UNIVERSITY OF CAPE COAST

UTILISATION OF APPLIED BEHAVIOUR ANALYSIS INTERVENTION IN THE MANAGEMENT AND EDUCATION OF CHILDREN WITH AUTISM SPECTRUM DISORDERS IN GHANA

JOHN AHORSU WALKER

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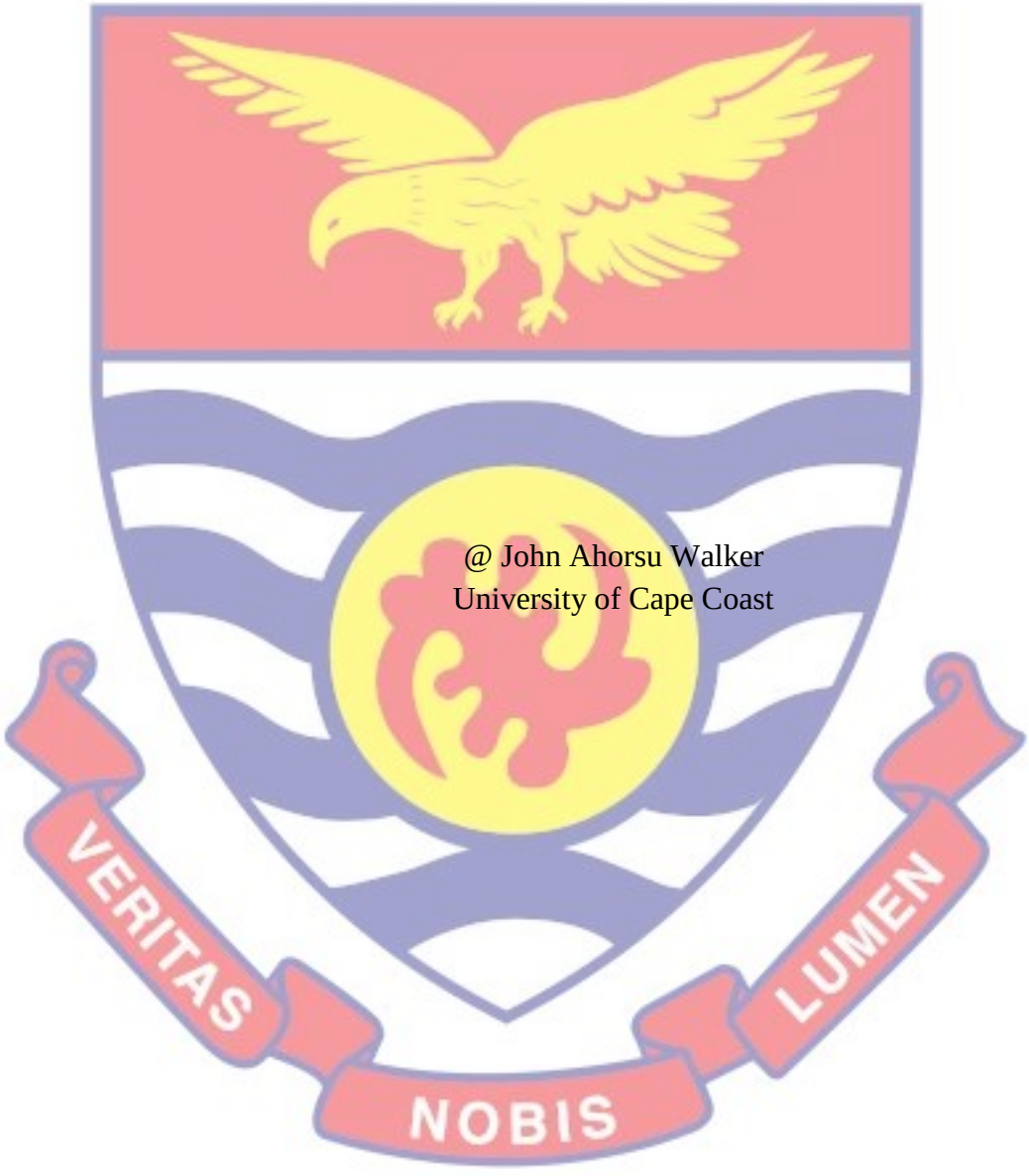

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UTILISATION OF APPLIED BEHAVIOUR ANALYSIS INTERVENTION IN THE MANAGEMENT AND EDUCATION OF CHILDREN WITH AUTISM SPECTRUM DISORDERS IN GHANA

BY
JOHN AHORSU WALKER

Thesis submitted to the Department of Education and Psychology of the Faculty of Educational Foundations of the College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Philosophy degree in Special Education.

NOVEMBER 2021

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result 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: …….

Supervisor's Declaration

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

Supervisor's Signature…… Date ……...

Name:……..

ABSTRACT

The purpose of this study was to examine the utilisation of Applied Behaviour Analysis (ABA) as a management and educational intervention for children with Autism Spectrum Disorders (ASD) in Ghana. The qualitative case study design with purposive and convenient sampling technique was employed to sample 19 participants. Semi-structured interview guide was used to collect data from participants. The data were analysed using thematic analysis. The finding revealed that ABA intervention is yielding positive impacts on the children receiving the intervention in Ghana. It was found out that children receiving the ABA intervention were able to perform tasks independently, gained mastery of self-help skills, social skills, motor skills, communication and attention. Additionally, they experience declined in challenging behaviours. Teachers indicated that ABA had equipped them with skills to be able to manage children with ASD. Family stress, worry and workload of parents were reduced. The findings further revealed that acceptability of ABA in Ghana increased among parents due to its positive results and modification done in ABA techniques by practitioners to modify programmes to suit the Ghanaian context. Participants also expressed satisfaction with the appropriateness of ABA techniques used. Lack of resources and high of cost running the intervention were found to be factors affecting the dissemination of ABA in Ghana. The study recommended that the government of Ghana through the Ministries of Education and Health should adopt ABA as treatment for ASD in Ghana. Finally, it was recommended that universities running Special Education programmes should include ABA in their training curriculum and greater focus should also be given to research in this area.

KEYWORDS

Intervention

Teachers

Parents

Autism Spectrum Disorder

Applied Behaviour Analysis

Picture Exchange Communication

Early Intensive Behavioural Intervention

Behaviour Technicians

Behaviour Analysts

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DEDICATION

To my family

TALBE OF CONTENT

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CHAPTER ONE

INTRODUCTION

The World Health Organisation's (WHO) recent global discourse indicates a rise in the prevalence rate of autism spectrum disorders (ASD) (WHO, 2013). This raise in ASD means that parents and teachers find appropriate intervention for their children who have been diagnosed of ASD. Applied Behaviour Analysis (ABA) has over the years been found to be an effective intervention for children with ASD (Smith, 1999; Matson et al., 2011; Reichow, 2012; Miltenberger, Keenan et al., 2014). The ABA intervention is however new in Sub-Saharan African countries. In Ghana, the intervention started about four years ago. Although there are evidence supporting the effectiveness of the intervention, there is an apparent lack of literature in the local context about how parents and teachers in Sub-Saharan African countries especially Ghana evaluates the ABA intervention programme. This study examines the utilisation of ABA as a management and educational intervention to children with ASD in Ghana.

Background to the Study

ASD is a neurodevelopmental disorder characterised by chronic deficits in communication as well as restricted and repetitive behavioural patterns that manifests in the first three years of life (Grant, & Nozyce, 2013). Children with ASD are often unable to express their desires, may become upset when routines are altered, or may be diagnosed with intellectual disability or epilepsy (Depape al., 2016). As a result, the defining characteristics usually displayed by a child on the autism spectrum are determined by the severity of the disorder. Children with ASD,

according to Dominic, Davis, Lainhart, Tager-Flusberg, and Folstein (2007), display behavioural traits that cause significant distress for both the child and the family. These include unusual eating patterns, irregular sleep cycles, temper tantrums, and aggression toward oneself and others. According to studies, raising a child with autism is extremely stressful (Baker-Erickzen, Brookman-Frazee & Stahmer, 2005; Falk, Norris, & Quinn, 2014). Children with ASD may also show disruptive and challenging behaviours, which can create disruption in the home and extended family (Myers, Mackintosh, & Goin-Kochel, 2009). As a result, families face a variety of additional pressures as they attempt to learn about ASD and what it actually means for their child (Webster, Cumming, & Rowland, 2016).

According to WHO (2019) prevalence and incidence data for diseases, the global prevalence of ASD is one in every 160 people, accounting for 0.3 percent of the global burden of disease (Adams, Clark & Keens, 2019). The epidemiology of ASD is well known and documented in countries such as the United Kingdom (UK), United States of America (USA), Japan, Canada, and China (Elsabbagh, et al., 2012). In the UK, 700,000 people were reported to have ASD (Mackay, Shochet, & Orr, 2017), with a clinical diagnosis rate of 1.6 among children (Rydzewska et al., 2018). The Centers for Disease Control (CDC) reported the rate to be one out of every 54 children in the USA (CDC, 2020). In India, the prevalence rate was estimated to be 0.11 in rural children and 0.09 in children at urban areas (Chauhan et al., 2019), and then in China, the prevalence rate was found to be 108 in 10,000 children sampled (Sun et al., 2019).

Even though, there is no published data on the prevenance of ASD in Ghana, Rural Integrated Relief Service Ghana (RIRSGH, 2013) reported that one out of every 160 Ghanaian children under the age of three have ASD. Ruparelia et al., (2016), also reported that the percentage of children under the age of 14 with ASD in Ghana is estimated to be 38.7%. While research has shown that the number of people diagnosed with ASD in the western world is higher than in developing countries (Uwaezuoke, 2015), other studies indicate that there could be more people with ASD in these developing countries (Missigman, 2017). Cultural beliefs about ASD, fear of social stigma, unavailability of qualified professionals to perform ASD diagnosis, and insufficient knowledge about the disorder all contribute to the low prevalence of ASD diagnosis in non-western countries (Missigman, 2017).

While there is no cure for ASD, early identification and intervention can enable people with ASD improve their condition over time (Mensah et al., 2018). Variety of therapeutic approaches, including psychological, medical, educational, behavioural and rehabilitative have been used to treat ASD (Mensah & Hayfron-Acquah, 2018). Behavioural-based interventions have gained prominence over other types of ASD treatment over the last 20 years (Smith, 1999; Matson et al., 2011; Reichow, 2012; Keenan et al., 2015). In recent years, the field of Applied Behaviour Analysis (ABA) has been internationally recognised as the gold standard for treating ASD (Smith, 1999; Matson et al., 2011; Reichow, 2012; Miltenberger, Keenan et al., 2014).

As the prevalence of ASD keeps rising, so does the demand for ABA intervention. This trend is mainly due to research outcomes showing positive outcomes of ABA intervention for children with ASD (Smith,1999; Matson &

Kozlowski 2011; Reichow 2012; Keenan et al., 2015). Professionals who use this intervention apply learning principles developed by psychologists to teach skills that are essential to people in the ASD population in order for them and their families to have an improved quality of life (Piazza, Roane, & Karsten , 2011). ABA intervention has been shown to improve children with ASD's communication, social interaction, academic skills, self-help and motor skills (Smith,1999; Sun et al., 2019). ABA has been shown to be effective in enhancing intellectual competence, improving cognitive skills, verbal and responsive language abilities, and raising Intelligence Quotient (IQ) in children with ASD (Makrygianni, Gena, Katoudi, & Galanis, 2018).

These positive outcomes from ABA intervention have had a significant impact on healthcare in the USA. Most state and federal funded early childhood and childcare services in the USA now provide ABA-based interventions for children with ASD and those with other forms of intellectual disability (Simpson, Mundschenk, & Heflin, 2011). There were campaigns in Canada (Perry et al., 2008) and the UK (Kendall, Slavenburg, & van Bilsen, 2013) for government agencies to provide ABA services and also for insurance companies to cover ABA services. The effectiveness and widespread availability of these ABA services, which has prompted a number of parents to campaign for their availability, has contributed to an increase in demand for ABA services in the USA (Simpson, Mundschenk, & Heflin, 2011; Makrygianni et al., 2018).

Families who have had ABA for their children have overwhelmingly positive feelings about it (McPhilemy & Dillenburger, 2013). Those using home-based ABA programmes in many parts of Europe and the UK, in

particular, have found a positive impact of ABA on the lives of their children and their families, pointing out that importance should be placed on ABA as a way of managing challenging behaviours in Children with ASD (McPhilemy & Dillenburger, 2013).

Despite the availability of ABA services and the strong advocacy for their dissemination by parents of children with ASD in North America and the UK, the same cannot be said for such parents in Ghana. According to Allotey (2020), parents of children with ASD in Ghana struggle to get their children access to treatment and education (Allotey, 2020). School administrators and teachers who took part in the study voluntarily defended government-assisted regular schools, claiming that they, too, are understaffed and lack adequate infrastructure and facilities to educate children with ASD (Allotey, 2020). They also stated that regular or mainstream schools may be unable to admit children with ASD because it is difficult for these children to adapt to the curriculum prescribed by the Ghana Education Service for implementation in schools across the country (Allotey, 2020). According to the findings, in Ghana, parents of children with ASD educate themselves in order to manage their children's condition (Allotey, 2020).

Standardised ABA intervention programme that met the international criteria set by the International Behaviour Analysis Organisation (IBAO), an organisation that provides Applied Behavior Analysis certifications worldwide, began in Ghana about 4 years ago with Autism Compassion Africa (ACA). ACA is a Non-Governmental Organisation (NGO) offering ABA intervention for children and their families in Cape Coast. In terms of ABA

teacher training, there appears to be no accredited professional training programme in any of Ghana's tertiary institutions.

The University of Cape Coast, on the other hand, offers a course in ABA to PhD Special Education students. USA-trained ABA (Certified Behaviour Analysts) in ACA conduct ABA training for teachers and parents in their facility and consultancy services to other schools offering ABA intervention in Ghana. It appears, however, that governments, especially those in Sub-Saharan Africa (SSA) countries, have no involvement in ABA dissemination, leaving the burden on parents and NGOs to provide and finance ABA interventions for children with ASD in the population (Ruparelia, 2016).

Evaluation of the impact of ABA intervention on the children and their families, appropriateness of the intervention techniques used in Ghana appears to be lacking in both literature and practice. Bailey, Palferman, Heavey, & Le Couteur, (1998). defined two major avenues of questioning to serve as a framework for research in this area. Bailey et al. (1998) stated that in an effort to facilitate research on the assessment of the effectiveness of behavioural based-intervention, family perceptions of services and impact of services on both the child and the family should serve as the framework. According to Grey, Coughlan, Lydon, Healy, and Thomas (2019), the evaluation of the effectiveness of behavioural-based interventions should include the perceived appropriateness of the intervention for the child, outcomes of the intervention on the child, content of the curriculum, and appropriateness of the procedures used.

Surprisingly, it seems that in most SSA countries, including Ghana, the majority of studies and reviews on effective treatment for ASD have

largely neglected to include any measure of parental perception about the effectiveness of ABA in the education and treatment of children with ASD. To establish global acceptance of ABA intervention, it is necessary to investigate the social validity of the ABA intervention across multiple cultural settings (Bailey et al., 1998 & Grey et al., 2019). This means that parental and practitioners' perception and views about ABA on children receiving the intervention in Africa is very vital. Given that there is a growing body of evidence supporting behavioural and educational approaches for people with ASD based on ABA principles, and that parents and teachers play a significant role in deciding how to educate their children with ASD, understanding parents and teachers' perception toward ABA-based intervention for their children living with ASD is critical.

Statement of the Problem

There is compelling evidence that ABA is an extremely effective type of intervention for children with ASD (Smith,1999; Matson & Kozlowski 2011; Reichow, 2012; Miltenberger et al., 2014). Tzanakaki et al., (2012), on the other hand, raised concerns about the intervention's rigidity, the potential use of aversive by some therapists, the costs of running the intervention, and the child's potential isolation from peers. Furthermore, there is less evidence about how parents and teachers perceive and evaluate ABA programmes, particularly in non-western cultures such as SSA countries where the outcome of the intervention on children with ASD is unknown (Ruparelia et al., 2016). Although parents of children with ASD in Ghana face numerous challenges in attempting to educate their children (Mensah et al., 2018; Allotey, 2020), very little exist about what they know about ABA interventions. There appears to

be an apparent lack of literature in the local context on how parents and teachers in this category perceive and evaluate ABA intervention programmes in SSA countries. Knochel, Blair, and Sofarelli (2021), appear to have conducted the only available study on ABA as an intervention for the ASD population in Ghana. Their studies, on the other hand, only looked at the impact of culturally focused classroom staff training on praise delivery and its collateral effects on student on-task behaviour. The perception of parents of children with ASD and that of teachers in educating children with ASD in Ghana toward ABA intervention is unknown.

Purpose of the Study

The purpose of this study was to examine the utilisation of Applied Behaviour Analysis (ABA) as a management and educational intervention to children with Autism Spectrum Disorders (ASD) in Ghana. Specifically, the objectives of the study were to;

1. Find out the impact of applied behaviour analysis intervention on behaviour changes in children with autism spectrum disorder in Ghana.
2. Explore the impact of applied behaviour analysis intervention on the work of teachers educating children with autism spectrum disorder in Ghana.
3. Find out the impact of applied behaviour analysis intervention on the family life of parents with children in the autism spectrum disorder in Ghana.
4. Find out the perceived appropriateness of the techniques applied in the applied behaviour analysis interventions in Ghana.

Research Questions

The following research questions were formulated to guide the study.

1. What is the impact of applied behaviour analysis intervention on behaviour change in children with autism spectrum disorder in Ghana?
2. What is the impact of applied behaviour analysis intervention on the work of teachers educating children with autism spectrum disorder in Ghana?
3. What is the impact of applied behaviour analysis intervention on the family life of parents with children in the autism spectrum disorder in Ghana?
4. What is the perceived appropriateness of the techniques applied in the dissemination of ABA interventions in Ghana?

Significance of the Study

The study's findings would bring to light the impact of ABA intervention on children with ASD in Ghana, the impact on their families and on teachers using ABA to educate children with ASD in Ghana. Parents, teachers, schools, governments, NGOs, and stakeholders in ASD education would find the findings of this study useful in making educational practice and policy decisions regarding adoption of ABA intervention as another alternative for educating and treating children with ASD in Ghana. The results of the study would also inform the government, the ministries of education and health to take practical steps towards embracing and making ABA services accessible to families seeking intervention for their children ASD in Ghana. The findings would also bring to attention of the academia especially those in Special education, Psychology and rehabilitative science and

management of our universities the need to focus research on ABA and also make consideration towards offering ABA a programme in our universities to train professionals in ABA as done in the USA and Europe. The findings would further enable the Ghana education service, Ministry of Education and Special Education departments in public universities and Colleges of Education to include in the curriculum for special education teachers.

For parents, results of the study would urge them to make more advocacy for ABA by putting pressure on government through its urgencies such as the ministries of Education and Health to make ABA services to families in the ASD population. The findings would also be beneficial to the Ghana Psychological Council, the body responsible for regulating the activities and training of professionals in Psychology, Counselling and Special Education in Ghana, to take steps towards regulating ABA services in Ghana. Finally, the finding would also add to the existing body of knowledge on ABA and the management of ASD.

Delimitation

The study was delimited to parents of children with ASD and teachers using ABA to educate children in Ghana. In terms of geographical delimitation, it is delimited to schools that practice ABA intervention to manage ASD in Ghana. The study focused on examining the perception of parents and teachers of children with ASD receiving ABA interventions for more than 25hours a week for more than a year at these schools.

Limitations

Due to the outbreak of the corona virus pandemic getting physical access to participants on time was challenging. Especially for parents their tight work schedules did not allow me to interview all of them face-to-face. Although I was able to interview some participants at their schools, workplace and homes, getting physical access to all of them was challenging. I resolved this by agreeing with those participants with tight work schedule to conduct the interview via phone calls with permission from the participants to record the conversation to be transcribed for analysis. Again, because this is qualitative study, the views, beliefs and personal opinions of the researcher is a threat that can influence his interpretation and analysis of the results. Oblivious of these facts, I was very cautious and objective in the analysis and interpretation of the results in order to ensure that the results presented are in their purest form, unadulterated or influence by my personal views.

Definition of Terms

The following terms have been operationally defined in the study as;

1. **Perception:** Perception is a mode of perceiving reality and experience through the senses, allowing for the recognition of figure, form, language, behaviour patterns, and action.
2. **Social validity** is the social importance and acceptability of three specific aspects of intervention: the intervention's goals, the procedures used for that intervention, and the outcomes produced by that intervention.

3. **Behavioural Change**: Behavioural change is defined in this study as any change or adjustment in behaviour that affects a child's functioning brought by ABA intervention.
4. **A behaviour analyst or Board-Certified Behaviour Analyst (BCBA)** is a paraprofessional within the field of ABA who designs and implements ABA programmes to help treat patients with mental, social, or learning, intellectual and developmental disorders using ABA principles such as positive reinforcement, shaping, prompt fading, and task analysis. A behaviour analyst also collect data to evaluate behaviours and track progress of ABA programmes.
5. **Behaviour Technician (BT)**: A behaviour Technician is paraprofessional within the field of ABA, who administers ABA intervention to patients or Children with ASD under close supervision a Board-Certified Behaviour Analyst (BCBA) or a Board-Certified Assistant Behaviour Analyst (BCaBA)
6. **Parents:** Parents who have children with ASD receiving ABA interventions in Ghana for 25 hours a week for more than a year.
7. **Teachers:** Refers to BTs and BCBAs who administer ABA intervention. The word teacher is used interchangeable with BT, Behaviour Analyst and BACB in the work.

Organisation of the Study

The work is organised into five chapters. The first chapter comprises the background to the study, statement of the problem, purpose of the study, research questions, significance of the study, delimitation and limitations, definition of terms and organisation of the study. The second chapter covers

the theoretical, conceptual and empirical framework underpinning the study. The third chapter contains the research methods. Analysis and discussion of results is in chapter four while the concluding chapter takes care of summary, conclusion and general recommendations and Suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter examines literature pertaining to the research. Abstracts, books, journals articles, online publications, and published thesis by past students were used to acquire information for this research. The literature review includes theoretical framework, conceptual and empirical reviews: The theoretical review focuses on behavioural learning theory (operant conditioning) and theory of diffusion of innovation. The concepts of ASD and ABA were reviewed in the conceptual Review. Based on the study's objectives, previous studies were reviewed under empirical review of this study.

