit (and its characteristics) can be manipulated. Slater, Spanlang, Sanchez-Vives and Blanke (2010) were among the first to demonstrate a full 'body ownership illusion' through Immersive VR. Although stronger body ownership illusions appear to occur

when the virtual body shares similar characteristics to one's own (Maselli & Slater, 2013), perceiving a VR body which is incongruent to the self has been found to be beneficial. For example, compared to a similar VR body, individuals who experienced themselves 'as Sigmund Freud' were more able to detach from habitual ways of thinking and find helpful cognitive solutions to their emotional difficulties (Osimo, Pizzaro, Spanlang & Slater, 2015). Something about temporarily 'being' Sigmund Freud appeared to enable them to access ways of thinking that were once inaccessible. This growing field appears to demonstrate that increasing psychological distance between oneself and tasks, by experiencing oneself 'as another', influences how they are approached.

Distancing through perspective taking

Taking another's perspective (third-person perspective taking) is thought to increase psychological distance from a first-person viewpoint as it is less similar to one's own (Trope & Liberman, 2010). A review by Wallace-Hadrill and Kamboj (2016) found that the act of *deliberately* adopting a third-person perspective was associated with a reduction in affective intensity and facilitated emotion regulation. In contrast, *spontaneous* adoption of a third-person perspective may lead to dysfunctional avoidance, maintaining psychopathology (Wallace-Hadrill & Kamboj, 2016). Libby, Schaefer, Eibach and Slemmer (2004) also found that people who imagined going to a polling station from a third-person perspective were significantly more likely to later turn up to vote than those who had imagined it from the first-person perspective. It appears that taking a different perspective helps individuals 'see' things differently, as if placing physical distance between themselves and situations. As a distancing

strategy, evidence suggests this may have a strong influence on emotional and behavioural change.

The link between psychological distancing and outcomes

The evidence presented so far demonstrates that psychological distancing can influence how individuals approach emotional, social and behavioural aspects of their lives. It seems logical that, in order for individuals to exert an increased or decreased level of control over their thoughts and actions, psychological distancing must have an impact on their cognition. Current research investigating the role of psychological distancing on cognition mainly focuses on how individuals *process* information. For example, decreasing an event's probability led to focusing on more abstract, general features (Wakslak, Trope, Liberman & Alony 2006), words with congruent psychological distances (e.g. 'near' and 'friend') may be processed more quickly (Bar-Anan, Liberman, Trope & Algom, 2007), and enhancing participants' feeling of power over others led to more abstract processing of stimuli (Smith & Trope 2006). This evidence has been particularly valuable to many fields such as cognitive science and consumer behaviour. However, fields of clinical- and neuro- psychology may, in general, focus more on cognitive domains directly impacting individuals' functional outcomes. The family of cognitive processes most widely associated with exerting effortful control over thoughts and actions are believed to be the 'executive functions'.

Executive functioning

'Executive functioning' is an umbrella term used to describe a cluster of cognitive processes required for complex skills such as exercising self-control, multi-tasking and

responding flexibly to novel situations. These higher-order functions are thought to primarily recruit prefrontal regions of the brain and enable us to exert top-down, conscious control over thoughts and behaviour (Miller & Wallis, 2009). Executive functioning abilities have been shown to support many important aspects of everyday life including mental health (Snyder, Miyake & Hankin, 2015), physical health (Crescioni et al., 2011; Miller, Barnes & Beaver, 2011), quality of life (Brown & Landgraf, 2010), school and job success (Pascual, Munoz & Robres, 2019; Chan, Wang & Ybarra, 2018), marital harmony (Eakin et al. 2004), and social problems (Hughes, Dunn & White, 1998).

The seemingly complex underlying processes supporting executive functions are much debated (Chan, Shum, Toulopoulou & Chen, 2008) and lack definition. One skills-based conceptualisation is that executive functioning has three key domains: Inhibition, Working Memory and Cognitive Flexibility (Miyake et al., 2000; Lehto, Juujarvi, Kooistra & Pulkkinen, 2003). These effortful processes enable the control and direction of more automatic cognitive functions, such as attention, allowing the direction of action towards goals (e.g. organising a holiday, or assembling flat-pack furniture).

Executive functions can be classified into ‘hot’ and ‘cool’ categories (Poon, 2017; Zelazo & Carlson, 2012). ‘Hot’ functions refer to emotionally driven processes such as interpreting and regulating social behaviour, or delaying gratification. On the other hand, ‘cool’ functions are more cognitive in nature and not thought to be influenced by emotions, such as mechanistic planning, verbal fluency and problem solving (Chan et

al., 2008). To illustrate, impairments in hot executive functioning may lead to risky decisions, or interpersonal difficulties such as regularly interrupting others. Those with impairments in cool executive functions may forget instructions, make careless mistakes, or repeatedly try the same unsuccessful solution to a problem. The notion of completely separable hot and cool executive abilities is dubious (Tsermentseli & Poland, 2016). Assuming all behaviour involves at least some emotional component to drive them (Gorman, 2004), 'cool' executive tasks may also benefit from psychological distancing. In addition, it is extremely helpful to understand cognitive functions in 'affectively neutral' situations as this likely reflects the environment of most day-to-day activities. Furthermore, as they rely less heavily on emotional state, altering psychological distance may have more of a 'pure' influence over the 'cool' subset of executive functions.

This review

Evidence stated so far has highlighted how psychological distancing can affect 'hot' executive functioning performance (e.g. emotion regulation). The question of how psychological distancing affects 'cool' executive functions has received little attention to date and forms the aim of this systematic review. There is little within the literature to suggest that psychological distancing *only* impacts 'hot' executive tasks. This review aims to investigate whether altering psychological distance also influences performance on 'cool' executive tasks. The main question asked is, "What impact does psychological distancing have on cool executive functioning performance?".

Method

Literature search

Relevant studies were sought by electronically searching the databases: Web of Science, MEDLINE, PsycINFO and PsycARTICLES. Google was also searched for grey literature not published in peer reviewed journals. The review question included two parts:

1) ‘Psychological distancing’ (or its equivalent concept)

The concept of ‘psychological distancing’ is broad, therefore an iterative process was employed in which papers were first systematically searched using the term. From these papers, seminal constructs and terminology used to study, explain or define the experience of psychological distancing were extracted and used to generate further search terms.

2) ‘Cool executive functioning performance’

‘Cool executive functioning performance’ was defined as cognitive task performance that is impartial, without an emotional influence on the individual.

No restrictions were placed on the date range, type of article or research methodology used. Through further iterative process, there was found to be a great deal of crossover terminology and theory between these broadly defined terms. Although finding that these fields appeared theoretically related was positive, there was also a significant amount of irrelevance. The ‘NOT’ Boolean function was therefore applied systematically to exclude related but imprecise fields which were not-of-interest to this

particular review, such as ‘consumer marketing’ or ‘information technology’. The search terms and Boolean operations used were as follows:

1) “psychological distanc*” OR “self distanc*” OR “construal level theory” OR construal OR “body ownership” OR clothing OR “role play” OR “role playing”[1] OR “third person perspective”.

NOT computer OR limb OR therapy OR consumer.

AND

2) cogniti* OR “executive function*” OR inhibition OR “self control” OR attention OR “working memory” OR visuospatial OR planning OR fluency OR “processing speed”.

NOT “emotion regulation” OR autobiographical OR biolog* OR episodic OR gambling

Inclusion/exclusion criteria

The aim was to find studies which had measured individuals’ executive functioning when their level of perceived psychological distance had been temporarily manipulated.

Studies were *included* if they:

- Used human participants of any age, healthy or from a clinical population.
- Manipulated participants’ psychological distance temporarily (for only the duration of the experiment).

[1] “role play” and “role playing” added separately instead of “role play*” as many studies use the phrase “the role played by … “

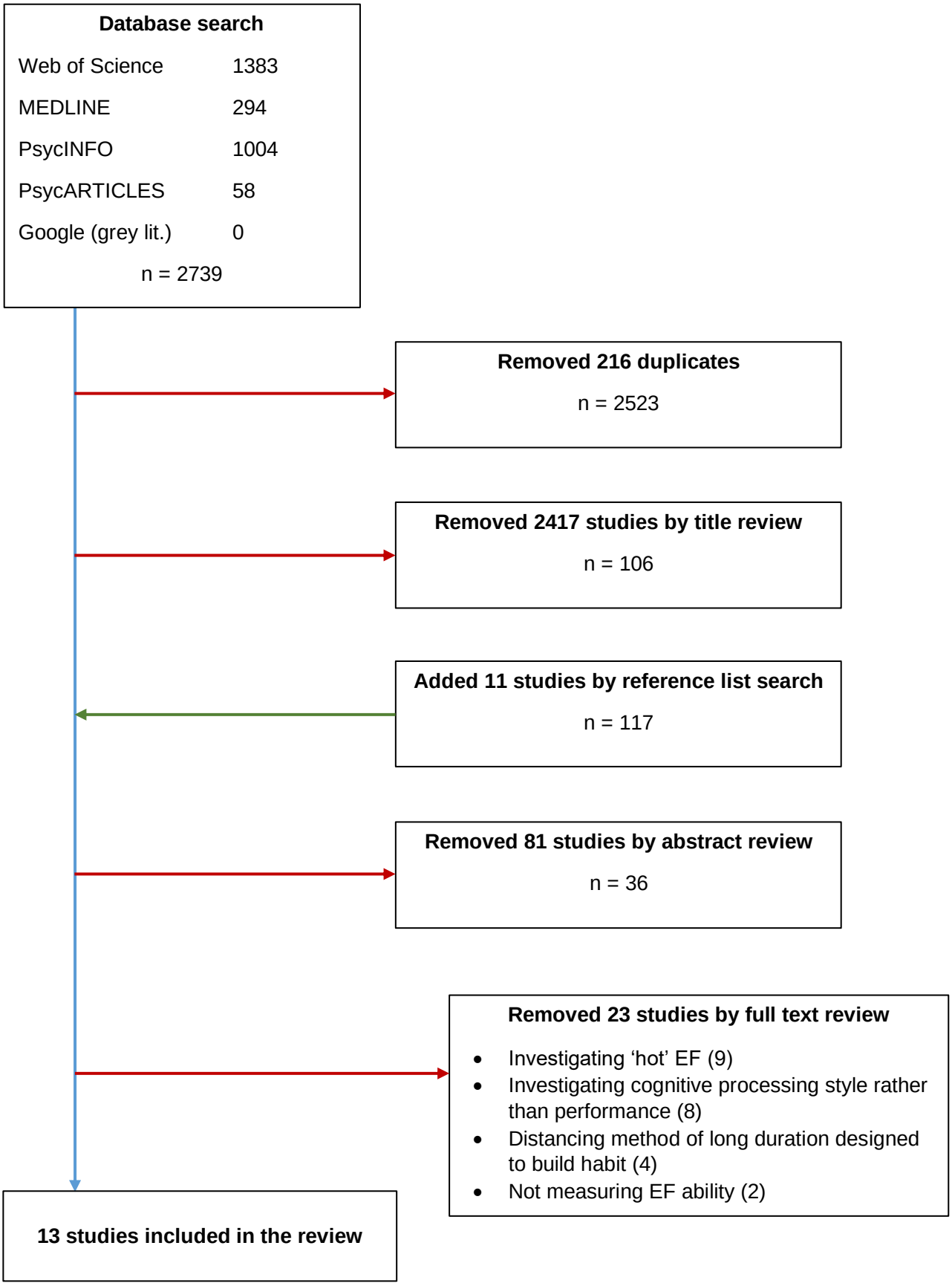
- Measured participants' 'cool' executive functioning ability (without an emotional component) in an objective way.
- Produced original data, as opposed to analysing data from previous studies.
- Were written in English.

Studies were *excluded* if they:

- Used a longer-term psychological distancing method designed to be trained as a habit (e.g. a mindfulness training course)
- Investigated the impact of psychological distance on cognitive 'processing style' which was not considered a single entity of cool cognitive performance (e.g. a preference or perception).
- Used psychological distancing to influence emotions or emotion regulation.
- Only measured hot executive functioning (such as delaying gratification).

Studies were then imported to the computer programme, RefWorks. Duplicates were removed and titles screened for relevant studies. Reference lists were hand searched for potentially relevant papers and added to the pool of screened when found. The above eligibility criteria were used throughout the review of the abstracts and a full text review of the remaining studies.

Figure 2. Search process



Findings

There were thirteen studies included in the review, published between 2004 and 2019. Twelve adopted quantitative methodologies, in addition to one comparative control case series study using two participants. Though no studies were excluded based on the methodology used, no qualitative or mixed-method designs met the other entry criteria for the review. Five studies included multiple experiments which have been highlighted numerically in Table 1. Overall, there were a large number of between-participant studies (n=11) compared to those that incorporated a within-participant design (n=2).

The most common method of psychological distancing was priming individuals' mindset before completing the cognitive tasks. Priming occurred on different dimensions: abstraction, temporal, social (experience of power), proximity and level of self-objectification. Other methods of psychological distancing included: role-taking, wearing specific clothing and taking a third-person perspective.

The measures of executive functioning by domain were defined by authors as follows:

- Inhibition: Stroop (Stroop, 1935), NEPSY-II (Korkman, Kirk & Kemp, 2007).
- Cognitive Flexibility: Minnesota Executive Function Scale (Carlson & Zelazo, 2014), Dimensional Change Card Sorting (DCCS; Zelazo, 2006), flexible problem solving questions (Schooler, Ohlsson & Brooks, 1993), fluency and creativity were measured by independent raters for two studies (Jia, Hirt & Karpen, 2009; Förster, Friedman & Liberman, 2004).

