How information affects attributions for ambiguous behaviours resulting from stroke

By

Jake Gallagher

A thesis submitted to Victoria University of Wellington
in fulfilment of the requirements for the degree of
Master of Science in Psychology

Victoria University of Wellington

2015

Acknowledgments

I would like to thank everyone who has helped me in some way in writing this thesis; however, doing so would make this acknowledgements section far too long. Instead, I will acknowledge some of the individuals who made this thesis possible. To my family – Mum, Dad, and Ellen – thank you for always being there, and for reminding me to look after myself. To my fellow psychology students – by simply knowing what I was going through you helped me to see the lighter side of things, and to know that I was never alone. Finally, to my supervisors Professor John McClure and Associate Professor John McDowall – you taught me so much, and were always there to motivate and guide me. I could not have asked for better supervisors.

Abstract

Research has shown that when people see young survivors of stroke, they often misattribute the person's symptoms to other factors (Wainwright et al., 2013). Consequently, these stroke survivors may suffer feelings of resentment towards, and from their acquaintances. They may also struggle to obtain or retain a job. This thesis examines whether these misattributions for stroke survivors' symptoms are affected by the information people have about the stroke survivor and the rapidity of the change in their behaviours. Experiment 1 investigated if the stroke survivor's age (72, 32 or unstated) and the level of information (no information, implied stroke or explicit stroke) for their behaviours influenced people's attributions. Experiment 1 showed that people attributed the behavioural changes to factors other than stroke when no additional information is present, and they attributed the behaviours to stroke when stroke was explicitly described. When stroke was implied, participants rated stroke as the best explanation but only when the target person was 72. Experiment 2 manipulated the rapidity of the stroke survivor's behavioural changes to assess the effect on attributions. Experiment 2 showed that people attributed the behaviours to stroke more if only one week had passed, and if the target person was 72, but not when he was 32. It was concluded that young stroke survivors may need to disclose their stroke in order for others to correctly attribute their behaviours, as this could improve their rehabilitation.

Contents

Introduction	5
Stroke incidence	5
Stroke in young people	8
Attributions underlying misdiagnosis of stroke	10
Research regarding misattributions for invisible injuries	11
Reasons for misattributions of stroke symptoms	13
Impacts of misattributions on young stroke survivors.....	18
Varying attributions based on stroke information.....	19
The present studies	20
Experiment 1.....	20
Experiment 1A (Explicit and no information conditions).....	21
Method.....	21
Results.....	25
Experiment 1B (Implied and no information conditions)	30
Method.....	30
Results.....	31
Discussion	35
Predictors of attributions.....	36
Experiment 2.....	38
Method.....	39
Results.....	40
Discussion	44
General Discussion	45
The effect of no information regarding stroke	45
The effect of explicit information regarding stroke	47
The effect of implied information regarding stroke	48
Predictors of attributions: anxiety and familiarity with stroke	50
The effect of rapidity in behavioural changes.....	51
Implications and Applications.....	54
Limitations and future research.....	58
Summary and conclusions	60
References.....	63

Introduction

On the first of March, 2014, a well-known New Zealand rugby player, Piri Weepu suffered a stroke at only thirty years old.

“Auckland Blues doctor Stephen Kara announced yesterday that Weepu, 30, suffered the 90-minute episode, followed by a headache and nausea, shortly before the team left for South Africa on March 1. He described its effect as ‘an inability to speak – he could understand but couldn’t portray language properly, he spoke like he was drunk.’

Nonetheless, Weepu was cleared to travel to South Africa and went on to play three games before having a scan on Monday, after which doctors realised he had had a stroke. Dr Kara said yesterday that he had not considered a stroke as a likely diagnosis and Weepu’s symptoms were put down to migraines. ‘If It was a 65-year-old male I was consulting with, stroke would be one of the first things I thought of, but given that he was a 30-year-old, that’s the least likely diagnosis,’ Dr Kara said. (Johnstone, (2014). Rugby star’s shock diagnosis Stroke knocks Weepu.” *The Dominion Post*, p. A1)

Misdiagnosis of stroke in young adults, as occurred in Piri Weepu, is the primary focus of this thesis.

Stroke incidence

A stroke is a medical condition which involves a disruption of blood moving into the brain (Easton & Sherman, 1977). The impacts of stroke can range from migraine-like symptoms such as headache and nausea through to death of the victim (Easton & Sherman, 1977). The known impact of stroke on victims has remained largely consistent in recent literature (i.e., from 1984-2002, Munter, Garret, Klag & Coresh, 2002), however; the base incidence of stroke has increased in this period (Munter et al., 2002), and the number of stroke survivors who are not being properly treated has also increased (Munter et al., 2002). The finding that stroke incidence has increased is unsurprising, given that stroke occurs more frequently in older age groups (Feigin et al., 2003) and that developed countries have aging populations (Christensen, Doblhammer, Rau & Vaupel, 2009). Moreover, rises in obesity and cardiovascular disease, which are both linked to stroke risk, further explain this increasing

incidence of stroke (Suk et al., 2003). The increased number of stroke survivors who are not in care highlights the need for research on stroke outcomes and treatment.

Although stroke is linked to developed nations in relation to ageing populations and obesity, it is a global issue, and stroke is the second most common cause of death worldwide (Feigin et al., 2003). The high impact of stroke in developing nations is reflected in the fact that developing nations have worse healthcare and higher mortality in general (Mathers, Sadana, Salomon, Murray & Lopez, 2001).

In New Zealand, stroke has a varying incidence rate, which is influenced by age and demographic factors. Estimates of the occurrence of stroke in New Zealand in under forty-five year olds range from as low as 0.01% per year to 0.03% per year (Feigin et al., 2003); however, in those eighty-five and over, the incidence of stroke has been estimated to be as high as 2% per year (Feigin et al., 2003). Additionally, the average age of first onset for stroke is sixty-nine for males and seventy-five for females (Feigin et al., 2003). Although stroke incidence in under forty-five year olds is relatively low, other factors increase the risk of stroke in all age groups. Obesity, stress, diabetes, smoking and heart disease are all known to contribute to stroke risk and together may have a greater effect than age (Borman, Wilson & Mailing, 1999; Wake, Hardy, Canterford, Sawyer & Carlin, 2007; Lee et al., 2009; Edmonds, 2011).

Although stroke in young people is far less common than with older persons, it does occur. Even at the lowest recent estimation of 0.1 incidents per 1000 people in New Zealand under the age of forty-five (Feigin et al., 2003), given the current population trends, approximately 270 young people per year in New Zealand (population 4.4 million) suffer a stroke (Statistics New Zealand, 2011).

Symptoms and consequences that occur after stroke

After the initial incident of stroke, many stroke survivors experience long-term behavioural and affective changes because of the stroke (Burvil et al., 1995; Dam, 2000). One of these is depression (Burvil et al., 1995; Dam, 2000). Depression is most likely to be diagnosed in stroke survivors approximately four months after the incident, with occurrence in approximately 20% of stroke survivors (Burvil et al., 1995; Dam, 2000). However, Burvil et al. (1995) found that depression after stroke decreases over time and of those who exhibited depression four months after the stroke incident, 56% of males and 30% of females still exhibited signs of depression one year after the stroke incident. Additionally, Dam (2000) found that of the stroke survivors who had been diagnosed with depression immediately after the incident, only 20% were still depressed seven years after the incident (although, this was still significantly more than the rate of depression in non-stroke survivors). A second significant issue for stroke survivors is fatigue, which is often associated with depression (Ingles, Eskes & Philips, 1999). However, fatigue may occur independently of depression as a symptom in stroke survivors (Staub & Bogousslavsky, 2001).

A third symptom resulting from stroke is irritability. Some research has shown that stroke survivors often display higher than normal levels of irritability (Folstein, Maiberger & McHugh, 1977), although irritability was found only in individuals who suffered stroke to the right hemisphere. Stroke affecting the right hemisphere is found in slightly below half of the cases of stroke in general (44%) (Foerch et al., 2005); however, the likelihood of left hemispheric stroke increases with age (in other words, young stroke victims are more likely to suffer stroke to the right hemisphere and to display symptoms of irritability than older stroke victims).

A fourth outcome in stroke, which is not a symptom, but rather the consequence of symptoms, is a decrease in amount of social activities that the stroke survivor participates in and subsequently a decrease in number of friends (Astrom, Asplund & Astrom, 1992; Northcott & Hilari, 2011). Largely due to an increase in fatigue, many stroke survivors report a notable change in their leisure activities, particularly that the amount of physical activities drops. This change in activities is a causal factor in the dissolution of friendships, particularly those that were based on mutual activities (Northcott & Hilari, 2011)

Stroke in young people

Differences between young and older stroke survivors

Young stroke survivors have a distinct set of needs compared to older stroke survivors and due to their underrepresentation in rehabilitation programmes, often these needs are not being met (Edmonds, 2011). Consequently, researchers such as Edmonds (2011) have used the term ‘invisible population’ when describing young stroke survivors. Young stroke survivors are frustrated with their treatment because they have a different set of needs (such as returning to work and initiating romantic relationships) to older stroke survivors (Teasell, McRae & Finestone, 2000), which are not being addressed during rehabilitation. Lawrence and Kinn (2012) suggested that in rehabilitation, young stroke survivors should be treated individually rather than being grouped with elderly stroke survivors in order to meet their different needs.

Unlike elderly survivors, the social consequences of stroke often also affect young survivors in the realm of work and romantic relationships (Teasell et al., 2000). Teasell et al. (2000) investigated the long term outcomes of stroke on young survivors. They found that of the stroke survivors who were married, 15% divorced shortly after the stroke and that as few as 20% returned to their place of work three months post stroke. However, given a longer

recovery time (i.e., up to thirty years after the stroke incident), the number who returned to work increased to around 50%, which is notably higher, but which still suggests that many young stroke survivors may never return to work (Varona, Bermejo, Guerra & Molina, 2004). Of those who did return to work, 25% had to have their working conditions altered to suit their new needs (Varona et al., 2004). This inability to work has been shown to lead to great frustration in young stroke survivors due to its impact on their ability to earn and to be independent (Malm & Ohmon, 2003).

Misdiagnosis of stroke symptoms in young people

Many of the symptoms mentioned previously (depression, irritability, fatigue and decrease in social activity) are common in young stroke survivors. These symptoms are often misdiagnosed by peers and strangers alike, who are more likely to suspect that the symptoms such as depression are due to causes such as personality rather than to stroke in young stroke survivors (Wainwright et al., 2013). The example of New Zealand rugby player Piri Weepu's stroke at the age of 30 (as cited at the beginning of the introduction) demonstrates the issues in diagnosis of stroke in a young victim, as his doctor misdiagnosed him as suffering a migraine rather than a stroke. Fortunately, Mr. Weepu's stroke was relatively minor and he is recovering well; however, the incident could have had a far worse outcome such as permanent brain injury or even death.

Stroke is particularly problematic in young victims because their symptoms are more often misdiagnosed than older stroke victims (Singhal et al., 2013). Kuruvilla, Bhattacharya, Rajamani and Chaturvedi (2010) conducted an analysis of stroke in-patients and found that 14% of stroke victims under 50 years old were initially given an incorrect diagnosis. They also found that the likelihood of misdiagnosis was even greater in stroke survivors under 35 (Kurivilla et al., 2010). Misdiagnosis of stroke can be dangerous because there is a crucial

window of time after the incident, and as time passes the effects of the stroke are likely to be more negative (Pancioli et al., 1998). Consequently, immediate recognition of the stroke is important for adequate treatment.

Misdiagnosis of stroke in clinical settings is not the only issue in relation to young stroke victims; the general population also tends to misdiagnose stroke. Travis et al. (2003) found that only 40% of a representative sample of the general population could recognise stroke and that only 42% of their participants would seek help if they suspected that someone was having a stroke. These findings along with the increased likelihood for a young stroke victim to receive an initial misdiagnosis when they see a doctor suggest that young stroke victims are likely to experience a delay before their stroke is recognised and correctly diagnosed. Reasons for these misdiagnoses are explained in following sections.

Attributions underlying misdiagnosis of stroke

Misdiagnosis of stroke symptoms in young people may be explained in terms of attribution theory (Wainwright et al., 2013). Causal attributions are people's explanations of why particular events and behaviours occur (Heider, 1944; Graham, 1991), and people use attributions to explain events such as unusual behaviour in another person. As naïve psychologists, people are often exposed to behaviours, events and even symptoms which do not have a clear explanation. People draw on several processes to decide why these events have occurred, including schemata (Kelley, 1973) and the availability heuristic (i.e. how easily an example of the situation is brought to mind, Tversky & Kahneman, 1973). In the case of stroke, examples of young stroke victims are not easily brought to mind, so stroke is less likely to be accessible or be considered as an explanation.

To understand how attributions relate to misdiagnosis of stroke symptoms, it may be useful to illustrate with a hypothetical scenario, in which the cause and effect are seen from a perceiver's point of view.