Theoretical Framework

This section review theories underpinning the study. Two theories are reviewed in this section. Behavioural theory of learning (operant conditioning) by B.F Skinner (1938, 1974) and theory of Diffusion of Innovation (Rogers, 1962, 2003)

Behavioural Theory of Learning (Operant Conditioning)

The underlying principles of ABA stem from the theory of B. F. Skinner (Skinner, 1938), who proposed that behaviour is determined by a process known as selection by consequences, which is similar in concept to Darwin's natural selection process. Skinner established that in a given environmental setting, behaviour actions that yield positive outcomes will reoccur through reinforcement, while behaviours that do not produce positive outcomes will decline or fade away. Watson (1991) (cited in Moore, 2011).

pointed out in his renowned work titled 'Psychology as the Behaviourist Views' that psychology is the science of observable behaviour, not states of mind or cognitive processes. The study of behaviour was seen through the lens of a stimulus (S) and response (R) paradigm by Watsonian behavioural psychologists. These psychologists believe that S-R philosophy can be used to explain behaviour and shape people to perform better in a variety of settings, including education, business, and law (Cooper, Heron & Heward, 2007). Watson's work on classical behaviourism paved way for B.F Skinner" operant or radical behavioural theory.

Skinner (1974)'s work brought new concept in the field of behaviour science. These concepts include reinforcement, behaviour being contingencies of survival and operant conditioning (Skinner, 1983). Skinner (1953) argued that in the study of human behaviour, both overt and covert behaviour is dependent variable. This distinguishes behaviour analysis from cognitive psychology, which considers hypothetical internal constructs to be the source of overt behaviour (Cooper et al., 2007). Skinner (1974) created the foundations for experiment-based behaviour analysis experiments that went beyond S-R trials. Operant conditioning, a key concept in Skinner' work is the scientific discovery that different consequences have varied effects on behaviour (Skinner, 1974). The contingencies of behaviour are formulated as a three-term contingency (ABC) in operant conditioning.

These are an environmental antecedent (A) which evokes a behavioural response (B) that is followed by a consequent stimulus (C), in other words, an antecedent discriminating stimulus (SD) is preceded by a behavioural response (R) contingent upon a consequent stimulus (S+) (Carlson

& Buskist, 1997). The behaviour is a result of the S+, which can either reinforce and thus improve the chances of the behaviour reoccurrence, or punished and decrease the likelihood of the behaviour occurring again (Pryor & Torrance 1997). According Skinner (1953) positive reinforcement (introducing or giving a stimulus) or negative reinforcement (removing a stimulus) both enhance the likelihood of the behaviour occurring. Punishment can also be positive (a stimulus is provided) or negative (a stimulus is eliminated), with both circumstances resulting in a reduction in the incidence of undesirable behaviours (Skinner, 1953; 1974). Skinner studied basic organisms like rats and pigeons because they allowed for precise assessments of simple reactions, such as being placed in different schedules of reinforcement. Skinner's Experimental Analysis of Behaviour (EAB) is widely considered as the foundational scientific methodology in the field of behaviour analysis (Cooper et al., 2007). EAB provided a straightforward and systematic means of presenting the causal relationships between behaviour and numerous environmental variables, which was very useful for applied behaviour researchers (Cooper et al., 2007).

How the theory of operant conditioning is Applied to ABA in Autism treatment

The principles of Applied Behaviour Analysis (ABA) used as a behavioural intervention for children with ASD are based on Skinner concept of operant conditioning, which include three strategies: (A) antecedent factors before a target behaviour is likely to occur, (B) behaviourally defined and measured intervention targets, and (C) consequences after the occurrence of a target or non-target behaviour (Brewster, Elliott, McCartan, McGregor, &

Kelly, 2016). Today ABA has become the most well-known treatments for children with ASD globally. Its principles are used to teach new skills as well as alternate, adaptive behaviours in order to minimise the severity and frequency of maladaptive behaviours in children in the ASD population across the globe (Cohen & Volkmar, 1997).

Diffusion of Innovation (DOI) Theory

The processes, constraints, and experiences acquired by parents when they embrace ABA-based interventions in managing their children with ASD are investigated using the Diffusion of Innovation (DOI) theory. The DOI (Rogers, 1962, 2003) is a theory that explains how, why, and how quickly innovations move across people and organisations. This theory looks at how ABA is being used in Ghana as a new approach to managing ASD hence this theory will help explain how ABA will be accepted or embraced parents, teacher and the general public.

Diffusion, according to Rogers (1962, 2003), is the process through which an innovation is spread among members of a social system over time through certain routes. People who are in groups or structures that have distinct purposes, traits, origins, or position within an organisation are referred to as social systems (Parsons, 1991). Diffusion, which is also classified as a sort of social change, is described as the process by which a social system's structure and functioning significantly change (Rogers, 1962, 2003).

An idea, behaviour, or thing that is viewed as novel and worth adopting by an individual or a group within the social system is referred to as an innovation (Rogers, 1962, 2003). According to the DOI theory, accepting, adopting, and using innovative interventions is a five-step process that

includes knowledge, persuasion, decision, implementation, and confirmation (Rogers, 1962, 2003). When the decision-making unit of an organisation is exposed to the existence of an invention and acquires an understanding of how it works, the knowledge phase of the diffusion of innovation theory begins (Rogers, 2003). Schools are made aware of innovative initiatives and encouraged to embrace them during the knowledge stage of the theory (Rohrbach, Graham, & Hansen, 1993). The persuasion phase comes when people who are already acquainted with an innovation get psychologically invested in it. These people actively pursue information about the new innovation, process it, and then interpret it to generate a general opinion about it. The school teachers and administrators communicate the advances to parents and general public at this point. Following that, the staff, in this case, special education teachers, paraprofessionals, and other support personnel generate opinions about the usage of the innovation and decide whether or not to start a programme (Rohrbach et al., 1993).

According to Rogers (2003), knowing about an innovation does not always imply acceptance or rejection because there are various factors at play during persuasion that can impede an innovation's acceptance. For instance, organisational culture, the inherent challenges connected with an innovation, and the disparity between learned perceptions and awareness about the innovation, are factors that could hinder the acceptance of the innovation. These factors, which have the potential to hinder an innovation's acceptance, are normally worked out during the decision phase. After the decision - making phase, the innovation proceeds on to the implementation phase. After that, the innovation is put to use. School administrators, teachers, and others

deliver the programme at the implementation phase (Rohrbach et al., 1993). Rogers (2003) also points out that adopting an innovation is rarely the final step in the innovation decision-making process. Organisations must continue to re-evaluate their adopted innovations even after they have been implemented. Teachers and other programme personnel are encouraged to continue implementing an adopted innovation in schools. The innovations are transitioning from implementation to institutionalisation at this point. This process explains how ABA is disseminated in Ghana.

How the DOI is Applied to Dissemination of ABA Intervention

The DOI theory looks at the several stages of the innovation decision-making process, from acceptance to institutionalisation. It also spends a lot of time looking at things that could operate against the planned innovation. These characteristics make ABA-based autism programmes in public schools difficult to embrace and implement (Kamau, 2014). While school administrators might well have primary authority to adopt innovative programmes, but variety of reasons may obstruct the adoption, implementation, and confirmation of innovations (Dingfelder & Mandell, 2011). Teacher preparation in ABA techniques, logistical decisions, and parent support and collaboration are examples of such factors that may hinder the adoption an innovative programme such as ABA in schools (Iovannone, Dunlap, Huber, & Kincaid, 2003; McKelvey, 2008; Smith & Smith, 2000). To address this issue in the USA for example, legislative authorities, such as the IDEA, requires educators to use evidence-based programmes to enhance academic and behavioural outcomes (Heward, 2003). Legislative acts adopted in 26 states in the USA recognise ABA and demands health insurance

companies to cover the yearly costs of ABA interventions for children with ASD until the age of 21. (Autism Speaks, 2013). In Ghana, such laws are required to overcome the obstacles parents who have children with ASD population are facing in educating their children and to ensure ABA diffusion or dissemination in Ghana. While is dissemination has reached the stage of institutionalisation in countries such USA, UK and Canada, in Ghana and in most SSA countries, ABA is still at the acceptance stage. A lot is needed to be done to overcome the unforeseen obstacles to ABA dissemination and make ABA acceptable and accessible in Ghanaian schools and hospitals for children in the ASD population.

Conceptual Review

Concept of Autism

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder marked by social skills deficiencies, repetitive behaviours, and nonverbal communications (Masi, DeMayo, Glozier & Guastella, 2017). ASD affects people in a variety of ways, but the most common symptoms are difficulties speaking vocally and nonverbally, difficulties in picking up on social cues, or indulging in repetitive activities (DSM-5 Diagnostic Criteria, 2014). Autism according Colman (2012) is a pervasive developmental disorder defined by sustained and gross impairments in social interaction and information exchange, restricted and stereotyped behavioural patterns, preferences, and activities with these abnormalities manifesting in the child's life before the age of three. Non- responsiveness to emotions, absence of reciprocity in social interactions, inability to develop peer relationships, delayed or failed speech development, stereotyped and unusual language usage or non-verbal

behaviour (such as gaze avoidance), insistence on sameness, and highly ritualised mannerisms are all possible symptoms of ASD (Colman, 2012). A child with ASD has difficulty interacting with others and is frequently unable to sympathise with others. He or she has trouble understanding verbal and nonverbal communication, and his or her thoughts, language, and conduct are rigid. Many researchers believe that this is due to a lack of theory of mind, or the ability to comprehend or interpret the thoughts and behaviours of others (Wing, 1996, as cited in Moore, McGrath & Thorpe, 2000). Hearing impairment, Attention Deficit Disorder, Down Syndrome, intellectual disabilities, visual impairment, Cerebral Palsy, learning disabilities, Epilepsy, and other developmental disorders may be present in a child with ASD (Atkins, 2011). Researchers assert that given the dynamic nature of ASD, no two children with ASD are alike (Atkins 2011). MacNeil, Lopes and Minnes (2009) also found that ASD is associated with illnesses such as epilepsy, mental illness, and intellectual disability.

Categories of ASD

Autistic disorder, Asperger disorder, Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), Childhood disintegrative disorder (CDD) are all part of the autism spectrum disorder (National Institute on Deafness and Other Communication Disorders (NIDCD), 2010 cited in Fordice, & Brown, 2016). The disorders are described and explained in more detail below:

Autism Disorder

Autism Disorder, often known as classical ASD, is a developmental disorder characterised by difficulties in social interactions, communicating,

play behaviours, and a wide variety of interests in children (Buckendorf, 2008). The diagnosis of autistic disorder is normally provided between the first 30 and 36 months after birth, but manifestations are more commonly found during the second year of a child's life (Tonge & Brereton, 2011). Maintaining eye contact and facial gestures are difficult for children with autism disorder, and they tend to pursue their desires regardless of the environment (Vernon & Rhodes, 2009). Three out of every four children with ASD, on the other hand, have a learning disability (Alotaibi, 2015). Seizures, poor muscular tone, underlying nervous behaviour, intolerance to change, and preoccupation with a particular concept are all typical in these children (Filipek, et al., 1999 cited in Alotaibi, 2015). Individuals with ASD may struggle to execute simple tasks such as hold a cup or play with their peers, and they are often behind their peers in terms of cognitive and intellectual development (Tager-Flusberg & Joseph, 2003)

Asperger's Syndrome

Hans Asperger, an Austrian pediatrician, initially described Asperger's Syndrome in 1944. (Klin, McPartland, & Volkmar, 2005). Young males with Asperger's syndrome had autistic traits such as confined and obsessive activities, but had a lower impairment in social interaction than children with ASD (Myles & Simpson, 2003). Asperger's syndrome is more common in teenagers and adults than other conditions (Frith, 1989). This could be due to the symptoms becoming more noticeable when under social or communicative stress (Alotaibi, 2015).

Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS)

Pervasive Developmental Disorder Not Otherwise Specified is marked by extreme social isolation, deficient verbal and nonverbal communication abilities, and stereotyped behaviours, interests, and hobbies, but lacks the full diagnostic criteria of ASD (APA, 1994). Children with PDD-NOS could be put into one of three subgroups. These are high-functioning group (24 percent) who resemble Asperger syndrome. These people experienced a modest cognitive deficit or a transitory linguistic delay. Another grouping (24%) that resembled autism but had late onset or too severe cognitive deficits or were too young to satisfy the full diagnostic criteria for ASD; and a group (52%) that did not match the criteria for ASD due to fewer stereotypical and repetitive behaviours (Walker et al., 2004).

Childhood Disintegrative Disorder (CDD)

Childhood Disintegrative Disorder is an uncommon disorder that was only recently recognised (Alotaibi, 2015). CDD causes a lack of social, communicative, and repetitive behaviours in children, which usually occurs during the first two years of life (Phetrasuwan, Miles, Mesibov, & Robinson, 2009). When compared to children with ASD who typically gain skills over time, this disorder is characterised by severe regression after several years of normal development followed by a more significant decline of skills. Seizures and tuberous sclerosis are common in children with CDD (Murray-Slutsky & Paris, 2000 cited in Alotaibi, 2015).

Management of Children with Autism Spectrum Disorders

Despite the urgent need for intensive treatment and its societal significance (as mentioned in Liu, Conn, Sarkar, & Stone (2008), adequate

intervention services for children with ASD and their families are frequently difficult to find and are expensive (Tarkan, 2002, as cited in Liu et al., 2008). It is frequently left to the parents to take the lead and seek other options for treatment.

Drug therapy, behaviour therapy, and communications therapy are three important subcategories among the various therapies designed for people with ASD (Thomas et al., 2007). The cornerstones of ASD management are educational interventions, such as behavioural interventions and habilitative therapy. Communication, social skills, daily-living skills, play and leisure skills, academic accomplishment, and maladaptive behaviors are all addressed in these programmes. Medical care optimisation is also likely to improve rehabilitative progress and overall quality of life. Management of sleep disruption, challenging behaviours or psychiatric diseases, and concomitant medical problems, such as seizures, may be particularly necessary in addition to standard preventative care and treatment of acute illnesses (Thomas et al., 2007). Medications have not been shown to improve the core deficiencies in ASDs and are not recommended as a first-line treatment. Associated disruptive behaviours or psychiatric comorbidities, on the other hand, may obstruct educational development, socialising, health or safety, and overall quality of life (Thomas et al., 2007).

Psychopharmacologic intervention or, in certain situations, treatment of underlying medical disorders that are causing or exacerbating the behaviours may be effective (Thomas, Morrissey, & McLaurin, 2007). Behaviour-based therapies, such as positive reinforcement, individualised goals and programming, and creating a rewarding environment, have

consistently proven to be successful educational interventions for ASD (CDC, 2007; Cooper et al., 2007; National Autism Center, 2009 & Kamau, 2014). Furthermore, educational and behavioural therapies can help to alleviate some of the difficulties associated with the disease, giving children with ASD more alternatives in life (CDC, 2007; National Autism Center, 2009; Kamau, 2014).

Concept of Applied Behaviour Analysis (ABA)

Applied Behaviour Analysis is a set of concepts and principles devoted to the study and improvement of human behaviour (Cooper et al., 2007; Morris, 2009). The purpose of ABA as a teaching approach is to utilise interventions based on learning theory principles to significantly change socially relevant behaviours (Baer, Wolf, & Risley, 1968, 1987; Greer & Ross, 2008; Alberto & Troutman 2008). Playing skills, social, language, and interpersonal relationship, as well as basic living or self-help skills like cleaning teeth and fastening shoe laces, are examples of socially significant skills and abilities taught by ABA intervention. ABA is also used to help individuals with ASD reduce or eliminate aberrant behaviours such as self-stimulation, self-injurious and other disruptive behaviours (Maurice, Green & Foxx, 2001; Bailey & Burch, 2006; Cooper, et al., 2007).

The Journal of Applied Behaviour Analysis (JABA), ABA's flagship magazine, was first published in 1968. (Cooper et al., 2007). JABA is a cornerstone for the advancement of ABA since it provides a venue for researchers to share their results. Baer et al. (1968) produced a paper in the first issue that characterised ABA as applied, behavioural, analytic, technological, conceptual systems, effective, and capable of adequately generalised outcomes. Furthermore, in their 1987 publication, these

characteristics were refined even further (Baer, Wolf, & Risley, 1987 cited in Liao, 2017). These are the defining characteristics of ABA, are as follows:

Applied: This refers to researchers, practitioners, and service users or parents selecting behaviours for modification or change based on social importance and relevance in order to better the lives of clients and their families (Baer et al., 1968, 1987).

Behavioural: This emphasised three forms: First, the behaviour analyst examines what the subjects do rather than what they say. The behaviour to be studied must be socially significant. Furthermore, objective behaviour should permit accurate and trustworthy quantitative assessments. Third, because change occurs during the observation and data collection process, it is critical to inquire whose behaviour has changed. The factors considered are always the observed behaviours.

Analytic: A persuasive experiment design is what this term refers to (Baer et al., 1987). To allow for further application, a functional relationship between instrumental interventions and behaviour modification must be established.

Technological: This refers to the idea that definitions should be exact and that the practice process should be repeatable.

Conceptual systematic: This indicates that the process of altering behaviour, as well as explanations for how these changes occur, are meant to be systematically described on the principles on which theories were first created.

Generality: This implies that treatments can be employed not only in one situation but also in others and with various persons. According to Baer et al., (1968) If the application of behavioural approaches fails to produce big enough effects to be useful, then the application failed. These dimensions are

considered the foundation of ABA and are frequently employed as a set of guiding principles in the administration of ABA intervention (Cooper et al., 2007; Morris, Altus, & Smith, 2013).

Types of Teaching Methods in ABA Intervention

The principles of ABA are applied in intervention approaches, such as Discrete Trial Teaching (DTT) (Lovaas, 1987; Smith, 2001), Pivotal Response Treatment (PRT) Koegel & Koegal, 2006), Picture Exchange Communication System (PECS) Bondy & Frost (1996), Early Intensive Behaviour Intervention (EIBI) Lovaas, (1987) and

Discrete Trial Training (DTT)

Discrete Trial Training (Lovaas, 1987), is one of the most extensively utilised ABA training approaches (Lerman, Valentino, & LeBlanc, 2016). DTT is frequently used to teach a range of behaviours to children with ASD, from academic related activities, to self-help skills and social-communicative skills. This technique emphasises the value of one-on-one instruction in a highly structured environment. The child is usually forced to sit at a little table, frequently in a room without distraction, with the behaviour technician or analyst sitting across the table. Each child is taught, individualised, specific and behaviourally defined goals that are determined and taught in a systematic manner (Elliot, 2016). The behaviour technician or analyst usually assigns a task to the child and instructs them on how to complete it. If the child correctly performs the desired behaviour in response to the instruction, praise, food, and or access to a preferred item are used as a reinforcer to reward the behaviour. If the child does not complete the task, the reinforcer is withheld and verbal feedback such as "no," "try again" is usually given. After completing one

activity, the child is given another trial or the next task. If the kid does not respond adequately to the instruction over time, the behaviour technician or analyst will prompt him or her to do so. The child's success and growth are often measured by their ability to complete 80 percent of trials correctly. DTT is usually done for 30 to 40 hours per week with the learner (Elliot, 2016). DTT's most important features are that it is highly structured, therapist-led, and that each successful targeted behaviour is reinforced by items that are motivating but not necessarily related to the behaviour's natural consequence (Elliot, 2016).

Pivotal Response Training (PRT)

Lynn and Robert Koegel, as well as Laura Schreibman of the University of California, Santa Barbara (UCSB), developed Pivotal Response Training (PRT) (Alotaibi, 2015). It is developed on ABA principles. In children with ASD, PRT improves skill initiation and generalisation of learned skills (Koegel, Koegel, Harrower, & Carter, 1999). A pivotal response is a type of response that is associated with the major behavioural skills needed for functioning in children with ASD as well as influencing other behaviours (Prizant & Rubin, 1999). PRT focuses on pivotal responses such as responsivity to multiple and different cues, self-management, motivation, and self-initiated activities, as opposed to DTT, which focuses on teaching individual target behaviours one at a time in steps (Koegel, Koegel, Shoshan, & McNerney, 1999). Clear and appropriate prompts, child choice, turn-taking, presentation of maintenance tasks, reinforcing the child's efforts, responding to various cues, and a direct response–reinforce relationship are all components of PRT (Ingersoll, 2008). This intervention saves a lot of time and reduce

cost because it is carried out in natural settings (Pierce & Schreibman, 1995). For pre-school children, people with minor cognitive impairment, and people with a basic level of expressive and receptive language, PRT has been shown to be effective for them (Patterson et al, 2012). Research has shown that PRT is an effective treatment for improving social skills and communication for children with ASD (Patterson, Smith, & Mirenda, 2012).

Picture Exchange Communication System (PECS)

The invention of the Picture Exchange Communication System is accredited to Bondy and Frost (1994). It has shown great potentials in equipping children with ASD have functional communication skills (Mirenda, 2003). The PECS approach, which is taught in a structured setting, starts with teaching the child to make a request for a desired item and goes through sentence use, basic communication skills, and responding to questions (Bondy & Frost, 2002). PECS assists ASD children in initiating social interactions with their parents or teachers through the use of reinforcers (Howlin, Gordon, Pasco, Wade, & Charman, 2007). PECS training is divided into six phases, each of which is organised in a hierarchical order. Teaching the physically aided exchange, increasing spontaneity, simultaneous discrimination of pictures, creating sentence structure, responding to questions. This method of breaking down the training of a desired task into smaller components aids in identifying the precise aspect of the skill that the kid is having trouble with, as well as ensuring success in mastering the skill through the use of prompts (Yokoyama, Naoi, & Yamamoto, 2006). PECS is a useful method for training persons of any age who have difficulty communicating with their peers, particularly verbally (Travis & Geiger, 2010).

Early Intensive Behavioural Intervention (EIBI)

Early Intensive Behavioural Intervention is a long-term programme that uses a variety of ABA-based techniques, such as Discrete Trial Teaching (DTT) and Natural Environment Training (NET), for children with ASD (Liao, 2017). Lovaas and his colleagues conducted a University of California-Los Angeles Young Autism Project study (UCLA YAP model) in 1970 to generalise behavioural interventions from one teaching environment to another, such as the school or community (Lovaas, 1987). Many research analysed and duplicated the UCLA treatment approach, yielding a lot of evidence for EIBI's effectiveness (Birnbrauer & Leach, 1993; Smith, Groen, & Wynn, 2000; Eldevik et al., 2009; Hayward, Gale, & Eikeseth, 2009). Several empirical research evidence have found a statistically significant association between children with ASD's skills and abilities and their involvement in EIBI (Fein et al., 2013; Orinstein et al., 2014). EIBI should be generalised across environments, according to Fava et al., (2011). EIBI can be offered in a variety of settings, including community-based programmes (Perry et al., 2008), home-based programmes (Anderson, Avery, DiPietro, Edwards, & Christian, 1987), and ASD specialist nurseries (Anderson et al., 1987; Dillenburger, Keenan, Gallagher, & McElhinney, 2004)

Who administers ABA intervention?