- Attention and Working Memory: 2-Back task (Braver et al., 1997), Stop-Signal Task (Logan, 1994), visual search task (Pomplun, Reingold & Shen, 2001).
- Planning and Strategy Formation: Tower of Hanoi (Goel & Grafman, 1995), Tower of London (Shallice, 1982), Key Search (Wilson, Alderman, Burgess, Emslie & Evans, 1996).

Table 1. Summary of reviewed studies

Study				**Outcomes**		**Findings**	
ID	**Reference**	**Experiments and design information**	**Sample** Participants (n)	**Psychological distancing method** Task	**Executive functioning domain measured** Task (measurement)	**Effect of psychological distancing on cognitive performance at *p*<.05?**	**Primary findings relating to review question**
1	Smith, Jostmann, Galinsky and van Dijk (2008)	3 relevant experiments	Undergrad. students	**Priming power** **Role taking**			
		Between-participants	1. (n=101)	1. superior vs subordinate	**1. Working Memory** 2-back task (error rate)	Yes	1. Low power group made more errors on 2-back task
			2. (n=72)	**Priming mindset** 2. Scrambled sentences task	**2. Inhibition** Stroop (error rate)	Yes	2. Low power group made more Stroop errors than controls. High power group did not differ to controls. 3. Low power group took more moves to complete Tower of Hanoi task

			3. (n=85)	3. Writing about being in control or under control	**3. Planning/strategy formation** Tower of Hanoi (moves above minimum)	Yes	
2	Chiou, Wu and Chang (2013)	Between-participants 3 groups (2 experimental + control)	Community sample of daily smokers n=102	**Priming mindset** (abstraction) 'how' vs 'why' to maintain good physical health.	**Inhibition** Stroop (Interference) - reaction time difference (ms) between congruent and incongruent trials)	Yes	High construal group sig. less interference than controls Low construal group sig. more interference than controls
3	Quinn, Kallen, Twenge and Fredrickson (2006)	Between-participants 2 groups ('body as object' vs control)	Women at university. (n=79)	**Priming mindset** Self-objectification Wearing swimsuit vs jumper and answering priming questions	**Inhibition** Stroop (reaction times - all trials)	Yes	Those who self-objectified showed significantly longer reaction times than those who did not.

4	Adam and Galinsky (2012)	3 relevant experiments Between-participants	Undergrad. students 1. (n =58)	**Clothing worn** 1. Wearing a lab coat	**1. Inhibition** Stroop (time to complete and error rate)	Yes	1. Group wearing a lab coat made around half as many Stroop errors as controls. Groups did not differ in time to complete task.
			2. (n=74)	2. Wearing a 'doctor's' coat vs 'painter's' coat vs *seeing* (identifying with) a 'doctor's' coat	**2. Working memory (visual)** Visual search task (identifying 4 differences in pictures)	Yes	2. Wearing doctor's coat group found more differences in pictures than painter's coat group and seeing doctor's coat. 3. Wearing doctor's coat found more differences than identifying with a doctor's coat
			3. (n=99)	3. Wearing 'doctor's coat' vs writing about 'doctor's coat'	**3. Working memory (visual)** Visual search task (identifying 4 differences in pictures)	Yes	

5	Burns, Fox, Greenstein, Olbright and Montgomery (2019)	Between-participants	Undergrad. students across 4 sites	**Clothing worn**	**Inhibition**		
				Lab coat vs no lab coat	Stroop (error rate)	No	No effect of lab coat on Stroop error rate
		Replication of Adam and Galinsky (2012) experiment 1	(n=200)				
6	Förster, Friedman and Liberman (2004)	3 relevant experiments	Undergrad. students	**Priming mindset** (temporal)	**Cognitive flexibility**		
		Between-participants	1. (n=35)	1+2. Imagined engaging in a task 'tomorrow' (close) vs 'next year' (distant)	1. Problem solving questions (number correct /3)	Yes	1. Distant condition solved more problems than near condition
			2. (n=52)		2. Generation of creative solutions (independent rater scores)	Yes	2. Distant condition higher scores for creativity
			3. (n=138)	3. Imagine life tomorrow vs next year	3. Generation of creative solutions (independent rater scores)	Yes	3. Distant condition higher scores for creativity

7	Jia, Hirt and Karpen (2009)	2 relevant experiments Between-participants	Undergrad. students 1. (n=65)	**Priming mindset** (proximity) 1+2. Told the task had been designed by students near vs far away	**Cognitive flexibility** 1. Fluency (modes of transport named), Flexibility (number of categories), Originality (uniqueness of answers)	Yes	1. Distant group showed higher fluency, flexibility and originality of responses than 'near' group.
			2. (n=132)		2. Problem solving questions (number correct /3)	Yes	2. Distant group condition solved more problems than 'near' group.
8	White and Carlson (2016a)	Between-participants 2 age groups distributed across 4 distancing conditions	3 year olds (n=48) 5 year olds (n-48)	**Role taking** Self-immersed 3rd person perspective Exemplar other Control (no instructions)	**Cognitive flexibility** Minnesota Executive Function Scale (MEFS) – Early Childhood version (card sorting task)	Yes (for 5 year olds) No (for 3 year olds)	For 5 year olds relative to controls: Exemplar sig. higher scores (effect *d*=0.81) Third-person sig. higher scores (effect *d*=0.40) Self-immersed no sig. difference (*d*=0.12)

9	Veraksa et al(2019)	Within-participants baseline, condition, post-condition 4 groups (3 experimental + control)	5-6 year old children (n=80)	**Role taking** (based on characteristics) Control (no role) Protagonist Villain Sage	**Cognitive flexibility** Progress on Dimensional Change Card Sort (DCCS) **Inhibition** Inhibition task from NEPSY-II (errors and completion time)	Yes Yes	DCCS – those in the Sage group and Control groups performed better from T1 to T2 to T3 Inhibition – those in the Villain, Sage and Control groups improved from T1, T2 and T3
10	Schmeichel, Vohs and Duke (2011)	Between-participants 2 groups (high and low construal)	Undergrad. students (n=99)	**Priming mindset** (abstraction) '*how* vs *why* to pursue a chosen value'	**Attention (focused)** Stop Signal Task – Standard **Working memory (goal maintenance)** -Stop signal task – Delayed	Yes Yes	Low construal mindset group correctly inhibited more items than high construal mindset on standard SST High construal group correctly inhibited more items than low construal on delayed SST

11	Hadar, Luria and Liberman (2019)	2 relevant experiments 1. Within-participants 2. Between-participant	Undergrad. students (n=69) (n=100)	**Priming mindset** (abstraction) '*how vs why* to maintain good physical health' '*how* vs *why* to take part in research studies'	**Working memory (visual)** 1+2. Computerised change-detection task assessing filtering of irrelevant stimuli. (variant from Allon & Luria, 2017)	Yes	1. Concrete mindset showed less ability to filter irrelevant stimuli than abstract mindset. 2. Concrete mindset showed less ability to filter irrelevant stimuli than abstract mindset.
12	Hunter, Phillips and MacPherson (2016)	Case study Observation of Key Search performance. 'CW' (61 years, 'impaired' EF) and 'FH' (75 years, 'intact' EF)	Male patients with right hemisphere stroke (n=2)	**Perspective taking** Administering task from first-person vs third-person perspectives	**Planning/strategy formation** Key Search task (Wilson et al., 1996)	N/A Case observation	CW (impaired EF) showed 'poor' first-person Key Search performance but 'average' during third-person FH (average EF) showed 'average' first-person Key Search performance but 'poor' during third-person

13	Banakou, Kishore and Slater (2018)	Between-participants 2 groups (not controlled)	Healthy males from university campus (n=30)	**Role taking** (Immersive VR) 'Normal VR body' vs 'Einstein VR body'	**Planning/strategy formation** Tower of London task improvement between pre-condition and post-condition scores.	N/A Descriptive only	Improved Tower of London performance for those in Einstein group than controls Those with higher estimated IQ appeared to benefit most from Einstein condition whereas those with lower IQ benefited more from 'normal' condition.

Main body of review

The review of the literature will be presented in sections relating to how psychological distancing was found to influence four areas of executive functioning: 'inhibition', 'flexibility', 'attention and working memory' and 'planning and strategy formation'. Although the search process placed no restrictions on design, all studies adopted quantitative methodologies. As such, quality appraisal was guided by a framework for critiquing quantitative literature (Jack et al., 2010). Key limitations to studies are commented on throughout.

Inhibition

Six studies investigated how psychological distancing impacted inhibition. This refers to individuals' ability to suppress a planned thought or action (Logan, 1994) and is thought to permit acts of self-regulation which benefit various processes in daily life. Impaired inhibitory control has been found to be a common feature in a wide range of psychiatric conditions (Richardson, 2008).

Smith and colleagues' (2008) conducted an experiment using a scrambled sentences exercise to induce feelings of increased or decreased power in participants. They found that those in the 'low power' (near) group made significantly more errors on a Stroop task (Stroop, 1935) than those in 'high power' (far) and control groups, which did not differ. They argued that low-power individuals tend to focus on the details of situations rather than their broader picture. However, this assertion would have been better supported had the high-power group outperformed controls. This sample was heavily weighted towards female students and there was little information provided

about participants overall, making the findings difficult to generalise to a wider population.

Chiou et al. (2012) *did* manage to find opposing effects of high and low construal mindsets on Stroop interference when measuring 'reaction times between congruent and incongruent trials'. Compared to controls, those adopting a high-construal (far) mindset showed less interference whereas those in a low-construal (near) mindset displayed more. This suggested that increasing psychological distance improved inhibitory control whereas decreasing psychological distance reduced it. The result was also supported by behavioural data of inhibition showing that the psychologically distant group smoked significantly fewer cigarettes. This sample may have been more varied in terms of age and experiences than Smith et al. (2008), although it was drawn from a community health study in Taiwan, so may not readily apply to a UK population. Unlike Smith et al. (2008), the sample was heavily weighted towards men, suggesting that the impact of psychological distance on inhibitory control is stable across genders. However, as the psychological distancing procedures and Stroop metrics were different, the findings should still be interpreted cautiously.

Quinn and colleagues (2006) used clothing to influence women's levels of self-objectification, leading them to view themselves as 'a body' or 'an agent' (control). Those viewing themselves as 'a body' showed significantly longer reaction times on Stroop trials. The authors argued this was because they viewed themselves from a distant, third-person perspective. However, this requires questioning as the self-objectifying group also reported higher levels of body shame, suggesting that paying

attention to their appearance actually encouraged a self-immersed (psychologically close) mindset. Positive efforts were made to double-blind this study, such as a cover story and delivering instructions to participants through headphones. The sample also had a relatively even mix of ethnic backgrounds, increasing the scope of the results. However, it may also be the case that a female university sample differs substantially to other groups with regard to attitudes towards their appearance, and this did limit the findings' generalisability.

Adam and Galinsky (2012) found that wearing a lab coat seemed to halve the number of errors participants made on the Stroop task compared to controls (no lab coat), arguing 'something special' about wearing items of clothing affects one's cognitive processes. However, a number of limitations to this particular experiment impacted its validity. The meaning people made of wearing a lab coat was assumed and a manipulation check was not included to address this. In addition, the cover story appeared as though it could have confounded the desired impact of the lab coat by asking participants to not think of it as part of the experiment. The primary measure of inhibitory control for the Stroop, 'time to complete trials', showed no significant differences between groups, yet the authors gave this little attention and reported the data for 'error rates'. This could indeed suggest distancing by wearing the lab coat increased participants' accuracy. However, in addition to increasing the chance of false-positives from a rising number of analyses (Ranganathan, Pramesh & Buyse, 2016), errors are relatively rare on the Stroop task. Most participants from both groups made no errors at all, suggesting there was a ceiling effect when using this metric.

Burns et al. (2019) conducted a pre-registered replication study of Adam and Galinsky's (2012) experiment. They used a larger student sample across four sites and administered three times as many trials per participant. This higher quality study found no significant impact of wearing a lab coat on Stroop errors, suggesting it would not have been possible to detect a significant effect using Adam and Galinsky's design. However, this experiment does not necessarily provide evidence against the impact of psychological distancing on inhibitory control as measuring error rate alone lacks rigour. Another more robust experiment in Adam and Galinsky's paper found that associating the lab coat with different roles affected working memory, which will be explained in the relevant section.

Similar to this idea, Veraksa et al. (2019) asked whether or not the *types* of characters being role-played have a differential impact on executive functions. As well as a control group, who received no instructions, they asked children to take the role of 'protagonist' (benevolent), 'villain' (malevolent) or 'sage' (skilful). Participants then completed executive function tasks, one of which was the Inhibition task from NEPSY-II (Korkman et al., 2007) at three time points (pre-condition, condition, post-condition). This requires children to name the alternative shape (e.g. circle) when the other (e.g. square) is presented. Although 'sage' and 'villain' groups significantly improved their scores, so did the controls. It was therefore not possible to reliably ascertain whether this distancing method helped improve children's inhibitory control. Testing occurred at two-week intervals, suggesting practice effects occurred and the use of alternate forms may have helped account for this. Also, it was not made clear why post-condition testing was required, and there appeared to be a lack of blinding procedures carried out.

Cognitive Flexibility

Four studies investigated the role of psychological distancing on cognitive flexibility. Cognitive flexibility plays a fundamental role in adapting to changing environments and has been associated with skills such as creativity and problem solving (Ionescu, 2012).