Tim, an office employee has noticed that Stan has recently begun falling asleep at work, something which Stan had never been known to do in the past. Tim does not know Stan very well and as he cannot see any probable external cause for the fatigue, Tim infers that Stan has become complacent and lazy at the job and subsequently begins to resent Stan's laziness.

In this scenario the effect is fatigue and the cause is a stroke that Stan suffered two weeks earlier, but Tim attributes the fatigue to other factors.

Early theories of how people explain behaviour propose that observers prefer to use internal over external attributions for behaviours in others (Heider, 1944; Kelley 1967; 1973); however, more recent works have elaborated on these theories and provide a better insight into why observers are likely to attribute behavioural changes resulting from stroke to factors such as age and personality. Observers tend to attribute behaviours to stable, dispositional causes when they are explaining behaviour in others (Tetlock, 1985). This tendency is known as the fundamental attribution bias. An example is where a person who has suffered a stroke is observed by someone who attributes the stroke survivors' irritability to their personality. Based on fundamental attribution bias, personality can be seen as a stable, dispositional explanation, whereas an incident of a stroke causing the behaviour can be seen as a situational explanation (suffering a stroke is a situation rather than a stable disposition, although the outcome of the stroke may be more related to disposition).

Research regarding misattributions for invisible injuries

Although general attribution theories (Heider, 1944; Kelley, 1967; 1973; Robins et al., 1996; Malle, 1999) give some basis for the misattributions that occur with stroke survivors, they do not specifically address attributions in people with visible or invisible disabilities. McClure, Devlin, McDowall and Wade (2006) investigated the effect of external (visible) markers of brain injury on attributions for brain injury-related behaviour. Consistent with salience theories (e.g. Fiske, Kenny & Taylor, 1982) McClure et al. (2006) found that showing an external sign of brain injury affected attributions to the extent that the injury was more often rated as the cause of the behaviour than when there were no obvious visible signs.

Another factor in attributions of invisible injuries is perceived severity of the injury (McClure, Buchanan, McDowall & Wade, 2008). Although unrelated to the actual severity of an internal injury, external markers (such as a scar on the head of someone who has suffered a brain injury) increased the perceived severity of that internal injury (McClure et al., 2008). A related example (in a stroke survivor) would be unilateral droop. Based on McClure et al.'s (2008) findings, a naïve observer is more likely to suspect that a stroke victim with visible paralysis suffered a severe stroke than a stroke victim with no outward sign. Additionally, McClure et al. (2008) found the tendency to assume injuries with visible signs are more severe accounted for the increased likelihood to attribute ambiguous behaviours to the injury when the injury had visible signs. This suggests that if an observer saw an external sign of injury, they would be more likely to assume that the injury was severe and subsequently attribute any problematic behaviour to the severe injury (McClure et al., 2008).

McClure's (2011) review explained why brain-injury related behaviours may be misattributed. Although McClure (2011) used the example of brain injury, the theory may be applied to other invisible disabilities, such as stroke. McClure (2011) noted that a major issue in how people perceive victims of invisible injuries is the tendency to attribute behaviour to other causes, even when the actual cause (the injury) is known. McClure (2011) proposed that

this tendency is due to a need to downplay, or to minimise negative behaviours such that they appear to be examples of normal behaviour, rather than abnormal behaviour. This theory explains why stroke in young people may be misattributed to a migraine, or in the case of post-stroke symptoms: personality. Irritability, for example may be found in normal behaviour as well as in abnormal behaviour caused by an injury. This tendency to attribute behaviour resulting from traumatic brain injury to other causes is problematic as it leads to people viewing the survivor as no less able than anyone else and subsequently not providing the help or treatment that the survivor needs (McClure, 2011). This tendency has direct consequences, as often an individual with a visible symptom like a cast on their leg is granted special treatment, such as priority seats in the bus, whereas an individual who has suffered a stroke and also needs priority seats in the bus due to fatigue may be neglected.

Reasons for misattributions of stroke symptoms

Ambiguous behaviours and symptoms

One reason why the symptoms displayed by a stroke survivor are misattributed is that they are often ambiguous – they have multiple potential causes. When presented with a behaviour which can have several causes, perceivers often choose the most available and fitting explanation, which is affected by the availability heuristic (Hutchinson & Gigerenzer, 2005).

Four changes in behaviour in young stroke survivors are particularly ambiguous and prone to misattribution: Increase in irritability, depression, increased fatigue, and lowered social activity. An increase in irritability is a clearly ambiguous change. The causes of irritability can range from a lack of sleep the night before (Daniela et al., 2010) through to traumatic brain injury (Alderman, 2003). Likewise, fatigue could be due to lack of sleep, or to heart disease, sleep apnoea or diabetes (Sharpe & Wilks, 2002). Similarly, observers may

simply attribute evidence of fatigue to laziness in the target person. Also, in regard to depression, research has shown that the public believes there are a number of causes for depression, including stress, genetic factors, and substance abuse (Link, Phelan, Bresnahan, Stueve & Pescosolido., 1999). Decreases in social activity may also be seen as caused by personality, depression, or simply old age of a target person (Laura, 1991).

Symptoms of stroke which occur during the incident itself are also ambiguous. The inability to comprehend language and headache may result from a number of causes, such as a migraine (as demonstrated in the example of Piri Weepu), or being intoxicated, or under the influence of drugs. As a result, there is a high likelihood that the victim, their peers and even their doctor will misattribute his symptoms and consequently the victim is likely to experience a misdiagnosis.

In sum, there are a number of ambiguous symptoms resulting from stroke. These symptoms range from highly ambiguous symptoms such as fatigue through to less ambiguous symptoms such as unilateral paralysis. Consequently, when a stroke survivor suffers from the more ambiguous (and invisible) symptoms, such as emotional difficulties (Murray & Harrison, 2004), people are more likely to misattribute their symptoms.

The cause of the behaviours resulting from stroke is invisible

A second reason why people often misattribute stroke symptoms is that the cause of the behaviour is invisible. For example, using a wheelchair is an ambiguous behaviour (it could be caused by spinal injury, leg injury, brain injury etc.); however, if the person in the wheelchair's legs have been amputated below the knee, observers are very unlikely to misattribute the behaviour, because the cause of the behaviour is visible (not having legs). In cases where the cause is invisible, observers are much more likely to misattribute the ambiguous behaviour.

Stroke is an invisible cause of behaviours (i.e. the stroke itself occurs in the brain, so is invisible to observers). As a result of the invisible disability, observers are unlikely to know what caused any symptomatic behaviours in the stroke survivor and consequently may assume that the stroke survivor is not disabled and that their behaviour is controllable (Stone, 2005). When observers cannot see the cause for behaviours resulting from an invisible condition, they tend to be less tolerant to those behaviours, and more likely to make inaccurate explanations for those behaviours than if there were a visible cause for the symptomatic behaviours (Stone, 2005).

Although some of the *symptoms* of stroke may be visible to an observer, such as a limp resulting from unilateral paralysis, which was caused by a stroke, the *cause* of the limp (the stroke) is not visible. Consequently, when confronted by a limping individual with no visible cause of the limp, observers are likely to choose a cause based on their own assumptions and which is influenced by heuristics. Typically, if the limping person is young observers are unlikely to consider stroke as a cause, leading to misattributions. Similarly, when the stroke survivor has invisible symptoms caused by an invisible disability (e.g., irritability caused by stroke), observers are likely to misattribute the behaviour to a cause unrelated to disability, such as personality (Wainwright et al., 2013).

Having both an invisible disability and ambiguous symptoms resulting from this disability create conditions likely to foster misattributions. Stroke survivors typically suffer from both invisible causes and ambiguous symptoms. However, another factor can exacerbate the likelihood of misattributions even further; being young – as discussed in the subsequent section.

Stroke is related to old age

A third reason why symptoms resulting from stroke are misattributed in young people is that stroke is predominantly an older person's condition (Feigin et al., 2003). As previously noted, the typical age of onset for stroke is sixty-nine in males and seventy-five in females (Feigin et al., 2003). Additionally, the likelihood of stroke increases with age (Feigin et al., 2003). As a result of this age difference, stroke is more available and salient as a cause for the related behaviours in older individuals, and people tend not to consider stroke as a cause of symptoms in younger persons.

This tendency to attribute stroke-related symptoms to alternative causes based on the age of the survivor is illustrated in the example cited above of Piri Weepu, when his stroke was misdiagnosed. In the example of Mr. Weepu, the doctor was exposed to a set of ambiguous behaviours (symptoms) that Piri Weepu displayed. As the symptoms exhibited by Piri Weepu were typical of stroke, it might be expected that a medical professional would suspect stroke as the cause; however, the doctor attributed these symptoms to a migraine, perhaps based on a representative heuristic about the typical age of stroke victims ('most stroke victims are old') – ruling out stroke from consideration. Although this attribution turned out to be incorrect, it is unsurprising given the circumstances – specifically that Piri Weepu was a fit and healthy thirty-year-old and that stroke is much more common in people over sixty (Feigin et al., 2003). This case of the doctor misattributing these symptoms typical of stroke suggests the power of the representative heuristic (i.e., stroke being overwhelmingly represented in an older population) on attributions. Mr Weepu's doctor acknowledged that the young age of Mr. Weepu was most likely the cause of his misdiagnosis. The above example shows that the age of the stroke survivor along with the ambiguity of the symptoms can combine to lead people to discount stroke as a cause of the stroke symptoms.

Poor knowledge of stroke

A fourth reason for people's misattributions of symptoms caused by stroke is the low general knowledge of stroke. Misattribution of stroke has been shown to occur even in medical professionals; however, another problem is the lack of understanding from the general public (Greenlund et al., 2003; Travis et al., 2003). Studies have shown that knowledge of stroke symptoms, warning signs and risk factors is poor. Greenlund et al. (2003) found that randomly selected citizens were unable to identify all major symptoms of stroke, and that even if they could identify a stroke occurring, many would not call an ambulance. Both of these findings were replicated by Travis et al. (2003), who noted that common, ambiguous symptoms such as loss of vision, dysphagia (difficulty swallowing) and chest pain were particularly poorly known.

Pancioli et al. (1998) showed that those who are most at risk of stroke are least able to describe their own risk factors. This finding is explained through the links between smoking, obesity and low socio-economic status, and the links between low socio-economic status and poor understanding of stroke (Borman et al., 1999; Wake et al., 2007). The implication of these findings are that not only are individuals suffering a stroke unlikely to receive timely treatment, but that those in the high risk group are also likely to suffer more misattributions due to being in a social class which is less knowledgeable about stroke (Travis et al., 2003).

It may be assumed that individuals who have had family members who suffered stroke or even those who have suffered a stroke themselves would be less likely to misattribute stroke symptoms both during and after the event; however, some evidence suggests that individuals with direct personal experience of stroke are no more knowledgeable than inexperienced laypeople (Travis et al., 2003; Das et al., 2007). Das et al. (2007) found that stroke survivors and a control group were nearly identical in their ability to describe stroke risk factors. The only major difference between the groups was that the stroke survivors were able to recognise unilateral heaviness as a symptom. Likewise, Sullivan and

Waugh (2005) found that stroke survivors and laypeople were the same in their ability to describe stroke risk factors and symptoms.

Impacts of misattributions on young stroke survivors

Two of the major areas in which misattributions of stroke symptoms cause problems specifically for young stroke victims are in social and financial areas. Young stroke survivors often exhibit symptoms of irritability and fatigue, which are likely to be misattributed by a naïve observer. These misattributions have been shown to cause resentment in both the stroke survivor and the person making the attribution (McClure, 2011), this resentment may then lead to a loss of friends. Finding or keeping a romantic partner or spouse is also influenced by these misattributions and the resentment they create in young stroke survivors, for example; research has found that 15% of young stroke survivors who were married before their stroke divorced after the stroke (Teasell et al., 2000).

A second effect of misattributions on young stroke survivors is the negative influence on the survivor's chances of obtaining or retaining a job (Jones & Archer, 1976; Stone & Colella, 1996), which is an important issue for young stroke survivors (Roding, Lindstrom, Malm & Ohmon, 2003). Although it may seem that a stroke survivor should simply disclose their stroke to others, research has found that disclosing stroke information is often difficult. Samuels (2003) noted that sufferers of invisible disabilities, including stroke survivors, struggle to explicitly tell others of their affliction – the author even used the analogy of ‘coming out of the closet’ to telling friends and family that you are disabled. Consequently, distant relatives and some friends may receive varying (if any) information about the stroke and subsequently misattribute the negative behaviour and then resent the victim (McClure, 2011), whereas strangers and workmates are likely to perceive the survivor as more threatening and less trustworthy if the survivor conceals the disability (Fishbein & Laird, 1979; Jones & Archer, 1979).

