

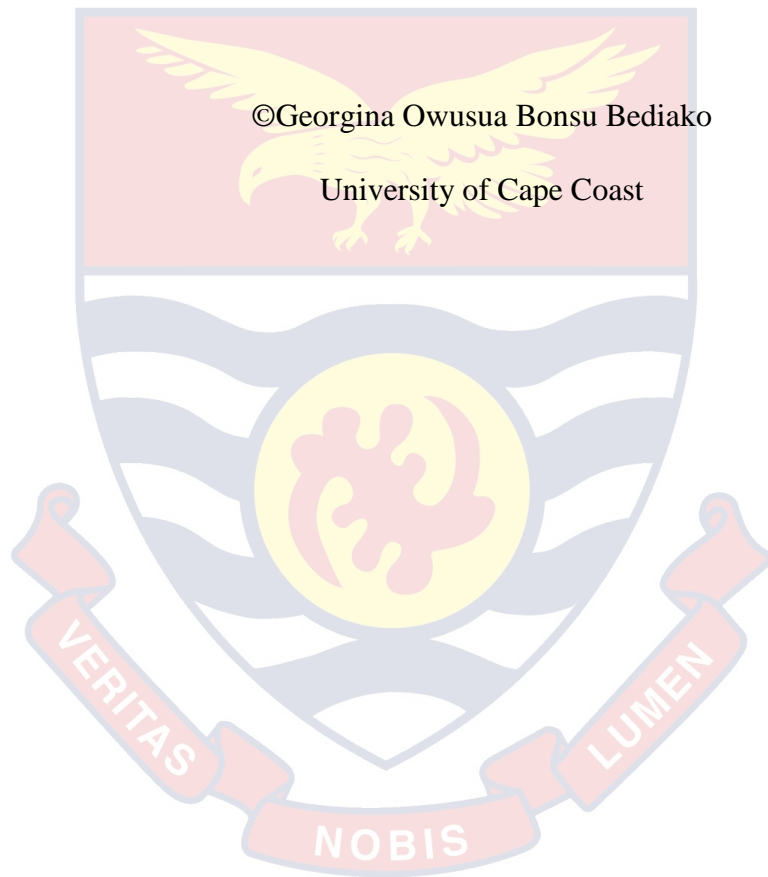
UNIVERSITY OF CAPE COAST

SUICIDAL IDEATIONS AND EMOTIONAL REGULATION AS  
PREDICTORS OF INVOLVEMENT IN POST STROKE  
REHABILITATION



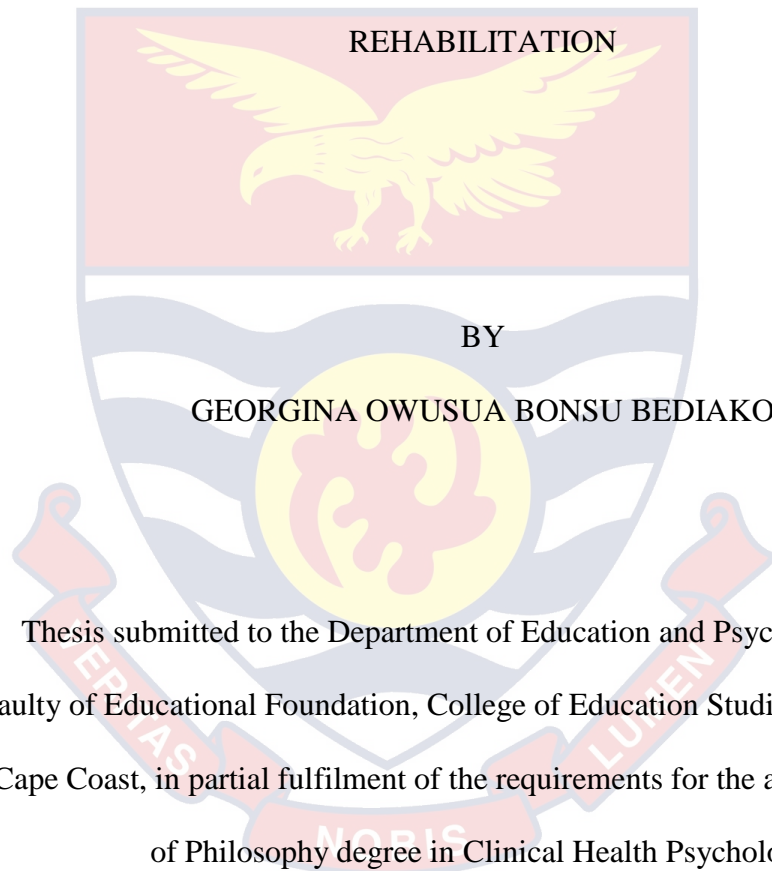
GEORGINA OWUSUA BONSU BEDIAKO

2021



UNIVERSITY OF CAPE COAST

SUICIDAL IDEATIONS AND EMOTIONAL REGULATION AS  
PREDICTORS OF INVOLVEMENT IN POST STROKE



JANUARY 2021

DECLARATION

**Candidate's Declaration**

I hereby declare that this thesis is the results of my own original research and that no part of it has been presented for another degree in this university or elsewhere

Candidate's signature.....Date.....

Name.....

**Supervisors Declaration**

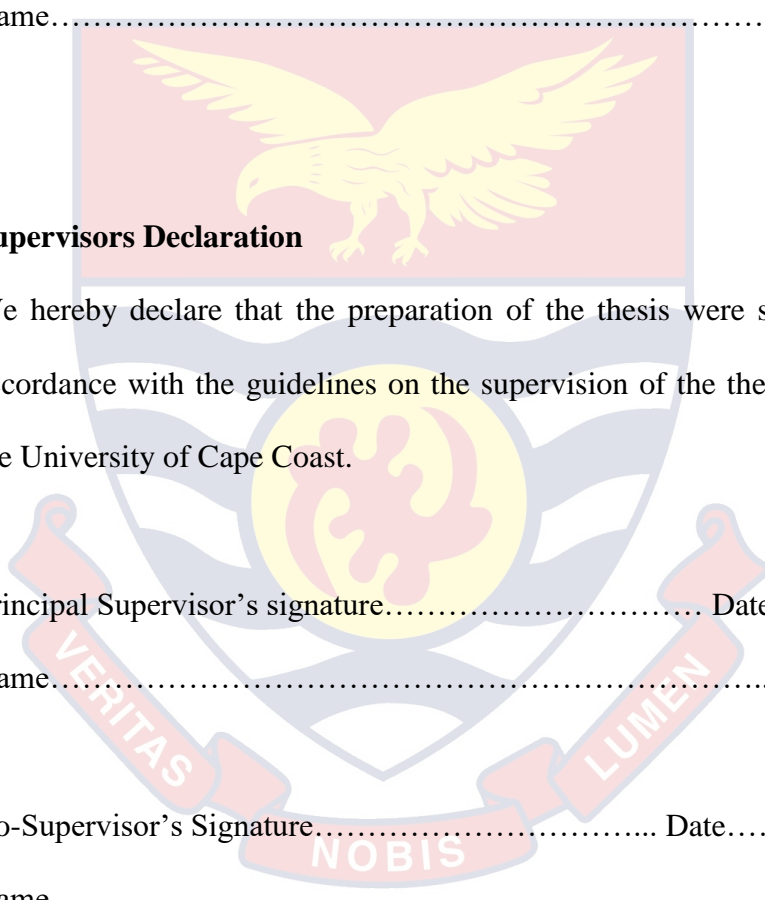
We hereby declare that the preparation of the thesis were supervised in the accordance with the guidelines on the supervision of the thesis laid down by the University of Cape Coast.

Principal Supervisor's signature..... Date.....

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Co-Supervisor's Signature..... Date.....

Name.....



## ABSTRACT

Patient's willingness to involve in decisions concerning their health and recovery process is of great importance to health care shareholders. Many factors have been found to influence involvement of stroke patients in rehabilitation activities. This study sought to find out the relationship between emotional regulation and suicidal ideations on stroke patient's involvement during rehabilitation and to find how age moderates' emotional regulation and involvement in post stroke rehabilitation. The cross-sectional design was used with a sample of 80 stroke patients. The results show a significant relationship between emotional regulation and involvement in post stroke rehabilitation, suicidal ideations and involvement in post stroke rehabilitation but emotional regulation did not significantly mediate the suicidal ideations and involvement in post stroke rehabilitation. Age was a significant moderator between emotional regulation and involvement in post stroke rehabilitation. In conclusion, difficulty in emotional regulation and suicidal ideations are psychological challenges some stroke survivors are facing. It is recommended that healthcare practitioners seek, choose and improve on the existing intervention for a better recovery of stroke survivors.

KEY WORDS

Stroke

Emotional Regulation

Suicidal Ideations

Involvement in Post Stroke Rehabilitation

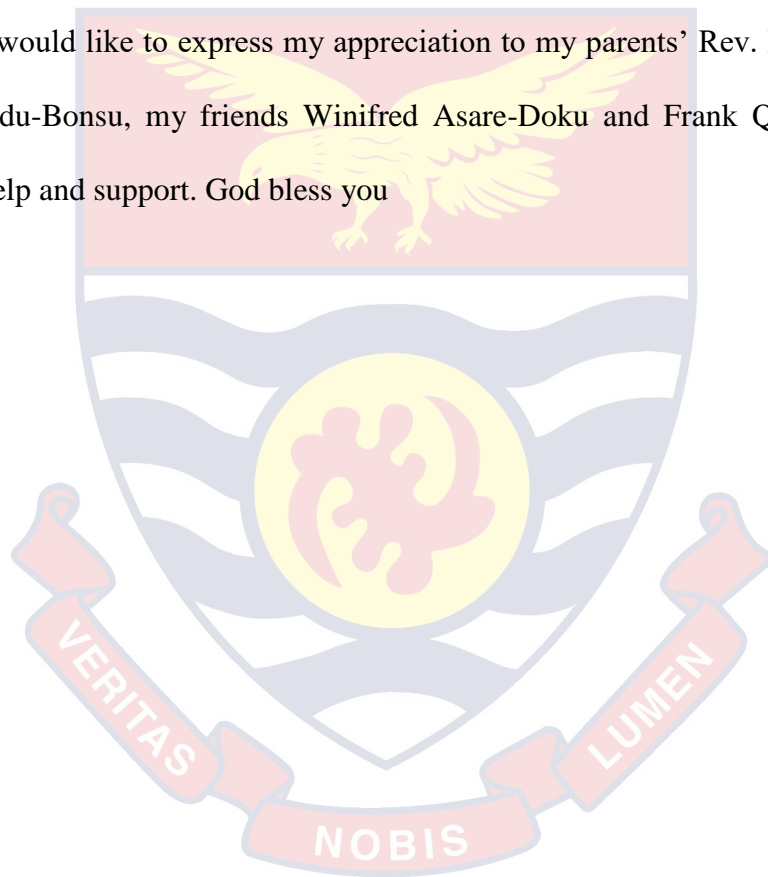


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## DEDICATION

Every challenging work needs self-effort as well as guidance of elders especially those who were very close to our heart. My humble effort I dedicate to God, family and friends.



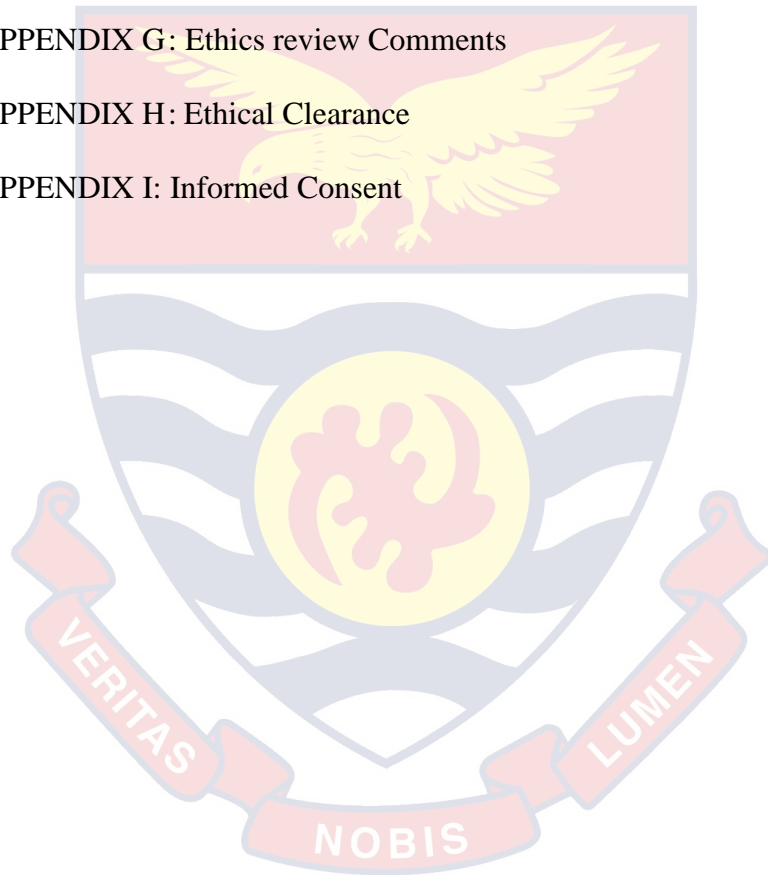


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## LIST OF ACRONYMS

CVA	Cerebrovascular Accident
TIA	Transient Ischemic Attack
dIPFC	Dorsolateral Prefrontal Cortex
TPJ	Temporoparietal Junction



## CHAPTER ONE

### INTRODUCTION

Patients' involvement in decisions concerning their health care and recovery process is of great importance to health care shareholders. This is because their efforts in the process make the recovery even more successful and reduce the degree of complications or disability especially in the case of stroke patients (Skidmore *et al.*, 2010). Over the years, many factors have been found to influence involvement of stroke patients during rehabilitation (Maclean, Pound, Wolfe & Rudd, 2002; Skidmore *et al.*, 2010). This study sought to find out the predictive power of suicidal ideations and emotional regulation on stroke patients' involvement during rehabilitation with age moderating emotional regulation and involvement in rehabilitation.

#### **Background to the Study**

Stroke is a cardiovascular condition, caused by damage or blockage of the artery leading to or in the brain and causes a global or focal lesion of brain cells (Alrabghi *et al.*, 2018; Manzanero, Santro & Arumugam, 2013). Generally, three types of strokes have been identified in the medical field: the transient ischemic attack which happens within 24 hours (Reiffel, 2014; Williams, Jiang, Matchar, & Samsa, 1999; Neaton, Wentworth, Cutler, Stamler, & Kuller, 1993) the ischemic stroke which occurs for more than 24 hours and is caused by blockage of arteries (Reiffel, 2014; Williams, Jiang, Matchar, & Samsa, 1999; Neaton *et al.*, 1993) and haemorrhagic stroke which occurs for more than twenty-four hours but is due to a breakage of an artery

(Reiffel, 2014; Williams, Jiang, Matchar, & Samsa, 1999; Neaton *et al.*, 1993).

Globally, stroke is one of the Cardiovascular Diseases which has received much attention through the quest to finding solutions to the problem it poses to humans (Ofori-Asenso & Garcia, 2016). It is the third leading cause of mortality in the world. In the middle and low-income countries, there are approximately seventy percent (70%) stroke patients and eighty seven percent (87%) mortality and stroke-related disability (Benjamin *et al.*, 2018). On the average, stroke occurs fifteen (15) years earlier in – and causes more deaths of – people living in low and middle-income countries, when compared to those in high-income countries (Benjamin *et al.*, 2018). This implies that quite a large number of people, in the low and middle-income countries, die from stroke or live with some form of stroke-related disability, of which Ghana may not be an exception.

Furthermore, stroke either takes your life or leaves you with some form of disability in your limbs, speech, thoughts and emotions (Paolucci *et al.*, 2000). These disabilities are usually (a) behavioural- difficulty moving the affected part of the body, problems with speaking and a possible change in personality traits; (b) cognitive- difficulty understanding language or difficulty with speech, problems with memory, may have distortion in thinking, difficulty recognizing objects and may have different perceptives to issues; (c) emotional- emotional problems, mood disorder, difficulty regulating emotions (Paolucci *et al.*, 2000).

Many stroke survivors spend days recovering from this disability (Fini, Holland, Keating, Simek & Bernhardt, 2015). In a country like Ghana, where



accessibility to facility and finance is a challenge for most people, this disability becomes a burden (Baatiema *et al.*, 2017). Again, anecdotal evidence shows, as much as most stroke patients have the hope of recovering to normality or at least to a point where they can return to work especially stroke patients in the working group of a given country thus age 45 to 75, these hopes may not come to life. Some of the reasons being that with the increase in age and the kind of injury acquired, it is less likely that total recovery will happen (Fell & Williams, 2008; Testa, Malec, Moessner & Brown, 2005). Some other challenges the stroke patient may face because of this disability include: dealing with cognitive problems and anger, experience with rehabilitation, psychological distress, impairment of basic functions and self-care, inability to return to work and scarcity of medication and challenges of care-giving (Kalavina, 2019). Altogether, this poses a great challenge to the stroke patients, their caregivers and developing countries. Therefore, it is important to find all the effective and possible ways to help the recovery process of stroke patients, whether through physical intervention, psychological interventions or social intervention, something must be done for stroke survivors.

In light of this, rehabilitation therapist with the support of their nation, the patient's family and friends, have managed to develop modern and innovative ways of reducing the mortality and disability rate (Lenze *et al.*, 2004a; Lenze *et al.*, 2004b). These include: provision of quality tools and equipment, building modern infrastructure, employing specialists from the fields of physical therapy, psychological therapy, speech therapy, medicine and using a person-centred intervention (Lawthers, Pransky, Peterson & Himmelstein,

2003). The resources and specialists help take into account the interests and needs of the patient and in the end develop the impairment or disability to a functional level. These interventions and resources provide a holistic approach to recovery (Lawthers, Pransky, Peterson & Himmelstein, 2003) and resolve some of the problems and losses stroke brings to families, friends and the nation (Pechak, Thompson, & Global Health Education Consortium, 2007).

The rehabilitation processes are structured, intense and a lot of time and hard work is put into the process to restore or bring the victim close to normal or to a functional level (Skidmore *et al.*, 2010). On the contrary, many stroke patients leave the hospital with some form of disability (Paolucci *et al.*, 2000; Skidmore *et al.*, 2010). Not to say that a stroke patient should recover fully- even though anecdotal evidence may show that physically, some may have- it is important that the degree of the stroke-related disability allows the patient to live some level of normal life.

Coming together, rehabilitation therapists have found that, even though rehabilitation is a good intervention for stroke patients, some factors interplay to affect the recovery of the patients to full state of functioning during and after the rehabilitation process. These factors may include: demographic factors, involvement in rehabilitation process (Skidmore *et al.*, 2010), patient-doctor relationship, cognitive and affective functioning of patients (Skidmore *et al.*, 2010), lack of appropriate resources at the hospital facility and home of patient (Donkor, Owolabi, Bampoh, Aspelund & Gudnason, 2014), reaction and support of caregivers, lack of control of patients distress (Maclean, Pound, Wolfe & Rudd, 2002) and socio-economic status of patient (Bettger *et al.*, 2014).

According to Skidmore *et al.* (2010), physiotherapist and occupational therapist have ruled on involvement in rehabilitation activity as an important factor for recovery, of which most stroke patients he studied were having difficulty practicing. From the physical and occupational therapist point of view, for a patient to be considered as fully involved in the therapy process, the patient must have the attitude of active learning and be motivated (Maclean, Pound, Wolfe & Rudd, 2002), the patient is required adhere to the therapist recommendations and suggestions on rehabilitation (Maclean, Pound, Wolfe & Rudd, 2002), be consistent with therapy, see the process as important and be willing to play their part in the process of rehabilitation (Kortte, Falk, Castillo, Johnson-Greene & Wegener, 2007).

On the other hand, Physiotherapists noted that stroke patients usually seem overwhelmed by the traumatic event, they show signs of extreme sadness, apathy, low concentration, some level of distress, lack of motivation (Maclean, Pound, Wolfe & Rudd, 2002) and they have found it to be a possible cause of poor involvement in rehabilitation (Lenze *et al.*, 2004a; Lenze *et al.*, 2004b). Apparently, poor involvement is not evident at physical and occupational therapy only but it is evident during social participation (Cooper, Phillips, Johnston, Whyte & MacLeod, 2014). Cooper *et al.*, (2014) in their study, found that stroke patients at the acute and chronic stages have problems with emotional management and this problem, at some point, influences their social participation.

The unmanaged emotions affects their response to therapy, to the people around them and to the situations or rehabilitation activities they find themselves (Lenze *et al.*, 2004). These overwhelming feeling and distress are

mostly due to damage of the brain structures and the thought of going through a traumatic event (Centre for Substance Abuse Treatment, 2014; Teasdale & Engberg, 2001). From analysis, some of the patients with the unmanaged emotions, overwhelming feeling and distress are reported to be depressed (Lenze *et al.*, 2004a; Lenze *et al.*, 2004b). Nevertheless, for both clinically depressed patients and non-depressed patients, these feelings, attitudes and poor concentration may stay through the acute stage and through to the chronic stage, depending on the person in question (Lenze *et al.*, 2004a; Lenze *et al.*, 2004b; Cooper *et al.*, 2014).