Two studies used construal level theory to prime participants' sense of temporal (Förster et al., 2004) and spatial (Jia et al., 2009) distance. Similar measures were administered for each study, assessing: 'number of answers generated', 'flexible problem solving' and 'creativity of responses'. Förster et al. (2004) also investigated whether 'type of task' (abstract or concrete) was influenced by mindset by asking groups either an 'abstract' or a 'concrete' question. However, it was felt this complicated their study and limited the results as asking individuals to answer very different questions could have impacted their scores, regardless of condition. Adding 'neutral' questions as a baseline may have helped determine whether 'mindset' or 'type of task' affected the groups' scores. The procedure adopted by Jia et al. (2009) was clearer and likely easier to follow for participants, however neither study used manipulation checks so this could not be confirmed. Those primed with a high-construal (distant) mindset were able to provide more answers in total than those in low-construal (near) groups (Jia et al., 2009, and Förster et al., 2004) and controls (Förster et al. 2004 only). Both studies also contained experiments which found those in the distant condition provided more creative answers (as rated by independent researchers) than the near condition.

Using the same three flexible problem solving questions, both studies found those in the distant condition solved significantly more problems than those in the near condition. Jia and colleagues (2009)' was deemed to be a higher quality experiment which used a much larger sample size and added a control group. They also used a control group who did not differ to the near condition but were also outperformed by the distant condition. Although the distancing between the two studies was different, the findings supported the view that increased psychological distance improves cognitive flexibility. The addition of controls suggested these findings were attributable to the distant condition increasing performance rather than the near condition impeding it. However, the reliability of this measure may be questionable as there were only three problems to solve (score out of three) and scores deviated by a large amount. Also, Förster et al.'s (2004) sample included twenty-one different nationalities and the impact of cultural differences on how questions could have been interpreted was not discussed. Overall, both Förster et al. (2004) and Jia et al. (2009) accounted for potential confounds in their experiments such as: task difficulty, mood, task expectancy, interest and motivation. It may have also been useful to understand the sample characteristics in more depth as, for example, certain university courses may be likely to include higher numbers of creative individuals, which could have skewed the results.

Two studies investigated how role-taking affected children's performance on card sorting tasks which required them to adapt to switching rules. White et al. (2016a) asked three and five year olds to complete the Minnesota Executive Function Scale (MEFS) from three psychological distances (using self-talk to reinforce the condition): 'self-immersed' ("Where do I think this card should go?"), 'third person' ("Where does

[*own name*] think this card should go?") and a chosen 'exemplar other' ("Where does [*Batman*] think this card should go?"). It was found that psychological distance affected MEFS performance for the five year olds only. T-tests showed that exemplar and third-person conditions had large facilitative effects when compared to controls, and that the exemplar group significantly outperformed the third-person group. The authors discussed how three year olds may not have developed the representational skills necessary to employ the role taking strategy. The MEFS appears to be a useful tool which is reliable (Beck, Schaefer, Pang & Carlson, 2011) and valid (Carlson & Harrod, 2013). A criticism of the study is that, although an initial power calculation recommended 96 participants, which was met, the significant findings reported were calculated once the three year olds had been excluded, meaning this new data set may have been too small to reliably assert the results' significance. In addition, a manipulation check would have increased confidence that the distancing procedures were having the desired effect.

Following White et al. (2016a), one of the measures used in Veraksa et al. (2019), mentioned previously, was the DCCS task. This requires children to sort cards while adapting to changing rules. 'Protagonist' and 'villain' groups did not show differences in their flexibility across time, however 'sage' and control groups did. This highlighted that role-taking skilful (rather than ethical) attributes, may have an important impact on flexible thinking. However, the question of why the control group's scores significantly improved was not sufficiently addressed in the paper and suggested practice effects occurred for this measure as well. This limitation did make it difficult to confidently attribute participants' cognitive improvements to psychological distancing.

Attention and Working Memory

Three studies investigated the impact of psychological distancing on attention and working memory. The ability to process certain information at the expense of others (selective attention) and hold it in an accessible, malleable state (working memory) are critical cognitive capacities that are thought to be closely interlinked (Fougnie, 2008). Deficits in attention and working memory may also cause daily tasks to become difficult as one may struggle to organise and direct actions towards their goals (Duncan, 1986; Duncan et al., 2008).

Schmeichel et al. (2011) used a measure requiring focused attention, the Stop Signal Task (SST). This requires the examinee to inhibit their dominant response only when a signal appears. They found a low construal (close) mindset helped individuals perform better, suggesting this mindset encouraged a narrow focus on the immediate environment. After this, they used an adapted version of the SST which incorporated a delay, so participants had to hold information in their working memory. On this task, a high construal mindset led to better performance, suggesting that if a task requires holding rules in mind, increasing psychological distance may benefit this. This design allowed both groups to be exposed to the same inhibitory, but different attentional demands of the task. Although the adapted SST was face valid, it had unknown construct validity. In addition, the adapted SST was more difficult than the standard version so it is possible this may have affected how the mindset manipulation affected scores, potentially confounding the results.

Using a similar measure to the delayed SST, an experiment in Smith et al. (2008) estimated working memory ability using a 2-back task. Here, participants decide whether the current stimulus matches the stimulus two trials ago. They found those who experienced low power made significantly more errors than those experiencing high power. However, the manipulation in this experiment was assigning participants to one of two roles; a 'superior' who would direct and evaluate a 'subordinate'. This could have made the low power participants wary of being evaluated, which may also have driven this result.

Through two experiments, Hadar et al. (2019) measured participants' visual working memory using a computerised change detection task which required them to ignore distractor stimuli. A within-subjects design found that compared to baselines, participants primed with a concrete (near) mindset were worse at ignoring distractor stimuli and those primed with an abstract (far) mindset showed no change. This suggested a psychologically close mindset may have a negative impact on individuals' visual working memory whereas increasing psychological distance may have no effect. However, this experiment did show order effects and it was not possible to counterbalance the baseline condition. As only half the sample could be analysed, the experiment may have been under-powered and the findings require cautious interpretation. The second between-subjects experiment removed potential order effects by design and used a more widely applicable priming strategy, increasing confidence in the results. This experiment found that those primed with a concrete (near) mindset performed significantly worse than the abstract (far) mindset group. Although it was found that near and far mindsets differentially affect visual working

memory, there was no control condition, leading to questions about which distancing method, if any, was having a significant impact.

Adam and Galinsky (2012) asked two groups to put on an identical lab coat that was either described as a ‘doctor’s coat’ or a ‘painter’s coat’. They then completed a visual search task, identifying differences between pictures. Those wearing the ‘doctor’s coat’ found significantly more differences in the pictures than the ‘painter’s coat’ group. Time taken to complete the task did not differ, suggesting this effect was likely a result of working memory and attentional capacity, rather than persistence. This extends findings from the child studies in this review indicating that embodying someone with typically strong ability may bring additional benefits to cognitive performance. As in the authors’ first experiment of inhibition, there was no manipulation check carried out and limited sample information was provided, apart from them being undergraduates. Interestingly, the group wearing the ‘painter’s coat’ performed no better than a group who identified with (wrote an essay about) a ‘doctor’s coat’ but did not wear it. Wearing the ‘painter’s coat’ may be expected to increase psychological distance through enhancing the role-taking experience. Indeed, in their third experiment, those wearing a ‘doctor’s coat’ outperformed those who wrote about it but did not wear it. This finding suggests psychological distancing through role-taking may have a positive or negative impact on working memory depending on the chosen character’s stereotyped abilities.

Planning and Strategy Formation

Three studies examined how distancing affected individuals’ ability to plan and form strategies. This can be thought of as the ability to organise behaviour in relation to a

specific goal through a series of intermediate steps (Luria, 1978), then monitoring and guiding that plan to its successful conclusion (Grafman, 1989).

Hunter and colleagues (2016) observed two stroke survivors' performance on the Key Search task (Wilson et al., 1996) when administered from first-person ("Where would you search?") and third-person ("Where would *John* search?") perspectives. Based on other tests, one participant had 'average' executive functioning whereas the other had 'impaired' executive functioning. The participant with 'average' executive functioning completed the Key Search satisfactorily from first, but not the third-person perspective. Due to his 'intact' executive ability, the authors attributed this to a deficit in theory of mind (putting himself in another's position). In contrast, the individual with 'impaired' executive functioning struggled to complete the task from a first person perspective, as would be expected, but performed satisfactorily when it was reframed in the third-person. He was able to complete this executive functioning task, but the way it was previously administered prevented him from doing so. This study may provide a useful foundation to investigate psychological distancing and possible compensatory strategies for individuals with cognitive impairments.

However, this study did have many limiting factors. Participants were tested one month post-stroke, where natural recovery may be continuously in process (Kelly-Hayes et al., 1989), and could confound the findings. The second trial of the Key Search appeared to be administered almost immediately after the first, making practice effects likely on a very simple task. Also, the assertion that theory of mind deficits may have impaired performance could have applied to both participants, or neither, as this was

not formally assessed. Finally, the independent variable reported was participants' baseline executive functioning, however different tools were used to report this, limiting the validity of this comparison.

An interesting study by Banakou et al. (2019) used Immersive VR to create a body-ownership illusion of Albert Einstein (well known for high intelligence and problem solving ability). Compared to those who experienced a 'normal' young adult male's body, those in the Einstein condition showed more improvement in baseline scores on the Tower of London task (ToL; Shallice, 1982). Efforts were made to eliminate practice effects by measuring baseline ToL performance one week prior to VR exposure, although it could be argued that this interval was still too short. This may be more relevant as 'score difference in ToL' did not appear to be a particularly sensitive measure of change. This may be a reason why statistical significance between groups was not reported. Further analysis revealed a moderating effect of estimated IQ on condition. Those with higher IQ appeared to benefit from the 'Einstein' condition, whereas those with lower IQ scores benefited from the 'normal' condition. However, scatter plots showed relatively weak relationships and correlation coefficients were not reported. The authors discussed how some people may find the ToL too easy and the new, exciting Einstein role may have increased their motivation to perform. For those who find it challenging, it could be argued the task is motivation enough. This study suggested that role taking can positively impact planning and strategy formation, and that IQ potentially has a moderating effect on this relationship. It should be noted that tasks of planning often require adapting to novel stimuli, making it difficult to administer the same task twice in quick succession without producing practice effects, as both of these studies did.

Using a similar task, an experiment by Smith et al. (2008) found those who were experiencing low power found it more difficult (more moves above the minimum) to solve problems on the Tower of Hanoi (Goel & Grafman, 1995) than those experiencing high power. Those in the high power condition did not differ to controls, suggesting that low power may have a particularly disruptive effect on planning and executing strategies. The authors argued low power impacts individuals' ability to maintain the goal in mind, also which relates to working memory and highlights how cognitive domains often overlap.

Discussion

Main findings

The research discovered by this review covered four broad areas of executive functioning. Reducing psychological distance was consistently found to impair inhibitory control. On the other hand, only one study (Chiou et al., 2012) was able to demonstrate improvements in inhibition when psychological distance was increased. However, the studies that explored this relationship were fraught with limitations such as unreliable metrics and probable practice effects.

When psychological distance was increased, it was found that individuals appeared to show higher levels of cognitive flexibility. They generated more responses in total and responses given were more creative. They also seemed to approach problems in a more flexible manner when psychological distance increased, although measurement of this appeared quite crude. In addition, psychological distancing by taking the role of another was found to be a useful technique for children of five years when flexibly

adapting rule changes. Although, further evidence was sought regarding particularly helpful *types* of roles to take, this remains inconclusive.

Conversely, one study (Adam & Galinsky, 2012) found that stereotypical ability of the role taken appeared to have either facilitative ('doctor') or inhibiting ('decorator') impacts on working memory, possibly mediating the effect of psychological distance. On balance, working memory tasks consistently benefited from increased psychological distance, possibly a result of a more global view of situations, keeping the superordinate goal in mind (Duncan, 1986). Interestingly, and perhaps to be expected, tasks requiring focused attention were found to benefit from reduced ('close') psychological distance (Schmeichel et al., 2011). These findings require tentative interpretation as attention and working memory constructs are thought to be highly related to other functions as well (Engle & Kane, 2004).

The evidence with regard to planning and forming strategies was not clear due to methodological limitations of the studies. 'Planning' tasks need to be novel, are often quite simple and would be especially vulnerable to practice effects. The repeated-measures designs appeared to be at risk of practice effects, so their findings that increasing psychological distance improved participants' performance on these tasks should be questioned. Conversely, the controlled, between-subjects design found that only reduced psychological distance (reduced feeling of power) negatively impacted planning ability. For these tasks in particular, the role of IQ may moderate the effect of psychological distancing on cognitive performance. Banakou et al. (2019) discussed

how, for those with ‘higher IQ’ (who may find tasks simpler to begin with), the challenge of approaching tasks ‘as another’ may be particularly motivating.

Overall critique of the literature

The above studies appeared to investigate psychological distancing and its impact on executive functions. Despite a number of limitations, varied distancing methods and cognitive measures were adopted, suggesting the construct of psychological distancing holds merit. Overall, as a body of evidence, there were specific issues which made drawing firm conclusions difficult.

First, it can be seen from Table 1 that a vast majority of the studies found significant results. There were not many studies available that reported a lack of significance. This may be because there are genuine, strong effects of psychological distancing on executive function performance, however it needs to be considered whether publication bias has an impact on this area of research. Although grey and unpublished articles were sought, publication bias would prevent an accurate picture of the relationship between psychological distancing and executive functions being presented in this review.

With regard to design, all studies were quantitative in their approaches. The addition of qualitative research to the findings may have helped develop an understanding of how individuals experience psychological distancing and highlight potentially important mediating variables. The majority of studies were between-participant

designs and it was felt more efforts could have been made to control for individual differences. The few within-participant designs appeared to show practice effects, which was disappointing as variables between participants can be controlled. In addition, although studies investigating similar executive skills tended to use similar cognitive measures, the metrics they used to assess performance often differed, making the comparisons between studies less certain. Also, some psychological distancing procedures, such as role-taking, are difficult to blind participants to. Studies which used construal level priming manipulations may have been less susceptible to suspicion, however this method would be less applicable outside of research settings. Furthermore, the samples were overwhelmingly made up of undergraduate students, who were young and presumably in good health. This population was well represented, however the current evidence may not generalise to the wider population, or indeed those with clinical issues, such as cognitive impairments.