Stone (2005) demonstrated some of the social costs involved with misattribution of stroke symptoms by conducting interviews with young female stroke survivors, who have somewhat different outcomes to male, such as higher dependency (Petrea et al., 2009). Stone (2005) found that the young victims were most concerned with the social costs of their stroke. These social costs varied between participants; however, all of the participants mentioned that constantly having to explain their various disabilities was very distressing to them. For example, some participants suffered from aphasia (Wade, Hewer, David & Enderby, 1986), which not only impacted their ability to explain their symptoms, but was in itself a symptom which required explaining to others (Stone, 2005). Even those with semi-visible disabilities (e.g. unilateral weakness shown through inability to use one hand) were frustrated at having to constantly explain their behaviour; one participant even stated that she would prefer to have her hand gone entirely, as people would not misattribute and ignore her disability in that hand (Stone, 2005). As all of the participants in Stone's (2005) study were young at the time of the stroke, Stone (2005) noted that their age created problems in their initial diagnosis and treatment, as well as a lack of understanding from friends and well-wishers attempting to appreciate what had happened. Stone (2005) suggested that young stroke survivors should be trained in how to cope with social situations, such as explaining their disabilities and coping with people who attribute their behaviours to something other than stroke.

Varying attributions based on stroke information

The research described above suggests that people misdiagnose and misattribute ambiguous symptoms, particularly with invisible injuries. Wainwright, McClure and McDowall (2013) examined whether the age of a stroke survivor influenced attributions that participants made for ambiguous symptoms relating to stroke. Participants were presented with a scenario describing a target person who had experienced changes in their behaviour. These changes included four ambiguous symptoms which occur post-stroke: depression,

fatigue, increased irritability and lowered social activity. The target person varied in whether they were twenty-two years old or seventy-two years old, and participants rated personality, age and stroke as explanations for the behavioural changes in the target person. Wainwright et al. (2013) found that when the target person was twenty-two, participants rated personality as a better explanation than stroke, whereas when the target person was seventy-two, they rated age as a better explanation than stroke. This study also found that participants rated stroke as a better explanation for the ambiguous behaviours when the target person was seventy-two than when he was twenty-two. Wainwright et al. (2013) concluded that the age of the stroke survivor influences attributions that people make for stroke-related behaviours.

The present studies

The present studies are an extension of Wainwright et al.'s (2013) study. Wainwright et al.'s (2013) study addressed the influence of age on attributions for stroke, but did not address the effects of information about stroke on these attributions. Their study thus leaves some questions unaddressed about attributions for stroke. In real-life situations, each stroke survivor is likely to vary in how open they are about their stroke and the related symptoms. Some survivors may explicitly state that they have had a stroke, others may have a notable limp, and others still may do their best to conceal their stroke symptoms. The present studies presented a target person with ambiguous stroke-related symptoms and varied the amount of information about this target person's stroke, to further clarify the causes of misattribution for stroke-related symptoms.

Experiment 1

The aim of this experiment was to assess how varying levels of information about stroke, and age of a target person influences attributions for ambiguous symptoms related to stroke. Participants were presented with a short vignette about a man who had a stroke. The

vignettes varied the information about the stroke, for which there were three conditions: first, no information, which was a replication of Wainwright et al.'s (2013) research; second, explicit information, informing the participants that the target person suffered a stroke; and third, implied information about stroke informing participants that the target person was paralysed in his left leg. These conditions assessed the factors which influence attributions for ambiguous symptoms related to stroke. As in Wainwright et al.'s (2013) study, we also varied the age of the person with stroke (72, 32 or age unstated).

Based on previous research, particularly the findings of Wainwright et al. (2013), I predicted that there would be an interaction between age and attribution, in that when the target person was described as being 32, they would attribute behaviour more to personality, whereas when he was described as being 72 they would attribute behaviour more to stroke and age. Additionally, I predicted that there will be an interaction between the information condition and attributions to stroke. I predicted that in the implied condition participants would attribute the behaviours more to stroke than the no information condition; based on the findings of McClure et al. (2008), which showed that visibility of an injury increased the perceived severity, which is a predictor of causal explanations to the injury, it is probable that when participants are told that a person with ambiguous symptoms has unilateral paralysis (an injury which they can visualise), they are more likely to attribute symptoms to stroke than other causes. I also predicted that in the explicit condition they would attribute the behaviours to stroke more than the no information condition and implied stroke information conditions.

Experiment 1A (Explicit and no information conditions)

Method

Design

This study used a random assignment between-subjects experimental design which included two independent variables and two dependent variables. The first independent variable was the age of the target person in the vignette, which had three conditions: 32 (years old), 72 and no statement of age. Each participant was randomly assigned to one of the three age categories. The second independent variable was the stroke information. This variable had two levels: explicit (explicitly stating that the target person in the vignette suffered a stroke) and no statement about strokes. The first dependent variable comprised of four ambiguous behaviours: Irritability, depression, fatigue and lowered social activity. Participants rated three attributions for each of the behaviours: Age, personality, and stroke. The findings were analysed in a 2 (information: Explicit or No information) x 3 (age: 32, 72, unspecified) x 4 (behaviour: irritability, depression, fatigue, social activity) x 3 (attribution: age, personality, stroke) mixed design Analysis of Variance. There were 23-24 participants in each of the nine between subjects conditions. 3 (attribution: age, personality, stroke)

Participants

A total of 143 participants recruited from Wellington public spaces completed the questionnaire, 45 of which were male and 98 were female. Participants ranged in age from under 25 years ($n = 44$), 26-35 years ($n = 24$), 36-45 years ($n = 25$), 46-55 years ($n = 29$), 56-65 years ($n = 11$), to over 66 years ($n = 10$).

Materials

The questionnaire was based on the vignette used by Wainwright et al. (2013), which described a fictional character ‘Michael’ who has suffered a stroke. The vignette varied in regard to Michael’s age and whether the scenario explicitly stated that he had a stroke. The vignette (containing all possible variations) is presented below. The text in bold typeface indicates the between-subjects manipulations.

Michael is a (32 year old/72 year old/age unstated) New Zealand citizen. He had a job with an architectural firm where he had been very successful. He had a real passion for competitive sports and had participated in national triathlons. He exercised on a daily basis. His hobbies included reading, spending time with friends, listening to music and travelling.

Michael (No statement/Suffered a stroke) (and) now tires very quickly, has to nap for a few hours each day and he finds exercising difficult as it increases his fatigue. He spends very little time with friends and his social group has diminished significantly. Michael has been diagnosed with depression and he often experiences feelings of sadness and no longer finds pleasure in activities that he previously enjoyed. He is now irritable and less tolerant towards other people.

This vignette had several minor changes to the vignette in Wainwright et al. (2013). In the young age condition of the present study, I modified the age of Michael from 22 to 32 in order to make the vignette seem more realistic, as it is more believable that a 32 year old has a successful job at an architecture firm than a 22 year old. Much of the literature regarding ‘young’ stroke victims refers to anyone under the age of 50 as ‘young’ stroke victims (Roding et al., 2003; Bermejo et al., 2004; Edmonds, 2011), so increasing the age to 32 does not violate that age range. In Wainwright et al.’s (2013) study, the vignette stated that Michael represented New Zealand in swimming; however in the present study, this statement was modified to state that he has participated in national triathlons as this is more believable in a 72 year old.

The second paragraph of Wainwright et al.’s (2013) vignette contained no manipulations. In the present study, the amount of information given in regard to stroke was manipulated in the second paragraph of the vignette, which had two versions. It began by stating either that ‘Michael suffered a stroke’ (explicit stroke statement) or made no statement regarding stroke (as in Wainwright et al., 2013). The second paragraph in the vignette described the four ambiguous behavioural changes in Michael. When describing Michael’s lack of energy, the original vignette stated that he ‘has to sleep for a few hours each day’

whereas in the present study, this statement was modified to: ‘...has to nap for a few hours each day.’

The vignette was followed by the questionnaire. The questionnaire largely replicated the questionnaire used by Wainwright et al. (2013), which was based on the attribution paradigm used by McClure et al. (2006). The first section of the questionnaire asked participants to rate three attributions for the four behavioural changes described in the vignette (Fatigue, depression, lowered social activity and irritability). These attributions were rated on a Likert scale, where 1 represented a very poor explanation, and 7 represented a very good explanation.

The next question described a hypothetical situation in which participants were an employer and Michael was a potential employee, and participants indicated (on a Likert scale) how likely it was they would hire Michael.

Questions also assessed participants’ familiarity with stroke and brain injury. Wainwright et al.’s (2013) questionnaire contained one question asking if the participant was familiar with stroke, with ‘yes’ or ‘no’ options. The present study assessed familiarity on a 7 point Likert scale. A further question asked: ‘Do you know anyone who has suffered a stroke?’, the next question asked the participant ‘do you know anyone who has suffered a brain injury?’ The final question asked: ‘how much do you worry about suffering a stroke?’ to assess if stroke was a major concern to participants. Demographic questions assessed age and gender.

Procedure

Ethical approval for this study was granted by the Victoria University of Wellington ethics committee. Participants were recruited in two locations; the researcher approached

people in Wellington public spaces (such as the waterfront) or participants approached a stall at the Wellington harbourside Sunday market. Participants were asked if they would like to take part in a short survey and were offered a chocolate reward. They were randomly assigned to one of the six conditions. The surveys were ordered in such a way that all six conditions were completed in similar circumstances. If probed about the purpose of the study prior to completion, the researcher explained that it was for his research. Once participants had completed the questionnaire, they were thanked and offered a debriefing sheet and the opportunity to discuss the study. Participants were offered the opportunity to provide an email address should they want further information about the study.

Results

A mixed design analysis of variance was performed, with behaviour (4: Increase in fatigue, decrease in social activity, depression, irritability) and attribution (3: Age, personality, stroke) being the within subjects variables, while stroke information (2: No information and explicit information) and age of the target person (3: 32, 72, age unstated) were between subjects factors. There was a significant main effect for behaviour, $F(3, 140) = 16.52, p < .001, \eta^2 = 0.11$. There was also a significant main effect for attribution, $F(2, 140) = 61.31, p < .001, \eta^2 = 0.31$, showing that participants rated the three attributions differently. They rated stroke ($M = 4.26, SD = 1.84$) higher than personality ($M = 3.19, SD = 1.41$), which they rated higher than age ($M = 2.79, SD = 1.35$).

There were two interactions relevant to the hypotheses. First, there was a significant interaction between age of the target person and attribution, $F(4, 140) = 5.65, p < .001, \eta^2 = 0.08$. As predicted, participants rated age as a better explanation when the target person was 72 years old ($M = 3.43, SD = 1.38$) than when the target person was 32 ($M = 2.28, SD =$

1.16); $F(1, 93) = 19.42, p < .001$, or when there was no age stated ($M = 2.65, SD = 1.26$); $F(1, 94) = 8.44, p < .01$.

As predicted, there was also a significant two-way interaction between attribution and stroke information, $F(2, 140) = 64.15, p < .001, \eta^2 = 0.32$. Participants given no information about the target person attributed to stroke less ($M = 2.99, SD = 1.43$) than participants who were explicitly told that the target person suffered a stroke ($M = 5.56, SD = 1.18$); $F(1, 141) = 137.46, p < .001$, as shown in Figure 1. They attributed the behaviours to age equally in the no information condition ($M = 2.83, SD = 1.32$) and the explicit information condition ($M = 2.75, SD = 1.37$); $F(1, 141) = .13, p > .05$. Similarly, there was no difference in attribution to personality in the no information condition ($M = 3.29, SD = 1.35$) and the explicit information condition ($M = 3.08, SD = 1.46$); $F(1, 141) = .83, p > .05$.

Figure 1: Attribution by Information interaction.

Figure 2: No information condition: Attribution by Age

Figure 3: Explicit information condition: Attribution by Age

Planned Comparisons

Figure 2 presents the mean ratings of attributions in the *no information condition*, while Figure 3 presents the mean ratings of attributions in the *explicit condition*. Planned comparisons examined the attributions in the no information and explicit information condition.

In the no information condition, there were several differences between the age conditions (see Figure 2). First, when the stroke survivor was 32, participants attributed his behaviours to personality ($M = 3.26$, $SD = 1.36$) more than to age ($M = 2.19$, $SD = 1.03$); $t(23) = 3.43$, $p < .01$, and to stroke ($M = 2.96$, $SD = 1.55$) more than to age; $t(23) = 2.89$, $p < .01$, but not to personality more than to stroke; $t(23) = 0.77$, $p > .05$.

In contrast, when the target person was 72, they attributed the behaviours to age ($M = 3.60$, $SD = 1.43$) marginally more than to personality ($M = 3.04$, $SD = 1.19$); $t(23) = 1.89$, p

= .07, but attributed his behaviour equally to stroke ($M = 3.29$, $SD = 1.64$) and age ($M = 3.60$, $SD = 1.43$); $t(23) = 0.45$, $p > .05$ and equally to personality and stroke; $t(23) = 0.91$, $p > .05$.

When the target person's age was not stated, participants attributed his behaviours to personality ($M = 3.59$, $SD = 1.46$) more than to age ($M = 2.68$, $SD = 1.10$); $t(23) = 2.99$, $p < .01$, and stroke ($M = 2.71$, $SD = 1.25$); $t(23) = 2.40$, $p < .05$, but attributed his behaviour equally to stroke and age; $t(23) = 0.64$, $p > .05$.