In spite of the uncontrolled emotions and other troubles the stroke patient might be facing, they are required to go through at least one hour or less of intense rehabilitation therapy, designed to help their recovery, of which they have to be involved in the rehabilitation process. The expectation is that these patients will show some form of 'motivation' or manage the way they feel, think and behave during the rehabilitation activities; in some cases, these expectations are not met (Maclean, Pound, Wolfe & Rudd, 2002).

Emotional regulation is worth noting because from analysis of the researchers in the field, prolonged emotional distress is an evidence of difficulty with emotional regulating (Gross, 1998a; Gross, 2013; Gratz & Roemer, 2004; Thompson, 1994). Thus, the stroke patients show low motivation, apathy, psychological distress and the likes because they are not able to regulate their emotional effectively. They may; have difficulty accepting their emotions, lack clarity on what emotions they are having, unable to set goals and make use of effective strategy for their emotions, be impulsive and not be aware of their emotions (Cooper *et al.*, 2014). With

difficulty in these dimensions of emotional regulation, the stroke patient may find it problematic involving effectively in any activity (Gratz & Roemer (2004). The ability to regulate emotions effectively, affects the total functional prognosis of patients (Gross, 2013) and their involvement to some activities prescribed to them (Cooper *et al.*,2014).

Apart from the problem of regulating emotions, one consequence of this overwhelming negative emotion on the stroke patient is Suicidal thoughts and/or desires (Pompili *et al.*, 2015). Suicide is a world problem and much attention are given to it, partly because it increases mortality rate. Suicide moves through stages, thus, from the suicide ideations down to the attempt and lethal stage (Kuramoto, Chilcoat, Ko, & Martins, 2012). Stroke patients experience these thoughts, desires and others, like extreme post stroke depression or happiness, apathy, aggressiveness and hopelessness (Hama, Yamashita, Yamawaki & Kurisu, 2011; Kim, 2016). This, plus post stroke personal and social experiences, extreme emotions, negative life events, and negative family events, which comorbid suicidal ideations compels some stroke survivors to opt for death (Van Orden *et al.*, 2010). Forsstrom, Hakko, Nordstrom, Rasanen, and Mainio (2010) reported that 11% of the patients they studied had suicide plans within the first 2 years of stroke. The risk factors included being female, being younger than 65 years, living alone, having had a re- current stroke, being dependent on others, and staying in bed three months after stroke (Eriksson, Glader, Norrving, & Asplund, 2015). This shows that stroke patients in Ghana may also be at risk of suicide ideations.

Suicidal ideations usually linger in the minds of persons experiencing it and due to the difficulty with emotional regulation, lack of impulse control and

quality of judgement they are more likely to end their life or attempt (Peterson, Chen, Karver, & Labouliere, 2019; Van Orden *et al.*, 2010). Most patients with suicidal ideations are made to sign a contract which compels them not to take their life (Centre for Substance Abuse Treatment, 2009; Samra & Monk, 2007; Miller, Jacobs & Gutheil, 1998). In the event of perceived suicide, interventions are designed for them to keep them alive (Fleischmann *et al.*, 2008); Lester, 2013). Studies among suicide patients show that the patients usually do not follow through or adhere to treatment or intervention (Boone & Brausch, 2016; Eriksson, Glader, Norrving, & Asplund, 2015).

Age, a major component of human life and a seemingly insignificant factor has indeed shown to affect the way we think, behave and express our emotions (Ebner & Fischer, 2014). As people age their difficulty with emotional regulation changes and their interest also change (Gross, 2013). Healthy old people, with effective emotional regulation strategies, get less interested in large groups and less worried about what people say. They are aware of themselves and can establish clarity on their emotions (Gross, 2013). On the other hand, Onig and Thompson (2019) found older people with high difficulty with emotional regulation, involve less in activities around them. Thus age moderates a person's emotions and their desire for other activities.

This paper sought to investigate suicidal ideations and emotional regulation, as factors which may predict involvement in post stroke rehabilitation regime. It also looked at how age moderate's the relationship between emotional regulation and involvement in post stroke rehabilitation.

## Statement of the Problem

On the whole, stroke is a condition which is treated gradually and continuously (Murphy & Corbett, 2009). Every stage of it is important and full attention has to be given to it. Whether at the acute or chronic stage, patients are required to be responsible towards their healing process and the physicians are also required to play their role in order to get the patient close to normal with less disabilities (Lenze *et al.*, 2003). Physicians complain of patients' poor involvement attitude to rehabilitation regime (Maclean *et al.*, 2002; Skidmore *et al.*, 2010; Lenze *et al.*, 2003) It is important therefore to explore all the possible factors influencing the patients' attitude since poor involvement affects recovery.

Furthermore, it is clear that poor involvement in post stroke rehabilitation is a problem affecting recovery outcome (Skidmore *et al.*, 2010). However, studies on involvement in post stroke rehabilitation was conducted in the Europe. In Ghana, literature on the concept of involvement have focused more on patients' compliance to medication, participation in decision making during patient's health care (Atakro *et al.*, 2019) but less is published on their willingness to actively learn or take recommendations form the rehabilitation therapist on the activities they need to do on their own to recover and reduce disability (Skidmore *et al.*, 2010; Kortte, *et al.*, 2007), their need for cues and how important the rehabilitation regime is to them. Involvement is a broader field as compared to adherence and compliance. This is worth noting especially among stroke patients since the items for the measurement of their involvement in post stroke rehabilitation includes adherence and other concepts.

Overwhelming emotions and Difficulty with Emotional regulation is one factor among stroke patients which is believed to have an influence on their whole orientation and desire to be part of the society. (Cooper *et al.*, 2014). However, studies done in the area of difficulty with emotional regulation and its relationship to involvement among stroke patients focused on the stroke patient's social involvement (where the stroke patient would have to use their social skills) (Cooper *et al.*, 2014). Others have focused on involvement in yoga and aerobics among non-stroke patients but not involvement in post stroke rehabilitation which includes physical therapy, occupational therapy and speech therapy (Wimmer, von Stockhausen & Bellingrath, 2019; Farioli-Vecchioli, Sacchetti, di Robilant, & Cutuli, 2018; McMahon *et al.*, 2017; Boone, Brausch, 2016; Krogh, Hjorthøj, Speyer, Glud & Nordentoft, 2017). Gratz and Roemer (2004) agree that emotional regulation should be studied in the clinical setting where goals are recommended for patients. Skidmore *et al.* (2010) made efforts in studying emotions in the clinical setting and among stroke patients but it focused on cognitive and affective functioning and not how emotion is regulated (Skidmore *et al.*, 2010). Thus, a gap exist on the relationship between emotional regulation and involvement in post stroke rehabilitation.

Emotional regulation is an emerging field of study and many of the studies focuses on how the effective use of emotional regulation can influence suicidal behaviours (Gross, 1998). This is on the positive side, were emotional regulation plays an effective role in managing suicide (Gross, 1998; Gross, 2013; Thompson, 1994). However, just a few studies exist on the relationship between suicidal ideations and difficulty with emotional regulation. Thus,



before we can say the effective use of the emotional regulation has worked on a person with suicidal ideations, it is prudent to establish an existing relationship between the suicide and difficulty with emotional regulation. It is also prudent to know on what dimension of emotional regulation is the patient having difficulty. Also, the studies which established a relationship between suicidal ideations and difficulty with emotional regulation did the study among non-stroke patient (Peterson, Chen, Karver, & Labouliere, 2019). Thus, a gap exists on the what is happening among stroke patients.

The overwhelming emotional component of stroke and the hopelessness some patients feel may make them potential people with suicidal ideations (Forsstrom *et al.*, 2010). In the past years, it is evident that Ghana has experienced more of its citizens committing suicide (Ghana Wed, 2014). However, very little is published among stroke patients in Ghana committing suicide.

It is well known among physicians that patients with suicidal behaviours have problems adhering to treatment. Thus, they do not take their medications, they do not attend treatment nor take recommendations on treatment (Lizardi & Stanley, 2010; Monti, Cedereke, & O'jehagen, 2010). There are studies which establish this fact and have gone a step ahead to develop intervention to help the patients adhere (Lizardi & Stanley, 2010; Monti, Cedereke, & O'jehagen, 2010; Granboulan, Roudot-Thoraval, Lemerle & Alvin, 2001). On the contrary, little is known on the relationship between suicidal ideations and involvement in post-stroke rehabilitation regime. The concept of involvement in post stroke rehabilitation is important because the scale of measurement for adherence is different from that of involvement in post stroke rehabilitation.

Also, the studies do not tell us the health state of the patients so it is difficult to establish that stroke patients were included in the study (Monti, Cedereke, & O'jehagen, 2010; Granboulan, Roudot-Thoraval, Lemerle & Alvin, 2001).

It is evident that age is a construct that influences emotional regulation and the involvement in every activity. As people age their desire to involve in some activities diminishes. On the other hand, patients having difficulty with emotional regulation find it hard to involve in some activities (Gross, 2013). Nevertheless, no evidence is given to show the role age may play on the relationship between emotional regulation and involvement in post stroke rehabilitation.

Below is case history of two stroke patients from a clinical observation. During an internship program I participated in, I had to help a stroke patient of about 78 years old with his speech and another of about 43 years old with his exercises. These were rehabilitation regimes the stroke patients were required to be involved in for the period of recovery. During the period, I realized that the 43-year-old man was actively learning and taking the instructions given while the 78-year-old man was unresponsive to treatment. Thus, the younger man was more involved in the rehabilitation process than the old man. The old man complied with his medication but not exercise or practice during therapy while the younger would gladly go for both. Sooner than later the younger was on his feet and the older man was still in bed. These are two extreme ages, with different motivational values, different situation surrounding the stroke, family support, emotional control, and patients' perception of the event could all be interacting in this story.

What if these three -emotional regulation, suicide ideation and age-are interplaying in the above report given on the two stroke patients? How relevant is this to our practice and study as Health Care workers? Through this study, we can find the predictive power of emotional regulation, suicide ideation and age on the stroke patient's involvement in the rehabilitation regime.

### **Purpose of the Study**

The study sought to examine what relationship exists between emotional regulation, suicide ideation and age. It assesses whether these variables interact to influence the involvement of stroke patients in their rehabilitation regime designed for them. The study focuses on patients at 37 Military Hospital, Accra Physiotherapy Centre and Brook Rehabilitation Centre.

### **Research Objectives**

The study sought to;

1. Investigate the effects of emotional regulation, suicide ideation and age on involvement in post stroke rehabilitation.
2. Find out the indirect effect of emotional regulation and suicidal ideations on involvement in post stroke rehabilitation.
3. Investigate the interacting effect of age on the relationship between emotional regulation and involvement in post stroke rehabilitation.

### **Research Hypotheses**

1.  $H_0$ : There will be no statistically significant relationship between emotional regulation and suicidal ideations  
 $H_1$ : There will be a statistically significant relationship between emotional regulation and suicidal ideations.

2.  $H_0$ : There will be no statistically significant relationship between emotional regulation and involvement in post stroke rehabilitation.

$H_1$ : There will be a statistically significant relationship between emotional regulation and involvement in post stroke rehabilitation

3.  $H_0$ : There will be no statistically significant relationship between suicidal ideations and involvement in post stroke rehabilitation.

$H_1$ : There will be a statistically significant relationship between suicidal ideations and involvement in post stroke rehabilitation.

4.  $H_0$ : Emotional Regulation will not significantly mediate the relationship between emotional regulation and involvement in post stroke rehabilitation.

$H_1$ : Emotional Regulation will significantly mediate the relationship between suicidal ideations and involvement in post stroke rehabilitation.

5.  $H_0$ : Age will not significantly moderate the relationship between emotional regulation and involvement in post stroke rehabilitation.

$H_1$ : Age will significantly moderate the relationship between emotional regulation and involvement in post stroke rehabilitation.

### **Significance of the Study**

Globally, the goal for human health by the United Nations is sustainability of health and reduction of mortality. The Sustainable Development Goals call on all health care practitioners to find ways of sustaining and reducing mortality. Therefore, it is very important to take into account and, if possible, curb all factors which would affect an intervening process like the rehabilitation regime. The knowledge from this study would be contributing to

the aim of maintaining health. Thus, it will provide further knowledge on how factors like emotional regulation and suicide is influencing rehabilitation.

On the national level, the National Policy for the Prevention and Control of Chronic Non-Communicable Diseases in Ghana may benefit from the knowledge of this study. It may provide the policy makers with information on some other variables that may affect the control of the number of high burdensome stroke-related disabilities. By this, they can know what areas to focus on during the prevention and control process.

The knowledge from this study would benefit the Ghana health service by providing them with more knowledge about the stroke condition and give information on what stroke patients need. It may help the service put in place policies or strategies which will meet the needs of the stroke patients with disability. Also, it may suggest to them the urgency and the need for specialist in the management of stroke survivors.

Reducing the degree of disability would also mean reducing the number of stroke patients with extreme burdensome disability. More stroke patients would return to work and make some income for themselves and their family. They may once again be counted as part of the human resource available to our beloved country, Ghana. Some patients may recover fully and earn back their lives, reducing the distress among family members and community.

The findings from this study would inform stroke survivors about the alternative medical services available to them for recovery. They get to find out the other factors they need to focus on during their rehabilitation regime and factors which may or may not affect their rehabilitation regime but would be important for their survival.

Also, the knowledge from these findings would contribute a great deal to the collaborative work between the stroke patients and their rehabilitation therapists. Going forward, both the patient and the therapist would come to understand the factors which may or may not affect the aim of rehabilitation. Practitioners would become aware of some other causes of poor involvement in post stroke rehabilitation among some stroke patients.

This would further improve collaborative work among health care practitioners in Ghana. Physical therapists may come to realize the dying and inevitable need for a psychologist or other therapists during the patient's rehabilitation. Through this, the Bio psychosocial Model would be realized in our healthcare system. The knowledge and the interventions which are suggested will reduce the degree of disability among stroke survivors, hence, reducing the number of stroke patients with extreme burdensome disability.

### **Delimitation**

Data for the study is from the Accra metropolis specifically 37 Military hospital, Accra Physiotherapy and Brook rehabilitation centre. These hospitals have a physiotherapy rehabilitation centre. Participants selected have been diagnosed with stroke and are in the chronic stage of stroke (thus between three months and 18 months), and are patients on out-patient treatment who have a physiotherapist. Stroke is selected because it is the third leading cause of CVA mortality and disability (Sarfo, Acheampong, Oparebea, Akpalu & Bedu-Addo, 2014). The participant must not be clinically depressed. This is because patients who are depressed are already experiencing difficulty in emotional regulation and may be having suicidal ideations (Gratz and Roemer, 2004). This study was interested in the group of stroke patients who are not

depressed because it is easy to overlook this group of patients. Also, variables of interest are delimited to emotional regulation, suicide ideation, age and involvement in rehabilitation.

### **Limitation of the Study**

The limitation of the study focuses on the various variables and situations which restricted the study and may have affected the results.

Results from the quantitative research approach are limited as they provide numerical descriptions rather than detailed narrative. Generally, it provides less elaborate accounts of human perception. It does not help in get more information on how the participants feel or on what they think about emotional regulation, suicide and involvement in post stroke rehabilitation.

For most of the stroke patients, the research assistants had to read the questions out to them and tick for them because they have their right hand disabled and requested it so the process could be faster. Due this process, some of the patients were not familiar with some of the words in the questionnaire so it had to be translated verbally into their local dilate for proper understanding. For those with no formal education, the questionnaires had to be translated verbally during data collection. This may have altered the meaning of the statement in the questionnaire. Hence, the participant may not have understood the questions the way it ought to and this may alter their rating on emotional regulation and suicide ideations.

The number of participants the researcher was able to reach was quite small. This could affect the results of the study. Therefore, caution must be taken when make inferential interpretation to the data and results in the study.

## **Definition of Terms**

**Stroke:** cardiovascular condition which causes a global or focal lesion of brain cells.

**Rehabilitation:** the intensive physical training Stroke Patients go through at the hospital facility.

**Involvement:** The Stroke Patient's willingness and activeness to participate in the recommended exercises.

**Emotional Regulation:** the ability to harness emotions during a distressing situation.

**Suicidal Ideations:** the thoughts and desire for death.

## **Organization of the Study**

The study is divided into five chapters. Chapter one introduces the reader to the study, states the aim and hypothesis of the study, gives the inclusion and exclusion criteria, and the limitation the study faced during the process of research. Chapter two introduces the theories used to explain the hypothesis of the study and explains the concepts of the variables in the study. It presents a conceptual framework of the hypothesis and concepts under study. It also shows some related studies to the stated hypothesis. Chapter three gives an account of the method and design used for the study, and describes the characteristics of the population and the sample of the study. The tools and procedure used in collecting the data are also discussed in this chapter. Chapter four presents the analysis of the data and the discussions on the results. In chapter five, the study draws conclusion from the results, gives recommendations and suggests areas for further studies.



## CHAPTER TWO

### LITERATURE REVIEW

#### Introduction

This study investigates suicidal ideations and emotional regulation as predictors of involvement in post stroke rehabilitation. It also investigates the moderating effect of age on emotional regulation and involvement in post stroke rehabilitation. The current chapter presents the theories, explanation of the concepts under study and literature which helps explain the problem and how the variables may be relating. It provides a conceptual framework and some evidence to show and support the possible existence or non-existence of this relationship in our world.

#### Conceptual Review

1. Stroke.
2. Stroke and Rehabilitation.
3. Involvement in Post Stroke Rehabilitation.
4. Emotional Regulation.
5. Suicidal Ideations.
6. Conceptual Framework.

#### Theoretical Review

1. The Process model.
2. The Interpersonal Theory of Suicide.

#### Empirical Review

1. Emotional regulation and involvement in rehabilitation.

2. Suicidal ideation and involvement in rehabilitation.
3. Age and Involvement in Rehabilitation.
4. Relationship between Emotional Regulation, Suicidal Ideations, Age and Involvement in Rehabilitation.

## Conceptual Review

### Stroke

The brain is the common area where stroke occurs. In order to understand the medical condition called stroke and the effect it has on a person, we must first understand the brain and how it functions. The brain is an organ found in the skull. It is the ‘central processing system’ of the body. It facilitates thinking, planning, problem solving, judgement, our ability to remember past and present events, learning, regulation of emotions and breathing, motor skills, eating, talking and hearing. Basically, it is vital for the survival of the human being. The brain is divided into parts: the brainstem, the cerebellum, the limbic system and the cerebrum. Also, the brain has blood vessels called Arteries which supply oxygen to the brain. These Arteries are positioned strategically to supply blood to all parts of the brain. With the supply of blood to the brain, there is maximum functioning of the brain. (Alrabghi *et al.*,2018; Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013; Paolucci *et al.*, 2000; Neaton *et al.*, 1993; Williams, Jiang, Matchar, & Samsa, 1999). The brainstem is responsible for breathing, sleeping, heart rate, blood pressure, swallowing and consciousness. The brainstem also links the brain to the other parts of the body, sending and receiving messages needed for the functioning of the body. The cerebellum, which can be said to be positioned between the brainstem and

the cerebrum, is responsible for muscle coordination and motor functioning. Thus, the cerebellum is responsible for the fine and gross motor movement, and the balance of the body. Looking on, there is the limbic system. This system is responsible for memory, motivation, emotions and learning. Finally, the cerebrum, this is the upper part of the brain structure. It is divided into two hemispheres- the left hemisphere and the right hemisphere. (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Neaton *et al.*, 1993). The left hemisphere controls the right side of the body and the right hemisphere controls the left side of the body. The two hemispheres are connected to each other through a network of fibres called the corpus callosum. The corpus callosum aids the communication between the hemispheres such that when one hemisphere is not functioning as it should the other may take up the role.

Each hemisphere is further divided into lobes. These are the frontal lobe, the occipital lobe, the temporal lobe and parietal lobe. The frontal lobe is responsible for executive functions like planning, decision making, problem solving, learning and judgement. The occipital lobe is primarily responsible for controlling vision and visual processing. The temporal lobe is primarily for language (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014). The temporal lobe on the left hemisphere has what is called the Wernicke's area and the Broca's area. The Wernicke's is responsible for language development and the use of language while the Broca's area is responsible for language production. The last but not least is the parietal lobe, which is responsible for sensation and perception. It also plays a role in integrating sensory input, primarily with the visual system (Fini, Holland, Keating, Simek

& Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013; Neaton *et al.*, 1993).

Stroke occurs when the arteries in the brain which carry oxygen break or are blocked by a clot of blood or a plaque. When this occurs, blood supply to the brain is interrupted, causing that part of the brain cell to function improperly or that part of the brain may die off. In the end, the brain does not perform the way it ought to function (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013;).