Psychologists, special educators, speech therapists, and occupational therapists are all capable of providing ASD therapies; however, most ABA practitioners have been credentialed by the Behaviour Analyst Certification Board (BACB) since 1998 (Roane, Fisher & Carr, 2016). The BACB credentials were created to promote ABA training and practical experience

consistency, as well as competency assessment through structured examination. The BACB offers two credentials which are Board-Certified Behaviour Analyst (BCBA; graduate level) and Board-Certified Assistant Behaviour Analyst (BCABA; undergraduate level) credentials. Although BCBAs are allowed to work autonomously, Board-Certified Assistant Behaviour Analysts must be supervised by a BCBA on a regular basis. A university degree from a predefined academic area, a specified number of hours of university coursework in behaviour analysis, and a defined field experience supervised by a professional who has met the necessary training requirements are the primary eligibility requirements for each credential (Martin & Carr, 2020).The BACB ensures that the professional and ethical compliance code must be followed by all BACB-accredited professionals and assures that these experts provide the public, including children with ASD and their families, with consistent and effective behavior analytic services (Martin & Carr, 2020). By breaking difficulties down into manageable components, the BCBA can help the child with ASD develop his reasoning skills until he can enable him to independently uncover or justify truths inductively or deductively. This helps the child to be able to apply his scientific reasoning to more practical issues, allowing him to cultivate the virtues of intellectual craftsmanship and prudence. When a child's scientific thinking can be applied to the timeless truths of the cosmos revealed through intuition, the virtue of wisdom is realised (Furman & Tuminello, 2015).

ABA Intervention Dissemination in Ghana

According to Ghana's Ministry of Education 2015 Inclusive Education policy, (MOE, 2015) all students, regardless of their physical, intellectual,

social, emotional, or linguistic problems, are entitled to an education in a regular school. These regulations are inclusive, allowing all children in Ghana to participate, including those with ASD. Despite the existence of these legislation, Ghanaian parents with children diagnosed with ASD continue to have difficulty enrolling their children in both regular and special education schools (Allotey, 2020). According to the studies, parents of children with ASD in Ghana educate themselves in order to better manage their children's condition (Allotey, 2020). In Ghana, a lack of qualified professionals, inadequate funding, and societal attitudes continue to obstruct the provision of effective care to people with ASD (Mensah et al., 2018). Although instructional and treatment models based on ABA protocols such as EIBI are the most widely used and empirically validated treatments for people with ASD in most western countries (Reichow 2012) (Matson and Kozlowski 2011), it appears that little attention is paid to the dissemination of ABA-related services for people with ASD. In most African nations, including Ghana, treatment and management plans for children with ASD are extremely inadequate (Ruparelia et al., 2016).

While it appears that certain African countries are considering adopting ABA to be employed in the education of children with ASD, there is currently no national policy statement on how it should be done (Ruparelia et al., 2016). Attempts to disseminate ABA services internationally in low- and middle-income countries have hit a number of roadblocks (Daley et al., 2013). Economic difficulties and the stigma associated with disability are two of these barriers (Daley et al., 2013). Ghana is an example of a low- or middle-income country where these barriers prevent people with ASD from receiving

care and other social services. In Ghana, educational facilities and training centres for children with ASD were essentially non-existent decades ago, but today, a number of ASD centres or services, including ABA-related programmes, are springing up around the country. In Ghana, the majority of ASD centres and services are supported by NGOs and foreign donors (Knochel et al., 2021). ABA-based intervention in Ghana is relatively recent. Autism Compassion Africa (ACA) located in OLA estate, Cape Coast appears to be the first and organisation that provides 100% ABA based intervention to children living with ASD. ACA is run by three US trained Board-Certified Behaviour Analysts (BCBA) who serves as clinicals supervisors and trainers to teachers at ACA. Apart from supervising the ABA intervention programmes at ACA, these behaviour analysts also provide ABA training to some parents and teachers at Accra and Tema (Ghana). Autism Compassion Africa has a holistic approach to their intervention. ACA services includes parents training, holding family monthly informative training family training, which is open to the general public. The ABA techniques they use includes DTT, PRT, natural environment training and the ABCs of Autism, Picture Exchange Communication (PECS), Toilet Training, Challenging behaviour reduction, Task Analysis to Teach Daily Living Skills among others. Multikids academy an inclusive school in East Legon, in Accra also started offering ABA intervention for children with ASD about 3 years ago. ABA services in Ghana is very recent and it appears that the field has not yet been explored by the academia in Ghana.

Review of Empirical Studies

Impact of ABA Intervention on the Behaviour Change of Children with Autism

Researchers are increasingly agreeing that the majority of effective interventions for developing skills in children with ASD are behavioural therapies (Ruigrok, Salimi-Khorshidi, Lai, Lombardo, and Baron-Cohen, 2014), and there is a growing body of evidence supporting early intensive behavioural intervention (Dawson et al. 2010; Koegel, Koegel, Ashbaugh, & Bradshaw,2014. & Eldevik et al. 2012). Eldevik et al. 2012; Pituch et al., 2011; Reichow 2012 and Virués-Ortega 2010) reported that ABA is more effective than any other intervention for children with ASD. ABA has long been used to help people with ASD to gain socially relevant skills and thereby enhance their quality of life and that of their family (Ferster & DeMyer, 1961; Baer et al., 1968). ABA has a substantial amount of scientific support as a foundation for educational interventions for students with ASD (Dawson et al., 2010; Eikeseth, Smith, Jahr, & Eldevik, 2007; Lovaas, 1987). In fact, ABA-based early intensive interventions for children with ASD are statistically closely correlated to the best treatment outcomes (Fein et al., 2013; Troyb et al., 2014).

As a result of the convincingly research evidence backing the successful treatment outcome for ABA intervention, A federal court in the USA recently concluded that ABA constituted a medically necessary treatment for children with ASD, based on the weight of all scientific data. As a result, the court ordered that ABA be administered to children with ASD who are on Medicaid in Florida (Furman & Tuminello, 2015). Virués-

Ortega (2010) did a meta-analysis on a number of published clinical trials and single-subject studies examining the effectiveness of long-term, comprehensive ABA interventions. Standardised assessments of competence in the domains of communication, daily living skills, motor skills, socialisation, and an adaptive behaviour composite score were used to assess adaptive behaviour. In 15 different articles (n=232), an adaptive behaviour composite measure (combining all four categories outlined above) was reported. Thirteen of the 15 studies found that ABA intervention had a positive impact on ASD children (the pooled effect size was 1.09 (95 percent CI 0.70 to 1.47, p.0.001) (Virués-Ortega, 2010). The effect size grew as the intensity of the intervention grew. In 11 research (n=170), communication, daily living abilities, and socialisation were evaluated. For these three domains, all studies found positive effects of ABA intervention (Virués-Ortega, 2010). All studies had favourable effect sizes, resulting in a pooled effect size of 1.45 (95 percent CI 1.02 to 1.88, p>0.001). For daily living abilities, the effect size was 0.62 (95 percent CI 0.30 to 0.93, p>0.001). The pooled impact size of socialisation was 0.95 (95 percent CI 0.53 to 1.37, p>0.001) (Virués-Ortega, 2010). In three controlled experiments, 51 participants motor skills were reported. (Virués-Ortega,2010) found that the pooled effect size was 0.71 (95 percent CI 0.19 to 1.22, p>0.008). These studies showed that ABA intervention is effective in treatment the conditions associated with ASD in children.

Lambert-Lee et al. (2015), describes a comprehensive ABA model that is implemented in an independent, autism-focused school. Individual education plans and function-based behaviour support plans were developed

by behaviour analysts, and students were taught using a combination of individual and group instruction. The interventions were designed and monitored by ABA supervisors and consultants, and they were delivered by BACaBs and teachers with at least bachelor's degree. The principles of ABA were taught to all teaching staff. After a year, all students had improved significantly on curriculum and adaptive behaviour measures (Lambert-Lee et al., 2015).

Lambert-Lee et al., (2015) added a new dimension to ABA intervention evaluation for older adults and youths. Participants ranged in age from 6 to 18 years old. Lambert-Lee et al., (2015) focused on older children to give us a comprehensive view of the impact of the ABA intervention in terms of age differences in the ASD population, unlike many studies which focus on younger children under the age of five who are receiving the ABA intervention. Another study by Pitts, Gent, Hoerger (2019) showed that children aged four to 13 years with ASD made significant gains on measures of language, social skills, academic curriculum and adaptive behaviours after one year of education based on the principles of ABA. Pupils engaged in fewer challenging behaviours after the intervention, and they improved their language and learning skills, which may help them learn new skills more effectively in the classroom and in the wider environment (Pitts et al., 2019). Positive outcomes were revealed by statistically significant gains and substantial effect sizes in the areas of learning, language, social and play, self-help, and motor skills. All of the students improved their learning skills, such as attention, imitation, following basic instructions, and basic communication (Pitts et al., 2019). This study has provided a unique description of how ABA

treatments for students with special educational needs can be implemented across critical phases within a school setting.

In another study, Sallows and Graupner (2005), discovered that after prolonged and early ABA training, 34% of the children evaluated were able to communicate, behave, and interact socially at the same levels as normally developing children. This means that in order to manage the challenging behaviours and deficiencies of ASD through ABA intervention, early identification and intervention are critical. Zachor, Ben-Itzchak, Rabinovich, and Lahat (2007) evaluated pre- and post-EIBI ABA methods using the Autism Diagnostic Observation Schedule, a standardised benchmark for ASD assessment. The Autism Diagnostic Observation Schedule is a social-environmental screening method that evaluates four competence fields: language and communication, shared social interaction, play, and stereotyped behaviour. According to Zachor et al., (2007), 20% of children identified were moving away from the autism spectrum, and 20% were no longer categorised as autistic. This studies further emphasised the impact of early identification and intervention using ABA.

Foran et al. (2015), examined outcomes from an ABA intervention delivered in a UK special needs school. Staff trained in ABA principles supported a group of seven children with ASD between the ages of five and seven years. Individual education plans and function-based behaviour plans were designed for each child by behaviour analysts. Every week, the students received an average of seven hours of one-on-one ABA therapy. Results from the study indicated that the children improved significantly on tests of IQ, language, social and play skills, as well as academic skills after one year of

ABA intervention (Foran et al., 2015). Following function-based ABA interventions, there were also reductions in challenging behaviours (Foran et al., 2015). It is however noted that the study by Foran et al. (2015), was one of the first studies to examine the effectiveness of ABA interventions in the UK, used a new approach to evaluating the impact of ABA programmes. Unlike most studies in the USA, which focus on single subject research in clinical ABA settings, Foran et al., (2015) investigate how ABA can be administered in inclusive school settings

In a more recent study, Leaf et al. (2017), conducted a study is using randomised control trial to evaluate social skills among individuals diagnosed with ASD who are receiving ABA interventions. A blind evaluator assessed participants' behaviour before, during, and after the intervention, as well as during the 16 and 32-week maintenance probes. The study's findings showed that participants improved their social behaviour significantly after the intervention. Though recent ABA research, such as Leaf et al., (2017), are confirming prior findings, they also fail to include parents and teachers' perception on the intervention, particularly those from non-western countries especially those in SSA countries. With recent dissemination of ABA in more non-western countries, academics have started evaluating the impact of ABA intervention has on the children receiving it in those countries. In Indonesia for example, Melati, Indriyanti, and Setiawan (2019) studied the effectiveness of an ABA-based intervention for children ASD during dental brushing procedures in Indonesia.

When it comes to preventive brushing, an ABA-based method efficiently modifies autistic children's behaviour. The study found that

children with level one autism spectrum disorder have a stronger ability to follow instructions and use a preventive brushing approach regularly. The study concluded that ABA may be the most viable intervention option for modifying the behaviour of children with ASD when it comes to the usage of prophylactic brushes for tooth cleaning. The study by Melati et al., (2019) is commendable because it examines the impact of ABA intervention in a non-western country Indonesia, providing a worldwide perspective on the impact of ABA intervention. However, the impact of the intervention in SSA countries appears to be unknown in literature, a phenomenon which is hindering international dissemination of ABA for ASD treatment in SSA countries.

Impact of applied behaviour analysis intervention on the work of teachers educating children with autism spectrum disorder

It appears that literature on teachers experiences in using ABA is scanty as far as empirical studies are concerned. Few studies appear to have been conducted on the topic. Few of the available empirical studies on the topic is reviewed below. In a study to evaluate pre-service special education teachers' performance skills through behavioural skills training (BST), Sawyer, et al., (2017) used a pre- and post-test design to compare participant performance before and following behavioural skills training exposure. Contrived study scenarios were created where the participants, pre-service special education teachers acted in a role play to give behavioural intervention such as discrete trial training, PECS, prompting, modelling and naturalistic intervention and differential reinforcement of other behaviour to the

researchers who acted as students of disabilities demonstrating atypical and challenging behaviours.

Results shows that BST resulted in high levels of accuracy across targeted skills. When their performance were measured and compare before and after the role play, the result shows that the pre-service special education teachers had gain skills in handling challenging and atypical behaviours through the BST. The study recommended that BST should be included in college classrooms and in training curriculum for pre-service teachers to equip them skills to support students with challenging behaviours them when working as teachers. Having gone through the ABA training, it expected that participants in the present study would have BST skills. This study would explore how these BST skills have helped their work as special education teachers.

In another study conducted in the UK, Dillenburger, Keenan, Doherty, Byrne and Gallagher (2012) evaluated professionals (including teachers using ABA) and parents experiences with ABA based intervention in school and home settings in the UK. Sixty-seven teachers were sampled and their experiences of using ABA were explored. Most of the participants noted that parents of children on ASD experienced significant distress when trying to access appropriate education ABA had therefore come as a stop gap to relief the stress. The professionals noted that they participated in both school and home-based ABA intervention however, they needed more training in ABA to equip them with skills. The professionals also noted that ABA was applicable not only to children with ASD but to other relevant areas such as obsessional compulsive disorder, weight control in children, anxiety or phobias, conduct

disorders, sleep problems, sexual disorders, self-control, addiction management mental health and anti-social behaviour. The present study will seek opinions from the professionals on how they have applied ABA in other areas other than children with ASD.

In an earlier study that compared ABA intervention to Treatment and Education for Autistic and related Communication handicapped Children (TEACCH) to determine their social validation rating among special education teachers and to show if service providers such as special education teachers demonstrate preference for one particular treatment model over the other as an evidence-based intervention for autism, Callahan, Shukla-Mehta, Magee, & Wie (2010), sampled two groups of special education teachers, first group included those using ABA only and the second group those using TEACCH model only. Result showed that teachers did not show clear preference for either the ABA model or the TEACCH mode rather each group rated their intervention approach as socially valid. It is should be noted however that the current study does not seek to compare ABA to TEACCH as teachers sample in the study are all ABA trained however, teachers who had experienced other teaching model for ASD children before receiving ABA training will be asked their perceived impact of ABA compare to their previous teaching model.

Impact of ABA Intervention on Family Life of Parents

Home-based programmes for children with ASD have been well documented in terms of their constraints (Grindle, Kovshoff, Hastings, & Remington, 2009). The impact on family well-being, challenges attracting programmes instructors, and difficulties receiving funds from local school authorities are only a few of the issues. Parents' experiences with early

intensive behavioural intervention were investigated by Grindle et al. (2009). They found many advantages to a home-based programme, such as tutors providing additional support at home. Finding and recruiting qualified service providers, on the other hand, was a challenge. Parents in the UK sample had also had trouble getting financing from their local authorities, with some turning to self-funding measures including remortgaging their homes. According to Grindle et al., (2009), 30% of parents said their children had fewer opportunities to socialise due to lack funding for appropriate intervention for their children. Another study also found that many families believe they have little choice when it comes to home-based interventions for their children since it was often left for parents to fund intervention programmes for their children (Batten, Corbett, Rosenblatt, Withers, & Yuille, 2006). Mueller & Buckley (2014) also reported that parents complained that their voices have gone unheard and misunderstood by local authorities and professionals when it comes to providing fundings for home and school-based intervention programmes. This financial difficulty has been recorded as one of the difficulties faced by Ghanaian parents in managing symptoms associated with ASD in their children (Daley et al., 2013; Knochel et al., 2020). The impact on family well-being is another issue. This is critical because parents of children with ASD are more stressed and depressed than parents of children with other developmental impairments (Estes et al., 2009). Mothers of children in home-based ABA treatments have similar depression symptoms as mothers in other ASD groups (Schwichtenberg & Poehlmann, 2007). When their children participate in more intervention hours per week, mothers reported fewer depressive symptoms. Less extensive intervention is

occasionally chosen, which Carter et al., (2013) speculated could be due to the high cost of programmes in countries with little government support. Mothers who participate in their children' programme may face increased personal stress (Parker & Childs, 2019). Nonetheless, McPhilemy and Dillenburger (2013) found that ABA-based intervention resulted in high levels of parental satisfaction. However, utilising Likert scales to capture parental expectations, impact, and obstacles as outcome measures has provided little insight into the quality of experience of ABA-based intervention and its usefulness for programme implementation (Parker & Childs, 2019).

Parents have positive opinion of the ABA intervention. Parker and Childs (2009) conducted a study to get insight into parents' lived experiences with applied behaviour analysis-based intervention for their ASD children. The study found that, parents reported that the interventions empower and give them hope following its successful impacts on their children. Parents reported "feeling empowered," implying that the ABA-based intervention had a remarkable effect on the children.

Another study by Ogilvie and McCrudden, (2017) who surveyed parents' opinion about behavioural treatment for ASD. When parents are surveyed, they had positive sentiments of the use of ABA-based interventions in their children's treatment. When parents of children who had completed ABA intervention were asked to describe their experiences with the programme, they gave it a positive rating and said it was socially valid (Ogilvie & McCrudden, 2017). Similarly, parents of children treated with a range of home-based ABA-based programmes emphasised the interventions overwhelming beneficial impact on their children and considered them

socially valid (Ogilvie & McCrudden, 2017). The views of parents receiving ABA intervention in Ghana have been sort in this study to find out how they perceived the impact of the programme on their children and the impact on their family life.

Appropriateness of the Techniques Involved in the ABA Interventions

Influential autism-focused organisations, such as Autism Speaks, the world's largest autism Charity organisation, have been vocal advocates of ABA intervention for ASD children. Autism Speaks promotes ABA over all other options, stating that it is a scientifically verified treatment that results in substantial improvements (Kirkham, 2017). ABA arose from behaviorism, with the underlying notion that behaviour could be changed through rewards and punishments (Smith, 2013). From the 1950s, a number of researchers, primarily in the USA, expanded this to humans (Smith, 2013). The propriety of these techniques drew a lot of criticism and ethical considerations. Lovaas' approach was initially met with suspicion (Dixon, Vogel & Tarbox, 2012). Skinner, for example, had previously claimed that using punishment had unfavourable behavioural consequences (Dixon et al., 2012). Lovaas also attempted to attract wider media attention by asking journalists to observe his treatment. He confessed his tactics were severe in public interviews, but defended them as the best way to improve the child's life (Kirkham, 2017). Many American scholars were engaged on ABA by the late 1960s, and the inaugural issue of The Journal of Applied Behaviour Analysis was published in 1968. To control suitable practices used in ABA therapies, researchers founded professional groups such as the Association for the Advancement of

Behavioural Therapy and the Behaviour Therapy and Research Society (Horwitz, 2013).

Prior to the development of ABA interventions, practitioners at the University of London's Institute of Psychiatry and the Maudsley Hospital began to use a behaviourist approach to the treatment of mental illnesses (Marks, 2015). Psychiatrists like Isaac Marks and Michael Gelder, as well as clinical psychologists like Monte Shapiro, Stanley Rachman, and Hans Eysenck (Eysenck and Rachman, 2013), used aversion, exposure, and operant training to treat neuropsychiatric disorders like phobias, obsessions, and compulsions (Buchanan, 2010). The aggressive techniques used in this therapy were heavily criticised (Buchanan, 2010). In the early 2000s, people led campaigns against the use of physical aversive in ABA. People believed the practices employed for ABA therapies were harsh and unsuitable, which prompted these campaigns (Clancy, 2017). Despite the fact that these activists opposed ABA's therapeutic goals, some self-advocates have highlighted its physically harmful characteristics (Clancy, 2017). For example, the Autism Friends Network of autistic self-advocates declares that it opposes "physically injurious treatments" aimed at autistic people, implying that they would be considered "torture" if used on non-autistic children (Autism Friends Network, 2013). Some ASD activist sampled in a study, reported that ABA is not therapy, it's cruelty (Bascom, 2012; Ne'Eman & Bascom, 2020). A former ABA practitioner has made a similar argument, claiming that using physical aversive indefinitely is harmful. She concludes, that autistic people who have experienced ABA, treatment can leave people "traumatized and devalued" (Socially Anxious Advocate, 2015).

Some proponents of the ABA have reacted to the neurodiversity movement's accusations. For example, Burkaba (n.d.) argued that the critics are confusing ABA's' solid science with Lovaas' work, which she agrees is incorrect. She denies that ABA's standardising goals are problematic, claiming that, as with all education, modifying behaviour is the whole idea. People, not techniques or theoretical ideas, abuse other people, says Hastings (2013), a psychology professor at Warwick University, meaning that ABA should be defended. However, such direct confrontations with the arguments of the neurodiversity movement are uncommon; as previously said, most proponents of ABA are ardent and unquestioning supporters of the procedures use in the ABA intervention. Because there has been no real communication between proponents and opponents of ABA, these debates are unlikely to be resolved anytime soon.

Beyond these concerns regarding ABA, it is critical to consider what constitutes proper ABA techniques and what influences parents' views on the subject. Acceptability of an intervention is defined as a client's perception and judgement of whether the intervention procedures are acceptable, reasonable, and fair (Kazdin, 1980). Interventions that are deemed acceptable are more likely to be followed than those that are deemed unacceptable (Kazdin, 1980; Miltenburger, 1990). Treatment acceptability is a key variable that influences clinical results, through influencing treatment decisions such as whether to stop and client compliance with treatment guidelines (Tarnowski & Simmonian, 1992). Characteristics of the intervention, the child, and the parent can all influence acceptability of intervention. Procedures in ABA

therapies are more acceptable to parents of children with more severe behaviour problems (Choi & Kovshoff, 2013).