In the explicit information condition, as predicted, there were two patterns in attributions which did not vary, based on the stroke survivor's age. In all age conditions, participants attributed the behaviour more to stroke than to age and personality (see Figure 3). Although stroke attributions were dominant, there was one notable difference in attributions, based on the age of the stroke survivor. When the target person's age was not stated, participants attributed his behaviour to personality ($M = 3.38$, $SD = 1.57$) more than to age ($M = 2.61$, $SD = 1.42$); $t(23) = 2.22$, $p < .05$. Likewise, when the target person was 32, participants attributed his behaviour to personality ($M = 2.76$, $SD = 1.48$) marginally more than to age ($M = 2.36$, $SD = 1.29$); $t(22) = 1.89$, $p = .07$. In contrast, when the target person was 72, participants attributed his behaviour equally to personality ($M = 3.10$, $SD = 1.33$) and to age ($M = 3.25$, $SD = 1.32$); $t(23) = 0.61$, $p > .05$.

Results summary

When there was no information regarding stroke in the target person, participant's ratings for stroke and personality did not differ in the 32 year old and 72 year old target person. Participants rated age as a better explanation than stroke in the 72 year old target person, but not the 32 year old or age unstated target persons. In the 32 year old and age unstated target persons, participants rated personality as a better explanation than age.

Explicitly stating that the target person suffered a stroke had a notable effect on attributions, regardless of the age of the target person. When the vignette explicitly stated that the target person suffered a stroke, participants attributed to stroke more than to age or personality in all age conditions. When the target person was 72, in the explicit information condition, participants attributed the behaviours to age and personality equally, whereas in the no information condition, they rated age as a better explanation than personality.

Experiment 1B (Implied and no information conditions)

Method

Design

Experiment 1B used a similar random assignment between-subjects design to Experiment 1A. The independent variable manipulating the age of the target person was the same as in Experiment 1A. The second independent variable – stroke information - was changed. The stroke information variable had two levels: Implied (suggesting that the target person suffered a stroke) and no stroke information. Participants were randomly assigned to an age and stroke information condition. The four ambiguous behaviours and three attributions did not change from Experiment 1A.

Participants

A total of 143 participants were recruited from Wellington public spaces, 43 were male and 100 were female. Participants ranged in age from under 25 years ($n = 43$), 26-35 years ($n = 27$), 36-45 years ($n = 30$), 46-55 years ($n = 25$), 56-65 years ($n = 9$), to over 66 years ($n = 9$). The participants in the no stroke information condition were the same as in Experiment 1A.

Materials and Procedure

All questions in Experiment 1B were the same as those in Experiment 1A. Only the second paragraph of the vignette (presented below) was modified. This modification was made to assess the influence of a symptom which implied stroke (unilateral paralysis) on attributions for stroke-related behaviours, in place of the explicit reference to stroke in Experiment 1A.

Michael (No statement/is now paralysed in his left leg) (and) now tires very quickly, has to nap for a few hours each day and he finds exercising difficult as it increases his fatigue. He spends very little time with friends and his social group has diminished significantly. Michael has been diagnosed with depression and he often experiences feelings of sadness and no longer finds pleasure in activities that he previously enjoyed. He is now irritable and less tolerant towards other people.

The same procedure for collecting data was used as in Experiment 1A.

Results

A mixed design analysis of variance was performed. As in Experiment 1A, ambiguous behaviours and attributions were within-subjects variables and stroke information (2: No information and Implied stroke) and age were between subjects factors. There was a main effect of behaviour, $F(3, 140) = 19.44, p < .001, \eta^2 = 0.12$, and a main effect of attribution, $F(2, 140) = 16.59, p < .001, \eta^2 = 0.11$, showing that participants rated the three attributions differently. They rated stroke ($M = 3.40, SD = 1.57$) and personality ($M = 3.28, SD = 1.30$) higher than age ($M = 2.70, SD = 1.23$).

There were two interactions relevant to hypotheses. First, there was a significant interaction between age and attribution, $F(4, 140) = 7.29, p < .001, \eta^2 = 0.09$. As predicted, participants attributed the behaviour more to age when the target person was 72 years old ($M = 3.36, SD = 1.34$) than when he was 32 ($M = 2.13, SD = 0.95$); $F(1, 93) = 26.79, p < .001$, or when his age was not stated ($M = 2.64, SD = 1.06$); $F(1, 93) = 8.38, p < .01$. Additionally, they attributed the behaviours more to stroke when the target person was 72 ($M = 3.74, SD =$

1.54) than when his age was not stated ($M = 3.04$, $SD = 1.47$); $F(1, 93) = 5.19$, $p < .05$, but not when he was 32 ($M = 3.43$, $SD = 1.65$); $F(1, 93) = 0.88$, $p > .05$.

Second, there was a significant two-way interaction between attribution and stroke information, $F(2, 140) = 9.76$, $p < .001$ $\eta^2 = 0.07$. Participants attributed the behaviours more to stroke when the scenario implied that the target person suffered a stroke ($M = 3.82$, $SD = 1.61$) than when there was no information regarding stroke ($M = 2.99$, $SD = 1.43$); $F(1, 141) = 10.78$, $p < .001$, as shown in Figure 4. There were no differences in attributions to age or personality based on the information condition.

Figure 4: Attribution by Information interaction

Figure 5: Implied stroke condition: Attribution by Age

Planned Comparisons

Figure 5 presents the mean ratings of attributions in the *implied stroke condition*, while Figure 2 (in Experiment 1A) presents the mean ratings of attributions in the *no information condition*. Planned comparisons examined the attributions in the implied information condition only. Attributions in the no information condition are reported in Experiment 1A results.

In the implied information condition, there were two differences in attributions based on the age of the stroke survivor. First, when he was 72, participants attributed his behaviour more to stroke ($M = 4.21$, $SD = 1.50$) than personality ($M = 3.15$, $SD = 1.19$); $t(22) = 2.67$, $p < .05$. In contrast, when he was 32, participants attributed his behaviour equally to stroke ($M = 3.91$, $SD = 1.64$) and personality ($M = 3.39$, $SD = 1.29$); $t(23) = 1.55$, $p > .05$. Likewise, when his age was not stated, participants attributed his behaviour equally to stroke ($M = 3.36$, $SD = 1.62$) and personality ($M = 3.26$, $SD = 1.34$); $t(23) = 0.31$, $p > .05$.

Second, when the target person was 72, participants attributed his behaviour equally to age ($M = 3.09$, $SD = 1.21$) and personality, $t(22) = 0.20$, $p > .05$. In contrast, when he was 32, participants attributed his behaviour more to personality than age ($M = 2.05$, $SD = 0.88$); $t(23) = 8.07$, $p < .001$. Likewise, when his age was not stated, participants attributed his behaviour more to personality than age ($M = 2.60$, $SD = 1.03$); $t(23) = 2.92$, $p < .01$.

In all age conditions, participants attributed the target person's behaviour significantly more to stroke than to age (see Figure 5).

Results summary

In the 'implied stroke' condition, participants rated stroke as a better explanation than both age and personality in the 72 year old target person; whereas, when the target person

was 32 or when their age was not stated, participants rated stroke as a better explanation than age, but not personality. Also, when the target person was 32 or when their age was not stated, participants rated personality as a better explanation than age; whereas, when the target person was 72, participants rated age and personality equally.

Discussion

The results of the ‘no information’ condition showed that regardless of age, participants did not consider stroke to be a particularly good explanation for the changes in behaviour when no other stroke-related information was presented. As in to Wainwright et al. (2013), this condition showed that when the target person was 72, participants considered age to be the best explanation for the behavioural changes. In contrast, when the target person was 32 or their age was not stated participants rated age as a poor explanation for the behavioural changes, while personality was considered the best explanation for the changes in behaviours.

As predicted, explicitly stating that the target person suffered a stroke caused participants to rate stroke as a better explanation than age or personality, regardless of the age of the target person. More interestingly, when the target person was 72 and it was explicitly stated that they suffered a stroke, participants rated age and personality equally, while in the no information condition, participants rated age as a better explanation than personality when the target person was 72. This difference suggests that when a participant is confident that one explanation (stroke) is superior, they rate other plausible explanations (age) as less valid. This finding is consistent with discounting theories of explanations (Morris & Larrick, 1995).

When stroke was implied, through an ambiguous stroke-related symptom (paralysis in the left leg), participants rated stroke as a better explanation than age, regardless of the age of the target person. When the target person was 72, participants also rated stroke as a better

explanation than personality. However, when the target person was 32, or their age was unstated, participants rated personality and stroke equally. The difference in attributions between the 72 year old target person and the 32/age unstated target persons show that a stroke-related symptom may influence people's judgements of the causes of ambiguous behaviours. However, only when the stroke is a plausible explanation (as it is for a 72 year old target person), is stroke judged the best explanation. When the target person was 32, participants may have considered alternative causes for the injury more plausible (such as a skiing accident); however, they could not express this, as they were limited to three possible explanations (age, stroke and personality).

Predictors of attributions

A multiple regression was conducted to assess whether any of the factors relating to the participants' knowledge of stroke influenced their attributions. Three factors predicted attribution to stroke (see Table 1); however, whether the variables predicted stroke varied based on the information condition. First, worry (how often the participant worries about suffering a stroke) predicted attributions to stroke in the no information condition but not in the explicit information condition or the implied stroke condition. Second, familiarity (how familiar the participant is with stroke) predicted attributions to stroke in the implied stroke condition but not in the explicit or no information condition. Third, knowing someone with a brain injury predicted attributions to stroke in the implied information condition but not in the explicit or no information conditions. Knowing someone who has suffered a stroke did not predict attributions to stroke in any of the information conditions.

The independent variables accounted for a marginally significant amount of variation in attribution to stroke in the no information condition, $R^2 = .12$, $F(67) = 2.32$, $p = .07$ and a significant amount of variation in the implied stroke information condition, $R^2 = .23$, $F(66) =$

5.04, $p < .01$, but not in the explicit stroke information condition, $R^2 = .03$, $F(66) = 0.57$, $p > .05$.

Condition	Worry about suffering a stroke	Familiarity with stroke	Knowing someone who has suffered a stroke	Knowing someone with a brain injury	R^2
No Information	.29*	-.18	.08	.09	.12
Explicit Stroke	-.03	.19	.10	.03	.03
Implied Stroke	.19	.37**	.10	.29*	.23**
<i>Note.</i> * $p < .05$, ** $p < .01$					

Table 1: Predictors of attributions to stroke

Secondly, a multiple regression was conducted to assess whether any attributions predicted likelihood of hiring the target person, see Table 2. Two attributions predicted likelihood of hiring the target person. First, attributions to stroke marginally predicted likelihood of hiring the target person in the explicit condition but not in the implied or no information conditions. Second, attributions to personality predicted likelihood of hiring the target person in the explicit condition and marginally predicted a decreased likelihood of employing the target person in the implied stroke condition but not in the no information condition. Attributions to age had no effect on the likelihood of hiring the target person in any of the information conditions.

The independent variables explained a significant amount of variance in likelihood to hire the target person in the explicit information condition, $R^2 = .11$, $F(67) = 2.74$, $p < .05$, but not in the no information condition, $R^2 = .03$, $F(68) = .77$, $p > .05$, or the implied stroke information condition, $R^2 = .09$, $F(67) = 2.22$, $p > .05$.

Condition	Attribution to age	Attribution to personality	Attribution to stroke	R ²
No Information	-.14	.06	-.08	.03
Explicit Stroke	-.18	.35*	.23 [†]	.11
Implied Stroke	.10	-.25 [†]	.16	.09
<i>Note.</i> * $p < .05$, $^{\dagger}p < .08$				

Table 2: Predictors of hiring the target person

Experiment 2

In Experiment 1, participants were presented with a target person who was described as having a number of changes in his behaviours with no explanation for those changes in behaviour (except in the explicit stroke condition). A key feature of Experiment 1 was that the speed of the changes in the four behaviours was not explicit in the scenario. Consequently, participants were left to make their own assumptions about how rapid the change was in the behaviours. Some participants may have inferred that the changes in behaviour happened over a short time period, and assumed that the changes were caused by an accident; whereas other participants may have inferred that the changes in behaviour occurred over a long time period (years, or even decades), and assumed that the changes were due to the increasing age of the target person.

The aim of Experiment 2 was to control for the rapidity in the behavioural changes in the scenario by directly stating the amount of time that passed before acquaintances noticed the behavioural changes in the target person. I predicted that when participants were told that people noticed the change in behaviours a week later, they would attribute those behaviours more to stroke than with the one year time interval. In contrast, when participants were told that that people noticed the change in behaviours one year later, they would attribute it more to age or personality. Based on the findings of Experiment 1, I also predicted that when the target person was 32, participants would attribute the changes to personality than stroke or

age; whereas when the target person was 72, participants would attribute the changes more to age than personality or stroke.