Depending on the part of the brain which is interrupted, the person will show certain psychological, behavioural or physical signs. For example, if there is a stroke in the arteries which supplies blood to the left hemisphere, the cerebellum and the limbic system, the victim is likely to have problems with speech, movement and memory (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013). The most common of the physical signs include the drooping of the side of the facial muscles, slurred speech, difficult or no movement of limbs- the patient reports feeling numb in the affected limbs, inability to lift the legs or hands, inability to speak, paralysis with weak muscles, twisted jaw difficulty walking, blurred vision, double vision, sudden visual loss, or temporary loss of vision in one eye, difficulty swallowing and headache (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013). The psychological aspects include depression, apathy, low motivation, irritability, confusion or feelings of anger and anxiety (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013). The mental aspects include problems with coordination, overactive reflexes,

fatigue, feeling light-headed, reduced sensation of touch, lack of insight, mental confusion, or rapid involuntary eye movement, forgetfulness and carelessness (Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013).

There are three main types of stroke. These include the transient ischemic attack (TIA), Ischemic stroke and haemorrhagic stroke. These three differ in the way they occur and how long they last. The Transient Ischemic Attack (TIA) occurs when there is a temporary break in the neurologic function of the brain due to a blockage by a clot in the arteries. This usually lasts less than an hour. Currently, there is a debate as to the exact definition of TIA (Alrabghi *et al.*, 2018; Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013; Paolucci *et al.*, 2000; Neaton *et al.*, 1993; Williams, Jiang, Matchar, & Samsa, 1999). In that the previous definition focused on the duration of TIA. It has been shown that victims who fall within the 24 hour definition show significant dysfunction in neurological activity which would lead to what is called the ischemic stroke. The TIA does not leave the victim with any form of disability but rather serves as a warning for future stroke. Research has shown that victims of the ischemic stroke reported experiencing the TIA maximum seven days before the stroke. With early interventions, stroke is most likely to be avoided (Reiffel, 2014; Manzanero, Santro & Arumugam, 2013). Ischemic stroke on the other hand is a type of stroke which causes infraction to the brain cells. Thus, whenever there is a blockage in the arteries and this event leads to the death of the surrounding brain tissues, then we can say an ischemic stroke has occurred in a person (Reiffel, 2014; Neaton *et al.*, 1993).

The haemorrhagic stroke is said to have occurred when any of the blood vessels in the brain breaks, causing injury in the brain. There is usually not an infraction of brain cells but rather the pool of blood puts pressure on the brain cells. This can also cause a significant level of neurocognitive dysfunction of the brain (Alrabghi *et al.*, 2018; Fini, Holland, Keating, Simek & Bernhardt, 2015; Reiffel, 2014; Manzanero, Santro & Arumugam, 2013; Paolucci *et al.*, 2000; Neaton *et al.*, 1993; Williams, Jiang, Matchar, & Samsa, 1999).

Except for transient ischemic attack, a victim of any of the types of stroke would experience a significant level of stroke related disability. This disability could be mild or severe and will require different degrees of rehabilitation (Neaton *et al.*, 1993).

#### ***Risk Factors and Prevalence of Stroke***

In Ghana, the traditional risk factors of stroke include hypertension, diabetes mellitus, hypercholesterolemia, raised body mass index, current smoking status, physical inactivity statuses (Sarfo *et al.*, 2014). Others include atheroma or spontaneous intracerebral haemorrhage, age, gender, eating habits, smoking, obesity, hypercholesterolemia, a previous Transient Ischemic Attack, and atrial fibrillation (Donnan, Fisher, Macleod & Davis, 2008).

The prevalence of stroke and some factors like socio-demographic factors, in Ghana, reveal that older people, aged 70-79 years, are more likely to have stroke as compared to those between 50 and 65 years (Sarfo *et al.*, 2014). Those who live in the urban areas were also more likely to have stroke as compared to those in the rural areas (Sarfo *et al.*, 2014). Also, stroke has shown to be high among the unmarried and does not show any difference in gender (Sarfo *et al.*, 2014). Bad lifestyle like being inactive or not exercising

has a positive correlation with stroke but alcohol use and drug use does not correlate with stroke (Sanuade, Dodoo, Koram & Aikins, 2019).

### **Stroke and Rehabilitation**

Rehabilitation is an intensive care designed to help patients recover lost skills and abilities (Alankus, Lazar, May & Kelleher, 2010). These abilities can be physical, mental or social. The ability may have been lost due to accidents, traumatic brain injury, stroke, drug abuse or chronic mental disorder. Physical activities and exercises the patient would go through helps them to perform and improve on daily functions (Alankus, Lazar, May & Kelleher, 2010; Lenze *et al.*, 2004). It is also designed to suit the need of the patient. For example, if a patient is suffering from cognitive deficit, broken skull, depression and slurred speech, the team is likely to consist of a neurosurgeon, a psychologist, nurses, an occupational therapist and a speech and language therapist (Alankus, Lazar, May & Kelleher, 2010; Lenze *et al.*, 2004). At the physiotherapy centre, stroke patients engage in exercises like climbing stairs, walking through obstacles, arm press, crumbling a Piece of Paper, Sitting Trunk Rotations, Supported Reaching and Grasping, Supported Mini Squats, Standing Hip Abduction, Sit to Stand, Dynamic Weight Shifts and Staggered Stance. These are exercises everybody can do but the difference is in the intensity of the activity.

Post stroke rehabilitation becomes important for the individual to relearn some basic functional skills for daily living. Some examples of these skills include: taking their bath, brushing their teeth, using the toilet, picking tiny and slim objects, relating with people, expressing emotions etc. Rehabilitation starts immediately after the patient is stable, up until the physiotherapist finds

that they have atrophied (reached the point where change to disability is impossible) (De Deyne, Hafer-Macko, Ivey, Ryan, & Macko, 2004). During this stage of atrophy, the patient has reached a 'chronic' phase and has to live with the new body they see whether it is close to normal or not (De Deyne, Hafer-Macko, Ivey, Ryan, & Macko, 2004). They are usually discharged at this stage because not much can be done to bring them to normal body figure so they are taught simple exercises which keep them functional and they are asked to visit the hospital twice or once a week for review (Maclean *et al.*, 2000). The discharged patients are treated on out-patient bases.

No matter the program (in-patient or out-patient) the patient is on, and the severity of the symptoms, they are required to see a specialist for their disability- a physiotherapist, for the speech impairment- a speech therapy and the medical doctor for their general medical checks (Gresham, Stason & Duncan, 2004). In Ghana, anecdotal evidence shows that only stroke patients exhibiting depression or anxiety (psychological distress) are referred to the psychologist. When a stroke patient is discharged, they start to think about the disability and try to come to terms with it.

This leaves the stroke patient with concerns about what their lives would be like. It is at this point, stroke patients begin to have compliances and adherences issues (Hamann, Weimar, Glahn, Busse, & Diener, 2003, Maclean *et al.*, 2000), their attendance go down, social and psychosocial issues set in and challenges caregiver become a concern for them. It is imperative for healthcare practitioner to consider the psychological aspects of the stroke patients' ability because stroke patients usually experience depression, apathy, low motivation, irritability, confusion or feelings of anger, anxiety, have



suicidal behaviours and difficult with handling their emotions due to the stroke being a chronic condition and the challenges they face after being discharged from the hospital (Alankus, Lazar, May & Kelleher, 2010).

### **Involvement in post stroke rehabilitation**

Involvement, Engagement and Participation are broader terms used interchangeably. They are used in various fields to mean different things. This study focuses on involvement as used in the field of physiotherapy and occupational therapy.

Generally, involvement is the act of being present and actively making meaningful learning, thinking through whatever activity is required to be performed and taking therapist recommendations and suggestions on rehabilitation seriously and into practice (Sahlsten, Larsson, Sjöström, & Plos, 2008). It also includes adherence to medication, complying to treatment, attending therapy. Many times, adherence and compliance are interpreted as involvement, but in the field of physiotherapy and occupational therapy and in rehabilitation, a person's need for verbal cues, a person's ability to see therapy as important, being willing to adhere or comply are all measured to give a total understanding of the patient's involvement in rehabilitation (Kortte, Falk, Castillo, Johnson-Greene & Wegener, 2007; Hamann, Weimar, Glahn, Busse, & Diener, 2003; Maclean *et al.*, 2000) whereas adherence to treatment looks at the attendance to therapy, the consistency of taking medication and practice of doctors' recommendations.

Physiotherapists of acute stroke patients identified that this group of patients hardly take an active role in the rehabilitation and this poses to be a great challenge for them. It is understood that, when acute stroke in-patients

get involved in rehabilitation activities, it influences the outcome of recovery and reduces the degree of disability of the patients (Lenze *et al.* 2004). However, there is conceptualization issues with this construct. What attitude a patient should show, to be described as getting involved is not well defined. Also, what patients see as involvement is different from what therapists see as involvement. It is therefore important to define involvement, measure it and find the factors that influence involvement (Maclean, Pound, Wolfe, & Rudd, 2000)

In defining and to measure involvement, Lenze *et al.* (2004) defined involvement in terms of participation. They defined participation as hours of practising exercises given to the patient, the efforts patients put into the exercise, the need for encouragement during the exercise period and finishing the exercises. These items were measured on 6 point likert scale: good, very good, excellent participation, fair, poor, or no participation. This allowed the researchers to measure the involvement of the patients during rehabilitation activities. The score of 1-3 meant the acute stroke inpatient has “poor” participation and a score of 4-6 meant “good” participation.

Maclean, Pound, Wolfe and Rudd (2002) in their effort to explore involvement in post stroke rehabilitation identified that professionals in the field of rehabilitation used “motivated” or “not motivated” as description for patients who were participating in the rehabilitation regime. Geelen and Soons (1996) also based participation on the assumption of motivation. Thus, the higher the patient’s motivation the more likely they are to participate in rehabilitation. In Maclean *et al.*’s study, they showed that by motivation the

professionals meant that the patient should be obedient and proactive when a rehabilitation activity is suggested to him/her.

This necessitated an operational definition for involvement since it seems to be multidimensional and a complex concept (Kortte *et al.*, 2007). For this cause, the published paper which introduced the involvement in rehabilitation rating scale introduced the word engagement. The Kortte *et al.*, 2007(p.878) defined engagement as “an interest in, and an intentional effort to, work toward rehabilitation.” As part of attendance- adherence, this term goes a step further to explain the perception and attitudes of patients to rehabilitation. It tells the importance of the patients’ level of knowledge, understanding of rehabilitation, the role of verbal prompts and the importance of the number of times they may need verbal prompts during acute rehabilitation. Kortte *et al.*, 2007 integrated the independent definitions of ‘motivation’, adherence and participation forming the definition of engagement. To them, “Engagement in rehabilitation therapy may be defined as an interest in, and an intentional effort to, work toward the rehabilitation goals” (Kortte *et al.*, 2007, p878).

They measured involvement in post rehabilitation on the following: “the level of attendance at therapy sessions, the attitude expressed by the patient toward his/her therapy, the need for verbal or physical prompts to facilitate initiation or maintenance of engagement within the therapy session, the patient’s acknowledgment of the need for therapy, and the patient’s level of active participation in the therapy” (Kortte *et al.*, 2007, p 878). This was rated on a 6-point Likert scale, where one is “never” and six is “always”.

A critical look at the studies done on involvement shows that to better explain the full concept of involvement in post stroke rehabilitation it must

include measuring their attendances, attitude, their need for cues and their active participation would be most appropriate. This study would focus on Kortte *et al.*, (2017) definition of involvement and would use the Hopkins Rehabilitation Engagement Scale (HRES) as measure for involvement in post stroke rehabilitation.

With that been said, all things being equal, involvement would require a person to be at some level of sound mind and determined to be present and active. Indeed, Rehabilitation is a program which needs collaborative work between the patient and the doctor to make it more effective (Skidmore *et al.*, 2010). Often, the neurology defects and some social issues make it difficult for the stroke patient to participate fully in rehabilitation (Maclean *et al.*, 2002). They may lose concentration along the way: the overwhelming feeling of the event of stroke may be playing a role, depression may set in, psychosocial problems on the part of the stroke patient may be a challenge, difficulty in movements may make it a bit overwhelming for them, problems at home, relationship with doctors and facilities or resources available for rehabilitation among others are all examples of the confounding variables of participation in rehabilitation program (Skidmore *et al.*, 2010; Maclean, Pound, Wolfe, & Rudd, 2000). However, some other reported factors which have been identified to affect the involvement include: clinical factors, personality, culture, family, rehabilitation environment, professional behaviour, cognitive impairment due to infraction, depression and poor executive function (Maclean *et al.*, 2002).

## Emotional regulations

There is no general definition for emotions however they are described as conscious mental experiences, which elicit complex cognitive processes and are directed towards someone or something (LeDoux, & Brown, 2017). They can be pleasurable or not pleasurable. It has strong biological bases with links to the subcortical part of the brain, for instance, the hippocampus and the amygdala. The interactions of these complex cognitive processes and the biological bases of emotions usually cause a change in the biological and behavioural state of an individual experiencing an emotion (LeDoux, & Brown, 2017). Some components of emotions include a subjective experience, cognitive processing and behavioural changes. Feelings of fear, anger, happiness, passion, love, apathy, laziness, jealousy are all examples of emotions.

Emotions, since the creation of man, has been of help to the human race as well as a source of distraction. Emotions have contributed to what is called the flight-and-fight systems which alerts and cautions an organism of a pending or unexpected danger (Steimer, 2002). It is very useful for communication of one's thought in a way that cannot be explained by words. It helps a person to communicate exactly how they are thinking in ways that make the second person understand their views and concerns (Lindquist, MacCormack & Shablack, 2015). Sometimes, it manifests itself in the form of motivation, which is a strong source of getting humans to be productive. Again, it helps us express what we like or dislike and what we desire. Also, it plays a role in our decision to take part in an activity and/or to socialize. To Charles Darwin

(1965, p.347), “The movements of expression in the face . . . are in themselves of much importance for our welfare”.

Emotions can also cause harm to an individual or the people around them. Excessive negative emotion affects our immune system by preventing it from working effectively (Seegerstrom, & Miller, 2004). It may equally stop people from participating in any activity or socializing. It may lead to suicidal ideations or suicide attempts (O’Keefe *et al*, 2014). Consequently, it may lead to mental health problems (Cole, Michel & Teti, 1994).

Managing emotions and handling it in a way that will not affect others has been one of the major concerns of man (Serrat, 2017). Day in day out people are advised to be expressive of what they think and how they feel in an effective and harmless way. Research in coping, self-regulation, emotional regulation and difficulty in emotional regulation has tried to help with this particular construct. Interventions like mindfulness, yoga and other psychosocial therapies have being designed to handle or manage emotions (Gross, 2013). Several fields like the developmental, biological, social and health psychology have conducted many studies into emotions. In relation to stroke, health psychologists have identified some significant effects of emotion on the health and recovery of the stroke patient (Ostir, Berges, Ottenbacher, Graham, & Ottenbacher, 2008).

One way that has been found to be effective for managing emotions is emotional regulation. This is an emerging field of study; however, significant evidence has shown that it has influence on various emotions and behaviours. Miller *et al*. (2017)’s study on the neuronal effect of emotional regulation gives some significant confidence that emotional regulation is an effective

way of managing emotions to affect health of individuals. In their experimental study, when participants applied the emotional regulation strategies, their cortex area responsible for judgement and emotions was activated and influenced the way they were feeling at the time of the experiment.

Cole, Michel and Teti (1994, p76) define Emotional regulation as “the ability to respond to the ongoing demands of experience with the range of emotions in a manner that is socially tolerable and sufficiently flexible to permit spontaneous reactions as well as the ability to delay spontaneous reactions as needed”. Gross (1998, p 274) also defines emotional regulation “as the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions”.

The scope of emotional regulation covers emotional expression, behaviour control, emotion elimination, emotion modification. Many arguments have gone into comparing control, elimination and modification with the aim of establishing their effectiveness for emotional regulation (Gross & Munoz, 1995). Most researchers in the field, subscribe to the use of control of emotions and behaviour instead of elimination of emotions and behaviour. This is because empirical studies suggest that elimination leads to both physical and mental health problems (Cole, Michel & Teti, 1994; Gross & Munoz, 1995).

Grazts and Roemer (2004) also suggested another way of thinking and conceptualising emotional regulation. They developed the difficulty in emotional regulation scale with the aim of presenting a construct which is well defined and well-structured or conceptualised. It also allows us to look at the

negative side of emotional regulation. Their school of thought believes that the functional property of emotions is more useful than the control property of emotions. In using the functional property of emotions, a person is able to regulate and modulate their emotions (Thompson, 1994). While in the use of the control property of emotions, a person would try to stop the continuous flow of emotions or change the discrete negative thoughts and feeling they are experiencing (Grazts and Roemer (2004; Garner & Spears, 2000). This school of thought believes that emotional regulation is not equal to emotional control (Grazts & Roemer, 2004).

Grazts and Roemer (2004) define emotional regulation on the basis of becoming aware of emotions, accepting emotions, controlling impulsive behaviours and behaving in line with desired goals when experiencing negative emotions, and using emotions and emotional regulation strategies which fit a given situation (This should be done in such a way that the individuals are able to reach their set goals). “The relative absence of any or all of these abilities would indicate the presence of difficulties in emotion regulation, or emotion dysregulation” (Grazts & Roemer, 2004). This led to the development of the Difficulty in Emotional Regulation Scale. It measures difficulty in emotional regulation on six levels.

Emotional regulation covers both negative and positive emotions (Gross, 1998). Thus, both positive and negative emotions may be regulated, and both emotion expression and experience may be targeted for modulation. In the emotional regulation process, individuals learn to pay particular attention to their emotional expression and how to harness their behaviour in order to



avoid the excessive arousal of the central nervous system (Gratz & Roemer, 2004; Gross, 1998).

Researchers interested in emotional regulation have further considered emotional regulation in the context of a present situation (Gratz & Roemer, 2004; Thompson & Calkins, 1996; Thompson, 1994). Emotional regulation is properly observed when it is used in the situation that triggers the negative or positive emotions. This is important because it is in the moment that a person experiencing a said emotion, would be required to use a particular emotional regulation strategy (Thompson & Calkins, 1996; Thompson, 1994). The selected strategy must produce a behavioural outcome which fits the situation in question (Cole, Michel & Teti, 1994).

The concept of goal setting is also found in emotional regulation. When a goal is set, certain directives are stated in the plan and many challenges are bound to happen during the implementation of the goal. In the midst of the challenges, the emotional regulation strategy which would be selected should produce a behaviour appropriate for the situation and also it should help the person follow through with the goals they have set (Melnick & Hinshaw, 2000; Linehan, 1993).

Emotional regulation is a useful tool when used appropriately and at the right time. It appreciates both positive and negative emotions and gives directions as to how best a person can manage their emotions for effective living. In emotional expression and experience control, individuals become aware of their emotions and accept their emotions. They become aware of how they are feeling and which emotions they are experiencing. With this, it is suggested that they will not act on impulse; they would choose appropriate

emotional regulation strategies and set good goals or follow through goals, depending on the context in which they find themselves. Difficulty in using these emotional controlling approaches is what is termed difficulty in emotional regulation (Grazts & Roemer, 2004). The study focuses on the difficulty in emotional regulation and measures the level of difficulty each stroke patients has on the dimensions of emotional regulation.

Difficulty in emotional regulation has been found to be presence among patients with many health challenges. For example, depression, borderline personality disorder, management of chronic conditions including stroke and among persons with suicide behaviours. Gratzs and Romeas (2004) believes that for every stroke patient experiencing an emotional distress there is a high probability that they have difficulty regulating their emotions. Gross (1998) further explains that, for persons who have suicidal tendency, there is a high probability of them experiencing emotional regulation difficulty.

### **Suicidal Ideations**

The word suicide is a combination of two Latin words *Sui* which means “of oneself”) and *Cidium* means “slaying”) (Obasola & Omomia, 2014). The term was well defined after Emile Durkheim published his word titled “Le suicide”. Today, the basic definition for Suicide is the act of causing one’s own death, usually with the aim of relieving oneself from something which is causing pain (Obasola & Omomia, 2014). Some common words in the field of suicide are fatal suicide, attempted suicide, planned suicide, suicidal ideations, assisted suicide, and murder-suicide.

### *Risk factors and prevalence of Stroke*

Many risk factors or reasons why people kill themselves have been identified among stroke patients and healthy people. These include: chronic physical illness, age, and marital status, level of education, poverty, spiritual reason, shame, psychosocial reasons, faith crisis, stigma, social exclusion, perceived infidelity, social taunting, betrayal, financial problems, neglect, existential crisis, mental illness, and previous attempt and self-harm, substance use and feelings of hopelessness (Teasdale & Engberg, 2001).