Parents who believe their children's behaviours is independent and not influence by the impact of the intervention are less likely to find the intervention acceptable (Thorton & Calam, 2011). The acceptance of the procedures involved in intervention can also be influenced by cultural factors such as stigma or if the intended objectives and goals are culturally relevant (Sanders & Kirby, 2012). Another factor that may improve acceptability is to discuss the variables that influence treatment outcomes with the parent at the start of the intervention (Sanders & Kirby, 2012). Parents who believe their child's intervention is ineffective are much more likely to abandon it (Matson, et al., 2009). Wolf (1978) questioned the concept of social validity when applying ABA methods. This topic emphasises on how essential an intervention is to society in terms of its goals, procedures, and outcomes. Ethics, cost, the feasibility of the intervention procedures, and the utilisation of the intervention are all factors to consider when assessing societal relevance if parents do not believe the intervention is socially valid for their children, they will place little value on it, and their motivation to engage in or continue with intervention will suffer as a result (Clancy, 2017). Other studies have been carried out to assess the response of the general public opinion on behavioural interventions. Positive reinforcement strategies are recorded to be preferred by parents over negative punishment techniques when it comes to reducing inappropriate behaviour (Jones, Eyberg, Adams, & Boggs, 1998). The most acceptable behavioural interventions reported by participants who took part in the study is positive reinforcement, which is followed by response cost, time

out, differential attention, overcorrection, and spanking as the least acceptable (Jones et al., 1998). Tarnowski, Rasnake, Mulick, and Kelly, (1989) found parents with children who have more severe challenging behaviours, as well as professionals who are more behaviourally focused, to be more likely to adopt behavioural based treatments procedures such as ABA (Tarnowski, et al.,1989). Parents' perception about the techniques used in ABA in Ghana is unknown.

Chapter Summary

The theories underpinning this study, concepts and related literature were reviewed in this chapter. Behavioural learning theory (operant conditioning) and theory of diffusion of innovation were the two theories reviewed. The concepts of ASD and ABA were reviewed in the conceptual Review. Empirical studies were reviewed based on the following; Impact of applied behaviour analysis intervention on behaviour change in children with autism spectrum disorder in Ghana, impact of applied behaviour analysis intervention on the work of teachers educating children with autism spectrum disorder in Ghana, impact of applied behaviour analysis intervention on the family life of parents with children in the autism spectrum disorder in Ghana and the perceived appropriate of techniques applied in the applied behaviour analysis interventions in Ghana.

CHAPTER THREE

RESEARCH METHODS

Introduction

The research method used for the study is explained in this chapter. The chapter comprises the description of the research paradigm and design, study area, population, sampling procedure and the data collection instrument used. Other issues covered in this chapter are pre-test of the instrument, data collection procedures, data management, data analysis and ethical consideration.

Research Design

The study took a qualitative approach and used a descriptive case study design (Yin,2003, 2018). According to Levitt, Morrill, Collins, and Rizo (2021), the term qualitative research refers to a group of approaches that examine data in the form of plain language using words to describe experiences or a phenomenon. Qualitative research employs a variety of techniques and approaches its subject in a naturalistic, realistic and interpretive, realistic manner (Denzin & Lincoln, 2011). This means qualitative researchers examine occurrences in their natural settings and attempt to comprehend or interpret phenomena in terms of the meanings people attribute to them (Denzin & Lincoln, 2004). It is utilised to interpret a complicated phenomenon about which there's little information. In this case qualitative paradigm is best fit for this study because there is little information about ABA intervention in Ghana and also the number of people receiving the intervention are also very few hence a qualitative paradigm was adopted to delve into the phenomenon. The use of qualitative method for this research

allowed participants who are parents and teachers of children with ASD to freely express their views and experiences on ABA intervention in their own words. It also allowed the researcher to get honest feedback from parents and teachers, as well as investigate the underlying social representations that arose.

Although, authors like Creswell and Poth (2018) have proposed phenomenological, narrative, ethnography and grounded theory as the main designs in qualitative research, qualitative researchers such as Yin (2003,2018), Merriam (2009), Baxter and Jack (2010) stated case study as a design in qualitative Research. Yin (2003, 2018) and Baxter and Jack (2010) went further to give the various types of qualitative case designs which included descriptive case study. The case study design was adopted for the study because the traditional known designs such as phenomenological, narrative, ethnography and grounded theory do not fit this study which seeks to investigates the perception of parents and teacher about ABA intervention. Phenomenological research, for example, aims to comprehend the essential and inherent characteristics of a phenomenon, such as people's lived experiences (Creswell & Poth 2018). Ethnography aims to comprehend not just how people interact with one another, but also how they interact with their culture in the environment they live. In grounded theory research, the aims are not only to comprehend the phenomenon under investigation, but also to construct a relevant theory about it. Narrative analysis examines people's stories, examining them in a variety of ways in order to comprehend the significance of the events depicted in the story (Merriam, 2009).

A descriptive case study design, is a kind of case study that is used to describe an intervention or event as well as the real-life setting in which it

occurred (Yin, 2003, 2018). Case study research, according to Yin (2008), is an empirical investigation into a current phenomenon in its real-life environment. He added that case studies are preferable when looking at current events, especially when the relevant behaviours under investigation cannot be manipulated. In this instance, application of ABA intervention in Ghana is the case being investigated by the researcher without any behaviour manipulation of the participants during the period of data collection. In descriptive research, the aim is to collect data to answer relevant questions about the current status of a phenomenon (Gay, 1992). Amedahe (2002), also stated that descriptive research seeks to accurately describe activities, objects, processes, and people. Because the aim of the present study is to assess the nature and practices of ABA intervention in Ghana from the views of teachers and parents the descriptive case study design was deemed appropriate for use.

The significance of case study in educational research cannot be overemphasised. It has proven to be useful in the study of educational innovations, programme evaluation, and policy formation in education (Merriam, 2009). This is not to say case study research has no limitations. The sensitivity and integrity of the investigator are some limitations in qualitative case studies (Stake, 2005). The researcher is the most important tool for gathering and analysing data in this type of research. The researcher is left to rely on his or her own instincts and abilities to analyse the data. This may present some form of bias on the part of the investigator (Hamel,1993). Other concerns such as reliability, validity, and generalisability are possible limitation of qualitative case study research (Hamel, 1993). A

single case, according to Flyvbjerg (2006), can advance both natural and human sciences. In addition, he argues that formal generalisations based on huge samples contribute too little to scientific advancement. Erickson (1986, 2012) also supports case studies, claiming that because generality rests in the specific, what we learn in one scenario can be applied to another. With the limitations of case mentioned by Hamel (1993), the researcher was very cautious and objective in the analysis and discussion of the results in order to ensure that the results presented are in their purest form, unadulterated by his personal beliefs.

Study Area

The research was conducted in two schools in two different regions of Ghana. These schools are Autism compassion Africa (ACA) in Cape Coast (Central Region) and Multi-Kids Academy (MKA) at East Legon in Accra (Greater Accra Region). These schools were selected because they all give ABA intervention to ASD children. ACA provides 100% ABA intervention. MKA on the other hand is an inclusive school that also gives ABA intervention to children with ASD. These schools have teachers trained as behaviour technicians/ therapists (BTs) who gives ABA interventions. Behaviour therapist at ACA and behaviour technicians at ACA and MKA also trains parents on how to give home-based ABA intervention to some children in their home setting.

Population

A population is an aggregation about which we seek to make inferences by sampling (Waples & Gaggiotti, 2006). Neuman (2007) defines population as the unit from which a sample is made. The population in this

study invloves all parents whose children with ASD receive ABA interventions at the ABA schools in Ghana and the BTs and BCBAs who give the ABA interventions in these schools. They were 48 parents and 52 BTs. The breakdown of the population is in the Table 1.

Table 1: Number of participants from each school

Name of School	**Location of School**	**Number of Parents**	**Number of BTs**
Autism Compassion Africa	Cape Coast (OLA estate)	14	15
Multi-Kids Academy	East Legon, Accra	8	4
Total		**22**	**19**

Source: Field Data (2021)

Parents and teachers were chosen for the study because they are those who spent most times with their children and are the best and the first persons to notice any behavioural, social and cognitive change in their children from the time they started receiving the ABA intervention. They are also the best persons to tell the impact the ABA intervention has had on their children and on their family lives. Since the children cannot speak and express their lived experiences of the ABA intervention and the research may not have the length time to observe each child in their natural setting (home environment and schools) it is appropriate the research chose parents and teachers and sample their perceptions about the intervention through interviews. To ensure that the research is not skewed in favour of the teachers' perspective of the intervention, the researcher included the parents since they are the service

receivers or clients of the ABA intervention and their views on the service they are receive is as important as that of the service providers (BTs and BCBAs).

Sampling Procedures

The sample is a subset of a population (Strydon & De Vos, 1998). I used purposive and convenient sampling techniques in this research. Purposive sampling is a sampling approach in which the researcher selects participants based on their knowledge of a specific topic (Tongco, 2007). According to him, it is the researcher's responsibility to determine what information to seek and who is willing to supply that information. As a result, purposive sampling is also described as convenient and flexible. I used purposive and convenient sampling because I was interested a particular characteristic of the population which were parents and teachers had children with ASD receiving ABA intervention for more than a year in Ghana. The purposive sampling is used to sample parents and teachers whose children are receiving the ABA intervention in Ghana. The inclusion criteria used were; parents and teacher whose children with ASD received ABA interventions at least 25hours a week for more than a year. Teachers must have additional qualification in ABA as a behaviour technician or behaviour analyst and must have practice in the field for more than a year. Parents and teachers who met the above criteria and willingly agreed to participate in the study were sampled and interviewed through convenient sampling. At the time of the data collection only six parents and 13 teachers agreed to participate in the study.

Table 2: Number of participants selected from each school

Name of School	Number of parents	Number of teachers (BTs/ BACBs)
Autism Compassion Africa	5	10
Multi-Kids Academy	1	3
Total	**06**	**13**

Source: Field Data (2021)

Data Collection Instruments

Data are the information that is gathered in the investigation of a case or study (Polit & Hungler,1999). Questionnaires, tests, interview guides, and checklists are just a few examples of data collection instruments (Seaman 2008). I made use semi-structured interview guides. A semi structured interview is a verbal exchange in which one person, the interviewer, uses questions to elicit data from the participants (Clifford, French, & Valentine, 2010). Since it is flexible, it allowed me to pursue a series of less structured questioning and obtain in-depth information from the participants. The use of a semi-structured interview guide provided flexibility, accessibility, and comprehension, as well as the ability to reveal crucial aspects of human behaviour (Kvale & Brinkmann, 2009).

Interview Guide for Parents

Interview guide for parents has the following sections; Section A: Background characteristics of participant, Section B: Impact of ABA intervention on the behaviour change in children with ASD, Section C: Impact of ABA intervention on the Family life of parents who have children with

ASD and Section D: Appropriateness of the procedures involve in the ABA interventions and Section E: Additional information participants wish to add

Interview Guide for Teachers

Interview guide for teachers has the following Sections; Section A: Background characteristics of participant, Section B: Impact of ABA intervention on the behaviour change in children with ASD, Section C: Impact of ABA intervention on the work of teachers who are educating children with ASD, Section D: Appropriateness of the procedures involve in the ABA interventions and Section E: Additional information participants wish to add

I prepared the interview guide based on the objectives of the study and it was taken to my supervisor for his expert opinion on the various items on the guide.

Pre-testing of the Instruments

It is therefore imperative to be watchful of the sources of error when conducting research. The essence of this pre-testing was to gain insights into the feasibility of administering the research instruments, the clarity of questions, translation of words and phrases from English to the Ghanaian languages (Twi and Fante) and any other challenges that may arose during the field work. After the pre-testing, necessary modifications were made to the instrument; for example, words and terms such challenging behaviour, adaptative behaviour were explained in simple terms for the understanding of participants and their mode of administration reviewed before the actual field work commenced. The development and validation of an instrument is primarily concerned with eliminating error in the data collection process (Kimbertin & Winterstein, 2008). The research instrument was pretested at

ACA. One teacher and a parent were interviewed for the pretesting. These two participants were however not involved in the main study. Each interview last between 25 and 30 minutes. The interview was done in the home of the parent but for the teacher it was done on a weekend on phone when she was home. This was done out of her working hours and workplace to ensure that her colleague teachers do not get access to the interview questions.

After the pretest, some changes were made to the interview questions. For example, questions such as 'Do you have other professionals involved in work? 'Has ABA affected the way you relate with other children?' added to the main interview guided as result of finding coming from the pretest. Also, some changes were done to the main instrument after the pretest. For example, problem behaviours in the pretest instrument were changed to challenging behaviours, sensitivity to light and sound was changed to hypersensitivity, this was done because participants in the pretest were finding it difficult to understand the initial phrases. Also, the parent I interview spoke in Fante Twi, this helped me to get an expert in Fante Twi to break down some key concept in the work for easy understanding of participants in the main study who preferred the interview to be conducted in Twi. For example, instead of using the phrase challenging behaviour for the main study I used a description of the phrase challenging behaviour in Twi for parents to understand. This was done for other phrases and words used in the interview guide which has no direct translation in Twi.

Trustworthiness and Authenticity

The researcher must reduce bias and raise the veracity of a claim regarding the phenomenon by assuring the research' credibility, transferability, trustworthiness, conformability and dependability (Krefting, 1991). Concerns about the representativeness of the typically small sample employed in qualitative studies, as well as an alleged lack of rigour collecting, analysing, and interpretating data, have led to skepticism in qualitative research (Cobbold, 2015). This lack of rigour is linked to the issue of bias brought by the researcher's subjectivity (Hamel, 1993). Lincoln and Guba (2000), developed qualitative research equivalents of internal validity as credibility, external validity as transferability, reliability as dependability and objectivity to ensure the study's conclusions were trustworthy which he termed as confirmability. The study's reliability and validity concerns will be addressed in terms of credibility, transferability, dependability, and confirmability.

Credibility

In qualitative research, the credibility construct is the qualitative equivalent of internal validity (Cobbold, 2015). According to Cobbold, it typifies the degree of concordance between the actual viewpoints of the participant and how the researcher has portrayed them. In the study, credibility was achieved through triangulation (Reeves, Kuper, & Hodges, 2008) as it helped to reduce bias on the part of the researcher. This was done through participants interview triangulation, as the responses came from different participants (Parents and teachers) which aided the verification of finding and avoidance of bias and skewedness (Roper & Shapira, 2000).

Transferability

The term "transferability" refers to whether a study's findings are applicable outside of the study's subjects and context (Cobbold, 2015). Although it does to a degree, the very tenets of its operation are that human behaviour is not random but unpredicted (Cobbold, 2015). As a result, researchers using qualitative approach are more concerned with the question of where their study will be applicable to rather than the question of whether their findings are just generalisable (Cobbold, 2015). To facilitate this, I gave a description of the study context and how the participants were sampled. This information will help anyone transferring or making inference of my study to make judgement of which aspect of the result they want to use.

Dependability

The issue of dependability concerns whether the results of the study would be consistent and replicable if repeated with the same participants in the same setting (Neuman, 2003). Consistency is achieved through transparent research method used to arrive at a conclusion (Neuman, 2003). Mertens (2005) has stated that a dependability audit should be done to certify to the quality and suitability of the inquiry process utilised in the study in order to permit dependability. To achieve this, I meticulously documented all decisions taken during the research process, including the data collection instrument, data collection coding, and data analysis techniques, in order to permit a reliable audit of the research process.

Confirmability

Confirmability is concerned with demonstrating that facts and interpretations of findings are not merely figments of the researcher's imagination, but can be traced back to where the data were collected (Tobin & Begley, 2004). To achieve this (Mertens, 2005), noted that the approach used to interpret the data is stated clearly, and the process of integrating data to derive conclusions may be verified. In the current study, this was accomplished through the triangulation of participant interviews, as the majority of the statements were stated verbatim in the analysis to reflect the participants' perceptions and views exactly as they stated them.

Ethical Issues

Informed consent, confidentiality, and the guidance of an ethical review board are the most important ethical factors in social research. Informed consent requires the researcher to provide the participants with correct information about the study's objectives (Kothari, 2017). The University of Cape Coast's Institutional Review Board (IRB) gave ethical approval. In addition, approval was obtained from the participants' gatekeepers. Gatekeepers play a critical role in ensuring that researchers have access to the people and places they need to do research (McFadyen & Rankin, 2016). The participants were also informed about the study's purpose and the nature of the instruments. All of the ethical principles outlined below were observed.

i. Informed consent: Participants were informed about the purpose of the study as well as their expected role in the successful completion of the study. After that, their verbal consent to engage in the study were

sought. Participants were informed that those who wished to withdraw from participating in the study would be permitted to do so.

ii. Right to privacy: Conscious efforts was made to respect the privacy of all participants. The degree of intrusion into the private lives of all participants was guided by the objectives of the study. Participants were not coerced to respond to questions they are not comfortable with.

iii. Anonymity: The identity of all study participants was protected, and they were made aware of that. To achieve this, real names and specific location of informants were deliberately omitted from the research reports and final thesis. Codes and some bio-data were used to label the responses for the sake of analysis.

iv. Confidentiality: All participants were assured that all information given in response to questions posed during the study would be strictly used for the intended purposes. The information was kept private and was not handed over to a third-party under any condition.

Data Collection Procedure

The data collection was preceded by an introductory letter which was requested from the Department of Education and Psychology, University of Cape Coast (see Appendices D). This was given to the parents and BTs through the heads of the various schools. This was done to enable the participants to fully elucidate what the research was about and to eliminate all possible issues that might baffle their minds. The formal introduction also helped to establish rapport and to explain how the instruments will be used that is, one-on-one interview with the participants and note taking, and the

approach of data collection thus, with the permission use of an audio recorder. With the approval of the interviewees, all interviews were recorded. Each participant spent an average of 20 to 30 minutes in the interview. The entire interview process took three weeks. In the realm of qualitative research, the face-to-face interview has long been the most common interview technique. Due to the outbreak of the corona virus pandemic getting physical access to participants on time was challenging. Especially for parents their tight work schedules could not allow the researcher to interview all of them face-to-face. Although the researcher was able to interview some participants at their schools, workplace and homes, getting physical access to all of them was challenging. The researcher resolved this by agreeing with those participants with tight work schedule to conduct the interview via phone calls with permission from the participants to record the conversation for the purpose of analysis.

Data Analysis Procedure

The goal of qualitative data analysis is to find, code, and categorise patterns or themes in the data (Woods, 2011). I employed Braun and Clarke, (2006) thematic analysis of data. The steps I followed to analyse the data using Braun and Clarke, (2006) thematic analysing of data was familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing the report. All qualitative in-depth interviews conducted during the field data collection were recorded and transcribed. Second, by regular line-by-line reading and re-reading, data from the interview transcripts I familiarised myself with the data for easy understanding and analysis. Re-listening to audio recordings and reading field

notes was also done during this step, as suggested by qualitative researchers Allen, (2010), to improve familiarity with the data. I then used Nvivo 11 Plus software to code the transcribed data into codes and later categorised them into themes. Both similar and different views, experiences and perceptions on the subject were identified under sub-themes to aid comparison. Finally, quotations from empirical and theoretical review were used to support the view, experiences and perceptions raised by the participants.

CHAPTER FOUR

RESULT AND DISCUSSION

This chapter presents the results and discussion of findings from the study. This study examined the application of applied behaviour analysis in the treatment and education of children with autism spectrum disorder in Ghana: Interview data were collected from teachers giving applied behaviour analysis interventions in Ghana referred to as Behaviour technicians and Behaviour analysts and from parents whose children were receiving the intervention. The data collected were based on the research questions and grouped under the following themes for analyses;

1. Impact of applied behaviour analysis intervention on behaviour change in children with autism spectrum disorder in Ghana.
2. Impact of applied behaviour analysis intervention on the work of teachers educating children with autism spectrum disorder in Ghana.
3. Impact of applied behaviour analysis intervention on the family life of parents with children in the autism spectrum disorder in Ghana.
4. The perceived appropriate of techniques applied in the applied behaviour analysis interventions in Ghana.

Demographic Information of Participants

Understanding the dynamics of any given population requires an understanding of its socio-demographic characteristics (Grix, 2004). The demographic characteristics of participants of this study includes, gender, age, marital status, educational qualification, occupation, qualification in ABA, years of teaching in ABA and years of receiving ABA intervention. This demographic information is presented in Table 3.

Table 3: Biographic Information of Participants

Variable	Teachers	Parents	Frequency	Percentage (%)
Gender				
Male	4	4	8	42.00
Female	9	2	11	58.00
Total	**13**	**6**	**19**	**100.00**
Age range				
25-30	10	-	10	52.60
31- 35	2	-	2	10.50
36-40	1	1	2	10.50
41-45	-	1	1	5.30
46-50	-	1	1	5.30
51-55	-	2	2	10.50
56-60	-	1	1	5.30
Total	13	6	19	100.00
Education Qualification				
JHS	-	1	1	5.26
SHS	-	-	-	-
Bachler's degree	10	2	12	63.17
Master's Degree	3	2	5	26.31
PhD	-	1	1	5.26
Total	**13**	**6**	**19**	**100.00**
Qualification in ABA Therapy				
Behaviour Technician	11	-	11	84.62
Behaviour Analyst / Clinical Supervisor	2	-	2	15.38
Total	13	-	13	100.00
Number of years teaching (Using ABA)				
1-2 years	-	-	-	-
2-3 years	4	-	4	30.77
3-4 years	9	-	9	69.23
Total	13	-	13	100.00
Number of years of receiving ABA intervention				
1-2 years	-	-	-	-
2-3 years	-	1	1	16.66
3-4 years	-	5	5	83.34
Total	**-**	**6**	**6**	**100.00**

Source: Field survey, (2021)

From the demographic data shown in the table 3 above, nineteen participants were interviewed for the study. The results from the qualitative interview data indicates that thirteen teachers made of eleven behaviour technicians and two behaviour analysts also known as clinical supervisors and six parents were interviewed for the study.