Method

Design

Experiment 2 used a similar random assignment between-subjects design to that used in Experiment 1A and 1B. This design included two independent variables and two dependent variables. The first independent variable was the age of the target person in the vignette, either: 32 (years old) or 72. The 'age unstated' condition was omitted from Experiment 2, as results from the '32 year old' and 'age unstated' conditions in Experiment 1A and 1B showed similar patterns. The second independent variable was the time span in the behavioural changes, either: one week later or one year later. Each participant was randomly assigned to one of the two age conditions, and one of the two time span conditions. The dependent variables: the four ambiguous behaviours and three attributions were the same as in Experiment 1A and 1B.

Participants

A total of 119 participants were recruited from Wellington public spaces, 48 were male and 71 were female. Participants ranged in age from under 25 years ($n = 32$), 26-35 years ($n = 30$), 36-45 years ($n = 24$), 46-55 years ($n = 17$), 56-65 years ($n = 11$) to over 66 years ($n = 5$).

Materials and procedure

All questions in Experiment 2 were the same as those in Experiment 1A and 1B. The 'age unstated' condition was removed from the first paragraph of the vignette, and the second paragraph of the vignette (presented below) was modified. This modification was made to

assess the effect of the suddenness of the behavioural changes on attributions for stroke-related behaviours.

Michael is a (32 year old/72 year old) New Zealand citizen. He had a job with an architectural firm where he had been very successful. He had a real passion for competitive sports and had participated in national triathlons. He exercised on a daily basis. His hobbies included reading, spending time with friends, listening to music and travelling.

(A week later/one year later), several acquaintances noticed that Michael now tires very quickly, has to nap for a few hours each day and he finds exercising difficult as it increases his fatigue. He spends very little time with friends and his social group has diminished significantly. Michael has been diagnosed with depression and he often experiences feelings of sadness and no longer finds pleasure in activities that he previously enjoyed. He is now irritable and less tolerant towards other people.

The same procedure for collecting data was used as in Experiment 1A and 1B.

Results

A mixed design analysis of variance was performed, with behaviour (4: fatigue, decrease in social activity, depression, irritability) and attribution (3: age, personality, stroke) being the within subjects variables, while rapidity (2: One week later, and one year later) and the age of the target person (2: 32, 72) were the between subjects factors. There was a significant main effect for behaviour, $F(3, 117) = 15.09, p < .001, \eta^2 = .14$, participants rated explanations for irritability ($M = 3.17, SD = 1.21$) higher than explanations for depression ($M = 2.89, SD = 1.16$), decrease in social activity ($M = 2.79, SD = 1.09$) and fatigue ($M = 2.63, SD = 1.07$). There was also a significant main effect for attribution, $F(2, 117) = 4.29, p < .05, \eta^2 = .04$, participants rated stroke ($M = 3.11, SD = 1.48$) higher than personality ($M = 2.81, SD = 1.34$) and age ($M = 2.69, SD = 1.32$).

There was one interaction relevant to the hypotheses. There was a significant interaction between age of the target person and attribution, $F(2, 117) = 5.75, p < .01, \eta^2 = .05$. Attribution to stroke was higher when the target person was 72 ($M = 3.50, SD = 1.55$) than when the target person was 32 ($M = 2.70, SD = 2.72$), $F(1, 117) = 9.05, p < .01$. Also, as

predicted, attribution to age was higher when the target person was 72 ($M = 3.02$, $SD = 1.31$) than when he was 32 ($M = 2.39$, $SD = 1.26$), $F(1, 117) = 7.14$, $p < .01$.

Contrary to predictions, there was no interaction between attribution and rapidity, $F(2, 117) = 0.56$, $p > .05$, ns. Attributions to stroke did not differ between the 'one week later' condition ($M = 3.17$, $SD = 1.46$) and the 'one year later' condition ($M = 3.05$, $SD = 1.5$), $F(1, 117) = 0.24$, $p > .05$; however, the 'planned comparisons' shows that the time delay did affect attributions to age for the 72 year old target person.

Figure 6: One week later condition: Attribution by Age

Figure 7: One year later condition: Attribution by Age

Planned comparisons

Figure 6 presents the mean ratings of attributions in the ‘one week later’ condition, while Figure 7 presents the mean ratings of attributions in the ‘one year later’ condition. Planned comparisons examined the attributions in the ‘one week later’ and ‘one year later’ condition.

In the ‘one week later condition’, there were several differences between the age conditions (see Figure 6). When the target person was 72, participants attributed his behaviours to stroke ($M = 3.55$, $SD = 1.49$) more than to age ($M = 2.78$, $SD = 1.19$), $t(29) = 2.24$, $p < .05$, and personality ($M = 2.56$, $SD = 1.23$), $t(29) = 3.44$, $p < .01$, whereas attributions to personality and age did not differ, $t(29) = 0.87$, $p > .05$.

In contrast, when the target person was 32, participants attributed his behaviours more to personality ($M = 2.97$, $SD = 1.36$) than to age ($M = 2.47$, $SD = 1.26$), $t(29) = 2.48$, $p < .05$, but equally to personality and to stroke ($M = 2.80$, $SD = 1.35$), $t(29) = 0.48$, $p > .05$, and equally to stroke and age, $t(29) = 1.14$, $p > .05$.

In the ‘one year later’ condition, when the target person was 72, participants rated all attributions equally: stroke ($M = 3.46$, $SD = 1.63$) and age ($M = 3.25$, $SD = 1.39$), $t(29) = 0.66$, $p > .05$, stroke and personality ($M = 2.92$, $SD = 1.60$), $t(29) = 1.29$, $p > .05$, and personality and age, $t(29) = 1.42$, $p > .05$.

Similarly, when the target person was 32, participants rated stroke ($M = 2.63$, $SD = 1.25$) and age ($M = 2.31$, $SD = 1.28$) equally, $t(29) = 1.27$, $p > .05$, and stroke and personality ($M = 2.78$, $SD = 1.13$) equally, $t(29) = 0.66$, $p > .05$. However, participants rated personality as a better explanation for the changes in his behaviour than age, $t(29) = 2.07$, $p < .05$.

Results Summary

With the 32 year old target person, the speed of the behavioural changes (one week or one year later) had little effect on attributions. In contrast, with the 72 year old target person, the speed of the behavioural changes had an effect on attributions to age. When the changes in behaviour were abrupt, participants rated stroke as a better explanation than age; however, when the changes in behaviour were noticed after a longer time span, participants rated age and stroke equally. Also, as predicted, attributions to age (in the one year later condition only) and stroke were higher with the 72 year old target person than the 32 year old.

Discussion

Experiment 2 demonstrated that even if there were abrupt behavioural changes in the target person, participants did not consider stroke to be a plausible explanation if the target person was 32. In contrast, when the target person was 72, participants seemed to interpret the abruptness of the changes as an indicator that stroke was the best explanation. This pattern of results coincides with the results in Experiment 1B in the ‘implied stroke’ condition. In this condition, participants did not judge stroke as a plausible explanation for the behavioural changes in the 32 year old target person and rated stroke and personally as equal explanations; however, when the target person was 72, participants may have used the symptom (paralysis in the left leg) to inform the decision that stroke was the best explanation. The findings in the ‘one week later’ condition in Experiment 2 and ‘implied stroke’ condition in Experiment 1B differed to the ‘no information’ condition in Experiment 1A, where participants rated age and stroke as equally good explanations. The finding that stroke was rated as a better explanation than age for the 72 year old target person in both the ‘implied stroke’ study of Experiment 1 and the ‘one week’ later study of Experiment 2 shows that both abruptness of behavioural changes and information about stroke-related symptoms inform explanations of stroke related

behaviour. However, the absence of this pattern in the 32 year old, in both instances, highlights the effect of the age of the victim on attribution to stroke – only when stroke is explicitly indicated, as in the ‘explicit stroke’ condition of Experiment 1, did participants rate stroke as a better explanation than personality in the 32 year old target person.

General Discussion

As predicted, the varying levels of information in relation to stroke in the vignette (no information about stroke, explicit information about stroke, implied stroke), influenced attributions that participants made for the changes in the target person’s behaviour. Consistent with Wainwright et al.’s (2013) findings, when the scenarios gave *no information* about the stroke, participants tended to rate age and personality as better explanations for the changes in the target person’s behaviour than stroke. In contrast, when participants were *explicitly* told that the target person had suffered a stroke, they attributed the ambiguous behaviours to stroke more than personality or age. However, when the vignette *implied* that the target person had suffered a stroke by stating that he was paralysed in his left leg, participants attributed his behaviours more to stroke, but only when the target person was 72.

The effect of no information regarding stroke

In the condition where participants were given no information regarding stroke and when the target person was 32, participants rated personality and stroke as better explanations for the changes in the target person’s behaviour than age, while they rated stroke and personality were rated as equally good explanations. These results vary slightly from Wainwright et al.’s (2013) finding that personality was rated as a better explanation of changes in behaviour than stroke in a 22 year old.

In contrast, when the target person was 72, participants rated age as a better explanation for the changes in his behaviour than personality. Additionally, they saw age and

stroke as equally good explanations, and saw personality and stroke as equally good explanations. Again, these findings differ slightly from Wainwright et al.'s (2013) finding that when the target person was 72, participants rated age as a better explanation than both personality and stroke.

These findings show that if a target person exhibits behavioural changes representative of stroke, people's explanations vary based on the age of the target person. The finding that participants attributed the behaviours more to age than to personality when the target person was 72 confirms our predictions; it is also consistent with Wainwright et al.'s (2013) findings. Likewise, the finding that personality was rated as a better explanation than age when the target person was 32 supports our predictions and is consistent with Wainwright et al.'s (2013) findings. The target person in Wainwright et al.'s (2013) study was 22 not 32, which indicates that regardless of this ten-year age difference, age is viewed as a poor explanation for behavioural changes characteristic of stroke in young adults.

The finding that when the target person was 32, participants attributed the behaviours to personality and stroke equally, differs from Wainwright et al.'s (2013) finding in their similar condition that people attributed the behaviours to personality more than to stroke. This difference may be due to the ten year age difference between the target persons, and it appears that participants may consider stroke to be a better explanation for behavioural changes in a 32 year old than in a 22 year old.

The finding that when the target person was 72, participants attributed the behaviours equally to personality and stroke is consistent with Wainwright et al.'s (2013) finding. This finding is interesting, as when the target person was 32, or their age was not stated, personality was rated as a better explanation than stroke. In terms of the availability heuristic (Tversky & Kahneman, 1973), it is likely that stroke is more available as an explanation for

the ambiguous behaviours in a 72 year old than a 32 year old. Additionally, the vignette depicts a notable change in traits that may reflect personality (such as irritability and sociability), which is otherwise a relatively stable trait throughout late adulthood (Costa & McRae, 1988), implying that an event occurred in order to create these behavioural changes. This may have informed participants' decisions to rate stroke as a better explanation in 72 year olds; whereas, in 32 year olds (and 22 year olds), personality is relatively less stable (Costa & McRae, 1988), and may loom larger on people's attributions.

The effect of explicit information regarding stroke

When participants were explicitly told that the target person had suffered a stroke, their attributions to stroke dominated the other two attributions. Regardless of whether the target person was 32, 72, or his age was not stated, participants consistently rated stroke as a better explanation than age or personality, as predicted. These findings contrast with the no information condition where the only occasion where participants saw stroke as a better explanation than any of the other explanations was when the target person was 32, in which case they rated stroke as a better explanation than age.

In the explicit condition, when the target person was 32, or when his age was not stated, participants rated personality as a better explanation than age; however, when the target person was 72, participants rated age and personality as equally good explanations. These findings are similar to the findings in the no information condition; however, in that condition, participants rated age as a better explanation than personality when the target person was 72. This difference may be due to the participants' knowledge that the target person suffered a stroke, causing a discounting effect (knowing that one cause is present (stroke) reduces confidence in other causes (age or personality) (Morris & Larrick, 1995) on the other explanations.

The finding that when participants were explicitly told that the target person suffered a stroke, they rated stroke as the best explanation, regardless of the age of the target person, shows that when directly informed about what happened to a target person, people apply that information when assessing causes of the target person's behaviour. In contrast, when information regarding the causes of behavioural changes is limited (as in the no information condition), people prefer 'normal' explanations such as personality or age over explanations which require an event or 'abnormal' occurrence. This finding fits with McClure's (2011) theory that people lacking diagnostic information tend to downplay clinical conditions and prefer to attribute behaviours to 'normal' causes.

The effect of implied information regarding stroke

Perhaps the most novel condition introduced in Experiment 1 is the implied stroke condition, where participants were told that the target person was paralysed in his left leg. In this condition, regardless of the age of the stroke survivor, participants rated stroke as a better explanation than age. This finding is similar to the explicit information condition, and differs from the no information condition, where stroke was only rated as a better explanation than age when the target person was 32.