Recommendations for future research

Based on the findings of this review and its current limitations, there are a number of recommendations for future research which could further the knowledge base:

1. There appears to be a need for qualitative research investigating the impact of psychological distancing on people's cognitive abilities. This could help elucidate the process of distancing and develop current theory behind it.

2. There is also a need for more balance in quantitative methodologies. Higher quality within-participant designs that have not been exposed to practice effects could provide this.

3. There was only one, relatively low quality study which investigated a method of distancing with individuals from a clinical population. This is a significant gap in the literature. It could be argued this population could benefit greatly from increased psychological distance as they are more likely to experience feelings of low power or being immersed in their 'problems'. If psychological distancing could be used as a compensatory strategy for cognitive impairments, this needs to be further investigated with people from clinical populations, such as those with acquired brain injury.

4. Following on from point three, if investigating the role of psychological distancing for those with acquired brain injuries, it will be important to use a distancing method that is applicable to daily life outside of research contexts. From this review, it could be argued role-taking would be more transferable than priming one's own mindset using questions based on construal level theory.

Recommendations for clinical practice

1. The studies reviewed suggest that those working in clinical settings should be aware that individuals' cognitive performance may not be a simple reflection of their ability. The level of psychological distance they are experiencing may be having a significant impact on their performance. This may be especially relevant if, for

example, a client has difficulty feeling comfortable around health professionals or sees the professional as ‘all knowing’ and is experiencing a feeling of low power in the room.

2. Experiencing a feeling of close psychological distance also suggests working memory capacity will be affected, meaning clients may find it difficult to retain and make use of information being discussed. Psychological distance may therefore be considered as a vital aspect of psychological therapy which can affect the quality of the work. Extending this logic, it is possible that strategies enabling individuals to notice and influence their psychological distance (from themselves or task), could prove beneficial to their daily wellbeing (Horvath, 2018).

Conclusion

This review systematically searched the extant literature for evidence relating to how the broad concept of psychological distancing affected ‘cool’ executive functions. Studies varied in their level of methodological rigour and as a result, firm conclusions cannot be drawn at this time. Overall, the findings appear to suggest psychological distancing can indeed have an impact on executive function performance. They indicated that 1) *reducing* psychological distance can temporarily impair executive functioning, whereas 2) *increasing* psychological distance can temporarily improve executive functioning. 3) The impact of increased distancing was also found to decrease performance on a focused attention task, suggesting psychological distancing may, on some level, assist top-down executive control of other cognitive processes.

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THE ‘SUPERHERO’ TESTS OF EXECUTIVE FUNCTIONING

MAJOR RESEARCH PROJECT

PART B

WORD COUNT: 7033 (plus 293 additional words)

Abstract

Evidence from non-clinical populations suggests psychological distancing may help individuals improve their performance on executive functioning tasks. However, this has not yet been investigated in populations who may benefit most, such as those who have experienced a stroke. If the use of executive functions can be improved or facilitated in this population, the benefits could potentially translate to everyday functioning.

This small pilot study (n=10) used a mixed-methods, repeated-measures design to investigate how three core executive functioning domains ('Inhibition', 'Cognitive Flexibility' and 'Working Memory') were influenced by psychological distancing (through taking the role of a 'superhero character'). Participants' qualitative experiences of using this strategy were also explored to better understand potential utility of a 'superhero distancing' approach.

Non-parametric analyses did not yield statistically significant results regarding the impact of the superhero role. However, individual analyses highlighted that, those who felt able to engage in the distancing task did demonstrate more clinically reliable changes, suggesting the strategy may have benefits for some. Four key themes were also generated using thematic analysis, suggesting that taking a superhero role 1) Improves mood, 2) Alters approach to tasks, 3) May benefit from character relatability, and 4) May strain cognitive load. The implications of these preliminary results for this emerging field are discussed.

Key words: stroke, psychological distancing, executive functioning, role-taking, strategies

Introduction

Executive functioning

Even with multiple sensory, motor and cognitive deficits, as long as executive functioning ability remains intact, individuals may be able to maintain the direction of their own lives (Lezak, 1982). Executive functions refer to high-level cognitive functions that provide control and direction of lower-level, more automatic processes (Stuss, 2009), enabling the regulation of thoughts and behaviours. There are thought to be three main domains (Miyake et al., 2000; Diamond, 2013): Inhibition refers to the ability to block pre-potent responses, Flexibility (also known as 'shifting' or 'cognitive flexibility') refers to the ability to transition from attending from one thing to another, and Working Memory refers to the ability to store, update and manipulate information within short-term memory. It has been argued that these three 'basic' executive functions form the 'building blocks' for overall self-regulation (Hofmann, Schmeichel & Baddeley, 2012).

Indeed, executive functions have been found to be important for almost all aspects of life which may well require a high degree of self-regulation at times. These include positive mental health (Snyder, Miyake & Hankin, 2015), physical health (Crescioni et al., 2011; Miller, Barnes & Beaver, 2011), quality of life (Brown & Landgraf, 2010), school and job success (Pascual, Munoz & Robres, 2019; Chan, Wang & Ybarra, 2018), marital harmony (Eakin et al. 2004), and social problems (Hughes, Dunn & White, 1998). Performance on executive function tests has also been found to predict success with instrumental activities of daily living (Cahn-Weiner, Boyle and Malloy, 2002; Jefferson, Paul, Ozonoff & Cohen, 2006).

Stroke: prevalence and impact

In England alone, around 110,000 strokes occur each year (National Audit Office, 2010). Stroke is the leading cause of long-term neurological disability worldwide, with 50% of survivors being dependent on others for everyday activities (Wolfe, 2000). There are currently around one million stroke survivors in the UK and prevalence is expected to increase by as much as 123% between 2015 and 2035 (King et al., 2020).

Post stroke cognitive impairment is common, occurring in up to 80% of cases (Sun, Tan, & Yu, 2014). In particular, executive function deficits were found to be associated with maladaptive (avoidant) coping after stroke (Kegel, Dux & Macko, 2014). Ownsworth and Shum (2008) also found 'post-stroke productivity' was positively correlated with performance on tests of planning, self-monitoring and self-regulation. This suggests that individuals who are able to retain or utilise more of their executive abilities after stroke are likely to function better. Currently, there is limited evidence for successful executive function interventions post-stroke (Poulin et al., 2012), suggesting there are current opportunities to explore ways of supporting stroke survivors' executive functioning.

Adjustment after stroke

After a stroke, survivors can experience dramatic changes in the perception of themselves regarding their identity (Lapadatu & Morris, 2019), relationships (Thompson & Ryan, 2009) and social roles (Mukherjee, Levin & Heller, 2006). Satink et al. (2013) found that individuals struggled with the change and discontinuity in their roles after a stroke, such as moving from 'care-giver' to 'care-receiver'. Adjustment to

disability and changing self-identity can be a continuous process and there is a clear need for approaches which facilitate optimism and a positive approach to life (Pallesen, 2013). In addition, Sarre and colleagues (2014) found adjustment practices after stroke were broadly categorised as 'practical strategies' (how one *does* things to limit the impact of stroke) and 'mental strategies' (how one *views* things). It is therefore important for current research to investigate ways of facilitating both of these processes. This study places its focus on 'mental strategies' through the application of psychological distancing theory.

Psychological distancing

This study presents the concept of psychological distancing as defined within the framework of construal level theory (Trope & Liberman, 2003; Trope & Liberman, 2010). Construal level theory states that any event or object can be viewed at different levels of construal. At a low-level of construal, one focuses on concrete, unstructured, immediate features of the event. A high-level of construal leads to focusing on abstract, schematic features and understanding the general gist of a situation (Liberman & Trope, 2008). Psychological distancing may be thought of as, "a spatial metaphor representing the mental separation of the self from the ongoing present" (Sigel, Stinson & Kim, 1993 p.214).

Trope and Liberman (2010) highlight four perceived dimensions along which people can transcend their current context, removing themselves from their immediate 'here and now' perspective. These are spatial (physical distance from x), temporal (chronological distance from x), social (similarity or dissimilarity to x) or hypotheticality (perceived probability of x occurring). Studies have generally shown that when an

individual's mindset is manipulated to construe tasks at a high level, regardless of dimension, their performance can improve on executive tasks of Inhibition (Smith et al., 2008; Chiou et al., 2012), Cognitive Flexibility (Förster et al., 2004; Jia et al., 2009; White et al., 2016) and Working Memory (Smith et al., 2008; Schmeichel et al., 2011; Adam & Galinsky, 2012; Hadar et al., 2019).

When considering potential ways of creating psychological distance that apply to stroke survivors managing daily life tasks, certain dimensions of psychological distancing are likely to be more 'useful' than others. For example, one may not be able to create increased *spatial* distance between themselves and a task. In addition, creating increased *temporal* or *hypothetical* distance from a task which often needs to be attempted 'in the moment' would likely be impractical. However, when considering a psychological distancing method which could be applied when approaching a range of daily tasks, creating *social* psychological distance (i.e. increasing the distance felt between one's usual abilities and the task itself) may be particularly applicable. In addition, if one is self-critical or unhappy with their changed roles, or hold negative views about their identity after stroke, creating distance between oneself and a task may be especially pertinent.

Creating social psychological distance through role-taking

Taking the role of another may be a promising method of increasing psychological distance between the self and a task. For example, Hunter, Phillips and MacPherson (2016) found that a stroke survivor with 'impaired' executive functioning was unable to complete the Key Search task (Wilson, Alderman, Burgess, Emslie & Evans, 1996)

from a first-person perspective (“Where would you search?”). However, when asked from a third-person perspective (“Where would John search?”) they performed satisfactorily, suggesting something about ‘no longer being themselves, but now being John’ might have allowed a new approach to the problem. White and colleagues’ (2016) study with children found that five-year olds who took the role of a ‘superhero character’ performed significantly better on the Minnesota Executive Function Scale (Carlson & Zelazo, 2014) than those who took a ‘third-person’ perspective. In addition, those who took the ‘third-person’ perspective performed significantly better than those who took a ‘self-immersed’ perspective, suggesting level of psychological distance and executive performance were positively associated. Furthermore, neuroimaging studies have found activity in dissociable regions of the brain during third-person perspective taking (Ruby & Decety, 2004), and when acting the role of fictional characters (Brown & Cockett & Yuan, 2019). This evidence does suggest executive functioning abilities may, to some degree, be enhanced or compensated for, by changing the way in which one views the task at hand.

If role-taking can be utilised as a method for stroke survivors to create psychological distance between themselves and executive function tasks, there may be the potential to improve their cognitive performance. Extending this, taking the role of someone of typically high ability, even ‘superhero’ ability, might facilitate high levels of psychological distance, ultimately affecting day-to-day functioning. Indeed, an Immersive Virtual Reality (VR) study (Banakou et al., 2019) recently demonstrated how creating the illusion that participants were Albert Einstein led to improved performance on the Tower of London task (Shallice, 1982). The authors suggested that taking on the role of Einstein allowed participants access to their own internal

mental resources that would previously have been inaccessible. This concept of ‘superhero distancing’ is used in the current study, whereby stroke survivors will be encouraged to take the role of a ‘superhero character’ in order to create psychological distance between themselves and executive tasks.

Aims and hypotheses

This pilot study used a mixed-methods case series design to investigate how ‘superhero distancing’ affected stroke survivors’ executive function performance, and explored their experiences of this strategy.

Primary hypotheses were that:

1) Superhero distancing would *increase* participants’ scores on an Inhibition task.

2) Superhero distancing would *increase* participants’ scores on a Cognitive Flexibility task.

3) Superhero distancing would *increase* participants’ scores on a Working Memory task.

The secondary hypothesis was that:

Those who were more engaged in superhero distancing would show larger improvements in their cognitive scores. In theory, these individuals should also be more likely to show clinically reliable change in performance when using the role-taking strategy.

Qualitative aim

The qualitative aim of the study was to understand how individuals were impacted by role-taking, and their overall experience of using this strategy. This qualitative research question asked, “What is the experience of stroke survivors using superhero distancing to approach cognitive tasks?”.

Method

Design

This study adopted a quantitatively driven mixed-methods design (notated as ‘QUANT+qual’ in Palinkas et al., 2011) whereby the quantitative data collection was a two-condition, repeated-measures design as this approach was able to best account for significant individual differences within this population. The independent variable was condition of testing (‘Superhero’ or ‘Standardised’), administered in counterbalanced order with the condition received first assigned at random. The dependent variables were performance on widely used executive function measures of Inhibition, Cognitive Flexibility and Working Memory. Qualitative information about participants’ experience was collected immediately after the Superhero condition to illustrate how it affected them and how they perceived the strategy overall. Inductive Thematic Analysis (Braun & Clarke, 2006) was then used to generate themes across the sample about the use of superhero distancing.

Recruitment

As the brain has been found to continue developing into the mid-twenties (Pujol, Vendrell, Junqué, Martí-Vilalta & Capdevila, 1993), adults twenty-five years and above were sought for the study. Those who experienced a stroke over one year ago were approached through support groups run by the charitable sector in South England. Brief information sheets explaining the purpose of the study, requirements of participation, eligibility criteria and the principal researcher's contact details, were distributed among group members. Those who provided their contact details were contacted for a 'pre-study phone call' lasting around fifteen minutes. The purposes of this call were:

- For the principal researcher to formally introduce themselves.
- Confirm eligibility criteria for participation (Appendix 2).
- Talk through the study using the 'full information sheet' (Appendix 3) and answer any questions.
- Explain the consent form.
- Mood screen using the 'Yale Question' (Watkins, 2001) for depression.
- Assess capacity.
- Collect demographic information.
- Schedule two meetings for cognitive testing spaced three-to-five weeks apart.