This shows that participants from Autism Compassion Africa dominate the study. Autism Compassion Africa being the first school in Ghana to offered clinical ABA services to children with autism has more trained behaviour technicians and behaviour analysts than any other schools in Ghana, it is therefore reasonable to have more participants from Autism Compassion Africa. In terms of gender, eight participants comprising four teachers and four parents are males while eleven participants comprising nine teachers and two parents are females. The data on the age distribution shows that majority of the participants (teachers) fall within the age range of 25-30 years, the ages of parents range from 40-60 years. Information from the interview data as presented in the table 4 indicates that for educational background of participants, one participant is an SHS leaver, 10 are bachelor's degree holders, five master's degree and on PhD holder. Judging from the data, it can be said that the participants are literates.

When a question was asked about the number of years teachers have working as behaviour technicians or analysts in Ghana, their responses showed that four of the teachers had been giving the ABA intervention for a period between 2 -3 years and nine had been doing same for a period between 3-4 years. The last part of the demographic data as shown in the table 4 above was seeking to ask parents the number of years their children had receiving

ABA intervention. Five of the parents said their children had been receiving ABA for a for 3-4 years and the remaining said the child had been receiving the intervention for 2-3 years.

Analysis of Findings

The findings are based on the research questions and presented in themes and sub-themes that emerged from the codes I gave to the transcribed interview data.

Research Question One: What is the impact of ABA intervention on behaviour change in children with autism in Ghana?

This research question elicited responses from participants, thus, teachers and parents about the behavioural changes they have observed in their children following the ABA intervention. Five major themes emerged from the responses given to research question. The themes are as followings,

a. General impact of the ABA
b. Impact of ABA on child's communication
c. Impact of ABA on child's challenging behaviours
d. Impact of ABA on Child's self-help skills
e. Impact of ABA on Child's Social Skills
f. Impact of ABA on child's attention
g. Impact of ABA on child's motor skills

General impact of the ABA

I asked participants to give their personal impression about ABA as treatment and educational intervention for children with ASD. The views of participants regarding their general evaluation of the impact of ABA on their

children was captured into the following sub-themes. These emerged from participants own words.

i. ABA has been positive
ii. ABA has been helpful
iii. ABA is super amazing
iv. ABA is very powerful
v. Rate of behaviour change varies from child to child.

ABA has been Positive

Participants shared their views that they had seen positive results in the lives of their children following the ABA intervention. From their claims their children are able to perform tasks independently, gaining mastering of self-help skills, communication, social and motor skills, safety, decreased in challenging behaviours and helping children to do things better. The views of participants with regard to the positive impact of ABA are optedly captured in the quotes below:

As a teacher, when I got to know ABA and understand ABA and me using it to impact life, I see it to be very effective. Because I have seen positive results. I have seen most kids have gained mastery and independence in so many areas of their lives; being it communication, being it social skills, being it self-help skills and other safety measures. Most kids have gained independence and I feel really good when I see most of these kids doing most thing independently without any assistance; things that they couldn't do at all, skills that they never had. But now they have

gained mastery in them. It gives me joy when I see such kids. **(Teacher 5)**

Another teacher also from school M, expressed her views on the positive impact of ABA this way:

My case child was around 20 years old that I had him and he had a lot of challenging behaviours distractive, pocket stuffing was part, aggression was part, none compliance was part. But through ABA, we were able to free him out the None-compliance and his aggression has gone down, Pocket Stuffing is moderate as compared to previously. **(Teacher 6)**.

These views on the positive impact of ABA were similarly shared by two parents, one from school M and the other from school K.

When we took my grandson from his former school to school M to receive ABA, there has been a lot of improvement in his condition. What he was not able to do, now he can do it. Now he can bath on his own, brush his teeth, he can apply pomade on his body independently, when we wash, he able to remove the things from the dry line, He is able to identify his own cloth, that of his mum and mine. So, I can see there has been a lot of improvement since we took him to School M. **(Parent 5).**

Certainly, ABA has been positive. Because ABA helps children with autism to do things better. It helps them as in everyday life skills so ABA is very very key. I know of other children in the USA who have gone through ABA and they started off just like how i describe my son that's about 4-5 years ago and these children

with the help of ABA intervention are doing very well now. One guy is in the university. So, as I have started seeing improvement in my child, I know with the ABA intervention he is receiving, I know things will be better. **(Parent 6)**

ABA has been helpful

From the interview it emerged that ABA had been helpful not only to the children receiving the intervention but to their families and the teachers as well. A participant from school M and another from explained this in the quotes below:

The second child that I had as my case child, he had a lot of stereotypy issues. Lots of stereotypies; he does a lot of Self - Injury behaviours (SIB), hitting the chain or head, biting the finger and other stuff. For now, finger biting has gone down, SIB has gone down. In a nutshell, I will say ABA is really good. It helps tame the bad behaviours in children so with time we can fade away all these negative behaviours or challenging behaviours that the child has. **(Teacher 7).**

A teacher from school K added:

I would say ABA has been helpful. It really has helped me especially in controlling challenging behaviours or even getting children to do what they have to do. ABA has really been helpful. And from what I have learnt, ABA is not only for children with Autism. It is for everybody. So, I can use ABA to run my life or I can use ABA on my family, my friends, anyone. I believe ABA is a good therapy that can be used everywhere. And if everybody

can get the chance to know about ABA and get involve in ABA, it will be very helpful. **(Teacher 11)**

ABA is Super Amazing

Some teachers and parents gave the general impression that comparing ABA to other intervention they were exposed to before starting the ABA intervention for their children, they will say ABA is super amazing. A participant explained this in her words below:

I worked with children with Down syndrome, learning difficulties but then we don't use ABA. In fact, at that time, I didn't even know what ABA is. But I would say ABA is super amazing because at my former school, we try to read into the mind of the children, try to think what is wrong with the child but with ABA see look at observable behaviours and clap for our achievements. **(Teacher 1)**

Her views were affirmed by a parent as:

The school he was first the teachers seemed not to know what to do to teach him, they always leave him idle but when I took him to school M, I have seen some orderliness in their approach to handling him far different from his former school. I pray that God gives them the heart to continue to take care of the kids. **(Parents 2)**

ABA is very powerful

Participants expressed their views that ABA is very powerful intervention because its application to children with autism had enabled some of them gained skills that the application of other traditional interventions

would not have enabled these children to acquire in the often. A teacher from school M stressed that she had a case child who through the ABA intervention has gained mastering of his motor and self-help skills and had graduated into vocational training now. She therefore described ABA intervention as powerful. Her statement is stated below:

> *I will start by saying that we had a child who came to school M and couldn't do anything but with ABA intervention that child is now in Vocational school, so ABA is very powerful and working effectively for children with autism in Ghana. With my case child that was her main challenge, when she wants to use the washroom, she couldn't communicate to us she will just do it on herself, she couldn't brush her teeth, she didn't know how to handle a spoon to eat, her self-help skills were very poor. So, her intervention was developed and focused on self-help skills. For a period of about a year and half, I seen great improvement in her self-help skills, especially her eating skills improved tremendously. First it was with assistance but now she can eat independently on her own with assistance.* **(Teacher 10)**

Are these impacts due to the ABA intervention alone

As to whether this impact is solely due to ABA intervention, a parent **(Parent 3)** expressed his view that he gave other intervention such as dietary supplements to his child but was not seeing improvement as rapid as when the child started receiving the ABA intervention. He further added that though he combined the ABA intervention to the dietary supplements he gave to the

child, the ABA has helped the child to improve a lot. His views are stated below

> *When I was work in Accra, we took him to different hospitals for treatment, the doctors recommended dietary supplements for him, so we bought them. But his skills area such as self-help skills were not improving, he was not even able to walk. So, I started reading on the internet about treatment for autism and came across ABA, there is this Wattsap page for parents with children with autism, someone mentioned ABA. I searched for ABA intervention in Ghana but couldn't get none. Few years later I was transferred to my current place of work and some introduced me to school M, we started send him to school M, months later, I went to work and my mother in-law called me on phone that a miracle has happened, my son stand on the feet and started walking. I think the ABA therapy they give him at school M played a major role because he wasn't walking when I took him there.* **(Parent 3)**

Rate of Change

Participants pointed out that the behavioural changes they had seen in the children differs from child to child. The rate of change mostly depended on the child. While it can take six months to see changes in some children, for other it could take about one year or more. The also noted that early intensive school-based and home-based intervention worked faster for the children. In her own words **Teacher 1**, explained this point as:

However, the rate of change depends or behaviour decrease depends on the child. Some child took over 1 year, other 6 months and some as early as 2 moths you will begin to see a change. Also, children who received the interventive intensively at school and at home responds faster.

The general impact of the ABA on the children receiving the intervention in Ghana were deduced from the views of teachers and parents in school M and school K in the above statements. Sub-themes such as ABA has been positive, ABA has been helpful, ABA is super amazing, ABA is very powerful, rate of behaviour change merged to described the broader theme 'General impact of ABA'. It revealed from the above statements that although participants expressed in general term positive impact of ABA, the impact varies from child to child. While it could take up to six months to see impact in a child, some children can take about one year. Early intensive school-based and home-based intervention woks faster for the children. After the participants expressed their views on the general impact of the ABA intervention, I went further to probe the specific skill areas they had observed these impacts. Impact of ABA on child's challenging behaviours, impact of ABA on child's communication, impact of ABA on child's attention, impact of ABA on child's motor skills, impacts on social and self-help skills were probed and categorised as themes with each further probed into detailed to reveal the exact skills area that was observed. This is explained in the sub-topics below.

Impact of ABA on child's Communication

Communication is a major challenge for children with autism. They are unable to express their needs and wants due to lack of communication. While some of these children are vocal many others are non-vocal. A typical characteristic of autism is that even for children who appears to be of vocal, their speech is not clear, they make unintelligible sounds when speaking. I probed participants on their views about the impact of ABA on the communication of the children. Analysis from the data collected from teachers and parents revealed improvement in the communication and speech of children receiving the ABA intervention. According to the interview data from the participants, communication and speech improved through the use of alternative form of communication for non-vocal children and also a therapy that improved the speech of vocal children. Basic sign language, the use of picture exchange communication system was found to be the alternative form of communication for non-vocal children with ASD through ABA. For children who were vocal had unclear speech, Data base communication system and vocal and sound imitation training were used to help them to build vocabulary and improved their speech. Three sub-themes emerged from the impact on communication. These are the use of;

i. picture exchange communication system
ii. basic sign language
iii. data base communication system
iv. speech

The use of Picture Exchange Communication System

According to a participant **(Teacher 2),** most of the kids in her school were non-vocal, so these children were taught alternative ways to communicate. Those who were able to use their fine motor skills, were taught how to sign (basic sign language) and those who were not able to grasp the meaning of sign language were taught picture exchange communication system (PECS) to communicate their needs. When asked whether PECS had improved communication? **Teacher 2 responded** in the affirmative as stated below:

> *We have kids who were not trained with this Picture Exchange Communication Skills but later on were able to communicate basic sentence; to say 'I want…' then they take the picture of that particular thing. so, for the PECS, we use pictures or the things that the kids are mostly familiar with in the environment so that they always encounter. That way, we think it helps them to quickly grab the concept. So, some of the kids were not trained, I cannot mention their names because of confidentiality. But when I came here, there were some kids who could hardly communicate 'I want water' but now can exchange picture of water. So, what we do is that we take pictures of those things that we want them to be able to use to communicate which is also in their natural environment. When they go home, they may also find those materials there. So, we take pictures of them, we laminate and use them so that it can easily be safe. So that they*

*exchange. And we start from somewhere and we believe in teaching from known too unknown (***Teacher 2)**

A teacher from school K shared a similar view on the use of PECS

so, for speech, all my children I worked with were not vocal so I didn't work on speech but for communication wise we were using PECS. So, example when you want to go to the washroom you pick up the PECS to show that you are going to the washroom and that has really help them communicate their needs **(Teacher 13)**

A parent from school M affirmed this position on the use of PECS. His views are stated in the statement below:

So far, His vocal speech is not is normalised but there is small small improvement in the sound he makes, overall, there has been great improvement in his communication. He has been taught picture exchange communication to help him communicate with us when he wants something done for him or when he wants to do or request for something, these have helped us a lot understand him when he needs something and it has helped reduce his tantrum throwing behaviour. So, for his communication I am satisfied with what has been done so far. **(Parent 1)**

The above data revealed that the use of PECS as an alternative form of communication had improved communication for non-vocal children with ASD who were receiving the ABA intervention in Ghana.

The Use of Basic sign Language

From the qualitative interview data, it was revealed that apart from the use PECS as an alternative means of communication for non-vocal children with ASD, they were also taught basic sign language to help them communicate. A participant opined on this as:

> *Most of the kids who also have the fine motor actions or fine motor skills we train them on basic sign language. And so, what we do is that we have signs like MORE, HELP and all that. Some of us are trained in Sign Language. I did Sign Language and so I have knowledge in that too. What we do is that, to be able to reach out, to communicate, we believe that these are signs that we can use to communicate lots of things to somebody. So, let's say a child want more of something; hungry, want to eat or not satisfied, they have been trained how to basic sign to communicate that. These signs include 'more', help, stop and so on. When the child does this, we know that the child wants more of this and we quickly deliver it to them. That is also one alternative way to train a child in communication. I must say the children are doing well with that.* **(Teacher 3)**

A teacher from school K added that they had been trained in basic sign language which they taught the children to use. The children according her, could now use the basic sign language to request for items such as water, food or play. His views are captured as follows:

> *so, we also have sign language training in terms of communication. We teach the children basic sign language to*

request for things they want. I will say we've seen a huge improvement; communication has improved. The children can now sign to request for items like water, food or play. **(Teacher 12).**

Two parents whose children were non-vocal supported the views of the teachers that their children' communication had improved through the use of basic sign language. This had made them understand their children better. Their views are stated below:

He has also been taught simple sign language like 'all done', 'I want more', 'is ok' this has helped him communicate his needs. **(Parents 3)**

His communication has improved through the use of PECS and the basic sign language he is being taught. I must say ABA has been so helpful. We now understand our son better. **(Parent 4)**

The use of Data Base Communication System

Apart from the use PECS and basic sign language, it was revealed from the data that a software known as data base communication system was used to help the children to improve their communication and build more vocabulary. To elaborate on this issue, a teacher from school K stated quoted in the below that:

those children are able to talk too, it's really not clear and use the PECS and database communication system. Yes, even those with vocals we still use PECS alongside because research has shown that, doing that helps them build more vocabulary **(Teacher 12)**

The use of Speech

Data from the study indicated that children who were vocal although could speak, they had speech defects that was making their speech unclear. ABA programmes such as Vocal Imitation and Repair Unintelligible Speech and imitate sound were designed to repair their speech. Participants however, stated that with the speech, they involve other professionals like speech and language therapist who occasionally came train the teachers to implement it. This point is elaborated in the quotes below:

> *Those kids who have vocals or who can also speak but are not intelligible, we have programs like Vocal Imitation for some of the kids. And when I joined here, I know some of the kids who were not communicating well with their voice. We have programs like Repair Unintelligible Speech for some of the kids. And so, when they initiate communication, we make sure we engage them more in the communication for them to speak up. And then we have also had instances where we have programs like Imitate Sounds. So, they imitate certain sounds and we encourage them to also use their voices even at home and we do that with parents and we train them to able to do that for the kids at home.* **(Teacher 2)**

> *So, we started with vocal imitation. We print certain words, then we show it to him. Then he tells us what they see on the card. So, let's say we have bathroom, hall, kitchen. So, we show it to him, then he says 'kitchen'. Then we know that yes, he knows these things.* **(Teacher 7)**

Impact of ABA on Child's Challenging Behaviours

Aggression, Tantrum, body rocking, kicking and self-biting were challenging behaviour identified by participants to had reduced drastically in the children as a result of the ABA intervention. Participants shared the following views on the impact of ABA on aggressive behaviours:

> *We have 'hand to object' intervention, kids who have been hitting their hands on tables, you put a blocking pad so that they wouldn't hit their hand on the table. We have had instances, where when they tap, we give them mutual faces, we are not giving them any vocal reprimand, like won't you stop what you doing, we ignore all those things we also give them time. At school M, everything is based on data, so talking about challenging behaviour so many behaviours have been declined., some are aggressive because most of them are not able to communicate their needs. Some have met their criteria and their target; some are not screaming that much. They have alternative ways to communicate their needs.* **(Teacher 4).**
>
> *….all children I worked with had challenging behaviours and there's been tremendous change for instance my first child of 8 years was crying as a form of escape from work which is a negative behaviour we had to correct so after putting interventions in place, like to having to work before you play or asking for breaks when you're bored so now instead of crying, he points to his sheet that the wants to work and take a break. Currently the child I'm working with does the self-hitting, so he*

will hit himself very hard to his ear and he's had a surgery to his ear so his parents were concerned that if he continues really hard, he will shift the hearing aid in his ear so we had to put interventions in place like redirection and by God's grace by the end of the term, there have been an improvement of about 80% **(Teacher 13)**

Parents reaffirmed the position of teachers that they had also observed changes in their children with regard to challenging behaviours owing to the ABA intervention.

*Formerly he used to do that, throw himself on the ground at the least provocation but things have changed now. When he started schools there was a training that they gave him, which we parents were also taught to take them through when they are home on vacation. I must say the tantrum has stopped in a long while now. Though he does get upset once in a while, he doesn't throw himself aggressively on the ground as he used to do formerly. For example, those days, when I am taking him to schools he can get upset about his colleague and start hitting him or her but so far, he has stopped***. (Parents 5)**

Another parent pointed that though the change was not drastic, it was a gradual process but over time he noticed that the aggression, body rocking and tantrum had reduced.

The aggression and temper tantrum has reduced, I wouldn't say it was drastic, was gradual but has indeed reduced. When he is with me, he doesn't really show any sign of hyperactivity,

formerly he shows a lot of hyperactivity, when he needs something. But when I took him to school M, they have worked on his speech so now he is able to communicate his needs so when he wants anything he is able to tell us without throwing tantrum. **(Parent 2)**

Another result from the interview shows that when the children found an alternative show of communication, the rate at which they exhibit their challenging behaviours declined. This point in reemphasized by a teacher from school K in the statement below:

....and so, they are crying and we don't know what it is but they're crying so when we got them an alternative way of requesting for what they wanted i'll say that has helped. We've seen the tantrums reduced, we've seen the aggressions reduce, we've seen the crying also reduced. Sometimes, instead of asking, they just come to grab or reach whatever it is that they want. So, then they prompt them to either use the PECS or sign for it and then these times, if they need help now, we don't really see them crying or being aggressive because they are able to communicate their need **(Teacher 12)**

Impact of ABA on Child's Self-help Skills

Teeth brushing, eating, hand washing, preparing tea, putting on cloth, sweeping room, toileting, washing bowl were identified from the interview data as self-help skills that had been improved with use of ABA intervention. Teachers indicated that with the use ABA procedure such as tasks analysis

with reinforcement and giving prompts, they were able to train the children to master these self-help skills. **Teacher 1** expressed it this way:

> *When my second case child came in to school M, she could basically not brush her teeth, wash her hand and put on clothes. Everything was being done for her by her parents and she was 9. So, we started training her on how to brush her teeth, putting on cloth, putting on underwear etc. and with time, we could realize she could do all these things by herself so much that she progressed to other skills. We taught her how to wash dishes, so instead of just focusing on her, is something that she could do to help others at home.*

Teacher 6 added:

> *With the self-help, using my case child, we were able to use the ABA to train him on brushing his teeth, folding his cloths, putting on his belt. We wanted to try other self-help skills like lacing his shoes, putting on his own shirt, learning the difference between the in and out of the shirt. and when we started training with the ABA, it worked because he was able to get the ideas that we wanted to bring on board. And when we give the instruction 'fold shirt' he knows what to do from 1 to 3. I believe the ABA helps.*

Teacher from school K added that the child was able to perform most of these self-help skills independently. The comment is quoted below,

> *.....yes, I've seen behavioural changes in all of them, my first kid that I was assigned to is a boy of 7 years who couldn't independently feed himself and we had to put him on a program i.e., the use of spoon and he is now able to feed himself independently. He was also placed on voiding in the toilet i.e., urinating, and he could stand independently go to the washroom, void and flash and come back. The second kid also around the same age, a boy was autistic and had had a condition with the leg so the self-help skill that was given him was also eating with the use of spoon. He was able to eat but not wipe his mouth so we were training him on how to wipe his mouth. Because of his condition it his progress was slower than the typical. So, we also had to add to his program the wipe mouth program, we started with the tissue and we started with promptings from physical to light physical to light touch and as time went on, he independently wipes his mouth* **(Teacher 13)**

A Parent from school K stated that although her had not fully mastered the brushing teeth but he was able to put-on clothes which she eluded as an improvement in the self-help skills. She stated that;

> *..... So i observed the change when we started on with Multikids and we have observed some changes. He's able to obey some instruction. He's able to do certain things himself. Dressing up, he's able to do certain aspects of the process of dressing up*

himself. Brushing his teeth, not perfect at all…it's something he doesn't like but at least he is accepting it now and there's still room for improvement. He is able to wear the underwear, t-shirt and stuff like that **(Parent 6).**

Impact of ABA on the child's Social Skills

From the data social skills had improved through numerous programmes ran to help the children master their social skills. These programmes include, greet person, like early morning group activity, late evening group activity and a programme called initiate play with peers. Others involve exchanging things with your peers, sharing with your peers, exchanging greetings with your peers. All these programmes had been designed to help them socialise with their peers with little prompts and gave them the opportunity to sit with their peers to interact. These programmes according to the data collected had shown that social skills had improved among the children. Play behaviour had increased, and some of them are social now, clinging to visitors also decreased. Participants expressed this below:

Those who are vocal can just tell you they want to play with you and they interact with each other very well **(Teacher 10)**.

Parent 5, added that for her child he was not able to play with other kids at home but he is able play with them now. Her verbatim statement supports this;

He was mostly seen alone when the sibling is gone to play. But few after I have taken him to school M, play behaviour has improved. He now socialises well with his sibling at times he is even the who initiate play **(Parent 5)**

Impact of ABA on the child's Motor Skills

One of the atypical characteristics of some children with autism is their inability use their motor skills. These result in their inability to carry out some self-help skills that demands the use of the hands and legs like eating, dressing and even walking. The motor skills had been group into fine and gross motor skills. Participants indicated that with the help of other professional like occupational therapists, they designed programmes for the kids that had improved their motor skills. For some of them, their writing had improved and were able to hold spoons to eat because they had been trained on how to hold pencils, make beads, and able to sit upright on chairs and other activities that demand the use of motor skills. Participants opined that:

> *Some of characteristics of children with autism is that, they are unwilling to use their motor skills. Some of them want to, but they can't so we start from the basis, teach them how to pull them apart, hold something between your palm, how to hold a pen etc so that they are able to get a firm grip to finger things like to open a bottle. We have other professionals like occupational therapist that we consult when we are doing this* **(Teacher 1)**

A teacher from school M added:

> *The first child that I had, he knew how to write already but he couldn't write in a sequential order. So, we looked for a writing skills program for him to do. Then we prompt him at where he needed any prompt. Then also we had beading work for him. So, he was beading bracelets for the teachers here.*

As stated above, as motor skills improved in some non-vocal children, they were taught to use their fingers and hands to sign basic sign language that has improved their communication.