Generally, suicide kills more lot people a day. Men succeed in the process more than women. Some studies have shown that stroke patients are at double risk of committing suicide (Eriksson, Glader, Norrving & Asplund, 2015; Forsström, Hakko, Nordström, Räsänen, & Mainio, 2010). In Sweden alone, Eriksson, Glader, Norrving & Asplund, 2015 found there were 1,217 suicide attempts, of which 260 were fatal. It is reported that stroke patients who are young are more likely to commit suicide as compared to older people. It is interesting to know that, in both cases, the desire for suicide declines with time, approximately after two years (Eriksson, Glader, Norrving & Asplund, 2015; Teasdale & Engberg, 2001). Whether, fleeting thought, Extensive thoughts and detailed planning, the problem with suicidal ideations is that it puts a person at risk of suicide.

Suicidal ideation (or suicidal thought) is thought about, contemplating, or planning suicide. It is not a diagnosis of DSM-5, but rather a symptom of many psychiatric illnesses (American Psychiatric Association, 2013). This is the definition proposed for the purpose of this study. It varies from role-playing, fleeting thinking to thorough preparation. Most people who have

suicidal thoughts do not attempt suicide but suicidal thoughts are considered a risk factor for suicide (Uddin, Burton, Maple, Khan, & Khan, 2019; Klonsky, May, & Saffer, 2016). Suicide ideation is commonly associated with depression and other mood disorders; however, it tends to be associated with many other life events, such as strokes and family events. All of which may raise the likelihood of suicidal ideation. On the opposite, some patients are not clinically depressed, but have thoughts and urges to end their lives (due to a sense of hopelessness) (Uddin, *et al.*, 2019; Klonsky, May, & Saffer, 2016).

According to Durkheim (1951), there are four ways by which the thoughts of suicide start. First is the egoistic suicide- Individuals take their life because they feel lonely or are actually alone. In this type of suicide, the person has a low social interaction with others. In Altruistic suicide, the person is too involved in a social group e.g. religious cult, shows high commitment to the group to the point of giving his/her life for it. Anomic suicide relates to having a low ability to manage or regulate oneself or emotions during a distress or frustration. Fatalistic suicide is when people feel high expectation to the extent that they lose themselves or they cannot answer the question, who am I?

A person with a desire to die would consider the thoughts of suicide. Suicidal ideations can be temporary but when nurtured, it can put a person at risk of attempting suicide (Cassidy, O'Connor, & O'Keane, 2004). Among stroke patients, drug overdose, jumping, cutting and hanging are the common ways for committing suicide (Chang, Chen, Liu, & Tsai, 2018; Eriksson, Glader, Norrving & Asplund, 2015; Forsström, Hakko, Nordström, Räsänen, & Mainio, 2010).

Recently, more effort is being put into suicide prevention. Many interventions have been developed for the prevention of suicide. These interventions are protective measures (Eriksson, Glader, Norrving & Asplund, 2015; Teasdale & Engberg, 2001). Protective generally means that once people involve themselves in these measures, they are less likely to practice suicidal behaviours. These treatment options for those experiencing suicidal ideation includes the development of emotional regulation skills, social participation, engaging in physical activity, being accountable to someone, having social support and constant check up on the patient by the hospital. The main focus of these programs and activities is to make them know they belong, while others like the physical exercises allow the body to produce natural chemicals which make them happy (Hallgren *et al.*, 2016).

These interventions like psychical activity are designed for patients to engage them (Hallgren *et al.*, 2016; Lester, 2013) and it exhibited effectiveness on the patients with suicidal tendencies. From Vancampfort *et al.*,(2018) systematic review, Fourteen of 21 studies in adults, in adolescents and in older adults found a significant negative association between Physical activities and Suicidal Ideations levels. Thus, those who were “active” versus those who were “inactive” were less likely to have Suicidal ideations. Additionally, Physical activity guidelines conferred a significant protective effect against Suicidal Ideations while not meeting guidelines was associated with increased Suicidal Ideations. According to Simon, Powell, & Swann (2004) the intensity of the physical activities does not play a role in this relationship. Interestingly, some of these physical activities performed by the suicidal patients can be found in the rehabilitation regime of the stroke patients

(Kortte *et al.*,2007) On the contrary, some stroke patients still have the desire or plan to commit suicide even though they are taking physical exercises or physical therapy during their rehabilitation regime.

The emergence of emotional regulation studies has also shown how effective emotional regulation is on suicide behaviours. Suicidal behaviours are found to be related to emotional distress and it is usually a symptom of depression (Gliatto & Rai, 1999). Persons who are able to control their thoughts and desire do not end their lives are believed to have developed some coping mechanisms of which emotional regulation is an example (Miller *et al.*, 2017; Neacsiu, Fang, Rodriguez & Rosenthal 2018; Onig & Thompson, 2018). Hence patients with suicidal thoughts and behaviours are taught these skills for prevention.

Before the patients are taught these effective emotional regulation strategies, Patients who have suicidal behaviours and are measured on the difficulty in emotional regulation scale show some difficulty with emotional regulation and on different dimensions of emotional regulation. the MRI studies of patients with suicidal thoughts show that the significant area responsible for emotional regulation are not activated during the process of study. Persons who have suicidal ideations would hardly active these areas until they are told to regulate their emotions (Miller *et al.*, 2017). In essence, stroke patients who have suicidal ideations may also have difficulty with emotions regulation (Cooper *et. al.*,2019). Much attention is given to the emotional regulation being an effective tool in managing suicidal behaviour but very little is said about the relationship suicide ideations may have on difficulty with emotional regulation.

As much as it is important, they do not follow through with it (put a paper). Adherence as used by suicidal patient professionals refers to being dedicated to the therapy process and being an active participant in a collaborative partnership to work to improve one's condition with a therapist (Stanley, & Brown, 2012; Lizardi, & Stanley, 2010; Cedereke, Monti, & Öjehagen, 2002; Spooren, Van Heeringen, & Jannes, 1998; Donaldson, Spirito, Arrigan, & Aspel, 1997; Rotheram-Borus, Piacentini, Miller, Graae, Dunne, & Cantwell, 1996; Van Heeringen, *et al.*, 1995). It is measured in two ways: first, the attendance of the patient at his or her first scheduled outpatient appointment, and second, the cumulative number of sessions attended by the patient (Stanley, & Brown, 2012; Lizardi, & Stanley, 2010; Cedereke, Monti, & Öjehagen, 2002; Spooren, Van Heeringen, & Jannes, 1998; Donaldson, Spirito, Arrigan, & Aspel, 1997). It includes consistency with medication, appointment and self-practice of interventions put in place for them. While Spooren, Van Heeringen, & Jannes, (1998) thinks that the issue was incentive to attend treatment, the caregivers of the patients believe that non-adherence with treatment is often due to internal variables such as lack of insight or ignorance of their psychiatric disease (Granboulan, Roudot-Thoraval, Lemerle, & Alvin, 2001). This is of great concern to their physician because a considerable number of those who do not adhere to the treatment end up killing themselves (Boone & Brausch, 2016; Eriksson, Glader, Norrving, & Asplund, 2015).

### **Theoretical framework**

Theoretical framework introduces and explores theories which enable us to explain the variables under investigation and why they exist. The theories used

in explaining the problems under investigation include the process model (Gross, 1998) and the interpersonal theory of suicide (Van Orden *et al.*, 2010).

### **The process model**

The effect of emotions is evident in our world, to the extent that it affects our health and how we react to situations and people around us (Zadra & Clore, 2011). Over the years, many theories and ways of managing emotions have been developed and proposed to explain emotions because of the role emotions play in the life of the human race. What we should do with emotions and how we should manage it, is answered differently in various cultures.

In the 1600 up onto the 1900, philosophers debated how emotions should be handled. To Descartes (as cited by Gross, 1998, p271), “The principal use of prudence or self-control is that it teaches us to be masters of our passions.” Hsun Tzu (as cited in Gross, 1998. P 271) also stated, “To yield to man's emotions will assuredly lead to strife and disorderliness it is only under the influence of teachers and laws . . . that courtesy will be observed, etiquette respected, and order restored”

In 1998, James Gross studied emotions and proposed a model he believed best explains the construct. He named it the Process Model. The process model of emotion regulation attempts to explain the mechanisms of emotions, how it is expressed and experienced and how we can manage and harness it to our benefit (Gross, 2013).

The process model uses the Process-Oriented Approach. James Gross indicated that using the process oriented model would help the researcher and practitioners consider what happens at every step of the emotion generation to emotion regulation (Gross, 1998a). This, to him, is far more productive than



using any other approach like just listing what people do to regulate their emotions or only focusing on just the experience, expression or physiological part of emotion (Gross, 1998a). Using the process-oriented approach takes a full conceptual analysis of the mechanisms underpinning all acts of emotional regulation. In the examination of response tendencies, the framework looks at emotion through an evaluation point and the impact of emotional regulation act at every point in the process (Gross, 1998a). It gives a broader view of causes, consequences, and underlying mechanisms of action.

He explains that the process-oriented approach gives a descriptive, prescriptive and exploratory view to the concepts (Gross, 1998a). Descriptive view of the process model means the model lays down what actually happens during emotional regulation and takes the point of view of an observer on how emotional regulation is performed by the one being observed (Gross, 1998a). On prescriptive, the process is designed to determine how emotional regulation should or could be practiced. It also creates flexible rules and behaviour patterns which would help bring out an effective and socially accepted emotional or behavioural response (Gross, 1998a). Explanatory includes giving explanation about the process, examining the course of the actions based on reasonable arguments, linking it to the process involved in emotional regulation and giving definitions to these concepts (Gross, 1998a). In short,

“the process-oriented approach may bring us closer to understanding the causes, consequences, and underlying mechanisms than the other two approaches.” (Gross 1998a, p. 281)

The theory assumes that everyone has an inner drive to reduce negative emotions and sustain positive emotions (Gross, 1998a). To do this, it is important to understand how emotion generates and ends. According to the process model, the assessment of a cue is the beginning of the generation of emotion. These cues could be internal or external cues. Examples of internal cues include memory of an object which elicits a particular emotion and/or the perception about a particular thing and withdrawal symptoms (Otto, O'Leirigh & Pollack, 2007). Examples of external cues include something someone says, a friend's actions, the way things are done at work (anything in the environment can be an external cue depending on the person in question who is experiencing the emotion)

Based on the results of the assessment of the cues, the individual could show a behavioural, experiential or physiological emotional regulation trends or responses (Gross, 1998a). This is aimed at facilitating an adoptive response to the challenges or the opportunities confronting the individual (Gross, 1998a). Again, this behavioural, experiential or physiological emotional regulation responses could be modulated to give a different shape to the emotional regulation response (Gross, 1998a).

Gross explains that the emotional regulation response comes in two forms: the antecedent-focused emotional regulation and the response-focused emotional regulation (Gross, 1998a; Gross, 1998b). On the antecedent-focused emotional regulation, the individual, during his/her initial assessment of the cues, challenge or opportunity modulates emotion before the emotional regulation response generates. On the other hand, in case the individual

modulates the emotions after emotional regulation trends or response then the individual is using the response-focused emotional regulation (Gross, 1998b).

Furthermore, Gross (1998a) gives five dimensions in this emotional generation process that gives way to the explanation of the changing and recursive nature of emotions and its effect on the physiological, affective and behavioural system. Thus, between the times an individual would notice a cue and show a behavioural, experiential or physiological response, these dimensions would take place intrinsically (Gross, 1998a). These five dimensions are situation selection, situation modification, attention deployment, cognition changing and responses modulation.

Gross (2013, p. 360) states, “This information-processing model treats each step in the emotion-generative process as a potential target for regulation ..... According to the process model, different forms of emotion regulation should have different consequences.”

### ***Situation selection***

Selecting a situation has at its foundation, avoiding or approaching a situation which would either reduce an unpleasant emotion or increase a pleasant emotion respectively (Gross, 1998a). To know why people select a particular situation, it is important to appreciate the parts of the situation that elicits an emotion in people and what an individual may consider as entertaining. Situation selection assumes that the individuals have knowledge of themselves and the situation (Gross, 1998a). In his explanation, knowledge of self or who one is and how one reacts to situations help the individual to understand what makes them emotional and which action they need to take to reduce or increase the effect of their emotions. Also, it helps the individual

make choices that have a long term positive effect. Knowledge on situation suggests that the individual understands the complexity of the situation, the dynamic nature of the situation and the emotional effects the situation is likely to have on them (Gross, 1998a). The dynamic nature explores how changeable or flexible the situation is while the complexity has to do with how many options there are with a particular situation (Gross, 1998a).

### *Situation modification*

Situation modification focuses on how the individual changes a selected situation in such a way that it changes the emotional effect. Thus, the individual tries to find a way to change the situation, just so the emotional experience can change. The flexibility of the situation is key in situation modification (Gross, 1998a). Is the situation changeable, what can I do to make this better? These are some basic questions which can lead to situation modification. This is an important part of the emotional regulation process because it causes emotional regulation to take place. As people think of how flexible a situation, it is more likely for them to find different approaches of dealing with the same situation. This may lead to the next dimension of emotional regulation.

### *Attention deployment*

This point of emotional regulation is to emphasise how the individuals will take their mind off or focus on an emotionally eliciting situation. It also dives into what they will choose to do after their focus has been changed or maintained on a particular situation (Gross, 1998a). Attention deployment comes in three forms: Distractions, Rumination and Concentration;

In Distraction, the person would usually take their minds off the situation that elicit a negative emotion in them. This may be temporal but helps reduce the effect and the pain the person may be feeling (Gross, 1998). Here, a person may use avoidance coping mechanisms.

During rumination, the individual is most likely to focus on the feelings and the consequence they may have for feeling the way they are feeling (Gross, 1998a).

Under concentration, an example of attention deployment, the individuals shifts their attention to a situation that may have nothing to do with the current situation which elicits a negative emotion in them to something positive and fulfilling (Gross, 1998a). Gross postulates this type of attention deployment may lead to transcendence or finding meaning in life. An individual who uses concentration unsuccessfully, may concentrate on situations that make them lose meaning in life. Loss of meaning in life may develop into suicidal ideations (Csikszentimihalyi, 1975).

### ***Cognitive Change***

Every emotion and/or emotion eliciting situation comes with a perception and its meaning (Cole *et al.*, 1994; Gross, 1998a). Thus, with every emotion and in every situation which is attended to, the individual would evaluate the situation. This evaluation may come in steps, even sometimes may happen unnoticed (Gross, 1998a). The evaluation of a selected situation or yet to be selected situation may be changed or 'modified'. This modification is what Gross refers to as cognitive change (Gross, 1998a). Some examples include: reappraisal, denial, isolation, intellectualization and cognitive reframing to mention a few. To Gross, these cognitive ways of evaluation greatly affect

people's way of regulating their emotions. It may also determine the behavioural and experiential response they would produce.

### ***Response Modulation***

As attention deployment may be the first to show up in the emotional regulation process, response modification is the late to show up (Gross, 1998a). In response modification, the individual attempts to change the physiological, experience and behaviours of the emotion that has already been elicited due to a particular situation in question (Gross, 1998a). People usually use techniques like exercise (Cairney, Kwan, Veldhuizen & Faulkner, 2014), relaxation (Armstrong, Best, & Domenici, 2009), suicide or even drugs (Sher, 2006) to curb the negative emotions they are feeling.

### **Review and Relevance of the theory**

This study aims at finding the relationship that exists between emotional regulation, suicidal ideations and involvement in post stroke rehabilitation. These variables have in common some elements of emotional and behavioural expression and/ or experience. It is important therefore to find a theory that would give some form of directional explanation to the study.

From the process model theory, these behavioural and emotional experiences are responses which may stem out from the 'process' the individual uses to manage their emotions (Gross, 1998a). The major aim in this 'process' is to minimise negative emotions and increase positive emotions (Gross, 1998a). Inferring from the theory, at or after the event of stroke, a patient may start an 'emotional regulation process' which can produce a behavioural response of either involving in rehabilitation or avoiding rehabilitation all together.

The 'situation' that the stroke patients find themselves in, is unavoidable. Stroke is not a condition which has many options or 'situation' the stroke patient can choose from. Thus, the outcome of the event cannot be avoided but has to be accepted and worked on daily. On the brighter side, the stroke patient has the option of following through with rehabilitation and being positive as opposed to avoiding involvement in rehabilitation and staying negative (Lequerica, Donnell, & Tate, 2009).

The knowledge of the stroke patients on the importance of rehabilitation in their recovery can affect their attitude towards rehabilitation (a selected situation). Hence, they are more likely to regulate their emotions before or during the rehabilitation so it does not interrupt with the process (Lequerica, Donnell, & Tate, 2009).

As time passes, the stroke patients may get tired of attending rehabilitation especially when they do not see their expected change. The stroke patients would need to focus 'attention' on things which will not distract them from their rehabilitation and at the same time reduce the effect of the emotions (Gross, 1998a). As an example, a stroke patient may choose to do either of these:

1. He or she may choose to focus on the significant improvement they are experiencing instead of the severity of the disability which may never lead to normality. The use of distraction may be aimed at reducing, for instance, the pain of the thought that they may never be normal again.
2. The stroke patient may practice rumination. Thus, he or she may continuously focus on the pain and have a perceived consequence of

what might probably happen if they continue in the rehabilitation activity.

3. The patient may start a movement which would support fellow stroke patients with their hospital bills. This would be, looking beyond themselves and may help the stroke patient develop some meaning in life (Csikszentimihalyi, 1975)

Cognitive change gives an understanding on the importance of evaluation, in this case, evaluation of the stroke condition and the activities for recovery during this emotional regulation process. How stroke patients evaluate the stroke condition, the rehabilitation activities and the progress they see when they involve themselves in the activities may determine their behaviour toward involvement. They may use reappraisal or suppression in this process. These two are also significant to the physical recovery of the patients (Gross, 1998a)

Finally, in the case where the response is still negative, the stroke patient may try to find ways of getting these negative experiential feelings out of the way by modifying the behavioural or affective response. This may be by continuous reappraisal of the situation, by suppression or at the extreme, take the lethal stands of ending their life.

Gross (1998a)'s process model on emotional regulation compared to other models of emotional regulation does not give just a simple input and output system but gives an explanation of the multidimensional assessment and modulation process of emotional regulation. This is important because it gives a broad understanding of emotional regulation.

The process model helps us to explain the relationship that may exist between emotions, suicidal ideations and involvement in post stroke rehabilitation.



Thus the relationship is based on the assumption that the output of the emotional regulation process produces a physiological, behavioural and an experiential response. However, the theory only gives us a fair idea of how the variables in this study may be linked to each other.

### **The interpersonal theory of suicide**

The interpersonal theory of suicide was developed in 2010 by Kimberly A. Van Orden, Tracy K. Witte, Kelly C. Cukrowicz, Scott R. Braithwaite, Edward A. Selby, and Thomas E. Joiner Jr. Before the development of the theory, the suicide rate was reported by World Health Organization in 2008 as being approximately one million worldwide and 20 times more attempts of suicide. At the time, research had found two effective interventions for suicide (Fleischmann *et al.*, 2008; Motto & Bostrom, 2001), and one psychotherapy effective for suicide attempts (Linehan *et al.*, 2006). This gave rise to the concerns of developing a theory which would better explain suicide (Van Orden *et al.*, 2010). The aim was to develop a comprehensive explanation to suicide.

The interpersonal theory of suicide seeks to give a comprehensive explanation to why many people have suicidal ideations but very few attempt and still few succeed in killing themselves (Van Orden *et al.*, 2010). It also seeks to address the definitional issues of the construct called suicide. The theory suggests that, like many health threatening constructs, there are underlining risk factors that contribute to 'suicide behaviours' (Van Orden *et al.*, 2010). These risk factors include physical illness, social isolation and unemployment. It is important to note here that these risk factors are, also, some examples of words one would find in the stroke patients world. Thus,

stroke as a condition is a chronic physical illness (Bonita, & Beaglehole, 2007) which comes with some level of social isolation (O’Keefe *et al.*, 2014) and a major post stroke problem- unemployment (Sanuade, Doodoo, Koram, & Aikins, 2019)

The foundation of the theory suggests that people kill themselves because they want to and can kill themselves (Van Orden *et al.*, 2010). Within the structure of their theory, three constructs are used to explain why people choose to die by suicide. These include a sense of thwarted belongingness, perceived burdensome and the capacity to die by suicide.

They believe that with the risk factors-physical illness, social isolation and unemployment, as foundation for these three- thwarted belongingness, perceived burdensome and the capacity to die (Van Orden *et al.*, 2010), a stroke patient is more likely to have suicidal desires and ideations, plan and attempt suicide or reach the lethal suicide (Pompili, & Lester, 2013).

### ***Thwarted belongingness***

According to the theory, thwarted belongingness has multiple parts. These include loneliness and the absence of a reciprocal-caring relationship (Van Orden *et al.*, 2010). Thwarted belongingness is the highest factor while loneliness and the absence of reciprocal-caring are the subordinate facets. The theory assumes that if the individual’s basic “need to belong” is not met, that individual is more likely to develop the desires for suicide (Van Orden *et al.*, 2010).