Participants were offered up to £10 reimbursement of any travel and parking costs incurred as a result of participating, paid at the second testing session.

Participants

Ten participants were recruited for the study (see Table 1 for sample characteristics). One did not attend their second session due to personal reasons. Isolation advice from the government due to the Covid-19 public health crisis meant second testing sessions did not occur for two participants and recruitment was halted thereafter. The remaining sample with complete quantitative data (both testing sessions) contained seven participants aged between 34 and 68 (mean=53.57, SD=10.50). All were White British and female, and mean years of education for the sample was 14.64(SD=2.87). Time since stroke was 3.39(SD=2.79) years and the number of days between testing ranged from 21 to 35 days (mean=27, SD=6.30).

Two participants (including one male) completed the 'superhero condition' only and were included in the qualitative analysis of the superhero role-taking experience (n=9). One participant who only completed the Standardised condition was excluded from all analyses due to incomplete quantitative data and no qualitative feedback being obtained.

Materials

Executive function measures

Establishing effective measures of executive functioning is notoriously difficult and measures with high reliability are not common. The three most frequently used measures for assessing executive functioning in stroke research between 1999 and 2015 were based on the Stroop, Digit Span and Trail Making Tests (Conti, Sterr, Brucki

& Conforto, 2015). This suggested these tasks may have good utility with this population, which was an essential consideration with this population. Neuroimaging studies have consistently shown tasks such as the Stroop and Trail Making Test are associated with activity in frontal brain regions (Nowrangi, Lyketsos, Rao & Munroe, 2014), which are widely believed to be recruited during executive tasks. In addition, Working Memory is partially defined by its capacity to simultaneously process and store information (Baddeley, 1992) and the digit span backwards task in particular appears to measure this. Therefore, cognitive tasks based on these well-known tests were used within this study.

Colour-Word Interference ('Inhibition' condition)

The Colour-Word Interference (C-WI) subtest of the Delis-Kaplan Executive Function System (D-KEFS; Delis, Kaplan & Kramer, 2001) was used to measure participants' inhibitory control. The 'Inhibition' condition measures inhibition in the same way as the conventional Stroop (1935) procedure. There are 50 items (colour words printed in different colour ink). The examinee must name aloud the colour ink the words are printed in, inhibiting the automatic verbal response to read the word itself. For example, if the word 'red' is printed in green ink, the participant would need to say, "green". The primary measure of inhibitory control is 'time to complete trials' and error rate can also be calculated as an optional process measure. Test-retest reliability coefficients for the age ranges relevant to this study were found to be between 0.50 and 0.71 (Delis et al., 2001).

Trail Making Test (‘Number-Letter Sequencing’ condition)

The Trail Making Test (TMT) of the D-KEFS was used to measure participants’ flexibility of thinking. The ‘Number-Letter Switching’ condition is a visual-motor sequencing task which requires individuals to draw a connecting line between numbers and letters in sequence. According to Delis, Kaplan and Kramer (2001), this classic executive function test enables higher-level skills such as multi-tasking, simultaneous processing and divided attention. The primary measure of flexibility of thinking is ‘completion time’ and error rate can also be calculated as an optional process measure. Test-retest reliability coefficients for the age ranges relevant to this study were found to be between 0.36 and 0.55 (Delis et al., 2001).

Digit Span Backwards

The Digit Span Backwards (DSB) subtest from the Wechsler Adult Intelligence Scale 4th Edition (WAIS-IV; Wechsler, 2008) was used to measure participants’ working memory. Individuals are required to listen to progressively longer strings of numbers and repeat them back to the examiner, in reverse order. Participants are required to encode, store and manipulate information, skills widely recognised to recruit working memory capacity. Raw scores are calculated based on each string of numbers answered correctly. Reliability data for the DSB from the WAIS-IV test was not found but was estimated to be in line with that from the WAIS-III at .83 for test-retest reliability (Waters & Caplan, 2003) and above .90 for internal consistency (Strauss, Sherman & Spreen, 2006).

‘Superhero distancing’ manipulation

For the ‘superhero distancing’ exercise, participants were given a choice of two fictional superhero characters, one being typically ‘strong and powerful’ (Wonder Woman or Superman), the other being ‘intelligent problem solvers’ (Nancy Drew or Sherlock Holmes). Giving participants this choice allowed sufficient flexibility for personal preference without adding too much potential ‘noise’ by asking participants to generate a character from memory (What do they look like? Is this the right fit for this task? and so on). An A4 cartoon picture of participants’ chosen character was then placed in front of them for reference. The cartoon image prevented associating film actors with other roles or stories in the media. The use of a prop (wearing a cape or holding a magnifying glass) was offered to each participant to help them embody the role and all embraced this option. They were also informed that they may be referred to as their superhero character’s name during the tasks (as in White et al., 2016). Three minutes were then spent engaging in the guided role-taking exercise, read from a script (Appendix 7). The image was removed but the props remained worn (cape) or on the table (magnifying glass). The cognitive tasks were administered as per standardised instructions with participant names switched to the chosen superhero names (Appendix 8).

Manipulation check and post-task questions

To determine whether the distancing manipulation was having the desired effect, the following question was asked, “Please rate how well you felt able to get into the role of your chosen superhero character today”. A 7-point Likert scale was used, enabling participants to indicate whether the experience felt positive, negative or neutral.

Options ranged from -3 (“I felt very put off by the exercise) through 0 (“No noticeable effect”) to +3 (“I was absorbed in the role of my character”).

Two additional self-report questions were asked immediately after the superhero condition to elicit qualitative information regarding this psychological distancing experience. These aimed to identify 1) any changes noticed during the role-taking process, and 2) how this new approach was experienced overall:

1) “When trying to take the role of your character, what changes, if any, did you notice in yourself from before the exercise?”
2) “What was your overall impression of trying to take the role of your superhero character today?”

Procedure

Each participant took part in two testing sessions spaced three to five weeks apart. Cognitive tasks were administered 1) under standardised procedures (‘Standard’ control), and 2) after the distancing manipulation (‘Superhero’). Testing conditions were counterbalanced to account for possible order effects. It is common for stroke survivors to experience fatigue (Colle et al., 2006) and structure their weekly activity around this, so testing sessions were scheduled at the same time on the same day of the week. This occurred for all but one participant, although they confirmed they did not experience fatigue, so this was not considered to have interfered with their performance.

The primary researcher and participant sat across the table (approximately one metre) from one another with testing materials set up identically for both conditions. The cognitive tasks above were administered in the following order: 1) Colour-Word Interference, 2) Trail Making Test, 3) Digit Span Backwards. The superhero condition also included the distancing manipulation (five minutes before cognitive tasks), a manipulation check and post-task questions (five minutes after cognitive tasks). As a result, this session generally lasted longer, although no session exceeded thirty minutes.

Blinding

Participants were told the study was investigating 'role-taking and its impact on executive functioning', rather than the explicit phenomenon of psychological distancing. Although individuals only found out which condition they would be exposed to upon arrival, it was not possible to blind participants to the condition they received.

Ethical considerations

The study was reviewed and approved by the Salomons Institute for Applied Psychology Research Ethics Committee (Appendix 1). The charity Headway provided valuable consultation regarding the study's eligibility criteria and testing procedure. The pre-study phone call allowed the procedure to be completed ethically and efficiently. Introducing participants to the principal researcher helped to reduce the chance of heightened anxiety at the first meeting. Assessing capacity to consent enabled any issues to be highlighted and to stop the process at this early stage if needed. The phone call also included a brief mood screen, 'the Yale-Brown single-

item screening question'. Compared to the Montgomery-Asberg Depression Rating Scale (Montgomery & Asberg, 1979), the 'Yale Question' was found to have 95% (52/55) sensitivity, 89% (32/36) specificity and good positive predictive value (93%, 52/56) and negative predictive value (91%, 32/35) for depression after stroke (Watkins, Daniels, Jack, Dickinson & van den Broek, 2001; Watkins et al., 2007). In the interest of participant wellbeing, if they indicated feeling 'depressed most of the time', they were informed that support could not be offered for mental health difficulties and were asked to consider withdrawing at this stage. Collecting detailed background information at this stage crucially enabled testing sessions to be kept under thirty minutes and as stress-free as possible.

Data analyses

The data failed to meet the assumption of normal distribution, therefore non-parametric analyses were conducted. There were no missing data. To assess order effects, Mann-Whitney U-tests were carried out, inputting 'order of condition' (Standard first x Superhero first) as the grouping variable and cognitive scores for each measure (Standard x Superhero) as dependent variables.

The primary hypotheses were that increased psychological distance would improve performance on C-WI, TMT and DSB tasks. Wilcoxon Signed-Rank tests were carried out to determine whether superhero role-taking significantly impacted executive function performance.

The secondary hypotheses were that participants who were more engaged in superhero distancing would show larger improvements in their cognitive scores. Their score changes would also more often be clinically reliable. Correlations between participants' self-rated level of engagement in the manipulation and their size of performance change were calculated. Kendall's Tau-*b* (τ_b) correlation coefficient was used as a measure of associations where at least one variable is ordinal.

To ascertain whether differences in individuals' performances could be considered clinically reliable, the Reliable Change Index (RCI; Jacobson and Truax, 1991) was calculated using published age-matched standard deviations and test-retest reliability coefficients for each measure (C-WI and TMT from Delis, Kaplan & Kramer 2001; DSB from Waters & Caplan, 2003). The RCI is a particularly useful measure of within-participant change, indicating whether the difference in test scores is reliably greater than a test's measurement error (Duff, 2012). A 95% confidence level was used, meaning an RCI value of ± 1.96 (change of at least 1 standard deviation) was deemed reliable.

On balance, this study took a realist epistemological perspective, in that individuals' cognitive performance and verbal feedback were deemed a true reflection of their real-life abilities and experiences. However, it is acknowledged that cognitive tests are often less reliable than would be desired and involve an element of measurement error. In addition, the selection of qualitative evidence and the degree to which participants' voices are highlighted does not occur without author influence.

The qualitative data set comprised of all answers to the post-task questions and analysis was informed by Braun and Clarke's (2006) framework for Thematic Analysis. An inductive approach was adopted as there was no previous theory which could be applied to this specific area. In addition, it was not possible to carry out detailed interviews, so room for interpretation of participants' feedback was limited. As a result of these points, semantic coding of the whole data set precluded the generation of themes to provide richer description of participants' experiences and emphasise areas of further interest. Potential themes were generated by grouping two or more similarly coded extracts. These themes were then reviewed, refined and defined (Braun & Clarke, 2006).

Results

Characteristics of the sample are shown in Table 1.

Table 1. *Sample characteristics*

ID	Gender	Ethnicity	Age	YoE	Employment type (current or pre-stroke)	Time since stroke	Testing interval (days)	Included in which analyses?
1	F	White British	52	16.5	Skilled	8y 7mo	28	Quant. + Qual.
2	F	White British	56	17	Skilled	2y 2mo	21	Quant. + Qual.
3	F	White British	34	13	Unskilled	1y 5mo	35	Quant. + Qual.
4	F	White British	49	17	Skilled	1y 11mo	21	Quant. + Qual.
5	F	White British	59	17	Skilled	1y 4mo	35	Quant. + Qual.
6	F	White British	57	11	Semi-skilled	2y 7mo	28	Quant. + Qual.
7	F	White British	68	11	Skilled	5y 10mo	21	Quant. + Qual.
8	F	White British	76	11	Semi-skilled	1y 3mo	Incomplete	Qual. only
9	M	White British	45	16	Skilled	1y 3mo	Incomplete	Qual. only
10	F	White British	75	11	Skilled	5y 3mo	Incomplete	None

M = Male; F = Female; YoE = Years of education; y = years; mo = months; Quant. = quantitative; Qual. = qualitative.

Participants 8 and 9 were excluded from the quantitative analyses due to incomplete quantitative data.

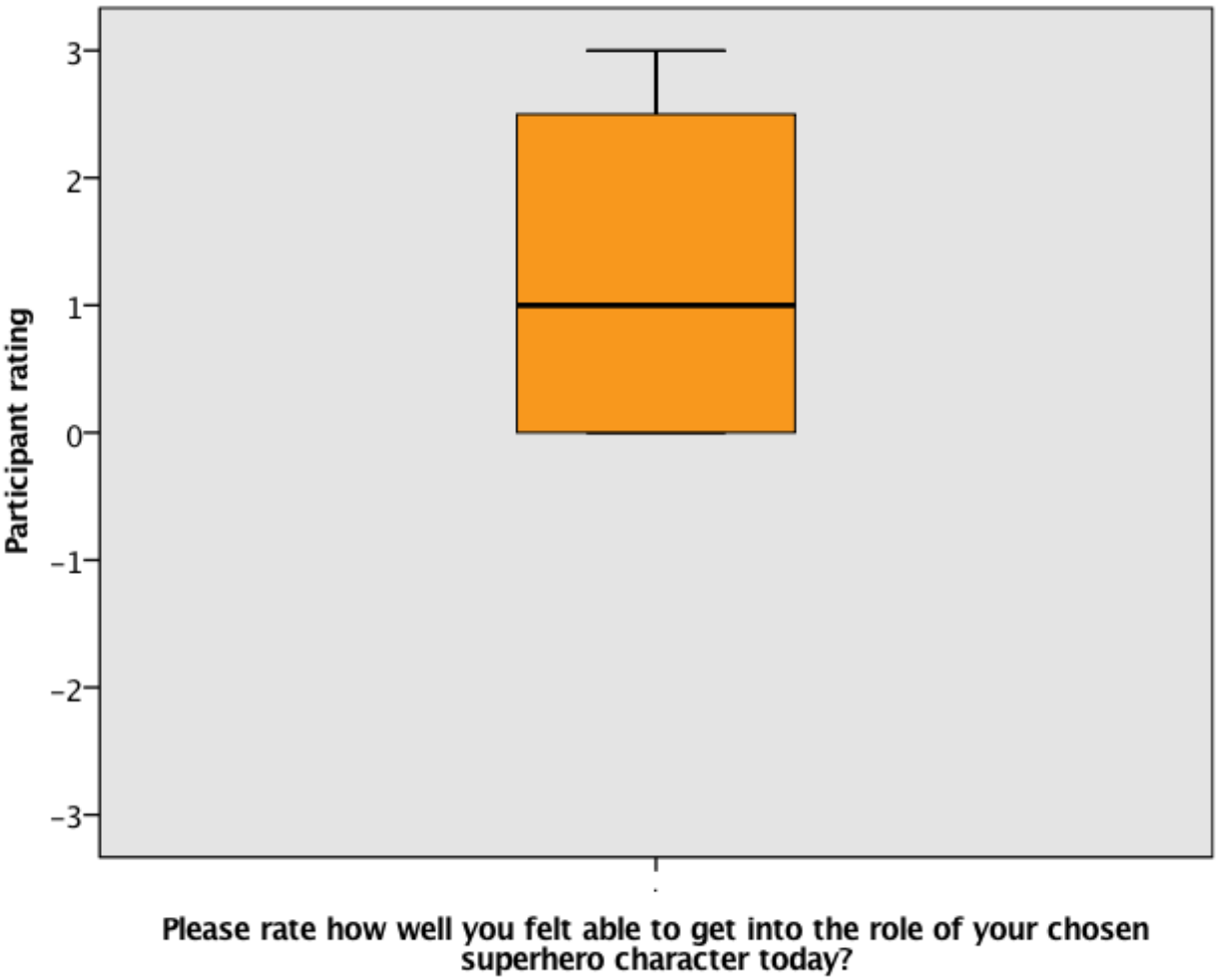
Participant 10 was excluded from all analyses due to incomplete quantitative data and no qualitative feedback. Information reported for transparency.