When the target person was 72, participants also rated stroke as a better explanation than personality; however, when the target person was either 32 or when their age was unstated, participants rated stroke and personality as equal explanations for the ambiguous behavioural changes. The finding that stroke and personality were rated as equal explanations in the 32 year old target person is similar to the finding in the no-information condition. This finding suggests that with an implied symptom which is representative of stroke as in a 72 year old, participants may assume that a cause such as injury is present, and consequently discount personality as a cause; however, with 32 year old target persons, participants did not

see stroke as a likely injury that may have caused the symptoms and rated it as a neither good, nor bad explanation.

A further finding in the ‘implied stroke’ condition is that when the target person was 72, participants rated age and personality as equal explanations. This was also found in the explicit information condition and gives further evidence to suggest a discounting effect where the implied stroke condition leads participants to discount the other explanations.

When the target person was 72 years old, in the ‘implied stroke’ condition, participants rated stroke as the best explanation for the behavioural changes. This finding suggests that when presented with information implying stroke, participants matched the symptoms (paralysis in the left leg) to an accessible diagnosis for a 72 year old man – stroke. In contrast, when the target person was 32 or his age was unstated, participants rated personality and stroke as equal explanations. Participants did not give high ratings of any of the explanations for the behavioural changes in the 32 year old target person in this condition, which suggests that participants may have matched the symptom (paralysis in the left leg) to an alternative explanation that was not available in the questionnaire. For example, if someone is in a car crash, or a sports accident, they may suffer injuries which cause paralysis similar to the description in the vignette, and those explanations are likely to be more available in people’s minds than stroke with a younger target person. Consequently, participants may have imagined such a scenario for the 32 year old target person due to lower availability of stroke as an explanation for paralysis in a 32 year old.

The ‘implied stroke’ condition shows that the age of the target person affects attributions for stroke similarly to the ‘no information’ condition. When given a symptom that may indicate stroke (paralysis in the left leg), participants used this to inform their attribution. When the target person was 72, participants appear to have used an accessible

heuristic, that unilateral paralysis is representative of stroke and that stroke is representative of 72 year olds, to rate stroke as the best explanation for the ambiguous changes in behaviour. In contrast, when the target person was 32, or their age was not stated, stroke may have been a less accessible explanation, as evidenced by participants rating stroke and personality equally. Also, the differences based on age in the ‘implied stroke’ condition effectively grouped the 32 year old and age unstated target persons together as those two age categories led to similar attributions and differed from the 72 year old target person. This suggests that participants may have assumed the age-unstated individual was young or middle aged.

Predictors of attributions: anxiety and familiarity with stroke

When comparing personal experiences and characteristics of participants with the explanations that they rated higher, worrying about suffering a stroke predicted greater attributions to stroke, but only in the no information and ‘implied stroke’ conditions.

This finding suggests that participants who tend to worry about suffering a stroke also rate stroke as better explanation for ambiguous behaviours than those with less concern about suffering a stroke. This suggests that higher levels of health anxiety (worrying about suffering an illness) correspond with greater likelihood to attribute ambiguous symptoms to an illness. Kenyon (1976) stated that as an individual increases in health anxiety, they have a greater tendency to focus on illnesses and symptoms. For example, someone with high health anxiety who is particularly concerned with suffering a heart attack may attribute shooting pains in their left arm to an impending heart attack; whereas, someone low in health anxiety may make a less extreme attribution and assume the pain in their arm is due to carrying heavy groceries earlier in the day. A similar attributional bias seems to occur in someone who worries about suffering a stroke, in that they are more likely to attribute ambiguous symptoms to stroke than to benign causes. The finding that in the explicit information condition, worry did not predict attributions to stroke is unsurprising, as participants were

explicitly told the target person had a stroke and therefore attributed the symptoms to stroke regardless of their own level of worry.

The results also showed that greater familiarity with stroke predicted attributions to stroke in the ‘implied stroke’ condition, but not in the explicit or no information conditions. This finding shows that those who are more familiar with stroke were more likely to recognise the implied symptom (unilateral paralysis) as a marker of stroke. As familiarity with stroke did not predict attributions to stroke in the no information condition, those who consider themselves familiar with stroke may be more aware of the external signs of a stroke such as unilateral paralysis, but no more aware of the subsequent behavioural changes that occur post stroke than individuals who do not consider themselves familiar with stroke.

The results showed that (in all condition) knowing someone who has suffered a stroke or someone who has suffered a brain injury had no effect on attributions to stroke, which Wainwright et al. (2013) also found. Finally, in regards to the likelihood of employing the target person, the results showed that greater ratings of personality as an explanation for the behavioural changes predicted a decreased likelihood of employing the target person, but only in the ‘implied stroke’ condition.

The effect of rapidity in behavioural changes

In the condition in Experiment 2 where participants were told that one week had passed before the behavioural changes were noticed in the target person, and when the target person was 32, participants rated personality as a better explanation for the behavioural changes than age, and rated stroke as an equally good explanation to both personality and age. The finding that personality was rated as a better explanation than age with the 32 year old target person replicates the findings in all conditions of Experiment 1 and the predictions

for Experiment 2. Similarly, the finding that stroke was rated as an equally good explanation to age and personality is consistent with findings from Experiment 1.

When the target person was 72, participants rated stroke as a better explanation than both age and personality and rated age and personality as equally good explanations. These findings differ from the findings of the ‘no information’ condition of Experiment 1, where age was rated as a better explanation than personality and an equal explanation to stroke. However, these findings match the pattern found in the ‘explicit information’ and ‘implied information’ conditions of Experiment 1, suggesting that stating that the target person’s behaviour changed over one week increases attributions to stroke in a similar way to implying they suffered a stroke by presenting a physical symptom (paralysis in the left leg).

The differences between attributions for the 32 year old and 72 year old target persons in the ‘one week later’ condition of Experiment 2 are similar to the differences in the ‘implied stroke’ condition of Experiment 1. As attributions to stroke in the 32 year old target person were low in the ‘one week later’ condition, participants have may assumed that the target person has suffered some sort of injury, but did not match it to stroke, due to stroke not being seen as a plausible explanation for behavioural changes in a 32 year old. In contrast, participants rated stroke as the best explanation for the changes in the target person when he was 72. In contrast to the findings of Wainwright et al. (2013) and the ‘No information’ condition of Experiment 1 where participants attributed the behavioural changes more to age than stroke when the target person was 72, in the ‘one week later condition,’ participants rated stroke as a better explanation than age. This suggests that participants used this short time delay to inform their decision that stroke is a better explanation than age (and personality). In other words, when a behavioural change is abrupt, people tend to assume that an injury or accident occurred; however, the low attribution to stroke with the 32 year old target person suggests that participants did not see the only “event attributions” listed as

plausible. They may have seen other events like accidents as plausible but the questionnaire did not give this option.

In the condition where participants were told that one year had passed before the behavioural changes, and when the target person was 32, they rated personality as a better explanation for the behavioural changes than age and rated stroke as an equally good explanation for the behavioural changes to age and personality. They mirrored the findings in the 'one week later condition.' In other words, the time delay manipulation had little impact on attributions when the target person was 32.

In contrast, when the target person was 72, participants rated age, personality, and stroke as equally good explanations (in the 'one year later' condition). These findings differ from the 'one week later' condition, where participants rated stroke as the best explanation for the behavioural changes in the target person. The pattern of attributions for the behavioural changes in the 72 year old target person in the 'one year later' condition is closest to the pattern with the 72 year old target person in the 'no information condition' from Experiment 1.

The finding that attributions in relation to stroke were affected by the rapidity of behavioural changes for the 72 year old target person, but not for the 32 year old target person shows that the abruptness of behavioural changes influences attributions, in this case increasing attributions to stroke, but only if the target person is representative of a stroke survivor (i.e., if they are older). It may be that the time delay did affect how participants' attributed the changes in the 32 year old target person's behaviour, but none of the three available explanations (age, personality and stroke) matched the explanations which participants thought plausible. For example, people may see a mid-life crisis, drug addiction

and depression as plausible explanations for the 32 year old target person's behavioural changes in the 'one year later condition.'

Implications and Applications

The findings of this study are relevant to the treatment of stroke survivors as well as having broader implications for how invisible injuries and disabilities are understood. As with Wainwright et al. (2013), the present studies found that if participants were presented with only ambiguous, post-stroke behavioural changes and no other stroke-relevant information, they rated age as a better explanation than stroke when the target person was 72 and personality as a better explanation than stroke when the target person was 32. The implications of this finding are that stroke victims with no external signs of their injury, and who choose not to disclose their disability are likely to experience misattributions for their behaviours. As a consequence of these misattributions, stroke survivors may struggle to retain their current job or obtain a new job (Jones & Archer, 1976; Stone & Colella, 1996), feel resentment to acquaintances who do not understand their changes (McClure, 2011), and become distressed at having to constantly explain their behaviours (Stone, 2005).

Experiment 1 showed that only when a participant is explicitly told that the target person had a stroke will they reliably attribute the symptoms to stroke regardless of age. This finding shows that younger stroke survivors may need to openly disclose the cause of their behaviour for it to be attributed correctly. However, the findings suggest that older stroke victims who have a visible symptom of stroke may not need to explicitly disclose their stroke for resulting behaviours to be correctly attributed (to stroke).

When stroke was implied in this study, by stating that the target person was paralysed in their left leg, participants rated stroke as a better explanation only with the 72 year old target person. This implies are that if an individual shows a symptom representative of their

invisible disability, observers use that symptom to explain the behaviour; however, an ambiguous symptom appears to only lead to the attribution to stroke if the individual fits the schema of a typical stroke survivor (i.e., if they are older). In contrast, if the individual does not fit the representative group of stroke survivors (i.e., if they are younger), the observer is likely to match the symptom to a cause that is plausible for the individual. For example, if an observer saw a 25 year old, athletic male who was in a wheel chair, they are more likely to match the injury to a cause such as a sports accident; in contrast, if the perceiver saw a 72 year old male who was in a wheel chair, they are more likely to match the injury to a cause such as stroke.

Much like the effect of the ‘implied stroke’ condition, the effects of the rapidity in behavioural changes showed that in older stroke survivors, people are more likely to attribute ambiguous behavioural changes to stroke if there is a short delay before the changes, but not if the stroke survivor is younger. Although this finding is logical, in that an abrupt change may be more indicative of an accident such as stroke than a gradual trend such as aging, there may be negative consequences for stroke survivors. If an individual suffered a stroke, then encountered an acquaintance who they have not seen in a long time, the acquaintance may misattribute the changes caused by stroke to another cause. Even if the stroke survivor discloses their stroke, if that stroke was a long time ago, the acquaintance may underestimate the lasting effects of the stroke on behaviour. McClure et al. (2008) showed how perceivers tend to overestimate the recovery that occurs over time, and consequently, stroke survivors may find that initially (i.e., one week post-stroke), acquaintances are very accommodating and understanding of their behavioural changes, but as time goes on, these acquaintances become less accommodating and in time, misattribute the behavioural changes, and resent the survivor for not improving.

As longer periods of time after a stroke incident may reduce the likelihood that observers correctly attribute behaviours resulting from stroke, it may be beneficial to advise stroke survivors to disclose the likelihood of improving. For example, if a male stroke survivor tells his partner that he is unlikely to ever have as much energy as he did before the stroke, his partner may be less likely to attribute his fatigue to laziness a year later, when she may otherwise have assumed that he had recovered fully and that the stroke is not the cause of any problematic behaviours. In order to reduce the problems caused by prolonged symptoms on attributions to stroke, stroke survivors could be educated on the probable effects of stroke, and how likely it is for these effects to improve over time. Additionally, to reduce false hope in rapid recovery, it would be important for the stroke survivors to state when disclosing their stroke (particularly to long-term acquaintances, friends and family) that their behavioural changes may initially improve, but may not ever be the same as they were before the stroke (Burvil et al., 1995).

Stone (2005) described the distress that misattributions cause to young stroke survivors. In her study, Stone (2005) interviewed stroke survivors who had ambiguous visible symptoms very similar to the symptoms described in the ‘implied stroke’ condition of the present study (e.g., one participant was paralysed in her left hand). The present study has demonstrated why, even with a visible symptom, that participant who had a visible sign of her disability suffered misattributions – her young age. Based on the findings of the present study, if that participant had been elderly, her paralysed hand may have led to more correct attributions to stroke.

In order to reduce these misattributions and the associated distress (Stone, 2005), young stroke survivors could be trained how to disclose their disability during rehabilitation. It is important that the young stroke survivors are helped to feel confident and comfortable disclosing their disability, as disclosing a disability can be distressing for both the stroke

survivor and the person receiving the disclosure (Samuels, 2003), and there can be other negative outcomes. Despite the potential risks and unpleasantness of disclosing a disability, the ramifications of not disclosing the disability are that the stroke survivor may miss out on a job opportunity (Roberts & Macan, 2006), or even cause friends and partners to resent their unexplained behavioural changes (McClure, 2011), which can lead to divorce and loss of friends (Teasell et al., 2000). Clinicians can advise clients when it is likely to be helpful to disclose that they have had a stroke.