Impact of ABA on the child's Attention

Most children with ASD also had attention deficit. This characteristic was manifested in their inability to maintain eye contact, maintain seating posture during class. This negatively affect their lessons or therapeutic sessions. Participants noted this a major concern and one the most significant areas they first designed programmes to treat because without giving full attention the child cannot grasp other skills areas that is being taught. From the data, it emerged that attending programmes were designed as measures to make sure kids gain some mastering over attention. Following the ABA intervention, participant admitted that although mastering has not been attained in most of the children with regard to attention however they had seen a gradual progress in attention. This is aptly expressed by a participant as:

> *……So, when he came, he was finding it difficult to attend because of his stereotypy. He was standing out of his seat. So, we had to train him on Section Behaviour; it's a program where he will sit, stand and attend to you with his full body. So, we have programs; Attending program, Section Behaviour Programs that makes a child give you attention so that you can continue to do whatever thing you want to do with the kid. With my case child, although his not gain full mastering, his attention, I must say has quite made some progress. Initially during lessons, he can only main attention up to 2 minutes but now he*

can maintain attention up to 5 minutes, at times up to 7 minutes. So, there is a gradual progress. **(Teacher 7)**

Teacher 13, however said that his children had had great attention following the ABA attending programme:

*.... all my children had great attention, my first child at first wasn't able to sit down. He will be standing up, always going out of seat as a form of escape or attention seeking attention. The second child too will just stand up and be roaming in the room, at a form of escape or for attention. So, all the programs that we put the child on even though we have the attention program we run attention through all the programs because you need the child's attention before you run the program. I have a child who couldn't do independent work but through interventions now he's able to do 3 minutes of independent work. (***Teacher 3).**

A Parent elucidated this by saying that his child had improved with attending programme he was taken through at school M**.**

*Before he went to school M, he couldn't maintain eye contact for long when talking to him, but as I speak, he can gaze into your eyes and talk when talking to him. He can seat and a chair and table and eat without standing up unlike he was doing first***. (Parent 2)**

Research Question Two: What is the impact of ABA intervention on the work of teachers educating children with ASD?

This research question sought to investigate the impact the ABA intervention has on the work on teachers in these institutions. Due to the challenging behaviours associated with ASD, teaching children with ASD appears to be a challenging task for many teachers owing to the fact that these challenging behaviours distract the work of teachers during lesson periods. Having the skills to control this or reduce these challenging behaviours in children with ASD is a great achievement for many teachers. When teachers were interviewed on this research question, codes generated from their responses were emerged to come up with the following sub-themes,

i. Teacher skills
ii. ABA impacts on teacher's relations to other children without ASD
iii. Challenges teachers face in ABA application.

Teacher Skills

Teachers said ABA has equipped them with skills to be able to handle children with ASD. Unlike other teaching methods, ABA protocol had given the teachers the knowledge of what action to take and at what time. They also said that ABA has improved their work output. They expressed these views as follows:

> *ABA has helped me a lot it has made my work very easy. Where I worked formerly a special education teacher, managing children with Autism was a very challenging task for me but now I can say ABA has equipped me a lot and I am able to do that with ease, achieving results with ABA makes me happy and it makes me*

work more. I think am doing better here than my previous. (Teacher **10)**

Another Teacher added that, his exposure to ABA has equipped him with a soft skill which is objectivity and made him a goal-oriented person. He narrated it as

....it has helped me as a teacher to be objective in the fact that we don't have to attribute the cause to something and we don't have to make inferences when we are working with the children with special needs. With ABA we set specific objectives and work to achieve it. Because I always set goals and work on achieving them at my school, beyond school hours, this objective way of doing things has impacted my life. I set goals for everything I want to do and work towards achieving it. **(Teacher 3)**

ABA impacts on the teacher's relation to other children without ASD

As to whether the impact on ABA affects the way teachers relate to other children outside the ABA school environment, there was a mixed opinion. While some teachers said that they consciously and sometimes unconsciously applied the ABA intervention to other children in their home environment, few other teachers had contrary views. For example, a participant stated that the influence of ABA on her personal live goes beyond the therapy session and has affected her relation with other children without ASD. She deliberately and at times used ABA to change some problem behaviours of children in her home environment.

ABA has really affected me so much! And now most of the kids around me, indirectly I am impacting their lives with ABA. At

time I will do certain things and realize that I am using ABA on this child without knowing. And it is helping them because they will know that if I need something (for the attention that we were talking about), if I cry or I throw tantrum, I won't get it. So, I have to use the right channel to request for what I want. And it is helping them. Because you throwing tantrum, you can hurt yourself and you can disgrace the person you are with if you are in public. But if you come to me in the right channel, you get what you want. **(Teacher 9)**

A teacher from school K added that through ABA she had helped a neighbour's son to brush his teeth regularly.

I had a neighbour whose son doesn't like brushing his teeth, I used ABA on him, you know brushing teeth is one of the ABA programmes, so I used it on him, now he brushes his teeth regularly. (**Teacher 12)**

Teacher 10, however had a seemly contrary view stating that although it is difficult to control the influence of ABA on her relation with other children, she consciously tried to restrain herself from its influence outside the therapy sessions. This is what she said;

Actually, I am very conscious about this fact of ABA not to influence my behaviour outside my workplace. It is quite difficult but I am managing **(Teacher 10)**

The evidence above clearly shows that ABA is not only for children with ASD but ABA service when structured well can be extended to other children to reinforce appropriate behaviours.

Challenges Teachers Face in ABA Application

Being the first practitioners or pioneers of ABA in Ghana, and ABA being new in Ghana it is of interest to the researcher to find out if there is any setback (s) that ABA practitioners are facing. This information would help stakeholders in the dissemination of ABA in Ghana work on bettering the service delivery to children with ASD and their families in Ghana.

From, the responses, the following emerged as challenges from the teachers,

1. Financial problems
2. Low involvement of parent in home training
3. Long anticipation of results
4. Lack of acceptance of ABA in Ghana by parents and general public

Finances

Teachers were of the view that ABA demanded a lot of resources making the intervention very expensive to run, some of these resources might not be available in Ghana. For example, as an observation made during the data collection, the researcher observed that the ABA programme were individualised, each child had one teacher each. At least not more than two children were in a room. Because of training the children were taken through, the school environment was set up as a school and also as a home with facilities such as classrooms, play grounds, sitting rooms with couch, washrooms, kitchen, teaching and learning materials such as blocking pads, diapers, timers, books and among others. Providing these resources were capital intensive, employing a teacher each to attend to a child is very expensive. In support of this, **Teacher 10** said.

.... major challenge has been finance, you know ABA is quite expensive but school M is rendering its service free, so they depend on donators to raise funds to pay their staff and manage the facility so sometimes there could be some delays in supply of materials we need to do some of the training but I understand, they are doing their best. At times there will be some shortage in there but our CEO will quickly turn around and raise some funds to get the items we need; she doesn't want to see shortage in our materials. It quite difficulty and financially very expensive to run ABA programme but school M is doing for free that is remarkable.

Teacher 3 added that, because ABA was individualised it was very expensive to run.

You know ABA is individualised, we need more trained staff and also resources to run ABA Programmes, take a lot at the facility we have here, you will understand that this capital intensive. Special education is expensive but ABA is more expensive, not many parents in Ghana can afford ABA services that is why school M is offering its services for free. Many parents want to bring their kids to school M but our facility now cannot take more.

Low Involvement of Parents in Home Training

For ABA to be effective, the role of parents in home training is very important, However, teachers lamented that some parents did not carry out the home intervention they had trained them in on how to handle the children at

home especially during vacations. Consequently, some of the children forget the skills they have been taught especially after vacations.

> *I have realised that any time my case child returns from vacation he forgets some of the skills. Later on, I was told that some parents don't continue the home intervention when school is on vacation. This quite disturbing because ABA cannot work effective when home intervention is not effective, in ABA we train the children so that they generalise it in their home environment. For example, when we do toilet training, brush teeth, or eating we train parents how to do it also, so we expect them to carry it out at home….* **(Teacher 6)**

Long Anticipation of Results

It emerged that ABA was time consuming and needed a lot of patience to see results. Teachers expressed the view that initially when they started working and not seeing results after some months, they thought they were not giving the intervention well, in their own words this was 'frustrating' but later they realised that with ABA they needed a lot of patience with consistent training to see results. Their views are captured below:

Another challenge is time, with ABA it needs a lot of time to see results which could be very frustrating at time but I got realized that with ABA you need patience to see results. **(Teacher 10)**

Teacher 11 added:

> *So, what so just as growth takes time so is ABA, we are not magicians to make it happen abruptly.so when it comes to special needs it takes time to see result when you are using ABA.*

For example, training like washing bowls it can take as long as 3 to 4 months to see results, there are other things like the PIQ questions (Which do you attend, what is your name etc) it takes but definitely the result will come...Though it takes time but it is worth the wait. Yeah!

Acceptance of ABA in Ghana by Parents and the General Public

Teachers shared their views that embracing ABA intervention in Ghana by parents and the general public was low. This is because ABA was new in Ghana, like any new innovation embracing it in a Ghanian culture is very challenging. It is only when people start to see result that they would begin to accept it. Some of the teachers have the following to say;

I think people have not really understood the concept of ABA. They see it to be a foreign something. But we can break it down to fit in our cultural setting. Because they did it in their cultural setting. If we understand the concept of ABA, we can fit it within our cultural setting. **(Teacher 5)**

Teacher 9 added that;

When it comes to acceptance, people don't know about ABA, they think once a child has Autism there is no cure. So, we had to spent a lot of time educating people about ASD and ABA intervention, which is a lot of work. It is when people who brought their children to school M started seeing results that their neighbour starting asking questions and believing in ABA.

Research Question Three: What is the impact of ABA intervention on the family life of parents who have children with autism in Ghana?

This research question sought to find out the impact the ABA intervention is having on the family of parents whose children are receiving the intervention. The following emerged as sub-themes under the theme impact on family lives.

1. Impact of ABA on family finances
2. Impact of ABA on family stress and worry
3. Impact of ABA on the workload of parents

Impact of ABA on Family Finances

On family finances, parents were of the opinion that ABA services were very expensive and call on government to include ABA training to special education training in public universities so that ABA services could be offered in our public special school. However, some parents from school M said that although ABA was very expensive school M is offering their service free to them. Parents shared their views as:

> *….. if you analyse how things are done there, you realise you are not paying much at all. One teacher to a child and the materials they use makes the service very expensive. ABA service is more than what they do in our regular and special schools here in Ghana. For me, though the service is very expensive, there is no pressure on my finances because school M is offering us free service. I was expecting them to increase the fee, because of covid, but it is the same. School M has helped me a lot, otherwise I would have paid a lot for the service.* (**Parent 2)**

*.... Financing yes, I am paying a lot for. ABA service is very very expensive, I understand because it is a private something not a public service. (***Parent 1)**. Another parent was of the view, ABA needs a lot resources both at the school and home. This is also financially demanding. Parents who are able to afford may skip some of the home training.

*ABA services they are okay, due to lack of resources some of the daily skills may be skipped by parents who cannot afford, meanwhile consistency helps with improvements (***Parent 4).**

Impact of ABA on Family Stress and Worry

Parents were of the view that ABA has helped relieve them of stress and worry when they started seeing results in their children. This is expressed in verbatim of participants below;

*When my son was diagnosed of ASD, it brought a lot of burden and thinking on the family. Myself and my wife were worried because we were moving from hospital to hospital trying all sort things and treatment to get our son well, that itself is stressful, but when he started attending school M, a year later we started seeing results and that gave me some relieve. I worry no more because I see hope coming out for my son with the ABA he is receiving. (***Parent 3).**

....I used to worry much about my son. especially when I lost my wife, I worry a lot because I don't know who to take of him. My work schedule doesn't make me get time to stay home. I took him to schools but anytime I go there, he is sleeping or left idle the teachers there not no how to

*handle him so one day the head teacher called me and told me my son he needs to my enrolled in a special school. I took him to some special school but the story was the same. It was challenging time for me and his siblings until someone told me about school M When he started receiving the ABA intervention, he now able to do a lot of things on his own. Now I worry no. I always say for my son, school M is his mother (***Parent 2)**

Impact of ABA on Workload of Parents

For work load, there were two contrary views from parents. While some parents were of the view that ABA had increased the independence and autonomy of their children hence decreasing the time and workload of parents other parents on the other hand said ABA demanded home intervention, and that had increased their workload. It was deduced from the views of parents that, At the initial stage, ABA increases workload of parents due to the home intervention, however, when the child gains mastering of skills, he could to do a lot of things for himself making him more independence which reduces the workload of parents. The statement of parents in relation to this are presented below;

They have taught us some stuff to teach the children at home, my work schedule is also very tight so at times I am not able to carry them out, it a lot of work to take care of him, so I am teaching his sibling to also help in my absence **(Parent 6)**

For my child he is able to bath, use the washroom, wear his shirt, brush his teeth, and even prepare tea so the things I have to

for him has reduced, time spent on him has also reduced. Things were not like this some years ago, that is why I am saying school M is the mother of my son. (**Parent 2).**

Research Question Four: What is the appropriateness of techniques applied in the ABA interventions in Ghana?

The last research question sought to find out from teachers and parents how they viewed the techniques used in the ABA programme. Two sub-themes emerged from their responses.

1. Appropriateness of ABA techniques
2. Contextualisation ABA intervention in the Ghanaian culture

Appropriateness of ABA Techniques

When I asked the participants about how they perceived the appropriateness of the ABA intervention techniques, participants were of the view that the techniques used were appropriate since it followed ethical protocols and did not cause any harm to the children. The following codes emerged and were used by parents and teachers to describe the techniques involved in ABA. These codes include ABA was not abusive, ABA is science, ABA was not about manipulating behaviour, ethical values were observed in ABA, ABA was systematic, ABA was not strict it, allows for modifications, parents were involved when we design our ABA programmes and ABA is flexible. Some of the views of the participants were captured as follows:

With the techniques used they are flexible and suitable for the children as compared to our Ghanaian traditional methods where we punished children inflicting pains on them to make them change. For example, when a child is crying in our

Ghanaians tradition what we will do is to give the child biscuit or something to stop the crying but in ABA we see such a behaviour as challenging, they child need to stop crying before we give the child reinforcement. So, we had to ignore the crying. ***(Teacher 1)***

ABA is not abusive! ABA is not harsh! Those saying that means they don't know about ABA because ABA, we don't do punishment. We mostly do reinforcement. The fact that the child is engaging in a challenging behaviour and we are not giving the child attention; is not punishment and is not harsh. I believe ABA is not rigid. It is flexible. Just that in our Ghanaian context, when you are correcting a child and you are soft spoken; and if you don't shout at the child or scream at the child, it's like you are not correcting the child. That is how it is in our culture. But ABA says don't shout at the child, don't scream at the child. Just ignore the behaviour, not the child. And the child will come to realize that it's the behaviour you are ignoring and not him or her and then there will be a change. That is what ABA is about. **(Teacher 6)**

A parent was of the view that she was not the right person to judge the appropriateness of the ABA techniques but she thought as long as the intervention given had not inflicted any physical or emotional pain on her son, she was okay with the procedures. She is quoted as follows:

…. well, I don't know whether I'm the right person to comment on the procedures or techniques but from what I read on online I

think they are following the standard procedures. So over here, so far so good, for example, the person who was taking my son in school K is a very dedicated and committed person so I like the energy and intensity to which he was doing the thing. Probably, they're exposed to all training and some kind of advance level and they would be in a position, better place to do more than they're doing but at the level where my son is, I think that the support which he is being given is what he needs and yeah, the training, the one they give is appropriate. as long as they have not inflicted any physical or emotional pain on my son, I am ok with the procedures. **(Parents 6)**

Contextualisation ABA intervention in the Ghanaian Culture

Many people were of the opinion that ABA is a 'foreign kind of thing' and they did not see how it would work in Ghana. Teachers were asked what they are doing to make sure the intervention they are giving makes sense in the light of the Ghanian setting. Responses from the teachers indicated that, they themselves saw ABA initially as a 'foreign kind of thing', realising the deficiencies in that, they decided to modify some of their approaches to tailor the intervention to suit the Ghanaian culture. These modifications included, breaking discrete trial and pivotal training down to fit in the Ghanaian cultural setting, using of local language to teach the children, using socially accepted behaviours, using pictures of local and home based-materials to design PECS programme, and involving parents in the design of ABA Programme for their children.

For example, **Teacher 1** said when they started ABA was new and they saw it as a western or 'abrofo' kind of thing so they had to do some modification like running some programmes using the local design to suit the Ghanian culture.

> *I think when we started, its relatively new you see, I think our director is the first person in Ghana who was certified to use this ABA in Ghana. So, when we started it was more like western kind of thing. It was more like this some "abrofo" thing that is quite new, we don't know how to use it, we don't know the technicalities. It was quite new so it appeared difficult. So, we realized oh that we can speak it to suit our environment, speak it to suit our own setting etc. and then make it work using our own maybe…if you remember you realise that some of the programmes are taught in Fante, we have to make that modification to make our children understand what we teaching. We get parents involved when designing a particular intervention because they also going to try it at home (**Teacher 1)***

Teacher 2, added that for a programme like PECS, they made use of items that were commonly available in the child's environment. They did not necessarily depend on PECS design from western country, they designed the PECS cards based on the needs of the child using items that he or she was familiar with in their home**.**

> *When we started, we thought we had to follow the programme strictly and it wasn't making sense to some extent to us or to the kids or to their families. But once we realized that we can change*

it to fit our setting, we were able to work easier and better with us. For example, PECS we modified it to use things that the children are familiar with in their home. So, if we ask the parent and they say they don't use sink at home, for their child we will use something like a bowl when we're teaching that child, a program like brush teeth we use bowl instead sink. So, the challenges were that, it was a western kind of thing and then we were able to overcome that by changing some of the programmes and modifying them to fit our environment. **(Teacher 2)**

Discussion of Findings

Impact of ABA intervention on behaviour changes in children with autism in Ghana

Analysis of the data collected from parents and teachers from both schools revealed that ABA intervention is yielding positive impacts on the children receiving the intervention in Ghana. The data shows that children receiving the ABA intervention were able to perform tasks independently, gained mastering of self-help skills such as brushing their teeth, eating, washing, preparing tea, putting on cloth, sweeping a room, toileting, washing a bowl after eating. Challenging behaviours such as aggression, tantrum, body rocking, kicking, self-biting was also reported by participants to have decreased following the ABA intervention. In terms of communication, participants opined that there had been improvement in their children' communication through the use alternative ways of communication such as PECS and basic sign language, improved speech through the use of speech training programme such as data base communication system, vocal imitation

and repair unintelligible speech and imitate sound. Other skill areas like social skills which includes initiating play with peers, playing and sharing items with peers, greeting and motor skills such as holding items, writing, buttoning shirt, lacing shoes, walking, sitting upright were found to have improved in the children following the ABA intervention they received. With regard to attention, participant admitted that although mastery had not been attaining by most of the children with regard to attention however they had seen a gradual progress in attention. These impacts were observed in the children after between six months to two years of receiving the ABA intervention. This result is in agreement with earlier studies done in the USA, Canada and Europe that found ABA to an effective intervention for building skills such self-help skills, social skills, motor skills and attention in children with autism (Smith,1999; Virués-Ortega, 2010; Matson & Kozlowski 2011; Lai, Lombardo, Baron-Cohen, 2014; Miltenberger *et al.*, 2014; Foran et al., 2015; Furman & Tuminello, 2015).

Owing to this revelation, I went further to investigate whether this positive impact was due to ABA intervention alone or there were varieties of intervention the children were receiving. Finding from the views of parents indicated that although they had been receiving medical intervention for their children, they started seeing observable changes in their children after months of intensive ABA intervention. This is a confirmation of an earlier study by Thomas, Morrissey, and McLaurin, (2007) who found ABA and habilitative therapies to be the cornerstone in the management of ASDs among several therapies designed for individuals with ASD such as drug therapy, behaviour therapy, and communication therapy. Again, this finding confirmed other

findings that found ABA-based interventions such as behaviour-based techniques, positive reinforcement, individualised goals and programming, and establishing a rewarding environment consistently as effective educational interventions for ASD than other forms of eclectic treatments for ASD (CDC, 2007; Cooper, Heward et al., 2007; Francis, 2005; Heward, 2007; National Alliance for Autism Research, 2005; National Autism Center, 2009; Kamau, 2014). Additionally, ABA interventions were also found to be able to reduce some of the challenges associated with ASD, thereby increasing the options in life for children with ASD (CDC, 2007; National Autism Center, 2009; National Research Council, 2001, Kamau, 2014). However, participants confirmed that services of other professionals such psychologists, Speech and language therapist, occupational therapists and medical professionals are occasionally sought by the ABA therapists when the need be. This means that in ABA therapy, practitioners within the field collaborates with other professionals to cater for the needs of the children with special needs and disabilities. Effort should therefore be made by schools and centres running ABA programmes in Ghana to collaborate with other professionals to see to the needs of the children.

Participants also revealed that the rate of behaviour change or skill acquisition is not the same for all the children as some children acquired skills faster than others. Children who received the intervention very early in life with intensity are reported to be doing better than those who started late. The work of scholars (Lovaas, 1987; Fava et al., 2011; Reichow, 2012 Fein et al., 2013 & Orinstein et al., 2014) confirmed the finding of this study. Their findings showed that there was a statistically significant relationship between

the skills and abilities of children with ASD and their participation in early intervention ABA intervention. This suggest that attention should be given to early identification and intervention for children with ASD in Ghana.

An explanation for children with ASD exhibiting challenging behaviours such as aggression, tantrum, body rocking, kicking, self-biting was found from the data collected from participants. It was revealed from the analysis of the data that when children with ASD found alternative means of communication such PECS and basic sign language to communicate their needs it resulted in the decline of challenging behaviours. This means that one of the reasons for children with ASD exhibiting challenging behaviours is the fact that they lack appropriate communication means to express their needs, once an alternative way of communication is found the challenging behaviour reduces. This finding is in agreement with a study by Rattaz, Michelon, Munir and Baghdadli (2018) which found that young adults with ASD who had no functional language were more likely to display irritability, stereotypy and hyperactivity behaviours than those who had functional language.