Quantitative analyses

Mann-Whitney U-tests to assess order effects revealed no significant differences in performance for C-WI, TMT or DSB tasks, suggesting order of condition did not significantly affect cognitive scores.

Participants appeared to be able to engage in the 'superhero distancing' manipulation. It can be seen in Figure 1 that the median rating of participants' ability to role-take was 1. Although ratings of 0 ('no change') occurred, there were no negative ratings, indicating participants did not feel the role-taking exercise was detrimental to their performance.

Figure 1. *Box plot of participant engagement in the distancing manipulation*



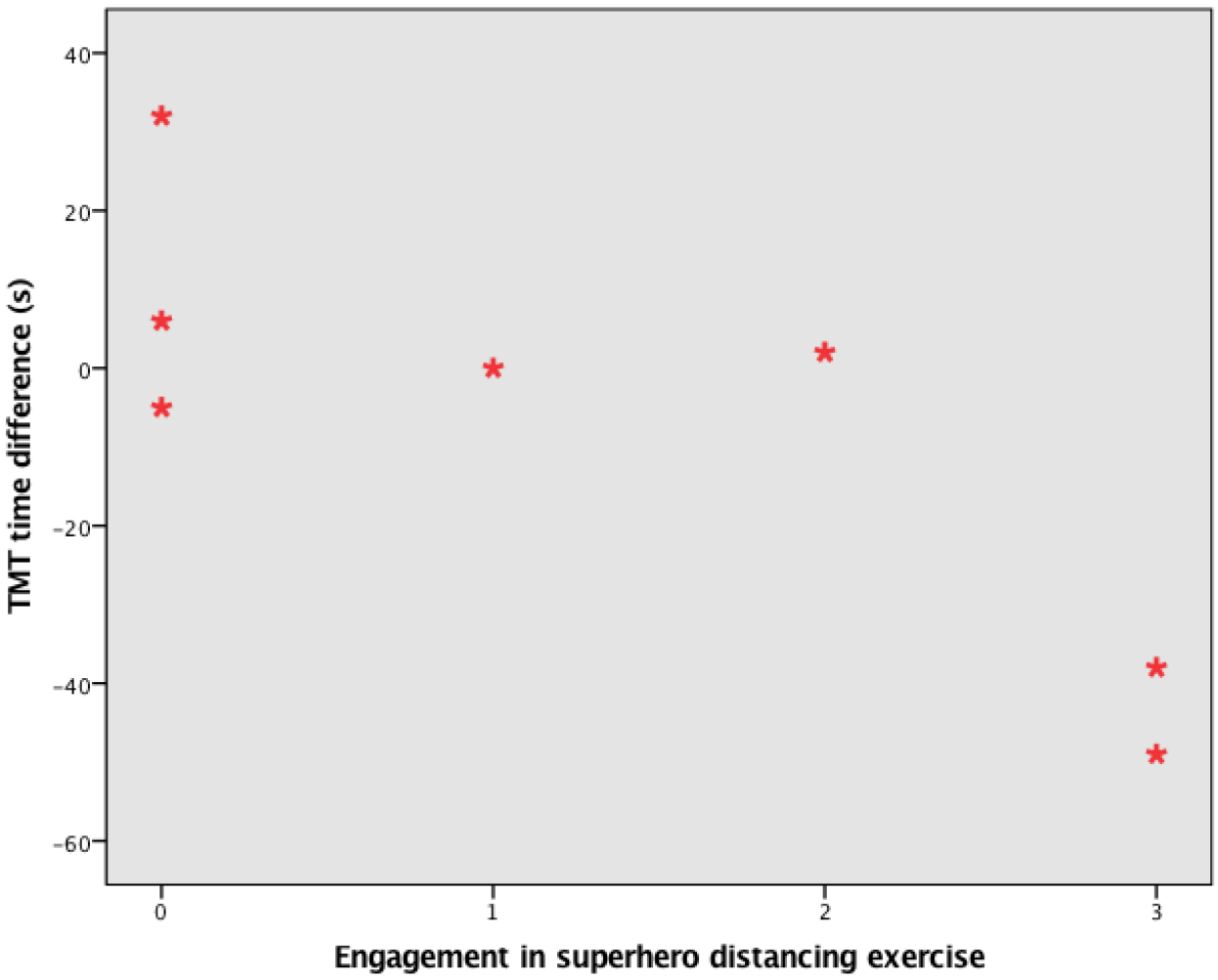
Primary hypotheses (comparison of medians)

Wilcoxon Signed-Rank tests revealed the difference in completion time for the C-WI task was not statistically significant (Z = -1.364, p = .172). Median completion times for Standard and Superhero conditions were 71 and 72 seconds respectively. Completion times for the TMT did not yield a statistically significant difference (Z = -.524, p = .600). Median completion times for Standard and Superhero conditions were equal at 99 seconds. Raw scores for the DSB task did not yield a statistically significant difference (Z = -.707, p = .480). Median raw scores for Standard and Superhero conditions were 7 and 8 respectively.

Secondary hypotheses (associations)

A scatter plot cautiously suggested that time to complete the TMT and self-rated engagement in the distancing task may potentially be negatively associated (Figure 2). In other words, as individuals felt more able to engage in psychological distancing, they demonstrated larger improvements on the TMT. However, Kendall's Tau-*b* correlation coefficients suggested there were no significant associations between 'engagement in the distancing manipulation' and 'size of performance change' for C-WI (τ_b = 0.00, p = 1.000), TMT (τ_b = -.582, p = .081) or DSB (τ_b = .229, p = .512) tasks.

Figure 2. *Relationship between TMT performance change and engagement in distancing manipulation*



Case series and reliable change data

Of the four participants who felt able to engage in the role-taking experience (rating >0), three achieved at least one instance of reliable cognitive improvement. Of those who did not feel able to engage in role-taking (rating 0), one participant reliably deteriorated on the Trail Making task and the others showed no reliable improvements. Participants' individual performances (Table 2) and experiences of applying the 'superhero distancing' strategy are reported next.

Table 2. *Engagement in distancing strategy and Reliable Change Index values*

ID	Engagement with Superhero role-taking	Colour-Word Interference (C-WI)			Trail Making Test (TMT)			Digit Span Backwards (DSB)		
		Time difference (seconds)	RCI value	Reliable change? (>±1.96)	Time difference (seconds)	RCI value	Reliable change? (>±1.96)	Raw score difference	RCI value	Reliable change? (>±1.96)
1	**+3**	-8	-2.16	**RC +**	-38	-13.38	**RC +**	0	0.00	**RC 0**
2	**+3**	+1	+0.33	**RC 0**	-49	-17.52	**RC +**	+2	+2.27	**RC +**
3	**+2**	+2	+1.00	**RC 0**	+2	+0.63	**RC 0**	-1	-1.45	**RC 0**
4	**+1**	-5	-2.49	**RC +**	0	0.00	**RC 0**	+1	+1.14	**RC 0**
5	**0**	+1	+0.33	**RC 0**	-2	-0.70	**RC 0**	+1	+1.14	**RC 0**
6	**0**	-5	-1.63	**RC 0**	-5	-1.76	**RC 0**	0	0.00	**RC 0**
7	**0**	-5	-1.63	**RC 0**	+32	+11.27	**RC –**	-1	-1.22	**RC 0**

'Time difference' = (*superhero time-standard time*); 'Raw score difference' = (*superhero raw score-standard raw score*).

RCI = Reliable Change Index; RC + = reliable improvement; RC 0 = no change; RC – = reliable deterioration.

Participants *reporting positive engagement* in the superhero distancing strategy

Participant 1 had a left-sided parietal stroke over eight years ago and reported difficulties with her mobility. She chose to take the role of Wonder Woman and rated her ability to engage in the task as +3. She reported enjoying the role-taking exercise as it made her feel more positive, bringing up thoughts of being "invincible" and "not being defeated". Her completion time for C-WI and TMT tasks improved significantly, achieving reliable change for both measures. Her performance on the DSB did not change.

Participant 2 experienced a left-sided haemorrhagic stroke two years prior. She chose the Nancy Drew superhero character and also rated her ability to take on this role as +3. She reported enjoying the exercise and feeling “reckless as Nancy Drew”, which was supported by her higher number of errors on both the C-WI and TMT tasks. Despite this, she was able to achieve a reliable improvement in her completion time for the TMT and was the only participant to demonstrate reliable improvement on the DSB task.

Participant 3 had a left-sided stroke (arterial venous malformation) almost eighteen months prior and reported some right-sided weakness. She felt the experience of taking the role of Wonder Woman positively affected her mood (more relaxed and confident) and even reported her posture became more upright. The exercise evoked vivid imagery of Wonder Woman and drew upon her interest in Drama. She reported feeling more able to “step back and look at every angle, not focusing so much on the here and now”. Despite this positive feedback, Participant 3 did not show reliable changes on any of the cognitive measures.

Participant 4 had a right-sided posterior inferior cerebellar artery infarct almost two years prior. Her superhero of choice was Wonder Woman and she rated her ability to engage in this task as +1. She reported role-taking “grounded me to positive aspects of myself” and described doing “something similar in the past when trying to get into a positive frame of mind” for work. Her completion time for C-WI showed reliable improvement whereas her performance on the other measures did not.

Participants *not reporting positive engagement* in the superhero distancing strategy

Participant 5 experienced a focal right-sided thalamic haemorrhage one year and four months prior and reported some fatigue which could be unpredictable. Sessions were carefully planned around this and she reported no difficulties during testing. She chose to take the role of Nancy Drew and reported 'no noticeable effect' (rating 0) from this. Participant 5 felt she 'could only concentrate on the tasks' and may have had to ignore the role-taking exercise to concentrate on performing. As to what this may predictively suggest, none of her cognitive scores changed at a level that was deemed significant.

Participant 6 had a right-sided ischaemic stroke two years and seven months prior and reported weakness in her left arm. She chose to take the role of Nancy Drew and although she found the exercise "enjoyable", she "did not feel it was particularly helpful" to the tasks. She rated her ability to get into the role as 0. Participant 6 felt as though she performed better during the Standard condition and suggested she may have been "trying too hard" as the Superhero. However, this was not supported by her cognitive scores as her completion times on C-WI and TMT tasks slightly improved (although not to reliable levels), and her DSB raw score remained the same.

Participant 7 experienced a left-sided subarachnoid aneurysm 5 years 10 months prior and reported that it had affected her speech. She also chose to take the role of Nancy Drew and reported her ability to 'get into the role' as 0, indicating she felt 'no noticeable effect'. Participant 7 described being slightly confused, struggling to 'get her head around' and relate to the young cartoon Nancy Drew character, so resorted

to thinking of a protagonist she was more familiar with, ‘Miss Marple’. This feedback indicated she may have been distracted by the role-taking strategy and would have likely been justified in rating her engagement lower than 0. Her cognitive scores for the C-WI and DSB tasks showed no changes, however her completion time for the TMT appeared to reliably increase under the Superhero condition.