Additionally, young stroke survivors could be taught to not assume that any of their symptoms ‘speak for themselves.’ Young stroke survivors who suffer from a physical symptom representative of stroke, such as unilateral paralysis, may assume that naïve observers will see their paralysis and realise that they have suffered a stroke. Although the results of these studies suggest that perceivers who are more knowledgeable on stroke do draw on physical symptoms such as unilateral paralysis to inform their attributions, this influence is largely limited to older stroke survivors, and is unlikely to benefit the younger stroke survivors. Further, in order to increase public understanding of post-stroke symptom, television advertisement campaigns could be utilised, as these have been shown to be effective at increasing sympathy for, and understanding of other invisible disabilities such as depression (Chang, 2008).

Edmonds (2011) discussed the issue that young stroke survivors, due to being a minority, are typically placed with larger groups of older stroke survivors for rehabilitation. Although creating rehabilitation programmes designed specifically for young stroke survivors may create an initial financial cost, the long-term benefits outweigh this. Roughly 270 young people suffer a stroke each year in New Zealand alone, a relatively small country. Of these young stroke survivors, only around 50% resume working after an extended period (up to thirty years) of recovery (Teasell et al., 2000; Varona et al., 2004). By giving these survivors

specialised treatment aimed at reintegration into work environments, independent living, and disclosing their disabilities, it may be possible to increase the proportion of young stroke survivors who return to work. Additionally, by helping young stroke survivors return to the work place, the survivors are likely to have increased independence and, subsequently, the proportion of young stroke survivors being treated for depression and anxiety is likely to drop, as unemployment has been linked to depressive symptoms (Linn, Sandifer & Stein, 1985; Dooley, Catalano & Wilson, 1994).

As well as generating economic returns through increasing the number of young stroke survivors who resume work, and reducing the strain on health services by improving independence and lowering post stroke depression and anxiety, specialised treatment for young stroke survivors would ameliorate the individual quality of life for each young stroke victim. While helping young stroke survivors return to work in itself would improve the quality of life for young stroke survivors, training them to disclose their disability when it is appropriate would also have smaller, day to day benefits. One benefit would be receiving proper assistance in situations involving physical exertion. Another benefit for the stroke survivor would be suffering less resentment (McClure, 2011) which would otherwise be caused by misattributions and the sense of deception in colleagues (Roberts & Macan, 2006) which comes with not disclosing the cause of behavioural changes.

Limitations and future research

The present study extended Wainwright et al.'s (2013) study in such a way that it accounted for more of the potential variation in stroke information that an observer may be exposed to. However, there are still avenues for additional research and modifications to further understand how people attribute ambiguous stroke-related behaviours. A limitation to the present study is the nature of the vignettes. In this study, participants read a description of a fictional stroke survivor. While the vignette was based on an actual stroke survivor and

exhibited common behavioural changes for stroke survivors, he had no visual representation. Consequently, the target person was essentially a template of a stroke survivor – in effect a personified list of symptoms. If people met an actual person, whether it was a stroke survivor or simply a confederate posing as a stroke survivor, other variables might influence their judgements. The clothes the target person was wearing, their physique and attractiveness, or even their race could affect participants' impressions (Hamid, 1968; Eagly, Ashmore, Makijani & Longo, 1991; Greenwald & Banaji, 1995). These impressions may activate stereotypes which would affect attributions (Jackson, Sullivan & Hobbes, 1993). For example, if the target person was overweight, and the experimenter described his fatigue, participants would be more likely to attribute this behaviour to his personality due to the behaviour matching the common stereotype of laziness in overweight individuals (Chambliss, Finley & Blair, 2004). Although it was useful to reduce 'noise' and extraneous variables by presenting only the description of a stroke survivor, this method does limit the present study as, in the real world, social interactions, impression formation and attribution for ambiguous behaviours are more chaotic in terms of variables.

Taking account of the methodological limitations of the present study, future research in this area could endeavour to explore additional factors that influence attributions for stroke-related behaviours. By presenting participants with a variety of modified photos of the target person, it may be possible to establish how physical characteristics of the survivor influence attributions that perceivers make.

In the present study, participants were asked to choose from three explanations (stroke, age and personality) for the four behavioural changes (irritability, depression, fatigue and decrease in social activities). By presenting participants with stroke as a potential explanation, the word stroke itself may have prompted participants to consider stroke as an explanation when they otherwise may not have considered it at all – especially when the

target person was 32. To examine whether this had an effect on attributions, another direction that future research could take is to present participants with ‘open attributions’ rather than forced choice attributions; by presenting participants with a similar vignette, then asking them to write down what best explains each behavioural change in the target person, an exploratory analysis may be conducted in order to see whether participants attribute the behaviour to stroke at all, particularly when stroke is not mentioned or when it is only implied in the vignette.

Finally, Experiment 2 found that time delay in behavioural changes affects attributions, but most notably when the target person was 72; however, there may have been a more interesting effect of time delay on the attributions for the behavioural changes in the 32 year old target person, but that effect may not have been seen due to there being no other attribution options than stroke, age and personality, and because stroke was not considered a plausible explanation for either an abrupt or delayed change in a 32 year old. If participants were told that the 32 year old target person suffered a stroke, any effect of time delay may become clear. Future research could manipulate the time delay further, by explicitly stating that the target person suffered a stroke, in order to assess whether people know that the target person suffered a stroke, they tend to attribute behaviours to causes other than stroke based on the rapidity of behavioural changes

Summary and conclusions

The aim of this study was to examine how age and information relating to stroke affect perceiver’s explanations for ambiguous behavioural changes resulting from stroke. In order to assess this, participants were presented with vignettes which described the behavioural changes that affected a fictional stroke survivor. In Experiment 1, the vignettes varied in regard to the age of the target person (32, 72 or age unstated) and the amount of information about the cause of the behavioural change (no information, implied stroke or

explicit statement of stroke). Participants then rated how well three explanations (age, stroke and personality) accounted for each of the four behavioural changes (depression, fatigue, irritability and decrease in social activity). Experiment 2 used the same paradigm, but instead of manipulating the amount of information regarding the stroke, manipulated the rapidity of the behavioural changes in the vignette (one week later or one year later).

Experiment 1 showed that, when the target person was 72, participants rated age as the best explanation for the behavioural changes when no information about the stroke was given; however, when the vignette implied or explicitly stated that the target person had a stroke, participants rated stroke as the best explanation. When the target person was 32 or age unstated, participants rated personality as the best explanation when there was no information about stroke; however, when the vignette implied that the target person had suffered a stroke, participants rated stroke and personality as equally good explanations. When the vignette explicitly stated that the target person had suffered a stroke, participants rated stroke as the best explanation when the target person was 32 or age unstated. The results of Experiment 2 showed that when the behavioural changes occurred abruptly, participants rated stroke as the best explanation, but only when the stroke survivor was 72.

The implications of these results are that young (and possibly older) stroke survivors may need to disclose their stroke (even if they have a visible sign such as a paralysed leg) to perceivers in order to not experience misattributions; whereas, older stroke survivors who have a visible symptom that implies stroke may find that people correctly attribute their behaviour to stroke without disclosing the cause. Young stroke survivors may benefit from a different rehabilitation strategy to older stroke survivors, with a specific focus on disclosing the cause of their behaviour when this is likely to be beneficial. Additionally, in order to reduce misattributions, the friends and family of stroke survivors could be given information about the likely outcomes of stroke, so that ambiguous symptoms are not misattributed.

Education for the general public (such as short television advertisements) on the effects of stroke and how to understand ambiguous behavioural changes could also help alleviate the distress caused by misunderstanding and misattribution of stroke. The benefits of such interventions include increased proportions of young stroke survivors returning to work, decreased numbers of young stroke survivors dependent on health services and better understanding from family, friends and partners of the needs of the stroke survivor and the causes of their behaviour.

References

- Aström, M., Asplund, K., & Aström, T. (1992). Psychosocial function and life satisfaction after stroke. *Stroke*, 23(4), 527-531.
- Borman, B., Wilson, N., & Mailing, C. (1999). Socio-demographic characteristics of New Zealand smokers: results from the 1996 census. *The New Zealand medical journal*, 112(1101), 460-463.
- Burvill, P. W., Johnson, G. A., Jamrozik, K. D., Anderson, C. S., Stewart-Wynne, E. G., & Chakera, T. M. (1995). Prevalence of depression after stroke: the Perth Community Stroke Study. *The British Journal of Psychiatry*, 166(3), 320-327.
- Chambliss, H. O., Finley, C. E., & Blair, S. N. (2004). Attitudes toward obese individuals among exercise science students. *Medicine & Science in Sports & Exercise*.
- Chang, C. (2008). Increasing mental health literacy via narrative advertising. *Journal of Health Communication*, 13(1), 37-55
- Christensen, K., Doblhammer, G., Rau, R., & Vaupel, J. W. (2009). Ageing populations: the challenges ahead. *The Lancet*, 374(9696), 1196-1208.
- Costa, P. T., & McCrae, R. R. (1988). Personality in adulthood: a six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory. *Journal of personality and social psychology*, 54(5), 853.
- Dam, H. (2001). Depression in stroke patients 7 years following stroke. *Acta Psychiatrica Scandinavica*, 103(4), 287-293.
- Daniela, T., Alessandro, C., Giuseppe, C., Fabio, M., Cristina, M., & Luigi, D. G. (2010). Lack of sleep affects the evaluation of emotional stimuli. *Brain research bulletin*, 82(1), 104-108.
- Das, K., Mondal, G. P., Dutta, A. K., Mukherjee, B., & Mukherjee, B. B. (2007). Awareness of warning symptoms and risk factors of stroke in the general population and in survivors stroke. *Journal of clinical neuroscience*, 14(1), 12-16.
- Dooley, D., Catalano, R., & Wilson, G. (1994). Depression and unemployment: panel findings from the Epidemiologic Catchment Area study. *American journal of community psychology*, 22(6), 745-765.
- Eagly, A. H., Ashmore, R. D., Makhijani, M. G., & Longo, L. C. (1991). What is beautiful is good, but...: A meta-analytic review of research on the physical attractiveness stereotype. *Psychological bulletin*, 110(1), 109.
- Easton, J. D., & Sherman, D. G. (1977). Stroke and mortality rate in carotid endarterectomy: 228 consecutive operations. *Stroke*, 8(5), 565-568.
- Edmunds, A. (2011) The Muted Plight of Young Stroke Survivors.

- Feigin, V. L., Lawes, C. M., Bennett, D. A., & Anderson, C. S. (2003). Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century. *The Lancet Neurology*, 2(1), 43-53.
- Fishbein, M. J., & Laird, J. D. (1979). Concealment and disclosure: Some effects of information control on the person who controls. *Journal of Experimental Social Psychology*, 15(2), 114-121.
- Fiske, S. T., Kenny, D. A., & Taylor, S. E. (1982). Structural models for the mediation of salience effects on attribution. *Journal of Experimental Social Psychology*, 18, 105-127.
- Foerch, C., Misselwitz, B., Sitzer, M., Berger, K., Steinmetz, H., & Neumann-Haefelin, T. (2005). Difference in recognition of right and left hemispheric stroke. *The Lancet*, 366(9483), 392-393.
- Folstein, M. F., Maiberger, R., & McHugh, P. R. (1977). Mood disorder as a specific complication of stroke. *Journal of Neurology, Neurosurgery & Psychiatry*, 40(10), 1018-1020.
- Graham, S. (1991). A review of attribution theory in achievement contexts. *Educational Psychology Review*, 3(1), 5-39.
- Greenlund, K. J., Neff, L. J., Zheng, Z. J., Keenan, N. L., Giles, W. H., Ayala, C. A., ... & Mensah, G. A. (2003). Low public recognition of major stroke symptoms. *American journal of preventive medicine*, 25(4), 315-319.
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological review*, 102(1), 4.
- Hamid, P. N. (1968). Style of dress as a perceptual cue in impression formation. *Perceptual and Motor Skills*, 26(3), 904-906.
- Heider, F. (1944). Social perception and phenomenal causality. *Psychological review*, 51(6), 358.
- Hutchinson, J., & Gigerenzer, G. (2005). Simple heuristics and rules of thumb: Where psychologists and behavioural biologists might meet. *Behavioural processes*, 69(2), 97-124.
- Ingles, J. L., Eskes, G. A., & Phillips, S. J. (1999). Fatigue after stroke. *Archives of physical medicine and rehabilitation*, 80(2), 173-178.
- Jackson, L. A., Sullivan, L. A., & Hodge, C. N. (1993). Stereotype effects of attributions, predictions, and evaluations: No two social judgments are quite alike. *Journal of Personality and Social Psychology*, 65(1), 69.
- Johnstone, T. (2014, March 28). Rugby star's shock diagnosis Stroke knocks Weepu. *The Dominion Post*, p. A1
- Jones, E. E., & Archer, R. L. (1976). Are there special effects of personalistic self-disclosure?. *Journal of Experimental Social Psychology*, 12(2), 180-193.