Van Orden *et al.* (2010), p582. defines loneliness “as an affectively-laden cognition that one has too few social connections”. The individuals may feel

disconnected from their social setting and may have reduced satisfaction from relating with the people in their circle (Van Orden *et al.*, 2010).

Reciprocal-caring relationship, on the other hand, is said to be occurring when the individuals are being cared for by others and they also are able to care for others. This comes with a positive feeling and a sense of being supported (Van Orden *et al.*, 2010).

The theory assumes that the feeling of thwarted belongingness can change because of the ever changing thoughts and feelings of the individual. Thus, the changing number of people in the social environment, the changing active individuals in the social environment and the changing emotional state of the individual can affect “thwarted belongingness” (Van Orden *et al.*, 2010).

Furthermore, the interpersonal theory of suicide assumes that the thwarted need to belong, coupled with perceived burdensome, would develop suicidal ideations. Thus, when there is heightened chronic feelings of loneliness coupled with thwarted belongingness, an individual is more likely to develop suicidal ideations. This makes thwarted belongingness less categorical (Van Orden *et al.* 2010).

Again, thwarted belongingness is assumed to be in magnitudes. Thus, individuals’ perception that the people in the former’s social group rejects them or are unavailable, may lead to the development of suicidal ideation. When this becomes chronic or continues, the individuals are more likely to end their life by suicide (Van Orden *et al.* 2010).

### ***Perceived burdensome***

Perceived burdensome is the second construct used to explain the suicide behaviour in this theory. Here, the risk factors may include unemployment,

physical illness and family conflicts. The theory proposes all three situations have the element of 'a sense of burden to care-givers' and this is a prerequisite for suicide behaviours. As the attitudes of care-givers change negatively, the one being cared for develops this perception of being a burden (Van Orden *et al.*, 2010)

Perceived burdensome is in two folds of interpersonal functioning: "beliefs that the self is so flawed as to be a liability on others, and affectively-laden cognitions of self-hatred" (Van Orden *et al.*, 2010, p.584). Just like thwarted belongingness, perceived burdensome may vary over a period of time, over relationships, and also along a continuum of severity (Van Orden *et al.*, 2010).

#### ***Acquired capacity for suicide***

The interpersonal theory of suicide acknowledges suicide as a fearful thing to do. Van Orden *et al.* (2010) speculate that the desire to die is not enough to cause a person to die by suicide. They describe the act of suicide from the evolution point of view. According to evolution, the act of suicide consists of certain practices which the human mind finds threatening to survival. Hence, naturally, a human being would not commit suicide because the act is embodied with activities which would not allow the human being to continue living. This makes the act of suicide a 'no go area' to human brain (Van Orden *et al.*, 2010).

For a human to be able to go through with suicidal behaviour and reach the lethal stage, the person should have acquired capacity for suicide (Van Orden *et al.*, 2010). The theory emphasises certain qualities which a person would need to die by suicide. These qualities include lowered fear for death, several

attempt of suicide and increased tolerance for physical pain (Van Orden *et al.*, 2010)

Some stroke patients usually feel a sense of loneliness, and lack of belongingness because they are not able to contribute to the activities going on around them and most do not go back to work, ending up unemployed. Applicably, the theory is throwing light on the fact that stroke patients are prone to suicidal ideations if indeed they have experienced these risk factors which is part of the theory. Suicidal ideations or the desire to die, is however determined by the number of people in their circle, the activeness of these people in the stroke patients' life, the stroke patients' thoughts and feelings on how connected or 'in-touch' they are with these individuals in their social group, the extent to which the stroke patients are contributing to the lives of the people around them and their employment status (Van Orden *et al.* 2010).

### **Empirical Review**

Empirical review introduces and evaluates some studies which have been done in relation to the variables and the aim of the study. The combined variables under study, according to the researcher's knowledge, is relatively new. Hence, not many studies give a direct evidence to some of the relationship being hypothesised. The good thing is, most of the studies found, show a path way to these relationships.

### **Emotional regulation and Involvement in post stroke rehabilitation.**

Cooper *et al.*, (2014) conducted an experimental study on how emotional regulation related with stroke patient's social participation using, 45 out of the 75 stroke patients (mean age 67.63) from their first study who had reached chronic stage of stroke. Stroke patients who had clinical depression were taken

out of the study. The results showed that, generally, the higher the number of months of stroke, the lower the number of domains of emotional regulation would be for the stroke patient. The researchers concluded on an association between emotional regulation and social participation restrictions. For both stages (acute and chronic) of stroke, emotional regulation significantly affected the patients' level of social participation.

Kortte *et al.*, (2007) cross-sectional study also measured the engagement of patients with disabilities in rehabilitation using the test instrument they designed called the Hopkins Rehabilitation Engagement Scale (HRES). They also correlated the patient's engagement levels with other tests including a depression, negative and positive affect test. The main aim was to develop a test tool which will help physiotherapists and occupational therapists measure the level of engagement among their patients in a more accurate and broader team. They sampled 206 participants with spinal cord injury, ischemic or haemorrhagic stroke, amputation, or hip or knee replacement. The results showed a negative correlation between engagement and depression, a negative correlation between engagement and negative affect and a positive correlation between engagement and positive affect. Thus patient with positive feeling would involve more in rehabilitation.

Skidmore *et al.* (2010) experimental study was a secondary study of in-patients who had acetylcholinesterase inhibitors administered to them during their rehabilitation. The aim of the study was to find the relationship that exists between the patients' cognitive and affective impairment, and participation in rehabilitation. They sampled 44 stroke patients, aged 60 years and above from University of Pittsburgh and Washington University hospital. It happens that

depression had a significant correlation with rehabilitation participation and as well as executive function. Again, they find no correlation between Age, race, education, and stroke location with rehabilitation participation.

These studies (experimental and cross-sectional studies which sampled stroke patients) give evidence that for both depressed and non-depressed patients, there is a significant relationship between the patients distress and their levels of involvement. This supports the bases of choosing non-depressed patients for the current study. However, Skidmore et. al., 2010 and Kortte et. al., 2007 measured emotions or affect not emotional regulation but gives us suggestions on the relationship between negative affect and cognitive processes and their relationship with involvement rehabilitation. Gratz and Romano states that for every person with an emotional distress there is an underlining difficulty with emotional regulation. Cooper et. al.,2014 who measured emotional regulation among patients with no clinical depression, did not measure it on involvement in rehabilitation but to social participation but the current study seeks to explore emotional regulation and involvement in post stroke rehabilitation.

Even though there are differences in the aims and the variables of study, there seem to be a trend which leads us to believe that unmanaged emotions can influence involvement in a said activity (Skidmore et. al., 2010); Cooper et. al., 2014).

### **Suicidal Ideations and Involvement in post Stroke rehabilitation.**

Lizardi and Stanley (2010) conducted a systematic review on the adherence of suicidal patients to their treatment and the interventions that have been put in place to curd non-adherence. Through PubMed, MEDLINE, and

PsycINFO, they sampled thirteen articles using the key words treatment, intervention, engagement, adherence, compliance, utilization, participation, and suicide attempt. Their results reveal that up to 50% of attempters refuse recommended treatment, and up to 60% drop out after only one session. Also, effective post discharge contact and Family group interventions for adolescents improved adherence.

In two studies of suicide attempts with different follow-up periods, that is, after one month and after three months, Monti, Cedereke, and O'jehagen (2010) research examined the attendance of suicidal patient for care and follow-up characteristics. Initially, they did not vary. Thirty-two percent of the non-attendants had not yet developed outpatient contact after one month of inpatient care, while 38 % of the patients had no psychiatric treatment after three months. The patients had sleep disturbances more often at one month, expressed hopelessness, and more often also expressed other forms of difficulties. Thirty-six percent and thirty percent had suicidal thoughts after one and three months, respectively. In both samples, these patients demonstrated a need for clinical assistance more often than others, regardless of ongoing care. They concluded that probably, there is a crucial amount of time for the patient to be interested in recovery, and maybe more than one follow-up contact should be made to get the patients to adhere.

Granboulan, Roudot-Thoraval, Lemerle and Alvin (2001) researched short-term treatment enforcement in a group of adolescent suicide attempts with follow-up treatment. One hundred and sixty-seven teenagers, aged from 13-18 years and hospitalized after a suicide attempt completed questionnaire. Immediately after the attempt, and post-discharge treatment arrangements,



physicians reviewed the hospital care. Adolescents were contacted by phone three months later and asked for follow-up treatment. 91.6% of teenagers were reached after 3 months: 25.5% never attended any follow-up; 11.1% went only once; 31.4% skipped certain appointments; and 32.0% went to all their scheduled appointments. Adolescents who adhered to follow-up treatment varied substantially from those who did not: at the time of the attempt, they displayed more depression, anxiety and illegal substance use; they plotted the attempt more frequently; they were hospitalized longer; and when hospitalized, they met with a therapist more often.

Lester (2013) conducted an empirical review on participation in sports activities and suicide prevention. They selected papers from 1991 to 2010 which had a similar aim, to find the relationship that exists between participation in sports and how it affected suicidal behaviour. In addition to other papers, they selected six papers which studied data from United States Nationwide 1991 Youth Risk Behaviour Survey among adolescents. According to the literature review, as much as there were gender differences in the tendency to having suicidal ideations, physical activity once or twice a week, reduces the likelihood of an adolescent having suicidal ideations.

Simon, Powell, & Swann (2004) compared 153 adults to 513 control group. The aim was to find the effect of physical activity on suicide. The sample was limited to youth and young adults with ages between 13 and 34 years living in Houston, Pennsylvania. A multivariable logistic regression was used to analyse the data. They also found physical activity to correlate negatively with suicide. However, the intensity of the physical activities didn't play a role in the relationship.

Vancampfort *et al.* (2018) conducted a cross-sectional and meta-analysis study to find first, the association between physical activity and suicidal ideation levels, and second, the effect of physical activity interventions on suicidal ideations. They sampled 21 studies which consisted of 50% adolescents' studies, 67% adults' studies and 67% older adults' studies. Most of the studies reviewed were conducted in USA, South-Korea, China, Japan, Australia, Germany, Canada, Iran and six middle-income countries. These studies were conducted among military veterans, students, employees and mental ill patients. The results showed that physical activity had a significant effect on likelihood of committing suicide.

Lizardi and Stanley (2010), Monti, Cedereke, and O'jehagen (2010) and Granboulan, Roudot-Thoraval, Lemerle and Alvin (2001) agree that quite a number of patients with suicidal behaviour do not adhere or comply to treatment and some skip continuous treatment all together. Thus, patients who are at risk of suicide have challenges involving in treatment. This gives the current study a stepping stone for the measurement of suicidal ideations on a broader term like involvement in post stroke rehabilitation since adherence is included in the latter. The limitation of these studies is, these studies do not give information on the health conditions of their participants and some other characteristics like the age of the participants are not known. Also, the research analysis used included percentages which only gives little information about the data. However, they give the current study evidence of what is happening among patients with suicidal thoughts when it comes to their treatment and the limitations of their study, gives the current study room to explore other variables like suicidal ideations among patients with stroke.

Also, Lester (2013) Simon, Powell, & Swann (2004) and Vancampfort *et al.* (2018), reports on the how effective physical exercises is on suicidal ideations but they do not tell us why some of the patients still commit suicide even though they take physical exercises during rehabilitation.

### **Suicidal Ideations and Emotional Regulation**

Miller *et al.* (2017) conducted a study among forty-nine (49) healthy adolescents in America, using the Magnetic Resonance Imagery (MRI). Adolescents (aged between 13 and 20 year) with or without suicidal ideations were to respond to a negative picture while their brains were being examined. The results showed no significant difference in their self-reported emotional regulation to negative picture, thus, for both control and experimental sample. However, where participants were to view the negative picture passively, there was a difference in the regions of the brain (i.e. the left temporal poles, the frontal control region the cerebellum, dIPFC and the TPJ) responsible for emotional regulation. They concluded that in cases where people are not instructed to regulate their emotions, people without suicidal ideations will effortlessly regulate their emotion while those with suicidal ideations would not activate the part of the brain responsible for emotional regulation.

Beauchaine, Sauderb, Derbidgec and Uyejid (2018) Observed the structural and functional abnormalities of the frontal regions (e.g., anterior cingulate, insula, prefrontal dorsolateral cortex) that sub serve the control emotions in adolescents who are involved in self-inflicted injury (SII). They used voxel-based morphometry to compare cortical grey matter volumes between self-injuring adolescent girls, ages 13–19 years (n=20), and controls

(n=20). Whole-brain studies showed decreased concentrations of grey matter in the insular cortex bilaterally among self-injurers, and in the right inferior frontal gyrus, an adjacent neural network mostly involved in emotion and self-regulation. Insular and inferior frontal gyrus grey matter volumes associated negatively with self-reported dysregulation of feelings, over-and above psychopathology results. In some but not all cortical brain areas, the results suggest structural abnormalities.

Neacsiu, Fang, Rodriguez and Rosenthal (2018) investigated 126 adults with ages between 18 and 60years (mean age 36.43) from the southern urban country in the United States. The aim of the study, first, was to examine if difficulty and vulnerability in emotional regulation predicted suicide ideation above and beyond negative affectivity and known demographic and clinical variables in a multi-diagnostic community sample. They measured emotional regulation on Difficulty in Emotional Regulation Scale- DERS and suicidal ideations on Adult Suicide Ideation Questionnaire- ASIQ. From the linear regression analysis, the results showed that difficulty in emotional regulation accounts for 11% of the variances in suicidal ideations. It further showed that difficulty with emotional clarity coupled with being single predicts suicidal ideations.

Onig and Thompson (2018) also conducted a study to find out how emotional regulation related to suicidal behaviours. The aim of the study was to find out the association between suicidal ideations, different coping strategies and methods of expressive suppression and cognitive reappraisal. They sampled one hundred and twenty (120) Asian students from Open University in Hong Kong. Using the correlations approach to explore the

relationship between coping, emotional regulation and suicidal behaviours, the results showed that lower use of emotional regulation strategies like cognitive reappraisal significantly lead to an increase in suicidal behaviour.

This study is supported by Rajappa, Gallagher and Miranda (2012). In their quest to find the importance and the relationship between emotional regulation and suicidal behaviours, they studied 96 students with ages between 18-30year (mean age= 19) from a public university in north eastern United States. 17 of the university students reported current suicidal ideations, 20 had one past suicide attempt, and 17 had multiple suicide attempts. 42 were in a control group with no history of suicide. Emotional regulation was measured on Difficulty in Emotional Regulation Scale-DERS and suicidal ideation was measured on Beck's Scale for Suicidal Ideations-BSSI. The study showed that emotional regulation is a significant predictor of suicidal ideations. It also showed that using emotional regulation strategies was important in Suicidal Ideations.

The experimental observations done by Miller *et al.* (2017) and Beauchaine, Sauderb, Derbidgec and Uyejjid (2018) supports the hypothesis of the current study, by showing that biologically, persons with suicidal behaviours have difficulty with emotional regulation. In the non-experimental designs done by Neacsiu, Fang, Rodriguez and Rosenthal (2018) and Onig and Thompson (2018), there is an inverse relationship between difficulty with emotional regulation and suicidal behaviours. Thus, difficulty with emotional regulation is influencing suicidal behaviour. Looking closely at the participants selected for their studies, all the patients engage in suicidal behaviour and they were measured on difficulty emotional regulation scale.

With simple logics, it gives the current study that view that, patients with suicidal ideations have difficulty with emotional regulation, however the difference lays in the analysis and the aim of the researchers. Also, the physical health status of the participants is not known. Again, most of participants were university students below age 30. This study seeks to use a different approach and analysis n these variables to find the significant difference from the other studies mentioned.

### **Emotional regulation as a mediator of Suicidal Ideations and involvement in post stroke rehabilitation**

Palagini et., al.,2019 examined the possible correlation between insomnia, dysregulation of emotions and suicidality in subjects with Bipolar Disorder. Seventy-seven subjects with Bipolar Disorder Type II with a mixed-feature depressive episode were recruited. Emotion dysregulation significantly mediated the association between insomnia and depressive symptoms. Furthermore, emotional impulsivity mediated the association between insomnia symptoms and suicidality. In their study, subjects with bipolar disorder suffering from insomnia experienced a greater severity of depressive symptoms and suicidality compared to subjects without insomnia. Insomnia was associated with emotion dysregulation, impulsivity and suicidality.

Yurkowskia et. al.,2014 examined associations between relationship difficulties with parents and peers and non-suicidal self-injury (NSSI). Particular focus was placed on the analysis of mediating mechanisms by emotional dysregulation, as is the widely accepted theory. Participants were 1153 university students (905 females; Mage<sup>1</sup>419.35 years, S.D.<sup>1</sup>41.49); 79 of these participants had engaged in NSSI during the previous 6 months (63

females,  $M = 19.35$  years,  $S.D. = 1.51$ ). Hierarchical logistic regressions indicated that the quality of parent-child relationships has a greater effect on the estimation of NSSI involvement than on the quality of peer relationships. Results of the structural equation model showed that feelings of alienation in both parent and peer relationships had indirect effects on NSSI through deficits in emotional control (ER).

Marchicaa et. al., 2020 investigated whether emotional deficits explain the connection between gambling intensity and depression. A sample of 820 emerging adult gamblers ( $M = 21.14$  years of age,  $SD = 2.90$ , 50.9% female) completed an online survey, including an evaluation of problematic gambling activity over the past year, levels of anxiety / depressive symptomology, and difficulties in emotive control. Results from a linear regression model showed that problems with impulse control have positively contributed to the problem of gambling scores and involvement in goal-oriented actions have positively contributed to the problem of gambling scores, even after the symptoms of depression have been accounted for. Moreover, the findings of the mediation model showed that the correlation between gambling disorders and depression have been clarified by the following dimensions of emotional regulation; participants' lack of acceptance, objectives, methods and clarification.

The studies above all looked at the mediating role of emotional regulation but on other variable and not on involvement in post stroke rehabilitation. These studies give an understanding that with emotional regulation difficulty people are likely to engage in behaviours that are detrimental to their health. However, little is said for stroke patients and how

emotional regulation is mediating among stroke patients and creates a gap on how emotional regulation is mediating suicidal ideations and involvement in post stroke rehabilitation. The focus of this study is to explore the gap.

### **Age as moderator of emotional regulation and involvement**

Robertson and Hopko 2009 examined the relationship between Experiential Avoidance (EA), age, and the use of emotional terms in positive and negative autobiographical narratives. Participants included younger (n1/460) and older adults (n1/460) who completed EA measurement and identified a positive and negative autobiographical narrative. Generally, older adults did not show a significant increase in preferences for positive stimuli or an increase in avoidance of negative stimuli across studies, compared to younger adults, suggesting that there is not a global age-related positivity effect in situation selection. Thus, in a positive autobiographical story, there was a substantial association between age and EA, with younger adults using more emotions than older adults among low EA participants. In the negative autobiographical story, the key consequence of age was that older adults used less emotional words and a significant interaction, with younger adults using more emotional words than older adults.

Mikkelsen et. al.,(2019) explored the moderating role of age in the relationship between the Sensitivity of Interoceptive Sensitivity (IS) and the Emotional Response to Effect-Inducing Images. A group of 65 young adults (mean age = 23.91 years, SD = 4.62) and 32 older adults (mean age = 61.78 years, SD = 8.76) were exposed to effect-inducing images from the Nencki Affective Picture System database and completed a heartbeat perception test. The participants' subjective emotional responses to the images were measured



using questionnaires and their physiological reactivity was demonstrated by electrodermal activity, pulse rate, and heart rate variability during image viewing. The findings showed that age moderated the relationship between IS and emotional reactivity, although there were no major age differences in IS, change in effect, or physiological reactivity. The results showed that IS was correlated with emotional reactivity in young adults but not in older adults, indicating that young and older adults may vary in their use of internal body signals to gain information on their emotional experiences. In line with contemporary advances in the field of affective sciences, the findings stress the importance of individual differences in emotional experiences.