Qualitative analyses: *“What is the experience of using superhero role-taking to approach cognitive tasks?”*

Four overarching themes were identified from participants’ feedback about the role-taking strategy and can be seen in Table 3, along with quotes used to generate them. Overall sample feedback indicated that the superhero role-taking strategy:

1) Potentially improves mood
2) Potentially alters approach to tasks
3) May benefit from character relatability
4) May strain cognitive load

Table 3. *Key themes identified across the sample regarding the experience of 'superhero distancing'*

Themes identified	Quotes from participants
1. Improved mood	*1. "I felt more positive… It was enjoyable".* *2. "It was a hugely enjoyable experience".* *3. "I had the image of the 'lasso of truth' and when Wonder Woman crosses her arms in the film version. I'm usually a bit of a 'huncher' but my posture changed and during the exercise I felt more relaxed… I felt more confident and 'elevated'".* *4. "An interesting exercise, I felt it grounded me to positive aspects about myself".*
2. Altered approach to the task	*1. "I thought of adjectives such as 'invincible' and 'not being defeated'.* *2. "I felt more reckless as Nancy Drew!".* *3. "I felt able to step back while thinking and look at every angle, not so much focusing on 'the here and now'".* *4. "It was like when I used to work and take a moment to get into a positive frame of mind"* *8. "I felt a little more motivated".*
3. Importance of character relatability	*7. "I couldn't get my head around the character, I could only think of Miss Marple… It was a picture of a young lady and all I saw was the cartoon, it was hard to relate".* *8. "It felt quite helpful. I felt that what she looked like was how I would feel. She thinks before doing, an observer".*
4. Strained cognitive load	*5. "I felt I could only concentrate on the tasks but tried to remember Nancy Drew was a detective".* *6. "Felt I did better last time. Not sure why, I was possibly trying too hard? Maybe [considering superhero effect] I knew what to anticipate?".* *9. "I felt I had to ignore the exercise to perform the tasks… My focus was taken up by the tasks and it added to the load on the brain. It wasn't a nasty experience, I just found it hard in addition to the tasks".*

Discussion

This preliminary mixed-methods study investigated how psychological distancing impacted stroke survivors' executive functioning performance. Participants' experience of 'superhero distancing' was also explored to better understand how it influenced them.

Main findings

In relation to the primary hypotheses, there were no statistically significant differences in cognitive performance between Superhero and Standard control conditions. Although psychological distancing was found to improve cognitive performance in children (White et al., 2016) and young adults (Smith et al., 2008; Banakou et al., 2019), it had not been trialled in a 'clinical population' before. It may be the case that role-taking is not an effective method of psychological distancing to use after a stroke. After stroke, individuals may feel discontinuity, uncertainty and ambiguity with regard to their own roles in life (Satink et al., 2013) and trying to imagine taking on another may be inconceivable. Based on previous research, this study used 'superhero role-taking' primarily as a method of psychologically distancing from one's current self, rather than to induce any particular cognitive changes. However, stereotyped abilities of the different characters may have influenced participants in different ways. As a hypothetical example, choosing a super-human character could encourage participants to focus on 'speed', whereas choosing a detective might encourage them to focus on 'accuracy'. There was nothing from the data to suggest that having a mix of characters led to this difference, although a larger sample may have helped to clarify

this. The further analyses emphasised how some participants did feel the distancing method affected them and benefited individually.

With regard to the secondary hypotheses, a scatter plot implied that cognitive flexibility (TMT) may positively associate with psychological distancing. Indeed, this would be supported by White and colleagues' (2016) finding that children's cognitive flexibility increased as psychological distance increased. However, the associations between participants' engagement in the distancing strategy and the size of their cognitive changes were not significant. Therefore, it was helpful to split the sample into those who felt able to engage in the distancing process (scores >0) and those who did not (scores of 0). This important distinction highlighted that, if an individual is able to psychologically distance themselves, they may be able to achieve reliable improvements in executive functioning. The finding that not everyone benefitted from the distancing manipulation is unsurprising as there is generally limited evidence for executive functioning interventions after stroke (Poulin et al., 2012). This could reflect the fact stroke survivors are an extremely heterogeneous group and finding any cognitive strategy that works for all is very unlikely.

The role of IQ may also be important to consider with regard to individual responses to psychological distancing. For example, one difference between Participant 3 and the others who felt engaged in the role-taking exercise (Participants 1, 2 and 4) was her Years of Education and 'employment type'. Although this was a very crude way of estimating IQ, Kostering and colleagues (2015) suggested the relationship between IQ and cognitive performance may be strengthened if a task is made more challenging

or unpredictable. It could be possible that individuals with higher IQ may be more motivated to do well when asked to take the novel role of the superhero.

Qualitatively, five of the nine participants had positive experiences of using the distancing method. Feedback from participants 1-4 suggested it improved their mood (Theme 1). Studies have shown that positive mood can be both a cause (Bar-Anan, Liberman & Trope, 2006; Labroo & Patrick, 2009) and a consequence of psychological distancing (Osimo et al., 2015). For the stroke population in particular, emotional difficulties are common (Mukherjee et al., 2006; Ferro & Santos, 2019) and it is possible that individual cognitive improvements achieved through taking the 'superhero role' were partly due to improved mood. In addition, Smith and colleagues' (2008) experiments showed how individuals experiencing low social power performed worse on many executive functioning tasks. If taking the role of a 'powerful superhero' has the effect of temporarily transcending this experience, it stands to reason that this could have a positive impact on executive functioning.

Theme 2 suggested that psychological distancing encouraged individuals to approach the tasks differently. It is possible that the new, 'exciting' role they were taking provided additional motivation and directed attentional resources for the tasks. Low mood and motivation can often be a consequence of acquired brain injuries (Feinstein, 1999). Participants who showed reliable improvements described 'not wanting to be defeated', feeling 'reckless' and 'getting into a positive frame of mind'. Pessoa (2009) suggested increasing motivation can impact executive control in contradicting ways. It may 'sharpen' executive functions by re-orientating attention towards motivationally

salient events, or it could impair executive functions as increased motivation can lead to individuals prioritising rewards. It is possible that Participants 1,2 and 4 found 'being a superhero' motivated them to perform and achieved reliable cognitive improvements as a result.

Participant 3 described in relative detail how she felt she was able to 'step back' and 'look from every angle'. Her description named many specific effects that increasing psychological distance and viewing tasks with a high construal mindset are proposed to evoke (Trope & Liberman, 2010). Although Participant 3's cognitive scores did not improve, her feedback suggests the qualitative experience of taking the role of another encouraged her to experience the situation differently. Other executive abilities may also benefit from distancing. Hunter et al.'s (2016) participant may have experienced this new outlook when successfully completing the Key Search task from the perspective of 'John' (e.g. "I am now John, who has not had a stroke and does not experience difficulties, I complete this task like this").

Theme 3 suggested that the relatability of the chosen character was significant in how Participants 7 and 8 engaged with this particular task. The decision to restrict the choice of roles in this study may have reduced some participants' ability to relate to their superhero character. Indeed, Participant 7 may have experienced distraction due to having trouble relating to the superhero character and may have performed better on the TMT had she taken the role of Miss Marple. Banakou et al. (2019) found that cognitive improvements occurred when students took the role of an individual they could not relate to, Albert Einstein. The use of Immersive VR in their study may have

overcome difficulties with relating as synchronous VR body movements supported 'ownership' over Einstein and his stereotyped characteristics.

Adam and Galinsky's (2012) 'enclothed cognition' study suggested wearing items of clothing associated with an individual of stereotypically strong ability ('a doctor') had a significant impact on cognitive performance. Interestingly, those who chose Wonder Woman and physically *wore* the cape all reported being engaged in the role-taking exercise although this did not improve all of their cognitive scores. An enclothed cognition hypothesis might suggest that, had the current study incorporated a wearable item for the Nancy Drew character, more cognitive improvements would have occurred.

Theme 4 showed how the act of role-taking could be overwhelming for some who feel unable to concentrate on the additional demands. Cognitive Load Theory (Sweller, 1988; Paas, van Gog & Sweller, 2010) highlights how a high amount of novel information may prevent adequate processing. In addition, working memory is generally thought to be able to process only around four items at once (Cowan, 2001), and possibly less after a stroke. Indeed, this study provided individuals with a number of scaffolds to facilitate the role-taking process (viewing an image, thinking about the superhero and engaging with props). However, less scaffolding may be sufficient to benefit from psychological distancing and as little as possible should be added to one's cognitive load.

Clinical implications

This study highlights how roles could be an important influence on cognitive performance and therefore may be especially important after a stroke. For some individuals, psychological distancing may improve mood and encourage new ways of approaching tasks, which can facilitate executive functioning. Trying to psychologically distance oneself after a stroke appears to not work for everyone and may depend on one's available resources to adjust to their situation at the time. A less intimidating approach than 'becoming a superhero' may be for a stroke survivor to take the role of themselves as they wish to be, a 'superhero' in their own right. Psychologically distancing from current experiences could be thought of as comparable to building new, positive narratives about oneself. Narrative therapy focuses on 're-authoring' one's story and identity (White & Epston, 1990; Carr, 1998). It seems reasonable that psychologically distancing oneself from the sudden loss of abilities, roles and identity that can be a consequence of stroke (Mukherjee et al., 2006) could support adjustment. Developing a sense of one's own 'internalised superhero' in an individual therapeutic or group (Chow, 2018) capacity may not only build a preferable new identity (White, 2007), but help facilitate cognitive benefits as well.

Research implications

Conclusive evidence on the impact of psychological distancing on executive functions after stroke was not established. However, these preliminary findings contribute to the wider literature, highlighting that, for some stroke survivors, psychological distancing may help support executive functioning. Research efforts may now wish to determine factors which help individuals engage in psychological distancing. Furthermore, it is

not yet known whether psychologically distancing oneself from the ‘here and now’ is a ‘learnable’ skill which could become natural over time. Practice-based research may be able to identify how spending time engaging with one’s ‘internal superhero’ after a stroke can be integrated into daily life as seamlessly as possible, building on the potential strategies available to individuals after stroke.

The current study explored how psychological distancing affected executive functions, and the qualitative experiences, of stroke survivors in general. Further research could be conducted focusing specifically on the effectiveness of psychological distancing for those who have post-stroke executive impairments. Extending this, studies establishing whether psychological distancing could help improve individuals’ daily functioning would be valuable and interesting.

Limitations

Due to the small sample size, it was not possible to run parametric analyses in this pilot study. Although one can be more confident in significant findings from non-parametric tests, they suffer from increased likelihood of type II errors, especially when used on a small sample. It is therefore not possible to know whether the lack of significant results in this study were due to confirmation of the null hypothesis, or the lack of power to detect a significant effect of ‘superhero distancing’.

The sample recruited was of a narrow demographic range. Despite this reflecting the ethnic diversity of the stroke support groups that were approached, it is clear stroke

does not only affect those who are White British, female and highly educated. In fact, prevalence of stroke is thought to be higher in black individuals (Howard et al., 2011) and men (Wyller, 1999). Also, despite most strokes occurring in low-income countries, Conti et al. (2015) also found an overwhelming majority research on executive functioning and stroke occurs in high-income, mostly Western countries. Although this limitation is not unique to this study, future stroke research should carefully consider how to access individuals who appropriately represent stroke survivors.

This was a pilot study within a new area of stroke research and participants' level of impairment was not used as a criteria for recruitment. This population is extremely heterogeneous and participants' level of cognitive impairment may have influenced the effect of distancing on their executive performance. Individuals with higher levels of impairment may have shown larger improvements in cognitive performance due to a tendency for scores to regress towards the mean. In addition, those who were less cognitively impaired by their stroke may have shown smaller changes due to having less 'potential improvement' to make. Using 'level of cognitive impairment' as an entry criteria may have allowed firmer conclusions to be made about the effects of psychological distancing on executive functioning and should be considered in further studies.

With regard to blinding procedures, this study was unable to blind participants to the conditions they received. This could have increased the anticipation they felt during the superhero tasks (as was expressed by Participant 6). Past studies have used cover stories to mask the manipulation of roles (Adam & Galinsky, 2012), however, the current study did not aim for this and actively sought participants' feedback. Although participants were not told about the concept of 'psychological distancing',

this study was overtly looking at how taking the role of a superhero impacted cognition. Interaction between participants and the principal researcher during each session ran the risk of introducing elements of interviewer or responder bias. Having an additional researcher complete the testing sessions would have removed the principal researcher from the data collection phase.

For the qualitative analyses, only limited information could be collected and data saturation was not possible with meetings being kept to thirty minutes. This was based on advice from experts and necessary to avoid participant stress and fatigue. In addition, the study aimed to collect preliminary data as no prior information on psychological distancing in the stroke population existed. Braun and Clarke (2006) stated that themes are actively 'generated', rather than 'excavated' from data and the amount of data required is subjective (Braun & Clarke, 2019). However, the themes generated in this study may have been different had more detailed interviews been conducted.

Conclusions

Due to its limitations, this study was unable to provide strong evidence for the effect of psychological distancing on stroke survivors' executive function performance. However, on an individual basis, there were those who demonstrated clinically reliable improvement in executive functioning, based on their RCI values. These individuals appeared to rate themselves as more able to engage with the superhero distancing exercise. Psychologically distancing may therefore help *some* stroke survivors access or utilise their executive functioning abilities more efficiently. Whether there are ways

of facilitating the superhero distancing process for those who struggle to engage with it, or if this skill could develop over time, remains to be determined.

Overall, participant feedback suggested superhero distancing may not be for everyone, which was unsurprising. Themes across the sample indicated a mixed response in that it may ‘improve mood’, ‘alter the approach to tasks’, ‘be enhanced by character relatability’ and potentially ‘be a burden on cognitive load’. The idea of transcending one’s usual experience and experimenting with a new ‘superhero role’ may be applicable to therapeutic work which focuses on managing cognitive changes and re-authoring one’s story and/or identity after stroke. The cognitive consequences of this approach may be an extremely interesting next step to explore.

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APPENDICES OF SUPPORTING MATERIAL

MAJOR RESEARCH PROJECT

PART C

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Appendix 1. Salomons research ethics approval letter

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Appendix 2. Brief information sheet

The Superhero Tests of Executive Functioning

Study background

Many people experience changes in their cognition (thinking ability) as a consequence of a stroke. Executive functioning is one aspect of cognition that involves holding rules in mind, weighing up decisions and multitasking, among other things.

After a stroke, one's sense of self can be altered, which impacts cognitive abilities generally. For example, if we anticipate being unsuccessful at a task, this will affect our performance. Neuropsychological evidence suggests that executive functioning may be related to perspective taking but draw on distinct regions within the brain. Taking the role of another may help access executive abilities that may have been affected.