The finding from the above results and the discussions clearly showed that when ABA intervention is given the needed attention, it can serve as the gold standard for treating ASD in Ghana.

Impact of ABA Intervention on the Work of Teachers

Diverse issues were offered by teachers who participated in the study in response to the question that sought to find the impact of the ABA intervention on the work of teacher. Teachers indicated that ABA had equipped them with skills to be able to handle children with ASD. According to them, unlike other teaching methods, with ABA it has protocol that gives

the teacher skills on what action to take and at what time when a child is exhibiting challenging behaviour. The teachers also stated that the influence of ABA on their personal live goes beyond the therapy session and it had affected their relation with other children without ASD. They were able to use ABA to change some problem behaviours of children in their home environment.

This result shows that ABA could be applied not only to children with ASD but it can be used to by teachers in the regular schools and by parents to reinforce social accepted behaviour and enhancing skills training in children. This finding supports that of Sawyer et al., (2017) who found behavioural skills training to be a key indicator in teacher performance and a vital in equipping pre-service teachers with the tools they will use to educate children. On the impact of the invention on the teachers beyond the therapy session and teachers using their ABA skills to teacher other children without ASD, this can also be said to be in line with the study by Dillenburger, Keenan, Doherty, Byrne and Gallagher (2012). In that study professionals using ABA including special education teachers noted that ABA was applicable not only to children with ASD but to other relevant areas such as obsessional compulsive disorder, weight control in children, anxiety or phobias, conduct disorders, sleep problems, sexual disorders, self-control, addiction management mental health and anti-social behaviour. The implication for this is that ABA can be used by regular education teachers and all parents to improve performance of skills and academic among their children.

High cost of running ABA, low involvement of parent in home training, long anticipation of results, low level of acceptance of ABA in Ghana were among challenges identified by teachers as facing them in the dissemination of ABA in Ghana. A similar result was found by Dingfelder and Mandell (2011) when they used the diffusion of innovation theory to understand why effective interventions for autism are rarely adopted or successfully implemented in public mental health and education systems. They found that such interventions were difficult to adopt due to lack of available resources, sustainability of the programme over time and low parental advocacy for the intervention. According to Rohrbach et al., (1993), the decision to accept, adopt, and use the intervention is not an instantaneous act, but a process consisting of four stages: dissemination, adoption, implementation and maintenance (Rohrbach et al. 1993). From the finding of Rohrbach et al., (1993) and Dingfelder, and Mandell (2011), the challenges faced by teachers in the dissemination of ABA services in Ghana could be solved when stakeholders such as the Ministries of Health and Education adopt ABA services for children with ASD and allocate resources to its implementation. For this to be achieved parents and teachers must advocate strongly for ABA for it to be accepted by the education and health ministries in Ghana.

Impact ABA Intervention have on the Family Life of Parents who have Children with Autism in Ghana

Family stress, worry and workload of parents were found to be reduced for parents whose children were receiving ABA services in Ghana. Workload, was found to be high at the initial stage of ABA intervention due to the home

intervention parents give their children. However, when the child gains mastery of skills, and he/she is able to do a lot of things for himself or herself, independence and autonomy was achieved by the child, the amount time parents spent at home with the child also reduces hence leading to reduction in the workload of parents. This finding is consistent with that of Dillenburger et al., (2014) who found UK parents receiving ABA services for their children reporting that ABA had made workload more manageable, reduced family worry/stress and made them more able to cope with situations at home.

Grindle et al., (2009), Daley et al., (2013) and Knochel et al., 2021 indicated the impact on family finances, impact on family wellbeing as some challenges faced by parents accessing ABA intervention in the UK, USA and Canada. This claim was however true as participants in this study recounted how financing ABA has been expensive to them. Parents in school M however claimed that the school offers their ABA service on humanitarian ground therefore even though they perceived the ABA programme as expensive, it did not pose any financial burden to them as they had it for free. Parents interviewed in this study called on government through the ministries of Education and Health to adopt ABA services and include it in the Ghanian health delivery system and also in special schools so that ABA services could be easily accessible for children diagnosed with ASD and their families in Ghana. This call by parents in the study reflects an earlier campaign by parents in Canada (Perry et al., 2008), and in the UK (Kendall et al., 2013) for ABA services to be provided by governments and to be covered by insurance companies. Similarly, in the USA, the effectiveness and widespread availability of ABA services, has led a number of parents into campaigning for

ABA services to be covered by health insurance schemes (Simpson, Mundschenk, & Heflin, 2011; Allure, 2014; Makrygianni et al., 2018).

From the above discussion, parents expressed satisfaction with the ABA intervention. What is therefore left is for stakeholders to join the effort of parents, the schools offering ABA services in the country to expand the ABA intervention to all districts to be accessible to all parents who have children with ASD in Ghana

Appropriateness of techniques applied in the ABA Interventions in Ghana

Proponents of ABA, have praised it as the only scientifically validated method of managing autism (Lovaas 1973; Horwitz, 2013; Hastings 2013) while its critics have vehemently condemned it as abusive (Clancy, 2017). Beyond these misgivings about ABA, it is important to look at what constitute appropriate ABA techniques and what inform parents opinions about it. Participants expressed satisfaction with the ABA techniques being used. From the views of teachers, ABA is science and that they followed the scientific protocols in ABA with adherence to ethical principles taken into account the cultural context in which they are. Parents expressed their views that, although they were not the professionals to judge the appropriateness of ABA techniques, since the intervention their children are receiving is yielding positive result and did not inflict any physical or psychological harm on their children, they are okay with the intervention techniques. As posited by Miltenburger, (1990), Mah and Johnson, (2008), Thorton and Calam, (2011), successful treatment increases the acceptability of ABA among parents and

such parents see ABA techniques as appropriate. This could be said to be the case of parents in this study.

Another factor that influences the acceptability of ABA in new cultures is whether the techniques involved are well fit into the cultural setting of the society. It emerged from the data analysis of this study that, initial acceptability of ABA in Ghana was difficult as both teachers, parents and members of the general public saw ABA as a 'foreign' kind of intervention that could not work in a South Saharan country like Ghana. In response to these treats of the survival of ABA in Ghana, teachers expressed their views that the school management together with teachers and parent put in measures to contextualise ABA to suit the Ghanaian culture. Use of Local Language, use of socially accepted behaviours, PECS programme made use of locally and home-based materials, and involving in the design of ABA Programme for their child were some of the measures. In the view of Liao, Dillenburger and Buchanan, (2018) Culture dictates the method of service delivery. In their study ABA to investigate culture matters in ABA in China and UK, Liao et al., (2018) found that parents in China had greater involvement in the treatment of in their children with ASD, attending ABA training sessions with their children, while the parents in the English system were more reliant on professional input. They recommended that while the ABA is the same internationally, its applications vary widely across cultural contexts and that when working with families from various ethnic backgrounds, behaviour analysts should be aware of cultural differences and remain flexible and adaptive to modifying their practices accordingly. This recommendation is line with the path taken by ABA practitioners in Ghana to modify the ABA

programme to fit the Ghanaian cultural through the running of the programme in local Ghanaian language that the child understands, making use of locally recognised and home-based items that the child is familiar in the design of PECS and involving parents in the design and implementation of ABA programmes, through intensive parents training programmes to facilitate home based intervention.

Beyond the views of teachers and parents about the appropriateness of the intervention techniques, there is the needs for a regulatory body to supervise ABA programmes in Ghana. The Ghana Psychological Council for instance can be mandated by the Ministries of Health and Education to serves as regulatory authority over ABA practice in the country.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of result of the study, conclusion and recommendations made for considerations as well as areas for further research.

Summary

This study examined the application of applied behaviour analysis in the treatment and education of children with autism spectrum disorders in Ghana. Interview data were collected from teachers giving ABA interventions in Ghana (Behaviour technicians and Behaviour analysts) and from parents whose children were receiving the ABA intervention. The study also sought to find out the impact of ABA intervention on behaviour change in children with autism in Ghana, the impact ABA intervention have on the work of teachers educating children with ASD, the impact ABA intervention on the family life of parents with children with autism in Ghana and the appropriateness of the techniques involved in the ABA interventions in Ghana.

This was a qualitative study employing case study design. Semi-structured Interview guide was used to collect the data from participants, each interview covered an average time period of 20 to 30 minutes per participant. The interview data were transcribed, coded, with emerging codes categorised into themes and sub-themes and analysed using thematic analysis by Braun and Clarke (2006).

Main Findings

1. Teachers and parents expressed satisfaction with the ABA intervention describing it as having positive impact on their children who were

receiving the intervention. According to the participants children with ASD are gaining mastering of skills, independence and autonomy within a period of six months to two years following intensive school-based and home-based ABA intervention.

2. ABA intervention was found to have positively impacted the following Behavioural skill areas:
    a. Self-help skills such as brushing teeth, eating, washing, preparing tea, put on cloth, sweeping room, toileting, washing bowl after eating between six months and two years after receiving the ABA intervention
    b. Challenging behaviours such aggression, tantrum, body rocking, kicking, self-biting was also reported by participants to have decreased following the ABA intervention.
    c. Participants saw improvement in their children's communication through the use of alternative ways of communication such PECS and basic sign language; improved speech through the use of speech training programme such as data base communication system, vocal imitation and repair unintelligible speech and imitate sound.
    d. Social skills which include initiating play with peers, playing and sharing items with peers, greeting was found to improved.
    e. Motor skills such as holding items, writing, buttoning shirt, lacing shoes, walking and sitting upright were found to have improved in the children following the ABA intervention.

f. With regard to attention, participants admitted that although mastering has not been attained in most the children with regard to attention but they could see a gradual progress in attention

3. Early intensive behavioural intervention was found to have yielded positive and faster result than children who receive the intervention later in life
4. It was found out that alternative means of communication such PECS and basic sign language reduces challenging behaviours in non-vocal ASD children.
5. Teachers indicated that ABA had equipped them with skills to enable them to handle children with ASD and it has also improved their efficiency and work performance.
6. The teachers also stated that the influence of ABA on their personal lives went beyond the therapy session and it had affected their relation with other children. They were able to use ABA to change some problem behaviours of children in their home environment
7. Family stress, worry and workload of parents was found to be reduced for parents whose children were receiving ABA services in Ghana.
8. Lack of resources, financial challenges and high cost of running ABA intervention were found to be factors affecting the dissemination ABA in Ghana.
9. Participants expressed satisfaction with the appropriateness of the techniques used in the ABA intervention arguing that the ABA

techniques were scientific and there was adherence to ethical principles.

10. Acceptability of ABA in Ghana had increased among parents and the general public due to results seen in children receiving the intervention modification done in the programmes by practitioners to contextualise ABA to suit the Ghanaian culture settings.

Conclusions

Many research works had been conducted into the education and treatment intervention for children with ASD in Ghana. However, research into behavioural intervention for children in the ASD population appeared to be missing. Applied Behaviour Analysis intervention is new in Ghana and in most Sub-Saharan African countries, this research had found the intervention to be an evidence-based intervention that is working effectively for children in the ASD population in Ghana. Despite the positive impact of ABA, the intervention is not accessible to most children with ASD in Ghana due to lack resources and high cost running ABA which were found to be the main challenges affecting the use of ABA in Ghana. This research has provided a deeper understanding of the ABA intervention in Ghana. It is hoped that findings and recommendations will help special education teachers, parents who have children with ASD, government and all stakeholders involved in ASD advocacy to find ways to improve the management of ASD in the country through the utilisation of ABA.

Recommendations

Based on the findings and conclusion of the study, the following recommendations are made for consideration;

i. Findings from research question one showed that ABA intervention is yielding positive impact on the lives of the children receiving the intervention. I recommend that ABA service be made accessible to all children with ASD in Ghana. By this I recommend that the government of Ghana through the Ministry of Education and our universities should help train more professionals in ABA, and more ABA training should be given to special education teachers in our schools. ABA should be included in the curriculum for special education teachers. The academia should also consider offering ABA a programme in our universities to train more professionals as done in the USA and Europe. In doing that the academia can partner with private sectors such as Autism Compassion Africa in Cape Coast and Multikids Academy in Accra that already have the facilities for running ABA programmes and training of therapist.

ii. From research question two, teachers indicated that ABA equipped them with skills to enable them handle children with ASD, it is therefore recommended that ABA training be included in the curriculum of special education teachers training programmes. Also, the GES, should consider providing in-service training in ABA for special education teachers in Ghana to equipped them with skills to work effectively.

iii. Due to the high cost of running ABA programme, ABA continued to be too expensive and inaccessible for parents of children in the ASD population. Ghana through the Ministries of Education and Health should consider adopting ABA intervention and making it available some selected schools and health facilities in countries so that ABA services can be accessible for all parents in the ASD population across the country.

iv. Finally, it is recommended the government set up a regulatory authority regulate ABA services in Ghana. Although it was found that procedures used in ABA intervention in Ghana is appropriate, there is the need for service to be regulated as done in the USA. The Ghana Psychological Council for example, should embrace ABA practices in Ghana serve as a regulatory body over ABA practice in Ghana. Currently, there is no professional body regulating ABA in Ghana, hence who qualifies to give ABA intervention in Ghana is left at the mercy of those involved in the practice. There should be proper regulation that will ensure that professional training and that schools giving the ABA meets the international standards.

Areas for Further Research

It is recommended that further research be committed to ascertain the impact of ABA intervention on the intelligent quotient of Ghanaian children with ASD and the impact of ABA on adults living with ASD in Ghana.

REFERENCES

Adams, D., Clark, M., & Keen, D. (2019). Using self report to explore the relationship between anxiety and quality of life in children on the autism spectrum. *Autism Research*, *12*(10), 1505-1515.

Alberto, A. C., & Troutman, P. A. (2008). Applied behavior analysis for teachers (8th ed.). Upper Saddle River, NJ: Merrill Prentice Hall.

Allure, A. (2014) 'Parents of autistic children fight for treatment in an unforgiving market', The Guardian [online], http://www.theguardian.com/money/2014/apr/21/autism-children-parents-therapy-insurance-treatment

Alotaibi, A. A. (2015). *Knowledge and use of applied behavior analysis among teachers of students with autism spectrum disorder in Saudi Arabia*. Washington State University.

Allotey, E (2020). Parental experiences of raising a child with autism spectrum disorder in Ghana: *A case study research analysis*. gupea.ub.gu.se.

Amedahe, F. K. (2001). Combining teacher-assessment scores with external examination scores for certification: The Ghanaian experience. *Educational Measurement*, *20*(4), 29-30.

Amedahe, F. K. (2002). *Fundamentals of educational research methods*. University of Cape Coast Press

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th Ed.). Author.

Anderson, S. R., Avery, D. L., DiPietro, E. K., Edwards, G. L., & Christian, W. P. (1987). Intensive home-based early intervention with autistic children. *Education and Treatment of Children*, 2(3) 352-366.

Atkins, W. E. (2011). *The history and significance of the autism spectrum* [Unpublished doctoral dissertation, University of Toledo]. rave.ohiolink.edu

Autism Friends Network (2013) AFN Goals and Aims http://autismfriendsnetwork.biz/portal.php

Autism Speaks. (2013). Leading the way: Autism-friendly youth organizations guide. Retrieved from http://www.autismspeaks.org/family-services/youth-organizations

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, *1*(1), 91-97

Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still- current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, *20*(4), 313-327.

Bailey, J., & Burch, M. (2010). *25 Essential kills and strategies for the professional behavior analysts: Expert tips for maximizing consulting effectiveness*. Routledge.

Bailey, A., Palferman, S., Heavey, L., & Le Couteur, A. (1998). Autism: The phenotype in relatives. *Journal of Autism and Developmental Disorders*, *28*(5), 369-392.

Bascom, J. (2012) 'Quiet Hands', in J. Bascom (ed.) Loud hands: Autistic people, speaking. The Autistic Press.

Batten, A., Corbett, C., Rosenblatt, M., Withers, L., & Yuille, R. (2006). *Autism and education: The reality for families today*. The National Autistic Society, London.

Baxter, P., & Jack, S. (2010) Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report,13* (4), 544–559

Birnbrauer, J. S., & Leach, D. J. (1993). The Murdoch early intervention program after 2 years. *Behaviour Change*, *10*(2), 63-74.

Bondy, A. S., & Frost, L. (1996). *What is PECS? Picture exchange communication system*. Pyramid Educational Consultants Inc.

Frost, L. (2002). The picture exchange communication system. *Perspectives on Language Learning and Education*, *9*(2), 13-16.

Brewster, S. E., Elliott, M. A., McCartan, R., McGregor, B., & Kelly, S. W. (2016). Conditional or unconditional? The effects of implementation intentions on driver behavior. *Journal of Experimental Psychology: Applied*, *22*(1), 1-33

Buchanan, R. (2010) *Playing with fire: The controversial history of Hans Eysenck.* Oxford University Press.

Buckendorf, G. R. (2008). *Autism: a guide for educators, clinicians, and parents*. Thinking Publications.

Carlson, N. R., & Buskist, W. (1997). *Stress and health. Psychology, the science of behavior.* Allyn and Bacon

Carter, E. W., Lane, K. L., Cooney, M., Weir, K., Moss, C. K., & Machalicek, W. (2013). Parent assessments of self-determination importance and performance for students with autism or intellectual

disability. *American Journal on Intellectual and Developmental Disabilities*, *118*(1), 16-31.

Callahan, K., Shukla-Mehta, S., Magee, S., & Wie, M. (2010). ABA versus TEACCH: the case for defining and validating comprehensive treatment models in autism. *Journal of Autism and Developmental Disorders*, *40*(1), 74-88.

Centers For Disease Control and Prevention (2014). Prevalence of autism spectrum disorders: autism and developmental disabilities monitoring network, 11 Sites, United States. *MMWR 2014; 63* (2),1-21.

Choi, K. Y., & Kovshoff, H. (2013). Do maternal attributions play a role in the acceptability of behavioural interventions for problem behaviour in children with autism spectrum disorders? *Research in Autism Spectrum Disorders*, *7*(8), 984-996.

Clancy, K. M. (2017). *Assessing parent involvement in applied behavior analysis treatment for children with autism*. Wayne State University.

Clifford, N., French, S., & Valentine, G. (2010). Getting started in geographical research: how this book can help. *Key Methods in Geography*, *2*, 3-15.

Cobbold, A. (2015). Exploring the perceptions of sterile services staff: a qualitative constructivist study. *Journal of Perioperative Practice*, *25*(9), 160-168.

Cohen, D. J., & Volkmar, F. R. (1997). *Handbook of autism and pervasive developmental disorders*. John Wiley & Sons Inc.

Colaizzi, P. (1978). *Psychological research as the phenomenologist views it*. In R. Valle & M. King (Eds). Existential Phenomenological Alternatives for Psychology. Oxford University.

Colman, A. (2012). Dictionary of psychology. *Applied Cognitive Psychology, 15*(3), 349-351.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis*. Thomson Brooks/Cole Publishing Co

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches* (4th ed.). Sage.

Daley, T. C., Singhal, N., & Krishnamurthy, V. (2013). Ethical considerations in conducting research on autism spectrum disorders in low- and middle-income countries. *Journal of Autism and Developmental Disorders, 43*(9), 2002-2014.

Dawson, G., Rogers, S., Munson, J., Smith, M., Winter, J., Greenson, J., ... & Varley, J. (2010). Randomized, controlled trial of an intervention for toddlers with autism: The Early Start Denver Model. *Pediatrics, 125*(1), 17-23.

Denzin, N. K., & Lincoln, Y. S. (2004). *The Sage handbook of qualitative research*. Sage.

DePape, A. M., & Lindsay, S. (2016). Lived experiences from the perspective of individuals with autism spectrum disorder: A qualitative meta-synthesis. *Focus on Autism and Other Developmental Disabilities, 31*(1), 60-71.

Dillenburger, K., Keenan, M., Gallagher, S., & McElhinney, M. (2004). Parent education and home based behaviour analytic intervention: an

examination of parents' perceptions of outcome. *Journal of Intellectual and Developmental Disability*, *29*(2), 119-130.

Dillenburger, K., Keenan, M., Doherty, A., Byrne, T., & Gallagher, S. (2012). ABA-based programs for children diagnosed with autism spectrum disorder: Parental and professional experiences at school and at home. *Child & Family Behavior Therapy*, *34*(2), 111-129.

Dingfelder, H. E., & Mandell, D. S. (2011). Bridging the research-to-practice gap in autism intervention: An application of diffusion of innovation theory. *Journal of Autism and Developmental Disorders*, *41*(5), 597-609.

Dixon, D., Vogel, T. and Tarbox, J. (2012) A brief history of functional analysis and applied behaviour analysis', in J. L. Matson (Ed.) *Functional assessment for challenging behaviors. Autism and child psychopathology series.* Springer. DOI 10.1007/978-1-4614-3037-7_2.

Dominick, K. C., Davis, N. O., Lainhart, J., Tager-Flusberg, H., & Folstein, S. (2007). Atypical behaviors in children with autism and children with a history of language impairment. *Research in Developmental Disabilities*, *28*(2), 145-162.

Eikeseth, S., Hayward, D., Gale, C., Gitlesen, J. P., & Eldevik, S. (2009). Intensity of supervision and outcome for preschool aged children receiving early and intensive behavioral interventions: A preliminary study. *Research in Autism Spectrum Disorders*, *3*(1), 67-73.

Eldevik, S., Hastings, R. P., Hughes, J. C., Jahr, E., Eikeseth, S., & Cross, S. (2009). Meta-analysis of early intensive behavioral intervention for

children with autism. *Journal of Clinical Child & Adolescent Psychology*, *38*(3), 439-450.

Elliott, N. A. (2016). *Effective interventions for children and adolescents with autism spectrum disorders and other special educational needs* [Unpublished Doctoral dissertation, University of Birmingham]. Retrieved from etheses.bham.ac.uk.

Erickson, F. (1986). *Qualitative methods in research on teaching*. Macmillan

Erickson, F. (2012). *Qualitative research methods for science education. In.* Second international handbook of science education (pp. 1451-1469). Springer.

Estes, A., Munson, J., Dawson, G., Koehler, E., Zhou, X. H., & Abbott, R. (2009). Parenting stress and psychological functioning among mothers of preschool children with autism and developmental delay. *Autism*, *13*(4), 375-387.