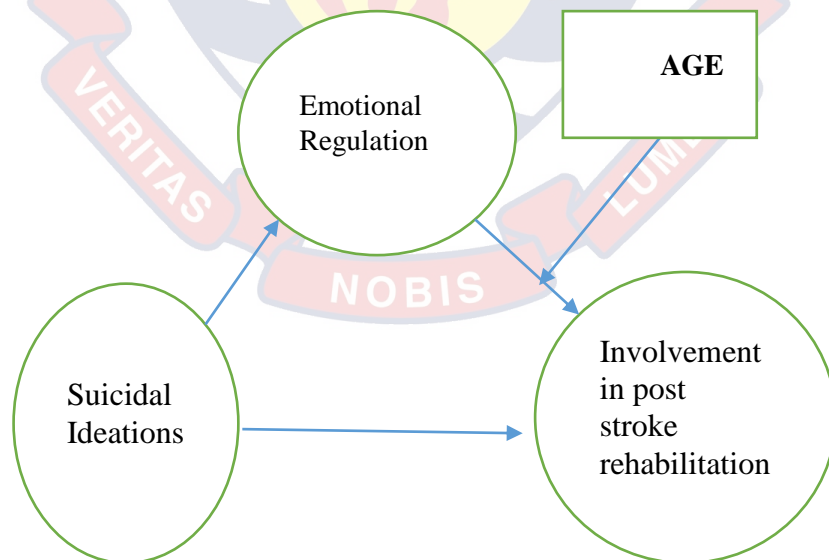
Sands, Livingstone, and Isaacowitz 2018 examined whether there are overall age gaps in the types of emotional situations people prefer by performing a "mini" meta-analysis to synthesize all existing evidence from the situation selection model used in their laboratory. This was based on the popular assumption that choosing to join or avoid situations is based on how people are likely to feel – which is theorized as a useful technique for controlling emotions, particularly in older ages. Overall age differences in the emotional situations of younger and older adults have not been established, while age differences are greater in contexts in which emotional information is more important or highly relevant.

Even with the variation in the analytical methods, predictor and criterion variables used in these studies, generally, the relevance of these studies is to give understanding on the role age plays in moderating emotions, emotional regulation and other variables apart from involvement in post stroke rehabilitation. However, these studies were done among non-stroke patients

and its criterion and predictor variables are different as well. The study seeks to examine what is happening among stroke patients.

### Conceptual Framework

The conceptual framework presents the proposed interacting relationship between emotional regulation, suicide ideations, age and involvement in post stroke rehabilitation. From the framework, it is proposed that suicidal ideations will predict, emotional regulation and also predict involvement in post stroke rehabilitation as suggested by the arrow. Also, it is proposed that emotional regulation will have a relationship with involvement in post stroke rehabilitation and at the same time may mediate the relationship between suicidal ideations and involvement in post stroke rehabilitation. While emotional regulation is relating with involvement in post stroke rehabilitation, the study proposes that the age of the stroke patient would moderate this relationship.



*Figure 1:* The proposed relationship between Suicidal Ideations and Involvement in post stroke Rehabilitation, with Emotional Regulation as a mediator and are as a moderator in the relationship between Emotional Regulations and Involvement in post stroke Rehabilitation.

## Chapter summary

This chapter reviews literature relevant to the study. It presented the explanations of the variables used in this study and proposed conceptual framework is presented in this chapter. The chapter reviewed the process model and the interpersonal theory of suicide and used them to explain why the problem exists. These theories give an idea that emotional regulation and suicidal ideations are related from the view point that once a stroke patient experiences suicidal ideation, it is most likely they having difficulty with emotional regulation and vice versa. Also, stroke patients in this state are more likely to engage in behaviours detrimental to their health (eg. Low involvement in post stroke rehabilitation). Finally, it reviewed empirical findings which had some relationship to the variables under study. Most of the empirical evidence shown in this chapter show a relationship that may exist between the variables hypothesized in this study or in other variables not related to the study. Some major gaps in literature reveals that emotional regulation and suicidal ideations are measure on variables like social participant and adherence to treatment and not involvement in post stroke rehabilitation. Also, the studies show that emotional regulation plays a mediating role between suicidality and insomnia, depression and suicide, and gambling but not on involvement in post stroke rehabilitation. These studies were presented as an evidence to show that there is a relationship that exit between the variables even though it is indirect. The next chapter introduces the Research Methods.

## CHAPTER THREE

### RESEARCH METHODS

#### Introduction

This study examined the relationship between Suicidal Ideation, Emotional Regulation and Age on patients' Involvement in post Stroke Rehabilitation. This chapter provides a detailed description of the methods and designs used to conduct the study. Based on the objectives of the study, specific methods were chosen to enable the researcher produce a valid and reliable data. The research method employed processes which gave a statistical evidence to the problem. These processes helped the study find the significant levels of stroke patients' involvement in rehabilitation and what significance emotional regulation, suicide ideation and age is to their involvement in the rehabilitation regime. The chapter is organised into the following sections: research design, study area, population, sampling procedure, data collection instrument, data collection procedures, data processing and analysis.

#### Research Design

The research design of a study is the set of techniques used in collecting data and analysing the measures of a variable or construct (Creswell, 2014). It is aimed at providing a specific structure which will aid the researcher in conducting the study. Depending on the objectives and the nature of the variables under study, a researcher will choose a particular type of research design.

In this study, the non-experimental approach was used. The non-experimental research design is a type of research design in which the researcher is not able to control all variables, especially variables that can act as confounding variables to a study (Cohen, Manion, & Morrison, 2007; Creswell, 2014). In this study the researcher does not seek to establish a cause and effect relationship between the variables. Two, the research does not hold constant a variable or set up a control group in order to examine their difference. The approach under the non-experimental design which best fits the nature of the variables and the aim of this study is the descriptive research survey. This is because Cohen, Manion, and Morrison, 2007, from their view, stated that descriptive research is concerned with:

“Conditions or associations that exist; beliefs, points of views, or attitudes that are held; practices that prevail; processes that are going on; effects that are being felt; or trends that are developing. In some cases, descriptive research is concerned with how what is or what exists is related to some preceding event that has influenced or affected a present condition or event” (Cohen, Manion, & Morrison, 2007, p. 75).

Going forward, the cross-sectional survey approach under the non-experimental design was selected for the collection of data. This is because the variables under investigation were studied once or at one time. Series of questions were posed to the participants and these were analysed in a numeric form. The disadvantage is that the analysed data only gives the characteristics of the variables but not the reasons or meanings behind the characteristics or relationship. Furthermore, it does not give the differences that may occur over

time but describes the characteristics which were recorded at the time of the study.

### **Study Area**

The major study areas of this research are found in Accra. Accra is the capital of Ghana. As at 2010, statistics from the population census estimated a population of 1.549 million (Ghana Statistical Services, 2014). The people living in Accra come from different Ghanaian cultures and a mixture of all Ghanaian languages can be found in this population. However, a number of them can speak and understand simple English language and terminologies. The city has major referral hospitals and some well-established private physiotherapy centres known to the stroke patients. The study was conducted at 37 Military hospital, Accra Physiotherapy and Brook rehabilitation in the rehabilitation. These hospitals were selected mainly because they had a physiotherapy rehabilitation centre and their physiotherapy services are recommended depending on the kind of service the stroke patients want to have. Patients who want private service visit Accra Physiotherapy and Brook rehabilitation. Also, these centres have a trained physiotherapist who take the stroke patients through their treatment process they are with the patients throughout their progress at therapy and can best measure the patient involvement in rehabilitation.

### **Population**

The target population of the study were all stroke survivors in Ghana. This target population was selected for the study because it matches the topic of the study needed to obtain information to answer the research hypothesis of the study. The estimate of targeted population is not known. The accessible

population for this research is stroke patients in Greater Accra who have had the stroke condition between three to eighteen months and are receiving treatment from a physiotherapist at 37 Military hospital, Accra Physiotherapy and the Brook rehabilitation. These hospitals did not give access to the statistics on the number of stroke survivors patronizing the facility.

### **Sampling Procedure**

The characteristics of the sample are; they are in the critical chronic stage of stroke (thus three months after stroke), they are not clinically depressed, they have a physiotherapist and are under professional supervision, the stroke patients have functional skills, they are stable and can have effective communication, they have gone back into their homes and have experienced what it is like to live with a stroke and they are under the supervision of a physiotherapist.

The sample consisted of both male and female stroke survivors with no limit to the age. Looking at the characteristics of the population and the objectives of the study and the number of people available at the selected hospitals (37 Military hospital, Accra Physiotherapy and the Brook rehabilitation in the rehabilitation), Census was used to select the samples for the study. It turned out that the number of stroke patients that fall in the category of stroke patients needed were few. In this case the census strategy was the best fit for the study (Creswell, 2012). The total number of participants were 80 stroke patients.

### **Data Collection Instruments**

The data collection instrument for this study was questionnaires with standardized psychological test tools and one rehabilitation involvement tool.

The instrument which was administered to the stroke patients was divided into five sections.

Section A included the age, the level of education, gender, duration post-stroke and income.

Section B consisted of the Difficulties in Emotional Regulation Scale. It was developed by Gratz and Roemer in 2004. A 38-item questionnaire was used to assess the emotional regulation abilities of the stroke patients. It has a Cronbach alpha of 0.93. The difficulties in Emotional Regulation Scale measures the stroke patients' emotional regulation on 6-dimensions. These dimensions include: non-acceptance (items 11, 12, 21, 23, 25, 29), clarity (items 1R, 4, 5, 7R, 9), goals (items 13, 18, 20R, 26, 33), awareness (items 2R, 6R, 8R, 10R, 17R, 34R), strategies (items 15, 16, 22R, 28, 30, 31, 35, 36) and impulse (3, 14, 19, 24R, 27, 32). It measures their difficulties in regulating their emotions. Total score is calculated by adding up sum of subscales. "R" indicates reverse scores. A response to "almost never" was scored 1 point, "sometimes" was scored 2 points, "about half the time" was scored 3 points, "most of the time" was scored 4 points and "almost always" was scored 5 points. Higher scores indicate high difficulty and lower scores indicate lower difficulty.

Section C consisted of the Suicide Behaviour Questionnaire- Revised. It was developed by Osman, Bagge, Gutierrez, Konick, Kopper and Barrios in 2001. It has a Cronbach alpha of 0.87, a sensitivity of 93% and specificity of 95%. It is a four-item questionnaire which measures suicidal ideations and suicidal attempts. The first response is scored 0; second is scored 1; third is



scored 2 and the last is scored 3. Higher scores indicate that the patient is at risk of suicide; lower scores indicate no risk of suicide.

Section D consisted of the Beck's Depression Inventory. It has 21-item scale and it was used as a screening tool for participants with depression. Patients who scored above 20 were excluded from the study. Scores above 20 indicate that the participant has depression; lower scores indicate absence of depression.

Section E contained the Hopkins Rehabilitation Engagement Rating Scale. It was used to assess the involvement levels of stroke patients in their rehabilitation regime. The assessment of the stroke patients' involvement was done by the physiotherapist of the patients. The Hopkins Rehabilitation Engagement Rating Scale was created by Kortte, Falk, Renan C. Castillo, MS, Doug Johnson-Greene and Stephen T. Wegener in 2007. It has a Cronbach alpha of 0.91. It is a five-item questionnaire which requires the physiotherapist to rate the patient based on how often the patient participated in rehabilitation. The ratings are 0= Never, 1= Seldom, 2= Some of the time, 3= Most of the time, 4= Nearly Always and 5=Always. (See APPENDIX for all questionnaires)

#### **Data Collection Procedure**

An introductory letter was taken from the Department of Education and Psychology as this is the researcher's main Department and sent to the selected hospital to seek permission to conduct the research. Also, a clearance form was taken from the Institutional Review Board (IRB) of the University of Cape Coast to enable the researcher conduct the study in the hospital. At the hospital, the researcher was requested to go through the IRB of the hospital.

After permission was granted, participants were assured of confidentiality and voluntary participation was obtained using a consent form.

The physiotherapists were trained on how to use the instrument. They were required to do the data collection during the session with their clients. After the therapy session, the questionnaires were administered to the stroke patients. The collected data was processed and analysed.

### **Data analysis**

After data collection was complete, the data was subjected to statistical analysis and interpretation. Data collected from the survey was organised and categorised using the Statistical Product and Service Solutions (SPSS version 22). The total score of responses on difficulty in emotional regulation was calculated and coded based on the interpretation of the author. The first item of the suicide behaviour questionnaire was coded and calculated based on the interpretation of author. The items on the Hopkin rehabilitation engagement scale was coded and calculated based on the interpretation of the author.

Statistical analysis consisted of both descriptive and inferential analysis of the responses provided. Data on research hypothesis one was analysed using Multivariate linear regression. This is because hypothesis one has a unidimensional predictor which is Suicidal Ideations and a six-dimensional criterion which is emotional regulation.

Data on research hypothesis two was analysed using multiple regression. Thus, emotional regulation, the predictor, is multi-dimensional and involvement in post stroke rehabilitation (criterion) is unidimensional.

Data on research hypothesis three was analysed using the linear regression. Suicidal ideation was the predictor and involvement in post stroke rehabilitation was the criterion.

Simple mediation was done on data for research hypothesis five. In the simple mediation analysis, there is one predictor, one criterion and one mediator variable and these were suicidal ideations, involvement in post stroke rehabilitation and emotional regulation respectively.

Simple moderation also uses one predictor, one criterion and one moderator variable. These were emotional regulation, involvement in post stroke rehabilitation and age respectively. It employed PROCESS by Hayes (a function in SPSS). Moderation analysis was conducted using 5,000 bootstrap samples.

### **Pilot testing**

To determine the reliability of the data collection instrument, it was subjected to pilot-testing. This is done among a small size of respondents who qualify for this study. The main aim of pilot-testing is to make the small sample answer the data collection instrument and comment on the feasibility and mechanics of the research instrument (Thabane *et al.*, 2010). They point out any problems with the test instrument, instances where items are not clear and other typographical errors. The pilot-testing was done at Achimota with stroke patients who visit their private gyms. The gym setting had similar machines and activities for stroke patients as used in the selected hospitals. There, the stroke patients do the recommended exercises their doctor gives to them. The gym coordinator was asked to fill the part needed to be signed by the physiotherapist. Twenty stroke patients selected pilot test (Julious, 2005). This

is because 20 was the maximum number of stroke patients who visited the gym. The sample characteristic includes chronic stage of stroke, has functional skills, stable and able to have effective communication and has a history of having work with under the supervision of a physiotherapist. Results from the reliability analysis of the various instruments used are 0.61, 0.80 and 0.78 for Difficulty in Emotional Regulation, Suicidal Behaviour Questionnaire-Revised and Hopkin Rehabilitation Engagement Scale respectively.

### **Chapter summary**

The chapter presents research methods used to explore the problem under investigation. The chapter looked at research design, population, sample techniques, data collection instrument, data collection procedure, data analysis and pilot-testing. This quantitative cross-sectional study uses a non-experimental research design. The population focuses on stroke patients in the Greater Accra metropolis specifically from the 37 Military hospital, Accra Physiotherapy and the Brook rehabilitation. A census of 80 stroke patients participated in the study. The data collection instruments include difficulty in emotional regulation scale, suicidal behaviour questionnaire and the Hopkins Engagement in Rehabilitation scale. The chapter also presents the data collection procedure. It also presents the tools used for the data analysis and the results from the pilot-test.

## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

The purpose of the study was to examine the interaction between Suicidal Ideations, Emotional Regulation and Stroke patients' Involvement in rehabilitation. It also sought to determine if Age would moderate the relationship between Emotional Regulation and Involvement in post Stroke Rehabilitation.

This chapter presents the results and the discussion from the collected data. Eighty questionnaires were retrieved as correctly and completely filled. Hence, the analysis presented here was based on the 80. This chapter presents the demographic characteristics of the respondents followed by the analysis of the data presented in line with the hypotheses of the study.

#### **Results**

##### **Demographic characteristics**

The demographic details of the respondents included age, gender, level of education and duration of stroke. The youngest participant was 15 years and the oldest was 73 years. The mean age was 53 years with a standard deviation of 13.11. The percentage of male respondents to female respondents was 50%, 50% respectively. There was an equal number of females to males. For the respondent's level of education, 2.5% had no formal education, 22.5% had primary level education, 50.0% had secondary level education and 25% had tertiary education. The minimum duration a respondent had had the stroke was

3 months and the maximum was 18 months. The mean was 9.98 months and a standard deviation of 5.55. This information is presented in table 1.

Table 1: *Demographic Characteristics of Respondents (n=80)*

<b>Demographic data</b>	<b>Mean (M)</b>	<b>Standard Deviation (SD)</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
<b>Age</b>	53	13	-	-
<b>Gender</b>				
<b>Male</b>	-	-	40	50
<b>Female</b>	-	-	40	50
<b>Level of education</b>				
<b>No formal</b>	-	-	2	2.5
<b>Primary</b>	-	-	18	22.5
<b>Secondary</b>	-	-	40	50.0
<b>Tertiary</b>	-	-	20	25.0
<b>Duration of stroke</b>	9.98	5.55	-	-

Source: Field data (2019)

### **Analysis of the Data**

This segment of the report shows the analysis of the data based on the hypothesis of the study. The instruments used were the Difficulties in Emotional Regulation Scale, Hopkins Rehabilitation Engagement Rating Scale and Suicide Behaviours Questionnaire-Revised. All the scales were adopted, however, only item 1 on the Suicide Behaviours Questionnaire-Revised was used to measure Suicidal Ideation.

### **Hypotheses testing**

The study tested five hypotheses using inferential statistics. Reverse coding was done to recode all positive items in the Difficulties in Emotional Regulation Scale to negative. Assumptions were tested for each hypothesis for the purpose of inferential statistical analysis.

### *Multivariate Normality*

The multivariate normality was conducted to satisfy the assumptions for using a parametric tool. Multiple indicators including the normal Q-Q plot, Shapiro-Wilk, Z-skewness and Z-kurtosis was used for the testing.

The result showed that the data was multivariate normal indicating that the normality assumption was not violated. This was shown by the Normal Q-Q plot. From the plot, it can be observed that the point is closer to the line. However, the Shapiro-Wilk, Z-skewness and Z-kurtosis did not show much in numbers. This may be due to the small number of participants under study.

### **Hypothesis One**

*H<sub>0</sub>: there will be no statistically significant relationship between suicidal ideations and emotional regulation.*

This hypothesis sought to examine the relationship that exists between the Suicidal Ideations and Emotional Regulation among Stroke patients. Multivariate linear regression was used to test the hypothesis. The predictor was suicidal ideations and the criterion was emotional regulation (6-dimensions). It is important to emphasize that certain specific assumptions underlying the use of multivariate linear regression was explored to ensure that this statistical procedure could be used. These assumptions include linearity, homoscedasticity and autocorrelation. A correlation matrix was developed to test for linearity.

Table 2: *Correlation Matrix of Suicidal Ideations and Variables of Emotional Regulation Dimensions*

	1	2	3	4	5	6	7
1 Suicidal ideations	1						
2 Non-acceptance	0.12	1					
3 Goals	0.33**	0.29	1				
4 Impulse	0.15	0.21	0.65	1			
5 Awareness	0.02	0.72	0.22	0.31	1		
6 Strategy	0.15	0.52	0.59	0.66	0.31	1	
7 Clarity	0.30**	0.24	0.32	0.57	0.40	0.34	1

\*\*Significant,  $p < 0.01$  (2-tailed)

Table 2 shows the results of the correlation matrix of Suicidal Ideations and the variables of Emotional Regulation. There was significant relationship between Suicidal ideations and two dimensions of emotional regulation (clarity and Goals). It is constructive to state that there is some linear relationship between the predictors and the some dimensions of emotional regulations, indicating that the linearity assumption has been met. Once the assumptions were met the test was conducted.

Table 3: *Multivariate Analysis*

Effect	Value	F	Df	Err. Df	Sig.
Pillai's Trace	.92	146.30	6.00	73.00	.000
Wilks' Lambda	.08	146.30	6.00	73.00	.000
Intercept Hotelling's Trace	12.03	146.30	6.00	73.00	.000
Roy's Largest Root	12.03	146.30	6.00	73.00	.000
Pillai's Trace	.21	3.17	6.00	73.00	.008
Wilks' Lambda	.79	3.17	6.00	73.00	.008
SUICIDAL IDEATION Hotelling's Trace	.26	3.17	6.00	73.00	.008
Roy's Largest Root	.26	3.17	6.00	73.00	.008

Source: field data 2019



Table 3 presents the multivariate test for understanding the relationship between the predictors and the criterion. The overall model was found to fit the data, Wilks' Lambda:  $F(6,73) = 3.17, p = 0.008$ . Suicidal ideations explain about 20.6% of the variances in difficulty in emotional regulation. The results revealed that having suicidal ideation predicts difficulty in emotional regulation, on a whole,  $F(6, 73) = 146.30, p < .05$ .

Table 4: *Univariate analysis on the relationship between suicidal ideation and emotional regulation*

Dependent Variable	Parameter	B	Std. Error	T	Sig.
CLARITY	Intercept	6.80	.44*	15.62	.000
	SUICIDAL IDEATIONS	.58	.21*	2.75	.008
STRATEGY	Intercept	11.83	.65	18.31	.000
	SUICIDAL IDEATIONS	.42	.32	1.34	.186
AWARENESS	Intercept	17.40	.67	25.88	.000
	SUICIDAL IDEATIONS	.05	.33	.15	.881
IMPULSE	Intercept	10.24	.68	15.14	.000
	SUICIDAL IDEATIONS	.45	.33	1.38	.173
GOALS	Intercept	9.06	.50*	18.04	.000
	SUICIDAL IDEATIONS	.75	.25*	3.04	.003
NON-ACCEPTANCE	Intercept	13.06	.88	14.91	.000
	SUICIDAL IDEATIONS	.41	.43	.97	.337

Source: field data (2019) \*significant,  $p < 0.05$

The table 4 shows the analysis of the positive relationship that exists between the predictor and the dimensions of the criterion. The results show that the relationship between suicidal ideations and the dimensions of emotional regulation exist at difficulty with clarity of the emotion being experienced and difficulty in ability to set goals or continue working through a set goals. Suicidal Ideations was a significant predictor of difficulty with clarity of emotions and difficulty in ability to set goals or continue working through a set goal. Suicidal Ideations explain 8% and 10% of the variances at Clarity and goals respectively.