- Kelley, H. H. (1967). Attribution theory in social psychology. In *Nebraska symposium on motivation*. University of Nebraska Press.
- Kelley, H. H. (1973). The processes of causal attribution. *American psychologist*, 28(2), 107.
- Kenyon, F. E. (1976). Hypochondriacal states. *The British Journal of Psychiatry*, 129(1), 1-14.
- Kuruvilla, A., Bhattacharya, P., Rajamani, K., & Chaturvedi, S. (2011). Factors associated with misdiagnosis of acute stroke in young adults. *Journal of Stroke and Cerebrovascular Diseases*, 20(6), 523-527.
- Laura, L. C. (1991). Selectivity theory: Social activity in life-span context. *Annual Review of Gerontology and Geriatrics, Volume 11, 1991: Behavioral Science & Aging*, 11, 195.
- Lawrence, M., & Kinn, S. (2012). Determining the needs, priorities, and desired rehabilitation outcomes of young adults who have had a stroke. *Rehabilitation research and practice*.
- Lee, D. S., Chiu, M., Manuel, D. G., Tu, K., Wang, X., Austin, P. C., ... & Tu, J. V. (2009). Trends in risk factors for cardiovascular disease in Canada: temporal, socio-demographic and geographic factors. *Canadian Medical Association Journal*, 181(3-4), E55-E66.
- Link, B. G., Phelan, J. C., Bresnahan, M., Stueve, A., & Pescosolido, B. A. (1999). Public conceptions of mental illness: labels, causes, dangerousness, and social distance. *American journal of public health*, 89(9), 1328-1333.
- Linn, M. W., Sandifer, R., & Stein, S. (1985). Effects of unemployment on mental and physical health. *American Journal of Public Health*, 75(5), 502-506.
- Malle, B. F. (1999). How people explain behavior: A new theoretical framework. *Personality and social psychology review*, 3(1), 23-48.
- Mathers, C. D., Sadana, R., Salomon, J. A., Murray, C. J., & Lopez, A. D. (2001). Healthy life expectancy in 191 countries, 1999. *The Lancet*, 357(9269), 1685-1691.
- McClure, J. (2011). The role of causal attributions in public misconceptions about brain injury. *Rehabilitation psychology*, 56(2), 85.
- McClure, J., Buchanan, S., McDowall, J., & Wade, K. (2008). Attributions for behaviours of persons with brain injury: The role of perceived severity and time since injury. *Brain Injury*, 22(9), 639-648.
- McClure, J., Devlin, M. E., McDowall, J., & Wade, K. (2006). Visible markers of brain injury influence attributions for adolescents' behaviour. *Brain Injury*, 20(10), 1029-1035.
- Morris, M. W., & Larrick, R. P. (1995). When one cause casts doubt on another: A normative analysis of discounting in causal attribution. *Psychological Review*, 102(2), 331.

- Muntner, P., Garrett, E., Klag, M. J., & Coresh, J. (2002). Trends in stroke prevalence between 1973 and 1991 in the US population 25 to 74 years of age. *Stroke*, 33(5), 1209-1213.
- Northcott, S., & Hilari, K. (2011). Why do people lose their friends after a stroke?. *International Journal of Language & Communication Disorders*, 46(5), 524-534.
- Pancioli, A. M., Broderick, J., Kothari, R., Brott, T., Tuchfarber, A., Miller, R., ... & Jauch, E. (1998). Public perception of stroke warning signs and knowledge of potential risk factors. *Jama*, 279(16), 1288-1292.
- Petrea, R. E., Beiser, A. S., Seshadri, S., Kelly-Hayes, M., Kase, C. S., & Wolf, P. A. (2009). Gender differences in stroke incidence and poststroke disability in the Framingham heart study. *Stroke*, 40(4), 1032-1037.
- Roberts, L. L., & Macan, T. H. (2006). Disability disclosure effects on employment interview ratings of applicants with nonvisible disabilities. *Rehabilitation Psychology*, 51(3), 239.
- Robins, R. W., Spranca, M. D., & Mendelsohn, G. A. (1996). The actor-observer effect revisited: Effects of individual differences and repeated social interactions on actor and observer attributions. *Journal of Personality and Social Psychology*, 71(2), 375.
- Röding, J., Lindström, B., Malm, J., & Öhman, A. (2003). Frustrated and invisible--younger stroke patients' experiences of the rehabilitation process. *Disability & Rehabilitation*, 25(15), 867-874.
- Samuels, E. J. (2003). My body, my closet: Invisible disability and the limits of coming-out discourse. *GLQ: A Journal of Lesbian and Gay Studies*, 9(1), 233-255.
- Sharpe, M., & Wilks, D. (2002). ABC of psychological medicine: fatigue. *BMJ: British Medical Journal*, 325(7362), 480.
- Singhal, A. B., Biller, J., Elkind, M. S., Fullerton, H. J., Jauch, E. C., Kittner, S. J., ... & Levine, S. R. (2013). Recognition and management of stroke in young adults and adolescents. *Neurology*, 81(12), 1089-1097.
- Statistics New Zealand. (2011) Demographic Trends: 2011. Retrieved from http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/demographic-trends-2011.aspx
- Staub, F., & Bogousslavsky, J. (2001). Post-stroke depression or fatigue?. *European neurology*, 45(1), 3-5.
- Stone, D. L., & Colella, A. (1996). A model of factors affecting the treatment of disabled individuals in organizations. *Academy of Management Review*, 21(2), 352-401.

- Stone, S. D. (2005). Reactions to invisible disability: The experiences of young women survivors of hemorrhagic stroke*. *Disability & Rehabilitation*, 27(6), 293-304.
- Suk, S. H., Sacco, R. L., Boden-Albala, B., Cheun, J. F., Pittman, J. G., Elkind, M. S., & Paik, M. C. (2003). Abdominal obesity and risk of ischemic stroke the Northern manhattan stroke study. *Stroke*, 34(7), 1586-1592.
- Sullivan, K. A., & Waugh, D. (2005). Stroke knowledge and misconceptions among survivors of stroke and a non-stroke survivor sample. *Top Stroke Rehabil*, 12(2), 72-81.
- Teasell, R. W., R McRae, M., & Finestone, H. M. (2000). Social issues in the rehabilitation of younger stroke patients. *Archives of Physical Medicine and Rehabilitation*, 81(2), 205-209.
- Travis, L. H., Flemming, K. D., Brown Jr, R. D., Meissner, I., McClelland, R. L., & Weigand, S. D. (2003). Awareness of stroke risk factors, symptoms, and treatment is poor in people at highest risk. *Journal of stroke and cerebrovascular Diseases*, 12(5), 221-227.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive psychology*, 5(2), 207-232.
- Varona, J. F., Bermejo, F., Guerra, J. M., & Molina, J. A. (2004). Long-term prognosis of ischemic stroke in young adults. *Journal of neurology*, 251(12), 1507-1514.
- Wade, D. T., Hower, R. L., David, R. M., & Enderby, P. M. (1986). Aphasia after stroke: natural history and associated deficits. *Journal of Neurology, Neurosurgery & Psychiatry*, 49(1), 11-16.
- Wainwright, C., McClure, J., McDowall, J. (2013). The effect of age of the stroke survivor on the attributions made for behaviours resulting from stroke. Unpublished honours dissertation, Victoria University, Wellington, New Zealand.
- Wake, M., Hardy, P., Canterford, L., Sawyer, M., & Carlin, J. B. (2007). Overweight, obesity and girth of Australian preschoolers: prevalence and socio-economic correlates. *International Journal of Obesity*, 31(7), 1044-1051.

Appendix

The following instructions accompanied all conditions;

Conditions affecting attributions for ambiguous behaviours of persons with stroke

Information Sheet

My name is Jake Gallagher and I am a MSc student studying psychology. For my thesis, I am conducting research about how people explain changes in behaviour. Professor John McClure and Associate Professor John McDowall are supervising me in this research.

If you agree to participate in this research, I will give you a brief description of a man called Michael and some recent changes in his behaviour. You will then fill in a short questionnaire.

This research is completely confidential. The data you provide will be used in my MSc thesis. The findings may also be submitted for publication in a scientific journal.

In order to protect your privacy:

- Only those people directly related to the project will have access to the raw data that you provide to us.
- You will never be identified in my research project or in any other presentation or publication. The information you provide will be coded by number only.
- In accordance with American Psychological Association guidelines, the confidential data may be shared with other competent researchers.
- Your coded data may be used in other, related studies.
- A copy of coded data will remain in the custody of my supervisor and I.

Completion of the questionnaire indicates your consent to take part in the research. You can decide to pull out at any time prior to completing the questionnaire without penalty.

This research has been approved by the Victoria University of Wellington Human Ethics Committee (Psychology).

The findings of the research will be available by the 1st of March 2015. Please fill in the attached contact details sheet if you would like to know the results. These contact details will be stored separately from your completed questionnaire.

If you have any further questions regarding this study please feel free to contact one of us:

Jake Gallagher, Jake.Gallagher@vuw.ac.nz

Prof. John McClure, John.McClure@vuw.ac.nz

Assoc. Prof. John McDowall, John.McDowall@vuw.ac.nz

Experiment 1

Questionnaire

This questionnaire asks about your opinions; there are no right or wrong answers. Since there is little information about Michael, you are not expected to know the exact answer for the following questions. Therefore, just answer the questions as a best guess if necessary. Feel free to refer to the caption below at any time if you need to.

Michael is a (32/72/*age unstated*) year old New Zealand citizen. He had a job with an architectural firm where he had been very successful. He had a real passion for competitive sports and had participated in national triathlons. He exercised on a daily basis. His hobbies included reading, spending time with friends, listening to music and travelling.

Michael (*suffered a stroke/is now paralysed in his left leg*) (*and*) now tires very quickly, has to nap for a few hours each day and he finds exercising difficult as it increases his fatigue. He spends very little time with friends and his social group has diminished significantly. Michael has been diagnosed with depression and he often experiences feelings of sadness and no longer finds pleasure in activities that he previously enjoyed. He is now irritable and less tolerant towards other people.

1. Please rate all of the following explanations for Michael's increase in fatigue.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation		Very good explanation	

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation		Very good explanation	

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation		Very good explanation	

2. Please rate all of the following explanations for Michael's decrease in social activity.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation			Very good explanation

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation			Very good explanation

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation			Very good explanation

3. Please rate all of the following explanations for Michael's depression.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation			Very good explanation

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation			Very good explanation

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation			Very good explanation

4. Please rate all of the following explanations for Michael's increase in irritability.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation		Very good explanation	

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation		Very good explanation	

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor Explanation			Neither a good nor poor explanation		Very good explanation	

5. Imagine that you are a manager at a workplace and you have just interviewed Michael, who applied for a job. Keeping in mind what you already know about Michael from the description of him at the beginning of the questionnaire (including the second paragraph), how likely is it that you would hire Michael?

A) Would you employ Michael at your company?

1	2	3	4	5	6	7
I would not hire him			I'm not sure		I would definitely hire him	

6. What is your age? (Circle one)

25 or under	26-35	36-45	46-55	56-65	65 or older
-------------	-------	-------	-------	-------	-------------

7. What is your gender? (Circle one)

Male	Female	Other
------	--------	-------

Please continue on the following page.

8. Please answer the following questions about your knowledge of stroke and brain injury.

A) How familiar are you with stroke?

1	2	3	4	5	6	7
I am completely unfamiliar			I am somewhat familiar		I consider myself an expert on stroke	

B) How much do you worry about suffering a stroke?

1	2	3	4	5	6	7
I have never worried about having a stroke			I am somewhat worried		I am very worried about having a stroke	

C) Do you know anyone who has suffered a stroke? (Circle one)

YES / NO

D) Do you know anyone who has suffered a brain injury? (Circle one)

YES / NO

Experiment 2

Questionnaire

This questionnaire asks about your opinions; there are no right or wrong answers. Since there is little information about Michael, you are not expected to know the exact answer for the following questions. Therefore, just answer the questions as a best guess if necessary. Feel free to refer to the caption below at any time if you need to.

Michael is a (32/72) year old New Zealand citizen. He had a job with an architectural firm where he had been very successful. He had a real passion for competitive sports and had participated in national triathlons. He exercised on a daily basis. His hobbies included reading, spending time with friends, listening to music and travelling.

(A week later/One year later), several acquaintances noticed that Michael now tires very quickly, has to nap for a few hours each day and he finds exercising difficult as it increases his fatigue. He spends very little time with friends and his social group has diminished significantly. Michael has been diagnosed with depression and he often experiences feelings of sadness and no longer finds pleasure in activities that he previously enjoyed. He is now irritable and less tolerant towards other people.

1. Please rate all of the following explanations for Michael's increase in fatigue.

B) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

2. Please rate all of the following explanations for Michael's decrease in social activity.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

3. Please rate all of the following explanations for Michael's depression.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

4. Please rate all of the following explanations for Michael's increase in irritability.

A) It is likely to be a result of Michael's age.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

B) It is likely to be a result of Michael's personality.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

C) It is likely to be a result of a stroke.

1	2	3	4	5	6	7
Very Poor			Neither a good			Very good
Explanation			nor poor explanation			explanation

Age: _____

Gender: _____