During this study, we will be investigating whether taking the role of a 'superhero character' may impact executive functioning for individuals who have experienced a stroke. It is hoped that this research will help shed light on potential strategies for adapting to executive difficulties after stroke. If taking on the role of another is found to be an important factor, this study could also influence how neuropsychological tests are administered in future.

What will taking part involve?

If you would like to participate:

If you choose to take part, I will contact you via phone or email to arrange two meetings, spaced 3 weeks apart. These meetings can take place at the Salomons Institute for Applied Psychology (Tunbridge Wells), somewhere local to your stroke groups, or at home if you would prefer.

During each meeting, you will be asked to complete 3 brief cognitive tasks (5-10 minutes each). For one of these meetings you will complete tasks as instructed by the standardised administration procedures. For the other meeting, you will take on the role of 'a superhero character'. **There will be no acting or role-play involved**.

Completing the tasks will last no longer than 30 minutes.

You will be reimbursed up to £10 for each meeting towards the costs of travelling and parking.

Please turn over for inclusion/exclusion criteria and contact details

Inclusion and exclusion criteria

To take part in the study, we are asking that participants:

- Be above 25 years of age
- Have had a stroke over one year ago
- Have your hospital discharge letter available
- Have a good understanding of English
- Be able to meet for a maximum time of 30 minutes (breaks if required)
- Be able to understand and fill in a consent form
- Not be currently undergoing any other cognitive testing
- Not have colour-vision deficiency or colour blindness
- Not have been diagnosed with dementia or autism
- Not have *a degree of* aphasia, motor difficulty or uncorrected visual or hearing impairment which means you are unable to complete pen and paper tasks. (You are still free to take part if you are able but find these tasks difficult).

Contact details

Thank you for considering participating in this study. I am very happy to answer any questions you may have, so please do get in touch.

Ben Kershaw (Trainee Clinical Psychologist and Primary Researcher)

Salomons Institute for Applied Psychology,
1 Meadow Road,
Tunbridge Wells,
Kent
TN1 2YG

Email: b.kershaw116@canterbury.ac.uk

Phone: 07745502707

What to do now?

If you have read the inclusion and exclusion criteria above and think you would like to take part in this study, please get in touch with the relevant member of your local stroke group. I will be in touch with them to collect your contact details. You will be provided with further information before making the decision to take part.

If you prefer, you can contact me directly on the details above and I will let you know how we can progress with the study.

Appendix 3. Full information sheet

Salomons Institute for Applied Psychology
One Meadow Road, Tunbridge Wells, Kent TN1 2YG

www.canterbury.ac.uk/appliedpsychology

INFORMATION ABOUT THIS RESEARCH

The 'Superhero' Tests of Executive Functioning

Hello. My name is Ben Kershaw, I am a trainee clinical psychologist at Canterbury Christ Church University. I would like to invite you to take part in a research study. Before you decide whether to take part, it is important that you understand why the research is being done and what it would involve for you.

Please talk to others about the study if you wish to.

- Part 1 tells you the purpose of this study and what will happen if you take part.
- Part 2 gives you more detailed information about the conduct of the study.

PART 1

What is the purpose of the study?

Many people experience changes in their cognition as a consequence of a stroke. Executive functioning is one aspect of cognition that involves holding rules in mind, weighing up decisions and multitasking, among other things.

After stroke, one's sense of self may also be altered, which impacts cognitive abilities generally. For example, if we anticipate being unsuccessful at a task, this will affect our performance. There is preliminary evidence to suggest that taking the role of another may help people during tasks that draw on executive functions.

During this study, we will be investigating whether taking the role of a 'superhero character' may impact executive functioning for individuals who have experienced a stroke. It is hoped that this research will help shed light on potential strategies for adapting to executive difficulties after stroke. The results of this study could also influence how neuropsychological tests are administered in future.

Why have I been invited?

You have been invited to take part in this study because you showed an interest in participating and have self-assessed as possibly being eligible to participate from the criteria outlined in the 'brief information sheet'. I have received the contact details you provided and would very much like you to be a participant in this study.

Do I have to take part?

Participation is entirely voluntary. If you agree to take part, I will ask you to sign a consent form. You will be given a copy of your signed consent form to keep.

You are free to withdraw from the study at any time without giving a reason and this will not affect your rights or the standard of care you receive in any way.

What will happen if I take part?

If you choose to take part, I will contact you via phone or email to arrange two meetings, spaced 3 weeks apart. These meetings can take place at the Salomons Institute for Applied Psychology (Tunbridge Wells).

In return for participating, you can claim up to £10 per meeting towards the costs of your travel, parking etc.

What will I be asked to do?

During each meeting, you will be asked to complete 3 brief cognitive tasks (around 5 minutes each). For one of these meetings you will carry out the tasks as instructed by the standardised administration procedures. For the other meeting, you will take on the role of 'a superhero character'.

For the role-taking exercise, you will be asked to take the role of a 'superhero character' before completing the tasks. There will be no acting or role-play involved, you will simply be using your imagination, guided by a script. You may also be provided with an item to aid this, such as a cape or magnifying glass to help embody your chosen character. The order of sessions will be randomised.

The tasks for each meeting will take no longer than 30 minutes.

What are the possible disadvantages and risks of taking part?

It is possible that carrying out cognitive tasks can temporarily heighten anxiety. For example, feeling that you may not be doing your best could potentially be upsetting. If this is an issue, we can take breaks and accommodate your needs during the meetings.

This study will require you to try taking on the role of a character. There is no acting involved and you will be using your imagination. Although this will be guided using a script, this could feel strange to some people or bring up thoughts of your own difficulties.

What are the possible benefits of taking part?

The study is intended to contribute to existing knowledge around executive function after stroke. Possible benefits of taking part could include questioning the way neuropsychological tests are administered. Further questions may also be formed around the use of role taking and self-distancing, such as how it could be applied to recovery and compensatory strategies after stroke.

Taking part in the study will likely involve trying something new which has the potential to be enjoyable.

We cannot promise the study will help you personally but the information we gain could help improve the care and understanding of how to help others who have experienced a stroke.

What if there is a problem?

Any complaint about the way you have been treated before, during and after the study, or any harm you feel you have come to will be addressed. The detailed information on this is given in Part 2.

Will information from or about me be kept confidential?

Yes. We will follow ethical and legal practice and all information about you will be handled in confidence. There are some rare situations in which information would have to be shared with others. The details are included in Part 2.

This completes part 1. If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making a decision.

PART 2

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

If you would like to withdraw from the study at any time, you are free to do so. If you choose to withdraw, you will be asked if you wish to have both your personal information and any data collected during the study to be removed and destroyed. If so, this will be carried out as soon as possible.

What if there is a problem?

We will take your concerns very seriously. If at any point throughout your participation in the study, you feel you have not been treated appropriately and wish to make a complaint, please find details of how to do this below.

Concerns and Complaints

If you have a concern about any aspect of this study, you should ask to speak to me, and I will do my best to address your concerns. You can contact me by leaving a message on a 24-hour voicemail phone line at 01227 927070. Please say that the message is for Ben Kershaw and leave a contact number so that I can get back to you as soon as possible. Alternatively, you may wish to email me at b.kershaw116@canterbury.ac.uk. If you feel unable to talk to me about a concern or remain dissatisfied and wish to complain formally, you can do this by [redacted]k.

Will information from or about me from taking part in the study be kept confidential?

You will be assigned a unique study ID number which will be used during the analysis of data and any identifying information will be kept in a separate location. It will not be possible to identify any individual from looking at the data set. Data and personal information will be held securely on separate encrypted devices and only the primary researcher and research supervisor, [redacted]) will have access to this. The other research supervisors, [redacted] and [redacted]) may also see the data to help with interpretation of the results. You also have the right to check the accuracy of the data held about you and to correct any mistakes.

All information which is collected from or about you during the course of the research will be kept strictly confidential, and any information collected about you will have your name and address removed so that you cannot be recognised.

The only time when I would be obliged to pass on information from you to a third party would be if, as a result of something you told me, I were to become concerned about your safety or the safety of someone else.

Your data will be used for this study only, however, you may be asked if your contact details may be retained in case you would like to participate in any future studies. Your full consent will be asked for beforehand and you are free to deny this request.

Once your participation in the study is complete, your data will be stored for 10 years, as this is generally considered the minimum length of time suggested by the Medical Research Council for basic research.

What will happen to the results of the research study?

The results of this study will be shared with you if you would like them to be. I will post or email a letter once the study has been completed. This will not comment on individual participants but will explain the findings of the study overall. Unfortunately, it will not be possible to discuss your individual test scores with you unless there has been reason for concern, such as mood ratings.

This study may be written up and submitted for publication in the future. You will not be identified in any reports or publications unless you have given your full consent.

Who is sponsoring and funding the research?

Canterbury Christ Church University is funding this study.

Who has reviewed the study?

This study has been reviewed and given favourable opinion by The Salomons Ethics Panel, Salomons Institute for Applied Psychology, Canterbury Christ Church University.

Further information and contact details

Please see the table below for further contact details regarding this study

1. General information about this research	If you would like to speak to me and find out more about the study of have questions about it answered, you can leave a message for me on a 24-hour voicemail phone line at 01227 927070. Please say that the message is for Ben Kershaw and leave a contact number so that I can get back to you. Alternatively, you can email me at b.kershaw116@canterbury.ac.uk
2. Specific information about this research	
3. Advice as to whether you should participate	Ben Kershaw, b.kershaw116@canterbury.ac.uk Dr [redacted]
4. Who you should approach if you are dissatisfied with the study and want to complain	Ben Kershaw, Trainee Clinical Psychologist, Principal Researcher, b.kershaw116@canterbury.ac.uk , 01227 927070. Dr [redacted]

Appendix 4. Consent form

CONSENT FORM

The 'Superhero' Tests of Executive Functioning

Primary Researcher: Ben Kershaw, Trainee Clinical Psychologist. Salomons Centre for Applied Psychology, 1 Meadow Road, Tunbridge Wells TN1 2YG.

Please **initial** each box.

First, please answer the following question:

Do you often feel sad or depressed? Yes ☐ No ☐

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these questions answered satisfactorily. ☐

2. I understand that completing cognitive tests could be upsetting if I feel I am not doing as well as I can. ☐

3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. My rights to fair treatment and confidentiality will not be affected. ☐

4. I understand that the data collected may be viewed by the lead supervisors, [redacted]

[redacted]. I give permission for them to have access to this information. ☐

5. I agree to take part in the above study. ☐

6. I agree for my anonymous data to be made available for future research studies, if required.

Yes ☐ No ☐

Name of participant _____

Date _____

Signature

_____

Name of researcher: Ben Kershaw

Date _____

Signature

_____

Appendix 5. Pre-study phone call schedule

Participant phone call

1. Introduce self. (3rd year trainee clinical psychologist completing major research project). “Thank you for taking the time to participate in my project”.
2. Explain phone call. (confirm eligibility, run through consent form, take some brief details, run through the study and any questions you may have, set up some times to meet).
3. Any questions about the study? Did you have a chance to look at info sheet? Give brief explanation.
4. Eligibility criteria
5. Run through consent form and ask Yale Question.
6. Assess capacity
7. Collect details

Nationality, ethnicity:

DoB:

Age left education:

Employment type?:

Any current pain?:

If not providing discharge letter: When did you have your stroke?

What type of stroke did you have? Location?

8. Schedule 2 dates, 3 weeks apart.

Appendix 6. Superhero images (A4 printed)

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Appendix 7. Superhero distancing manipulation – guided script

There will be points for thought during this exercise but you are not required to give answers, just think about them to yourself. When the exercise is done, don't worry about anything, just try the tasks as you usually would. Okay?

Focus your gaze on the image of [character], keeping your eyes on them.

Raise your shoulders up toward your ears as you breathe in (demonstrate), and lower your shoulders into a relaxed position as you exhale (demonstrate). Breathe in, raising your shoulders, and out ... relaxing your shoulders.

Keep your shoulders in this relaxed position as you breathe slowly... deeply... calmly...

Start to create a sense of [character], the character you will become today.

Who is [character]?

What is [character] like?

Allow all the details about [character] to fill your mind. (Pause)...

Imagine how [character] would go about the things they do. Seeing the world through [character's] eyes.

How does [character] hold him/herself?

What motivates him/her?

Envision the obstacles that [character] faces. How might [character] handle these challenges?

Now imagine that you are [character], taking/wearing the [item] at this stage if you wish. (Pause)...

In your mind, truly *be* them. What characteristics do you, as [character], have? What do you feel?

What drives you?

What are some attributes you now have to draw upon as [character]?

Allow yourself to take on this role, so you can react to situations in the same way [character] would.

Allow [character] to shine through... embodying [character]... reacting and thinking as [character]... so naturally... so easily...

Take a deep breath in… and out. [character], YOU are now going to complete a series of tasks (remove image). Are you ready?

Appendix 8. Cognitive task scripts

Colour-Word interference (STANDARD)

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Colour-word interference (SUPERHERO)

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Trail Making (STANDARD)

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Trail Making (SUPERHERO)

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Digit Span Backwards (STANDARD)

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Digit Span Backwards (SUPERHERO)

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Appendix 9. Post-task questions including manipulation check

Post-task questions

1. Please rate how well you felt able to get into the role of your chosen superhero character today (please circle).

   -3 = ‘I felt very put off by the exercise’

   0 = ‘no noticeable effect’

   +3 = ‘I felt I was absorbed in the role of my character’

-3 -2 -1 0 +1 +2 +3

2. When trying to take the role of your character, did you notice any changes in yourself from before the exercise? No matter how small or temporary

3. What was your overall impression of trying to take the role of your superhero character today?

Appendix 10. Author guidelines for publication

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Appendix 11. Final Report to Ethics Committee

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