**Hypothesis Two**

*H<sub>0</sub>: there will be no statistically significant relationship between emotional regulation and involvement in post-stroke rehabilitation.*

The hypothesis sought to find the relationship between emotional regulation and involvement in post-stroke rehabilitation. The multiple regression analysis was used to test the hypothesis. Emotional regulation (clarity, strategy, awareness, impulse, Goals, non-acceptance) was the predictor and involvement in post-stroke rehabilitation was the criterion.

Table 5: *Multiple Regression table for emotional regulation and involvement in post-stroke rehabilitation*

	B	Std. Error	B	T	Sig
Clarity	-.817	.261	-.400	-3.127	.003
Strategy	-.504	.225	-.354	-2.242	.028
Awareness	.388	.151	.281	2.570	.012
Impulse	.288	.232	.211	1.241	.219
Goals	-.071	.235	-.041	-.303	.763
Non-Acceptance	-.169	.126	-.160	-1.340	.185
R <sup>2</sup>	.309				
F	5.43				

Source: field data 2019

Table 5 shows the relationship that exists between emotional regulation (6-dimensions) and involvement in post-stroke rehabilitation. A significant regression equation was found at  $F(6,73)= 5.43, p<0.05$ . Difficulty in emotional regulation explains 30.9% of the variances in involvement in post-stroke rehabilitation. This relationship is significant on clarity, strategy and awareness. Thus, if a stroke patient at the chronic stage has difficulty with clarity of emotions, has limited access to emotional strategy, then their involvement in post stroke rehabilitation may turn out to be low 30.6 % of the time but with lack of emotional awareness they may have high involvement in post stroke rehabilitation.

**Hypothesis Three**

*H<sub>0</sub>: there is no statistically significant relationship between suicidal ideations and involvement in post-stroke rehabilitation.*

Hypothesis three was analysed using the linear regression method. The main aim was to find the relationship that exists between suicidal ideations and the patient’s involvement in post-stroke rehabilitation. Suicidal ideation was the predictor and involvement in post-stroke rehabilitation was the criterion.

Table 6: *Linear regression analysis on suicidal ideations and involvement in post-stroke rehabilitation*

	B	Std. Error	B	t	Sig
Suicidal ideations	-2.685	.338	-.668	-7.939	.000
R <sup>2</sup>	.447				
F	63.02				

Source: field data 2019

Table 6 shows the relationship that exists between suicidal ideations and involvement in post-stroke rehabilitation. A significant regression equation was found  $F(1,78)=68.02, p<0.05$ . Also, suicidal ideations explain 45% of the variances in involvement in post-stroke rehabilitation. It further means that the higher the suicidal ideations of a stroke patient, the less likely they are to involve themselves in post stroke rehabilitation.

**Hypothesis Four**

*H<sub>0</sub>: Emotional regulation is not a significant mediator of the relationship between suicidal ideations and involvement in post-stroke rehabilitation.*

This hypothesis aimed at finding the mediating role of emotional regulation on suicidal ideations and patients’ involvement in post-stroke rehabilitation. A simple mediation analysis tool was used to measure this relationship. Suicidal Ideations (X) is the predictor, involvement in post stroke rehabilitation (Y) is the criterion and emotional regulation (M) is the mediator.

Table 7: *Predictions of emotional regulation, suicidal ideations and Involvement in post stroke rehabilitation*

Model		b-value	SE	t-value	p-value
1	Constant	68.389	2.599	26.316	.000
	Suicidal ideations	2.668	1.270	2.101	.039
2	Constant	30.934	2.097	14.749	.000
	Suicidal ideations	-2.481	.335	-7.402	.000
	Emotional regulation	-.077	.029	-2.633	.010
3	Constant	25.699	.692	37.126	.000
	Suicidal ideations	-2.685	.338	-7.939	.000

Criterion: Model one- emotional regulation, model two- involvement in post stroke rehabilitation, model three- involvement in post stroke rehabilitation

Table 8: Model summary

Model	R <sup>2</sup>	F	df1	df2	P
1	.054	4.415	1	78	.039
2	.493	37.373	2	77	.000
3	.447	63.020	1	78	.000

Table 9: Total effect, direct effect and indirect effect

	Effect	SE	t-value	p-value	CI Lower limit	CI Upper limit
Total effect of X on Y	-2.685	.338	-7.939	.000	-3.359	-2.012
Direct effect of X on Y	-2.481	.335	-7.402	.000	-3.149	-1.814
Indirect effect of X on Y	Effect	BootS E	Boot LLCI	Boot ULCI		
Emotional regulation (M)	-.204	.181	-.681	.009		

X- Suicidal Ideations, Y-involvement in post stroke rehabilitation \*Significant at p<0.05

The results in Table 9 show that suicidal ideation is directly related to difficulty in emotional regulation. Further observation shows that difficulty in emotional regulation did not mediate the relationship between involvement in post-stroke rehabilitation and suicidal ideations. Thus, suicidal ideations may influence a stroke patient's willingness to involve in rehabilitation but difficulty in regulating their emotions did not influence this relationship in this study. Therefore, fail to reject the null hypothesis.

### Hypothesis five

*H<sub>0</sub>: Age is not a significant moderator of the relationship between emotional regulation and involvement in post stroke rehabilitation.*

The study hypothesized that age will not significantly moderate the relationship between emotional regulation and involvement in post stroke rehabilitation. This hypothesis was tested using moderation analysis by Hayes. The analysis used 5,000 bootstrap samples using 95% confidence interval. Age was the moderator; the predictor was emotional regulation and involvement in post-stroke rehabilitation was the criterion variable. Table 10 and 11 highlight the results.

Table 10: *Moderating Role of Age in the Relationship between emotional regulation and involvement in post-stroke rehabilitation*

Model	Effect	Boot SE	t-value	Boot LLCI	Boot ULCI
Constant	-6.932	10.982	-.631	-28.803	14.940
Emotional regulation	.340	.149	2.285	.044	.635
Age	.687	.195	3.520	.298	1.076
Emotional regulation* Age	-.008	.003	-3.194	-.014	-.003

Overall Model:  $F(3, 76) = 9.085, p < .001, R^2 = .264$

Table 10 presents the moderating role of age in the relationship between difficulty in emotional regulation and involvement in post-stroke rehabilitation. It was revealed that the overall model was significant:  $F(3, 76) = 9.085, p < .001, R^2 = .264$ . Further analysis revealed that difficulty in emotional regulation, age, and the interaction term (emotional regulation\* age) contributed about 26.4% of the variances in involvement in post-stroke rehabilitation. Age was found as a significant moderator in the relationship between difficulty in emotional regulation and involvement in post-stroke rehabilitation. The details of the interaction are provided in table 11 to give a better understanding of the complete moderating role of Age.

Table 11: *Conditional Effects of the Focal Predictor*

Age	Effect	Boot SE	t-value	Boot LLCI	Boot ULCI
Young adult	.008	.053	.158	-.098	.115
Middle age	-.123	.034	-3.583	-.192	-.055
Older adult	-.229	.048	-4.779	-.325	-.134

Interaction:  $F(1, 76)=10.205, R^2 \text{ change}=.099$

The results in Table 11 show the role of age in moderating the relationship between emotional regulation and involvement in post-stroke rehabilitation. The results showed that the effect of age on emotional regulation and involvement in post-stroke rehabilitation is prominent among middle-age, and older adult than young adult. The graph (figure 1) gives a clear explanation for this result.

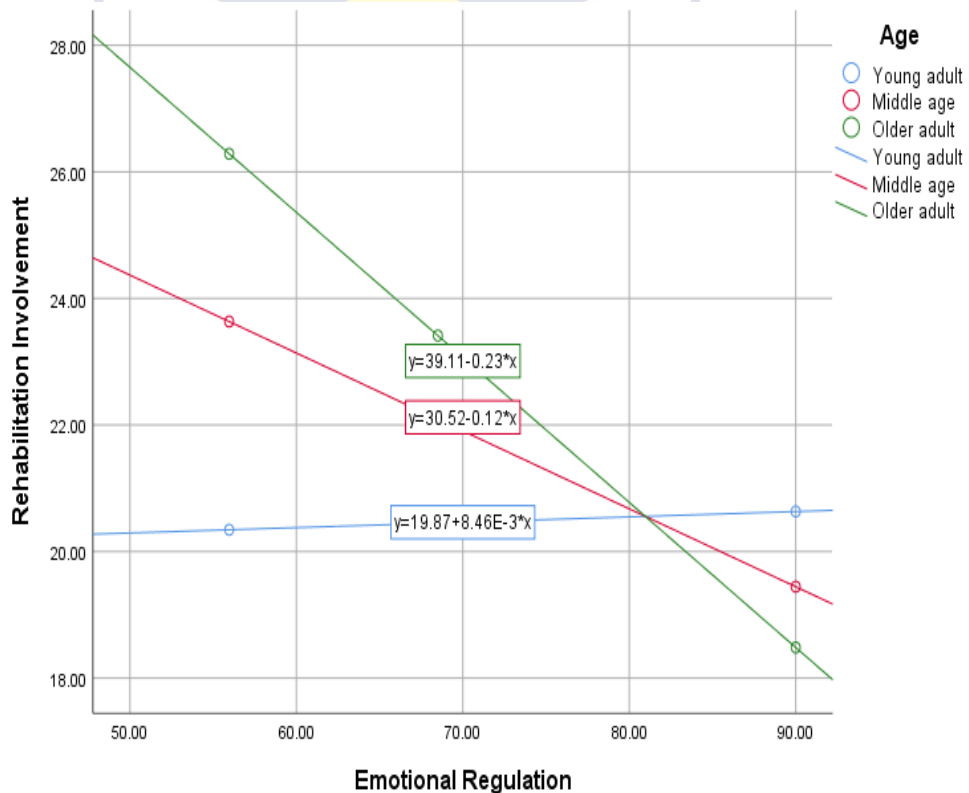


Figure 2- Moderating role of age in the relationship between emotional regulation and involvement in post stroke rehabilitation

From the graph, it can be observed that the difficulty in emotional regulation affects involvement in post-stroke rehabilitation for young adults (15-39 years), middle-age (40-54 years) and older adults (55-73years). However, those in middle age and old age would have changes in the influence difficulty in emotional regulation has on involvement in post stroke rehabilitation. For example, if all age groups are having high difficulty in emotional regulation, younger adults would show constant levels of involvement as compared to middle age and older age. As difficulty in emotional regulation ability lowers over time, stroke patients in their middle age and older age would sharply rise in their willingness to involve in post stroke rehabilitation.

Also, at any point of difficulty in emotional regulation, young adults would hardly change their mind about their involvement in post stroke rehabilitation as compared to older adults and middle age. Again, as difficulty in emotional regulation lowers, the older adults would be more in involved in post stroke rehabilitation as compared to the middle age adults.

### **Discussion**

The study sought to examine what relationship exists between suicide ideation and emotional regulation. It assesses whether these variables interact to influence the involvement of stroke patients in their rehabilitation regime designed for them. It further analyses the moderating role of age on the relationship between emotional regulation and involvement in post stroke rehabilitation.



### *Hypothesis one*

This hypothesis one sought to find the relationship between the suicidal ideations and emotional regulation among stroke patients whose condition has lasted between three (3) months and eighteen (18) months. The study found that there is a relationship between suicidal ideations and emotional regulations. This relationship is found to be on a positive slope. In that, the higher a stroke patient is at risk of suicide the more difficult it is for them to regulate their emotions. This means the hypothesis stated will be rejected.

This Corroborate other studies (Miller et al 2017; Onig and Thompson, 2018; Rajjapa, Gallagher & Mirenda, 2011; Neacsiu, Fang, Rodriguez & Rosenthal 2018; Abeyta, Routledge, Juhl & Robinson, 2015; Beauchainea, Sauderb, Derbidgec and Uyejid, 2018). Even though all of these studies were conducted among health adolescences and healthy old people; the results show that among the sick or patients with stroke, the situation is no different.

From this study, a stroke patient at the chronic stage, is likely to have suicidal ideations and this will 20.6% of the time, explain their difficulty in emotional regulating. Also, there may be different reasons why suicidal ideations may be eliciting emotions and different intensity of emotion.

One reason suicidal ideations and emotional regulation may be relating in the stroke sample, may be due to damage to the brain structure. Miller et al. 2017 reported in their study how some brain parts like the dIPFC, TPJ and the frontal region were activated when participants without suicidal ideations were asked to perform an activity which required them to regulate their emotions. These parts are responsible for emotional control, action emotional regulation and potential working memory (Buhle *et al.*, 2014; D'esposito *et al.*, 1995;

Ochsner, Silvers & Buhle, 2012; Olson, Plotzker & Ezzyat 2007). If the damage to the brain is around the said areas responsible for processing emotions or suicidal thoughts then the stroke patient at some point in time, may have some challenges performing this task.

Further analysis on the relationship between the suicidal ideations and the six dimensions show that even though suicidal ideations relates with emotional regulation, it is statistically significant at the stroke patients' difficulty in clarity about the emotions they are experiencing (clarity) and difficulty in involving in a goal-oriented behaviour when emotionally distressed (goal). The difficulty in clarity of emotions results is supported by Neacsiu, Fang, Rodriguez and Rosenthal (2018). They found that people with suicidal ideations are usually not clear about how they are feeling. Lack of clarity on emotions has to do with people's inability to identify, understand and discriminate between emotions (Abeyta, Routledge, Juhl, & Robinson, 2015).

Also, suicidal ideations may be related with difficulty in following through with goal because the suicidal ideations come with a chronic, intensive, negative feeling which is usually difficult to manage at a set time, when the stroke patient may be going through the process of emotional regulation. Gross (1998) suggests that the extreme intense negative feeling may cause the stroke patient to opt for death as a selected situation to reduce the intensity of the emotions. Furthermore, they could be using a cognitive approach other than cognitive reappraisal. Cognitive reappraisal is an approach which assesses the situation at hand to find a different perspective other than the negative view. When this approach is used, there is a high

tendency that difficulty with emotional regulation would go down and suicidal ideations would also go down (Rajjapa, Gallagher & Mirenda, 2011).

*Hypothesis two*

The hypothesis sought to find a relationship between difficulty in emotional regulation and involvement in post stroke rehabilitation. In support with the other studies (Skidmore et al., 2010; Kortte et al., 2007; Cooper et al., 2014), difficulty in emotional regulation does have a significant relationship with involvement in post stroke rehabilitation. The stroke patient's difficulty in emotional regulation would 30.9% of the time influence their involvement in the rehabilitation regime. From the analysis, the difficulty in emotional regulation could influence involvement in post stroke rehabilitation, when the stroke patients lack awareness of their present emotion, is having difficulty being clear on what emotion they are experiencing and/or when they are having difficulty accessing an appropriate strategy for the emotion or the situation they find themselves.

From Cooper et al. (2014), chronic stage stroke patients had difficulty coming up with strategies during social participation. The difference is that during involvement rehabilitation, stroke patients have difficulty in clarity and lack of emotional awareness and not non-acceptance of their emotions which happens during social participation.

Emotional regulation is by itself a process of thinking though emotions, managing them or modulating them to suit a situation or to reduce its negative effect, as well as produce a behaviour fit for the situation eliciting the emotion (Gross, 1998). In the process of choosing and modulating factors like the environmental setting, the demands of the rehabilitation activity and/or social

demands, the cognitive change approach may influence involvement in post stroke rehabilitation. For example, anecdotal evidences show that in a typical rehabilitation centre in Ghana, stroke patients come with their relatives; they meet a lot of different people at the centre including their physiotherapist, some feel they are forced to come because their family member have paid for the therapy and they are required to go through these rehabilitation activities within a specific period of time. At this point, the stroke patients who already has difficulty regulating their emotions, would not have the time to process how they are feeling or even be aware of what kind of emotion is being experienced at the time. Therefore, the most available strategy (eg. Aggression or avoidance of the rehabilitation activity) would be used by the stroke patient (Rajappa, Gallagher & Mirenda, 2012). What appropriate strategy to choose, during the rehabilitation process may become a challenge. Skidmore et al. (2010) suggest that once executive functions become difficult for stroke patients, their willingness to involve in post stroke rehabilitation may go down.

Awareness of emotions is somewhat linked to being clear about emotions (Gratzs & Roemer, 2004). For stroke patients to have clarity on how they are feeling, they need to become aware or know what emotion they are feeling at a given point in time. Unfortunately, during the time for rehabilitation, the stroke patient may not have the opportunity to process what emotions they are feeling; hence awareness may not be achieved at that time.

When difficulty with awareness, clarity and strategy interplay, the stroke patient may then tune to avoidance or isolation as a way of staying in

equilibrium or reducing the negative effects of the factors eliciting the emotions.

### *Hypothesis three*

The hypothesis sought to find the relationship between suicidal ideations and involvement in post stroke rehabilitation. The results showed that stroke patients at the chronic stage and are without clinical depression experience suicidal ideations. These suicidal ideations have a relationship with the stroke patient's involvement in their rehabilitation activity. The association existing between suicidal ideations and involvement in post stroke rehabilitation is on a negative flow. This means that the more persistent the suicidal ideations, the less likely the patient would be willing to involve in the rehabilitation activity or take doctor's recommendation.

This can be supported with studies done on adherence to treatment intervention among suicide patients (Lizardi & Stanley, 2010; Monti, Cedereke, and O'jehagen, 2010; Granboulan, Roudot-Thoraval, Lemerle & Alvin, 2001). The current study found the stroke patients have suicidal ideations which can be compared with the participants from the supporting studies. Also, the current study looked at involvement in post stroke rehabilitation which has adherence as a component of it. Even though a component of adherence is component of involvement in post stroke rehabilitation, the current study and the supporting studies both agree, the despite the health status of a suicidal patient, they would at some point have challenges involving in their treatment.

Suicidal behaviour usually comes with a sense of hopelessness and a loss of meaning in life (Neacsiu, Fang, Rodriguez & Rosenthal, 2018). The stroke

condition takes a lot from the victims: it takes part of the physical abilities they know and were used to practicing, it takes their employment status and changes their interpersonal interactions. All these losses can create a sense of hopelessness or loss of meaning in life (Van Orden et al., 2010). In this state of thinking, the stroke patient may see the rehabilitation activity as useless or pointless. Thus, why go through an activity when they do not believe that it can bring recovery?

Also, at the time of rehabilitation, the overwhelming feelings of sadness they may also be experiencing could affect their ability to concentrate on the rehabilitation goals (Gross, 1998). These goals consist of activities set for the day, by the physiotherapist which they believe would help the stroke patient. A clouded concentration may reduce the stroke patients' chances of having to do a cognitive analysis of which emotions they are feeling.

#### *Hypothesis Four*

This hypothesis sought to find the mediating power of emotional regulation on the relationship between suicidal ideations and involvement in post stroke rehabilitation. The results show that difficulty with emotional regulation did not mediate the relationship between suicidal ideations and involvement in post stroke rehabilitation. Thus, difficulty with emotional regulation will not intervene the influence of suicidal ideations on the stroke patients' willingness to involve in rehabilitation. With or without difficulty in emotional regulation, suicidal ideations would solely affect involvement in post stroke rehabilitation.

Currently, there is no published empirical support for these results. It is contrary to the mediating role of emotional regulation on other variables like

gambling, depressions, Non-suicidal injuries and interpersonal relationship (Palagini et., al.,2019; Yurkowskia et. al.,2014; Marchicaa et. al.,2019). However, Gross (1998) and Van Orden et al. (2010) may agree with these findings thus basing the explanation of the findings no the relationship that exist between the individual variables. As suicidal ideations are continuously nurtured, there will be a possible difficulty with emotional regulation ((Miller et al 2017; Onig and Thompson, 2018; Rajjapa, Gallagher & Mirenda, 2011; Neacsiu, Fang, Rodriguez & Rosenthal 2018; Abeyta, Routledge, Juhl & Robinson 2015).

It is evident from the results that the sample under have a significant level of difficulty with emotional regulation. Difficulty with emotional regulation means that the stroke patients in this study are not managing their emotional the best way hence the significant level of difficulty. The stroke patients may be choosing the ineffective attention deployment strategy or response modification strategy (Gross, 1998a). As Gross mentions in his theory of the process model, if concentration, for example, is done unsuccessfully the stroke patient is likely to have Suicidal Ideations or to desire death. This also implies that emotional regulation may only mediate at the point where difficulty in emotional regulation is at its lowest point.

Another reason may be that, the stroke patient could by using suicidal ideations as strategy to escape negative emotions. When this happens, it may be said that the patient is having difficultly regulating their emotions (Gratz and Roemer, 2004; Miller et al., 2017). With this, the stroke patient would be going far away from being willing to involve in post stroke rehabilitation.

### *Hypothesis Five*

The hypothesis sought to find the moderating role of Age on the relationship between emotional regulation on involvement in post stroke rehabilitation. The results that Age does influence the relationship between these variables. In that, in the study, the older a stroke patient the likely their emotional regulation would influence their involvement in post stroke rehabilitation.

Gross (2013) agrees that as people grow their ability to regulate their emotions also grows. Of younger adults, Gross (2013) explains that fast development of the prefrontal cortex gives them the advantage of cognitive modification strategy even though at that stage there may less involvement of parental involvement in managing emotions as compared to when they were babies. Also, older adults on the other hand report greater feelings of wellbeing as compared to middle age and younger age (Urry& Gross 2010; Issacowitz, 2012; Mather& Carstensen, 2005)

A possible explanation to the reason why, Younger adults (15-39 years) may not change their mind about involvement in post stroke rehabilitation during high emotional regulation difficulty is that, they are more likely to recover close to normal as compared to middle and older adults (D'Amore *et al.*, 2013). The evidence of speed in recovery patients may be driven to continue rehabilitation or may not. So, accepting of the point of atrophy and the reality that a middle age or older adult may not get close to normal may overtime influence the sharp fall in the willingness to involve in post stroke rehabilitation



Also, anecdotal evidence shows that this group of stroke patients are still in their young days; they have dreams of writing the BECE, they have dreams of starting a family or they are married and may wish to procreate, they have dreams of completing their master, they have dreams of starting their career and they have a social life which they can afford to isolate themselves from. With all these needs in mind, the young adult would be driven to involve themselves and very activity recommended by the physiotherapist, when their having emotional regulation difficulty or not.

### **Chapter summary**

The chapter presented the results and discussions of the study. Emotional regulation has a significant relationship with suicidal ideations and involvement in post stroke rehabilitation when emotional regulation and suicidal ideations is examined independent from emotional regulation and involvement in post stroke rehabilitation. However, emotional regulation does not mediate the relationship between suicidal ideations and involvement in post stroke rehabilitation. Suicidal ideations have a significant relationship with involvement in post stroke rehabilitation. The chapter also presents the results from the moderating role of age on emotional regulation and suicidal ideations.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### Overview

Stroke, a non-communicable disease and a cardiovascular which causes lesions to the brain cells, leaves its victims with disability (Manzanero, Santro & Arumugam, 2013). This disability after stability becomes the focus of recovery (Baatiema *et al.*, 2017). The stroke survivor would be put on intensive rehabilitation program design to consider the specifications of their disability. This rehabilitation should ideally consist of a team of professionals like physiotherapist, occupational therapist, medical doctor, a psychologist and a speech therapist. The aim of the rehabilitation program is to help the stroke patient gain some level of functions for daily living (Fini, Holland, Keating, Simek & Bernhardt, 2015). Full involvement in this program is needed to make the activities of the program successful. The major problem of the study is that some of the patients do not involve themselves in the program as expected by the rehabilitation team. Before or during the activities, some of the patients seem to show no intrinsic and extrinsic interest in the activity (Maclean, Pound, Wolfe & Rudd, 2002). At home, most of them do not follow through with recommended exercises. A continuation of this attitude would or may influence the degree of disability (Skidmore *et al.*, 2010). This study suggested that emotional regulation and suicidal ideations may be a contributing factor to the low involvement in post stroke rehabilitation.

## Research Objectives

The study seeks to

1. Investigate the effects of emotional regulation, suicide ideation and age on involvement in post stroke rehabilitation.
2. Find out the indirect effect of emotional regulation and suicidal ideations on involvement in post stroke rehabilitation.
3. Investigate the interacting effect of age on the relationship between emotional regulation and involvement in post stroke rehabilitation.

## Research Hypotheses

1.  $H_0$ : there will be no statistical significant relationship between emotional regulation and suicidal ideations  
 $H_1$ : there will be a statistical significant relationship between emotional regulation and suicidal ideations.
2.  $H_0$ : there will be no statistical significant relationship between emotional regulation and involvement in post stroke rehabilitation.  
 $H_1$ : there will be a statistical significant relationship between emotional regulation and involvement in post stroke rehabilitation
3.  $H_0$ : there will be no statistical significant relationship between suicidal ideations and involvement in post stroke rehabilitation.  
 $H_1$ : there will be a statistical significant relationship between suicidal ideations and involvement in post stroke rehabilitation.
4.  $H_0$ : suicidal ideations will not significantly mediate the relationship between emotional regulation and involvement in post stroke rehabilitation.

H<sub>1</sub>: emotional regulation will significantly mediate the relationship between suicidal ideations and involvement in post stroke rehabilitation.

5. H<sub>0</sub>: Age will not significantly moderate the relationship between emotional regulation and involvement in post stroke rehabilitation.

H<sub>1</sub>: Age will significantly moderate the relationship between emotional regulation and involvement in post stroke rehabilitation.

A quantitative cross-sectional approach was used to study the problem of the study. It used census to select all the participants available at the hospital who fall in the inclusive criteria by census. 80 stroke patients consented to participate in the study. Difficulty in emotional regulation scale, suicidal behaviour questionnaire and Hopkins rehabilitation engagement scale was used to measure emotional regulation, suicidal ideations and involvement in rehabilitation respectively. The hypothesis were analysed using Multivariate linear regression, multiple regression, the linear regression and simple mediation and moderation analysis on PROCESS by Andrews Hayes.

### **Summary of findings**

The hypothesis one results showed that emotional regulation had a significant positive relationship with suicidal ideations. This relationship when examined at the six dimensions of emotional regulation shows that difficulty with clarity and goals is a significant predictor of suicidal ideations among stroke patients.

Hypothesis two results showed a significant negative relationship between emotional regulation and involvement in post stroke rehabilitation. On the six dimensions of emotional regulation, the relationship was significant between

emotional regulation and involvement in post stroke rehabilitation if the patients were having difficulty with clarity, awareness and strategy.

Hypothesis three results showed a significant relationship between suicidal ideations and involvement in post stroke rehabilitation. This relationship was on a negative flow. Thus, the stronger the suicidal ideations the less likely a stroke patient would be involved in the rehabilitation regime.

Hypothesis four results showed that emotional regulation does not mediate the relationship between emotional regulations and involvement in post stroke rehabilitation. Thus, the presence or absence of emotional regulation would not influence the effect suicidal ideations has on involvement in post stroke rehabilitation.

Hypothesis five results showed a significant moderating effect of age on the relationship between emotional regulation and involvement in post stroke rehabilitation. From further analysis, the younger a stroke patient was the less likely their difficulty in emotional regulation would influence their involvement in post stroke rehabilitation.

### **Conclusions**

The results drawn from this study is a profound one. It shows that contrary to what most health professionals would call a lack of motivation on the part of a stroke patient, to involve in a program as important as rehabilitation, there is at some point in time an underlining reason. Thus, from the results of the study, it is evident that poor involvement is also influenced by difficulty in emotional regulation and suicidal ideations. This is a call for healthcare practitioners to check for suicidal tendencies when dealing with their stroke patients. It also implies that health practitioners should add the

screening of difficulty in emotional regulation since this would affect the goals of rehabilitation. Again, it tell all stakeholder that dealing with stroke patients goes beyond encouraging them to go through rehabilitation.

Contrary to most views, the sample selected for this study were screened such that stroke patients who were clinically depressed were not included in the study. This is worth noting because it is indeed easier to think that only depressed stroke patients could be referred to a psychologist because they are more likely to have suicidal behaviours. It is evident that thought who are not clinical depressed, have suicidal ideations and this sometimes influences their desire for rehabilitation.

Also, age is showing to be a significant factor when dealing with stroke patients during rehabilitation. In deals with stroke patients, development factors are possible areas to consider. Developmental factors may include how each age group thinks and their level of independence. Therefore, considering their age based on the thinking pattern is as important as handling their muscle.

Stroke patients need something more professional and permanent: a system that will take into consideration these psychological factors for a better recovery of stroke disability.

### **Recommendations**

To start off, a general education which creates awareness on emotional regulation and suicidal behaviours among stroke patients is important. This is needed if any form of change would happen. Stroke patients, caregivers and physiotherapists would need education on the emotional experiences of stroke patients and how these affect their rehabilitation. An initial education before

the rehabilitation program could help. There should be an educational system which runs as part of the policy of the hospital. The education should be significant or if possible, it should address the experience stroke patients may be having. It should address all ages and social circumstance the patients may find themselves.

The education can introduce a system that teaches stroke patients basic emotional regulation skills which would help them control their emotions during rehabilitation. From the judgement of the physiotherapist and the medical doctor, patients who after three months seem down and don't sound encouraged to continue rehabilitation should immediately be referred to see a psychologist for possible treatment and diagnosis. Emotional regulation and suicidal ideations are psychological factors that go beyond talking or encouraging patients during rehabilitation.

The data collected on the suicidal ideations of the stroke patients in this study, shows that the patients have at some point thought of suicide. This could mean that during the course of the treatment, stroke patients could be at risk of suicide. Therefore, it is recommended that, after three months of stroke, a screening for suicidal behaviour could be done for the patients. This will help healthcare practitioners prevent suicide among stroke patients

### **Suggestions for further Research**

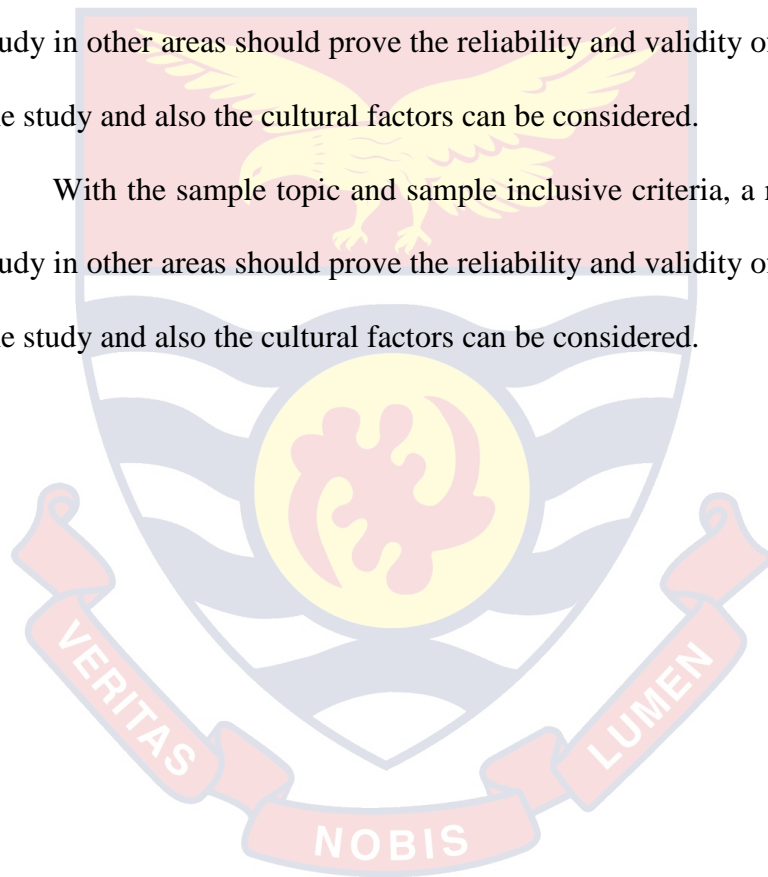
A qualitative research approach could be a more useful tool in adding meaning to the data. It would expose the exact strategies the patients use during rehabilitation.

In other studies, emotional regulation can be used as moderator to find the effect it could have on the relationship between suicidal ideations and involvement in post stroke rehabilitation.

Also, studies on the effects of suicidal behaviours on involvement in rehabilitation among stroke patients is warranted since much literature is not found on it.

With the sample topic and sample inclusive criteria, a replication of the study in other areas should prove the reliability and validity of the results from the study and also the cultural factors can be considered.

With the sample topic and sample inclusive criteria, a replication of the study in other areas should prove the reliability and validity of the results from the study and also the cultural factors can be considered.





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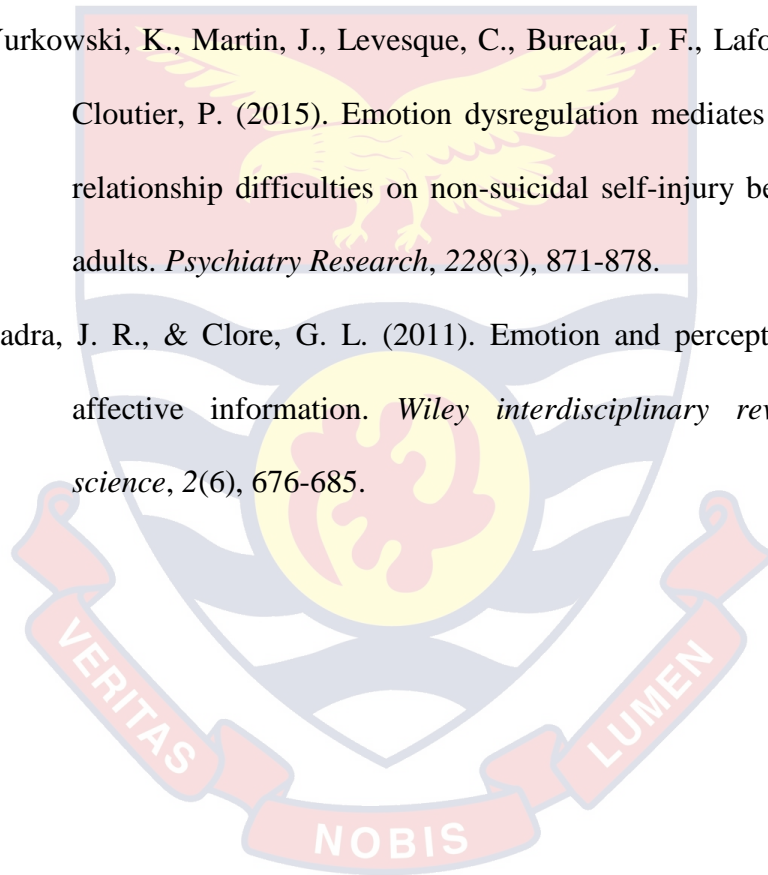


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## APPENDICES

### APPENDIX A

#### UNIVERSITY OF CAPE COAST, GHANA

#### DEPARTMENT OF EDUCATION AND PSYCHOLOGY

The purpose of this study is to examine *emotional regulation and suicidal ideations as predictors of involvement in post stroke rehabilitation*.

Your participation is essential to the success of this study. Information provided is solely for academic purposes and would be kept as *confidential* as possible. Responses provided would be anonymous during data collection. Participation is voluntary and thus, you have the right to withdraw any time without any given reason(s).

#### SECTIONS A

1. Gender: Male  Female
2. Age: .....
3. Level of education: Primary  Secondary   
Tertiary
4. Type of stroke: Clot blockage  Vessel break
5. Duration post-stroke: .....
6. Income per month: .....

**APPENDIX B**

**SECTION B**

Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item.

No.	Statement	Almost never	sometimes	About half of the time	Most of the time	Almost always
1.	I am clear about my feelings					
2.	I pay attention to how I feel.					
3.	I experience my emotions as overwhelming and out of control.					
4.	I have no idea how I am feeling.					
5.	I have difficulty making sense out of my feelings.					
6.	I am attentive to my feelings.					
7.	I know exactly how I am feeling.					
8.	I care about what I am feeling.					
9.	I am confused about how I feel.					
10.	When I'm upset, I acknowledge my emotions.					
11.	When I'm upset, I become angry with myself for feeling that way.					
12.	When I'm upset, I become embarrassed for feeling that way.					
13.	When I'm upset, I					

	have difficulty getting work done.					
14.	When I'm upset, I become out of control.					
15.	When I'm upset, I believe that I will remain that way for a long time.					
16.	When I'm upset, I believe that I will end up feeling very depressed.					
17.	When I'm upset, I believe that my feelings are valid and important.					
18.	When I'm upset, I have difficulty focusing on other things.					
19.	When I'm upset, I feel out of control.					
20.	When I'm upset, I can still get things done.					
21.	When I'm upset, I feel ashamed at myself for feeling that way.					
22.	When I'm upset, I know that I can find a way to eventually feel better.					
23.	When I'm upset, I feel like I am weak.					
24.	When I'm upset, I feel like I can remain in control of my behaviours.					
25.	When I'm upset, I feel guilty for feeling that way.					
26.	When I'm upset, I have difficulty concentrating.					

27.	When I'm upset, I have difficulty controlling my behaviours.					
28.	When I'm upset, I believe there is nothing I can do to make myself feel better.					
29.	When I'm upset, I become irritated at myself for feeling that way.					
30.	When I'm upset, I start to feel very bad about myself.					
31.	When I'm upset, I believe that wallowing in it is all I can do.					
32.	When I'm upset, I lose control over my behaviour.					
33.	When I'm upset, I have difficulty thinking about anything else.					
34.	When I'm upset I take time to figure out what I'm really feeling.					
35.	When I'm upset, it takes me a long time to feel better.					
36.	When I'm upset, my emotions feel overwhelming.					



## APPENDIX C

### SECTION C

Please check the box beside the statement or phrase that been applies to you

1. Have you ever thought about or attempted to kill yourself?

Never

It was just a brief passing thought

I have had a plan at least once to kill myself but did not try to do it

I have had a plan at least once to kill myself and really wanted to die

I have attempted to kill myself but did not want to die

I have attempted to kill myself but really hoped to die

2. How often have you thought about killing yourself in the past year?

Never

Rarely (1 time)

Sometimes (2 times)

Often (3-4times)

Very often (5 or more times)

3. Have you ever told someone that you were going to commit suicide or that you might do it?

No

Yes, at one time, but did not really want to die

Yes, at one time, and really wanted to die

Yes, more than once but did not want to do it

Yes, more than once and really wanted to do it

4. How likely is it that you will attempt suicide someday?

Never

No chance at all

Rather unlikely

Unlikely

Likely

Rather likely

Very likely



## APPENDIX D

### Physician Ratings

Please rate the patient's participation in your portion of his/her rehabilitation program on the following scales. This rating should be completed at the time of discharge and is a summary of his/her participation during the entire course of your interactions with the patient.

No.	Statement	Never	Seldom	Some of the time	Most of the time	Nearly always	Always
1.	The patient regularly attended my therapy/rehabilitation activity.						
2.	The patient required verbal or physical prompts to actively participate in my therapy/rehabilitation activity.						
3.	The patient expressed a positive attitude towards my therapy/rehabilitation activity.						
4.	The patient acknowledged a need for rehabilitation services and the benefit of therapy exercises or rehabilitation activities						
5.	The patient actively participated in his/her rehabilitation						

Rater: \_\_\_\_\_

Job Title: \_\_\_\_\_

Date: \_\_\_\_\_

APPENDIX E

Ethical Review Board

UNIVERSITY OF CAPE COAST  
COLLEGE OF EDUCATION STUDIES  
ETHICAL REVIEW BOARD

UNIVERSITY POST OFFICE  
CAPE COAST, GHANA



Our Ref: CES-ERB/ucc-edu/v3/19-01

Date: March 4, 2019

Your Ref: .....

Dear Sir/Madam,

ETHICAL REQUIREMENTS CLEARANCE FOR RESEARCH STUDY

Chairman, CES-ERB  
Prof. J. A. Omotosho  
[jomotosho@ucc.edu.gh](mailto:jomotosho@ucc.edu.gh)  
0243784739

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0244742357

Secretary, CES-ERB  
Prof. Linda Dzama Forde  
[lforde@ucc.edu.gh](mailto:lforde@ucc.edu.gh)  
0244786680

The bearer Georgina O.B. Bediako, Reg. No. EF/4P/17/0005 is an M.Phil. / ~~Ph.D.~~ student in the Department of Education and Psychology in the College of Education Studies, University of Cape Coast, Cape Coast, Ghana. ~~He~~ / She wishes to undertake a research study on the topic:

Emotional regulation and suicidal ideations as predictors of involvement in post-stroke rehabilitation

The Ethical Review Board (ERB) of the College of Education Studies (CES) has assessed ~~his~~/her proposal and confirm that the proposal satisfies the College's ethical requirements for the conduct of the study.

In view of the above, the researcher has been cleared and given approval to commence ~~his~~/her study. The ERB would be grateful if you would give him/her the necessary assistance to facilitate the conduct of the said research.

Thank you.  
Yours faithfully,

Prof. Linda Dzama Forde  
(Secretary, CES-ERB)