Eysenck, H. J., & Rachman, S. (2013). *The Causes and cures of neurosis (Psychology Revivals): An introduction to modern behaviour therapy based on learning theory and the principles of conditioning*. Routledge.

Fava, L., Strauss, K., Valeri, G., D'Elia, L., Arima, S., & Vicari, S. (2011). The effectiveness of a cross-setting complementary staff-and parent-mediated early intensive behavioral intervention for young children with ASD. *Research in Autism Spectrum Disorders*, *5*(4), 1479-1492.

Fein, D., Barton, M., Eigsti, I. M., Kelley, E., Naigles, L., Schultz, R. T., ... & Tyson, K. (2013). Optimal outcome in individuals with a history of autism. *Journal of Child Psychology and Psychiatry*, *54*(2), 195-205.

Ferster, C. B., & DeMyer, M. K. (1961). The development of performances in autistic children in an automatically controlled environment. *Journal of Chronic Diseases, 13*(4), 312-345.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, *12*(2), 219-245.

Foran, D., Hoerger, M., Philpott, H., Walker Jones, E., Hughes, J. C. & Morgan, J. (2015), Using applied behaviour analysis as standard practice in a UK special needs school. *British Journal of Special Education, 42(*1), 34–52.

Fordice, H., & Brown, J. (2016). Autism spectrum disorder (ASD) and the criminal justice system: An introduction for professionals. *Forensic Scholars Today, 2(*1), 1-6

Freudenheim, D. A. (2004). *The effect of drawing on children's verbal expression of feelings*. Case Western Reserve University.

Frith, U., (1989). *Autism and theory of mind: Diagnosis and treatment of autism*. Plenum Press.

Furman, T. M., & Tuminello Jr, A. (2015). Aristotle, autism, and applied behavior analysis. *Philosophy, Psychiatry, & Psychology*, *22*(4), 253-262.

Gay, L. R. (1992). *Educational research, competences for analysis and application.* Charles E. Merill Publishing, co.

Greer, D. R., & Ross, D. E. (2008). *Verbal behavior analysis: Inducing and expanding new verbal capabilities in children with language delays.* Pearson Education.

Grey, I., Coughlan, B., Lydon, H., Healy, O., & Thomas, J. (2019). Parental satisfaction with early intensive behavioral intervention. *Journal of Intellectual Disabilities*, *23*(3), 373-384.

Grindle, C. F., Kovshoff, H., Hastings, R. P., & Remington, B. (2009). Parents' experiences of home-based applied behavior analysis programs for young children with autism. *Journal of Autism and Developmental Disorders*, *39*(1), 42-56.

Grix, J. (2004). *The foundations of research.* Palgrave Macmillan.

Hamel, J (1993). *Case study methods*. Sage Publication.

Hastings, R. (2013). *Autism and evidence 5:15 Criticisms of ABA and some responses*. http://profhastings.blogspot.co.uk/2013/03/ autism-and-evidence-5-15-criticisms-of.html.

Hayward, D. W., Gale, C. M., & Eikeseth, S. (2009). Intensive behavioural intervention for young children with autism: A research-based service model. *Research in Autism Spectrum Disorders*, *3*(3), 571-580.

Heward, W. L. (2003). Ten faulty notions about teaching and learning that hinder the effectiveness of special education. *The Journal of Special Education*, *36*(4), 186-205.

Horwitz, A. V. (2013). *Anxiety: A short history*. JHU Press.

Howlin, P., Gordon, R. K., Pasco, G., Wade, A., & Charman, T. (2007). The effectiveness of Picture Exchange Communication System (PECS) training for teachers of children with autism: a pragmatic, group randomised controlled trial. *Journal of Child Psychology and Psychiatry*, *48*(5), 473-481.

Hu, X. (2019). *Teaching strategies for children with autism spectrum disorder in China*. Springer.

Idring, S., Lundberg, M., Sturm, H., Dalman, C., Gumpert, C., Rai, D, & Magnusson, C. (2015). Changes in prevalence of autism spectrum disorders in 2001–2011: findings from the Stockholm youth cohort. *Journal of Autism and Developmental Disorders*, *45*(6), 1766-1773.

Jones, M. L., Eyberg, S. M., Adams, C. D., & Boggs, S. R. (1998). Treatment acceptability of behavioral interventions for children: An assessment by mothers of children with disruptive behavior disorders. *Child & Family Behavior Therapy*, *20*(4), 15-26.

Iovannone, R., Dunlap, G., Huber, H., & Kincaid, D. (2003). Effective educational practices for students with autism spectrum disorders. *Focus on Autism and other Developmental Disabilities*, *18*(3), 150-165.

Kamau, L. Z. (2014). *Applied Behavior Analysis based interventions in public schools: Understanding factors that hinder adoption, implementation and maintenance*. Northeastern University.

Kazdin, A. E. (1980). Acceptability of alternative treatments for deviant child behavior. *Journal of Applied Behavior Analysis*, *13*(2), 259-273.

Keenan, M., Dillenburger, K., Röttgers, H. R., Dounavi, K., Jónsdóttir, S. L., Moderato, P., ... & Martin, N. (2015). Autism and ABA: the gulf between North America and Europe. *Review Journal of Autism and Developmental Disorders*, *2*(2), 167-183.

Kendall, P. C., Slavenburg, J. H., & van Bilsen, H. P. (Eds.). (2013). *Behavioral Approaches for Children and Adolescents: Challenges for the next century*. Springer Science & Business Media.

Kimberlin, C. I., & Winterstein, G. A. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health Systematic Pharmacology*, *65*(2), 2276-2284.

Kirkham, P. (2017). 'The line between intervention and abuse'–autism and applied behaviour analysis. *History of the Human Sciences*, *30*(2), 107-126.

Klin, A., McPartland, J., & Volkmar, F. R. (2005). *Asperger syndrome*. John Wiley & Sons Inc.

Knopf, A. (2020). Autism prevalence increases from 1 in 60 to 1 in 54: CDC. *The Brown University Child and Adolescent Behavior Letter*, *36*(6), 3-4.

Knochel, A. E., Blair, K. S. C., & Sofarelli, R. (2021). Culturally Focused Classroom Staff Training to Increase Praise for Students with Autism Spectrum Disorder in Ghana. *Journal of Positive Behavior Interventions*, *23*(2), 106-117.

Koegel, L. K., Koegel, R. L., Ashbaugh, K., & Bradshaw, J. (2014). The importance of early identification and intervention for children with or at risk for autism spectrum disorders. *International journal of speech-language pathology*, *16*(1), 50-56.

Koegel, R. L., & Koegel, L. K. (2006). *Pivotal response treatments for autism: Communication, social, & academic development*. Paul H Brookes Publishing.

Koegel, L. K., Koegel, R. L., Harrower, J. K., & Carter, C. M. (1999). Pivotal response intervention I: Overview of approach. *Journal of the Association for Persons with Severe Handicaps*, *24*(3), 174-185.

Koegel, L. K., Koegel, R. L., Shoshan, Y., & McNerney, E. (1999). Pivotal response intervention II: Preliminary long-term outcome data. *Journal of the Association for Persons with Severe Handicaps*, *24*(3), 186-198.

Kothari, C. (2017). *Research methods and techniques.* New Age International (P) Ltd., Publishers, 91.

Krefting, L. (1991). Riggor in qualitative research: The assessment of trustworthiness. *The American Journal of Occupational Therapy, 43*(3), 272-281.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*: Sage.

Lambert, C. (2013, June 22). Is it right to try to 'normalise'autism. *The Guardian*, *29*.

Lambert- Lee, K. A., Jones, R., O'Sullivan, J., Hastings, R. P., Douglas-Cobane, E., Thomas J, E., & Griffith, G. (2015). Translating evidence based practice into a comprehensive educational model within an autism specific special school. *British Journal of Special Education*, *42*(1), 69-86.

Leaf, J. B., Leaf, J. A., Milne, C., Taubman, M., Oppenheim-Leaf, M., Torres, N., ... & Yoder, P. (2017). An evaluation of a behaviorally based social skills group for individuals diagnosed with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *47*(2), 243-259.

Le Couteur, A., Haden, G., Hammal, D., & McConachie, H. (2008). Diagnosing autism spectrum disorders in pre-school children using two standardised assessment instruments: the ADI-R and the ADOS. *Journal of Autism and Developmental Disorders*, *38*(2), 362-372.

Lerman, D. C., Valentino, A. L., & LeBlanc, L. A. (2016). *Discrete trial training in early intervention for young children with autism spectrum disorder*. Springer.

Levitt, H. M., Morrill, Z., Collins, K. M., & Rizo, J. L. (2021). The methodological integrity of critical qualitative research: Principles to support design and research review. *Journal of Counseling Psychology*, *68*(3), 357-363.

Liao, Y. (2017). Early applied behavior analytic interventions for children diagnosed with autism spectrum disorder: A cross-national study of the UK and China [Unpublished doctoral thesis, Queen's University Belfast, Belfast]

Liao, Y., Dillenburger, K., & Buchanan, I. (2018). Does culture matter in ABA-based autism interventions? Parent and professional experiences in the UK and China. *European Journal of Behavior Analysis*, *19*(1), 11-29.

Lincoln, Y., & Guba, E. (2000). Paradigmatic controversies, contradictions, and emerging confluences. *Handbook of Qualitative Research,* 2(3) 163–188. Sage.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*(1), 3-9.

Liu, C., Conn, K., Sarkar, N., & Stone, W. (2008). Physiology-based affect recognition for computer-assisted intervention of children with autism spectrum disorder. *International Journal of Human-Computer Studies*, *66*(9), 662-677.

Makrygianni, M. K., Gena, A., Katoudi, S., & Galanis, P. (2018). The effectiveness of applied behavior analytic interventions for children with autism spectrum disorder: A meta-analytic study. *Research in Autism Spectrum Disorders*, *51*, 18-31.

Mackay, B. A., Shochet, I. M., & Orr, J. A. (2017). A pilot randomised controlled trial of a school-based resilience intervention to prevent depressive symptoms for young adolescents with autism spectrum disorder: A mixed methods analysis. *Journal of Autism and Developmental Disorders*, *47*(11), 3458-3478.

MacNeil, B. M., Lopes, V. A., & Minnes, P. M. (2009). Anxiety in children and adolescents with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *3*(1), 1-21.

Makrygianni, M. K., Gena, A., Katoudi, S., & Galanis, P. (2018). The effectiveness of applied behavior analytic interventions for children with autism spectrum disorder: A meta-analytic study. *Research in Autism Spectrum Disorders, 51(1),* 18-31.

Manen, M. V. (1997). From meaning to method. *Qualitative Health Research*, *7*(3), 345-369.

Marks, S. (2015). Psychologists as therapists: The development of behavioural traditions. *Clinical psychology in Britain: Historical perspectives (*pp. 194–207). BPS Books

Martin, N. T., & Carr, J. E. (2020). Training and certification of behaviour analysts in Europe. *European Journal of Behavior Analysis*, *21*(1), 9-19.

Masi, A., DeMayo, M. M., Glozier, N., & Guastella, A. J. (2017). An overview of autism spectrum disorder, heterogeneity and treatment options. *Neuroscience Bulletin*, *33*(2), 183-193.

Matson, J. L., Kozlowski, A. M., Worley, J. A., Shoemaker, M. E., Sipes, M., & Horovitz, M. (2011). What is the evidence for environmental causes of challenging behaviors in persons with intellectual disabilities and autism spectrum disorders? *Research in Developmental Disabilities*, *32*(2), 693-698.

Maurice, C. E., Green, G. E., & Foxx, R. M. (2001). *Making a difference: Behavioral intervention for autism*. Pro-Ed.

McFadyen, J., & Rankin, J. (2016). The role of gatekeepers in research: learning from reflexivity and reflection. *GSTF Journal of Nursing and Health Care (JNHC)*, *4*(1), 82-88

McKelvey, D. M. (2008). *Relationships between attitudes of school-based administrators and inclusion practices of students with autism/ Asperger's syndrome* [Unpublished doctoral dissertation, University of Phoenix]. proquest.com

McPhilemy, C., & Dillenburger, K. (2013). Parents' experiences of applied behaviour analysis (ABA) based interventions for children diagnosed

with autistic spectrum disorder. *British Journal of Special Education, 40*(4), 154-161.

Melati, F., Indriyanti, R., & Setiawan, A. S. (2019). Effectiveness of applied behavior analysis (ABA) with regard to tooth brushing in autistic children. *Dental Journal (Majalah Kedokteran Gigi), 52*(3), 117-121.

Mensah, R. M. O., & Hayfron-Acquah, J. B. (2018). Preliminary observations from interactions among Ghanaian autistic children and Rosye, a humanoid robotic assistive technology. *Int. J. Adv. Sci. Res. Eng., 4*(1), 261-271.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation* (3ed). Jossey-Bass.

Mertens, D.M. (2005). *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches*. (2nd ed.) Sage.

Miltenberger, R. G. (1990). Assessment of treatment acceptability: A review of the literature. *Topics in Early Childhood Special Education, 10*(2) 24–38. doi:10.1177/027112149001000304

Ministry of Education (2015). Standards and guidelines for practice of inclusive education in Ghana. http://sapghana.com/data/documents/InclusiveEducation-Policy-Standards-Guidelines-official-document.pdf

Missigman, S. (2017). *Autism in developing countries*. https://borgenproject.org/autism-in-developing-countries/

Moore, J. (2011). Behaviorism. *The Psychological Record*, *61*(3), 449-463.

Moore, D., McGrath, P., & Thorpe, J. (2000). Computer-aided learning for people with autism–a framework for research and development. *Innovations in Education and Training International*, *37*(3), 218-228.

Morris, E. K. (2009). A case study in the misrepresentation of applied behavior analysis in autism: The Gernsbacher lectures. *The Behavior Analyst*, *32*(1), 205-240.

Morris, E. K., Altus, D. E., & Smith, N. G. (2013). A study in the founding of applied behavior analysis through its publications. *The Behavior Analyst*, *36*(1), 73-107.

Mueller, T. G., & Buckley, P. C. (2014). Fathers' experiences with the special education system: The overlooked voice. *Research and Practice for Persons with Severe Disabilities*, *39*(2), 119-135.

Myers, B. J., Mackintosh, V. H., & Goin-Kochel, R. P. (2009). "My greatest joy and my greatest heart ache:" Parents' own words on how having a child in the autism spectrum has affected their lives and their families' lives. *Research in Autism Spectrum Disorders*, *3*(3), 670–684

Myles, B., & Simpson, R. (2003). *Asperger's Syndrome: A guide for educators and parents* (2ed.). Pro- Ed.

National Autism Center. (2009). *Evidence-based practice and autism in the schools: A guide to providing appropriate interventions to students with autism spectrum disorder*. National Autism Center

Ne'Eman, A., & Bascom, J. (2020). Autistic self-advocacy in the developmental disability movement. *The American Journal of Bioethics*, *20*(4), 25-27.

Neuman, L. W. (2007). *Social research methods, 6/E*. Pearson Education India.

Neuman, S. P. (2003). Maximum likelihood Bayesian averaging of uncertain model predictions. *Stochastic Environmental Research and Risk Assessment*, *17*(5), 291-305.

Ogilvie, E., & McCrudden, M. T. (2017). Evaluating the social validity of the early start Denver model: A convergent mixed methods study. *Journal of Autism and Developmental Disorders*, *47*(9), 2899-2910.

Orinstein, A. J., Helt, M., Troyb, E., Tyson, K. E., Barton, M. L., Eigsti, I. M., ... & Fein, D. A. (2014). Intervention for optimal outcome in children and adolescents with a history of autism. *Journal of Developmental & Behavioral Pediatrics*, *35*(4), 247-256.

Parker, V., & Childs, C. (2019). Stresses, challenges, and rewards of home-based applied behaviour analysis intervention for children with autism spectrum disorder. *Research and Practice in Intellectual and Developmental Disabilities*, *6*(2), 154-163.

Parsons, T. (1991). *The social system* **(**New ed.). Routledge

Patterson, S. Y., Smith, V., & Mirenda, P. (2012). A systematic review of training programs for parents of children with autism spectrum disorders: Single subject contributions. *Autism*, *16*(5), 498-522.

Perry, A., Cummings, A., Geier, J. D., Freeman, N. L., Hughes, S., LaRose, L., & Williams, J. (2008). Effectiveness of intensive behavioral intervention in a large, community-based program. *Research in Autism Spectrum Disorders*, *2*(4), 621-642.

Phetrasuwan, S., Miles, M. S., Mesibov, G. B., & Robinson, C. (2009). Defining autism spectrum disorders. *Journal for Specialists in Pediatric Nursing, 14*(3), 206-209.

Piazza, C. C., Roane, H. S., & Karsten, A. (2011). Identifying and enhancing the effectiveness of positive reinforcement. *Handbook of Applied Behavior Analysis, 2*(1)151-164.

Pierce, K., & Schreibman, L. (1995). Increasing complex social behaviors in children with autism: Effects of peer- implemented pivotal response training. *Journal of Applied Behavior Analysis, 28*(3), 285-295.

Polit, D. F., & Hungler, B. P. (1999). *Nursing research principles and methods.* Lippingcott Company.

Prizant, B. M., & Rubin, E. (1999). Contemporary issues in interventions for autism spectrum disorders: A commentary. *Journal of the Association for Persons with Severe Handicaps, 24*(3), 199-208.

Pryor, J., & Torrance, H. (1997). Formative assessment in the classroom: Where psychological theory meets social practice. *Social Psychology of Education, 2*(2), 151-176.

Pitts, L., Gent, S., & Hoerger, M. L. (2019). Reducing pupils' barriers to learning in a special needs school: integrating applied behaviour analysis into Key Stages 1–3. *British Journal of Special Education, 46*(1), 94-112.

Pituch, K. A., Green, V. A., Didden, R., Lang, R., O'Reilly, M. F., Lancioni, G. E., & Sigafoos, J. (2011). Parent reported treatment priorities for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 5*(1), 135-143.

Rattaz, C., Michelon, C., Munir, K., & Baghdadli, A. (2018). Challenging behaviours at early adulthood in autism spectrum disorders: topography, risk factors and evolution. *Journal of Intellectual Disability Research*, *62*(7), 637-649.

Reeves, S., Kuper, A., & Hodges, B. D. (2008). Qualitative research methodologies: Ethnography. *BMJ, 2*(3) *337-349*.

Reichow, B. (2012). Overview of meta-analyses on early intensive behavioral intervention for young children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *42*(4), 512-520

Roane, H. S., Fisher, W. W., & Carr, J. E. (2016). Applied behavior analysis as treatment for autism spectrum disorder. *The Journal of Pediatrics, 175 (2)*, 27-32.

Rogers, E. M. (1962). Diffusion of innovations (1st ed). Free Press.

Rogers., E.M. (2003). *Diffusion of innovation, (*5th ed). Free Press

Rohrbach, L. A., Graham, J. W., & Hansen, W. B. (1993). Diffusion of a school-based substance abuse prevention program: Predictors of program implementation. *Preventive Medicine*, *22*(2), 237-260.

Roper, J. M., & Shapira, J. (2000). *Ethnography in nursing research*: Sage

Ruigrok, A. N., Salimi-Khorshidi, G., Lai, M. C., Baron-Cohen, S., Lombardo, M. V., Tait, R. J., & Suckling, J. (2014). A meta-analysis of sex differences in human brain structure. *Neuroscience & Biobehavioral Reviews*, *39*(3), 34-50.

Ruparelia, K., Abubakar, A., Badoe, E., Bakare, M., Visser, K., Chugani, D. C., & Newton, C. R. (2016). Autism spectrum disorders in Africa: Current challenges in identification, assessment, and treatment: a

report on the International Child Neurology Association Meeting on ASD in Africa. *Journal of Child Neurology*, *31*(8), 1018-1026.

Rural Integrated Relief Service- The Autism Project, Ghana (2010). https://rirsgh.webs.com/theautismproject.htm

Rydzewska, E., Hughes-McCormack, L. A., Gillberg, C., Henderson, A., MacIntyre, C., Rintoul, J., & Cooper, S. A. (2018). Prevalence of long-term health conditions in adults with autism: observational study of a whole country population. *BMJ Open*, *8*(8), e023945.

Sallows, G. O., & Graupner, T. D. (2005). Intensive behavioral treatment for children with autism: Four-year outcome and predictors. *American Journal on Mental Retardation*, *110*(6), 417-438.

Sanders, M. R., & Kirby, J. N. (2012). Consumer engagement and the development, evaluation, and dissemination of evidence-based parenting programs. *Behavior Therapy*, *43*(2), 236-250.

Sawyer, M. R., Andzik, N. R., Kranak, M. P., Willke, C. P., Curiel, E. S., Hensley, L. E., & Neef, N. A. (2017). Improving pre-service teachers' performance skills through behavioral skills training. *Behavior Analysis in Practice*, *10*(3), 296-300.

Seaman, C. B. (2008). *Qualitative methods.* Springer.

Simpson, R. L., Mundschenk, N. A., & Heflin, L. J. (2011). Issues, policies, and recommendations for improving the education of learners with autism spectrum disorders. *Journal of Disability Policy Studies*, *22*(1), 3-17.

Skinner, B. F. (1938) *The behavior of organisms: an experimental analysis*. Appleton Century

Skinner, B. F. (1953) *Science and human behavior*. Macmillan.

Skinner, B. F. (1974) *About behaviorism*. Knopf

Skinner, B. F. (1983). Can the experimental analysis of behavior rescue psychology? *The Behavior Analyst*, *6*(1), 9-17

Smith, M. K., & Smith, K. E. (2000). "I believe in inclusion, but…": Regular education early childhood teachers' perceptions of successful inclusion. *Journal of Research in Childhood Education*, *14*(2), 161-180.

Smith, T.A. (1999). "What's wrong with behaviour-based safety?" *Professional Safety, 44* (3) 37-40

Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on Autism and other Developmental Disabilities*, *16*(2), 86-92.

Smith, T., Groen, A. D., & Wynn, J. W. (2000). Randomized trial of intensive early intervention for children with pervasive developmental disorder. *American Journal on Mental Retardation*, *105*(4), 269-285.

Smith, R. (2013) *Between Mind and Nature: A history of psychology*. Reaktion Books.

Strydom, H., & De Vos, A. S. (1998). *Sampling methods*. Research at grass.

Sun, X., Allison, C., Wei, L., Matthews, F. E., Auyeung, B., Wu, Y. Y., ... & Brayne, C. (2019). Autism prevalence in China is comparable to Western prevalence. *Molecular Autism*, *10*(1), 1-19.

Tager-Flusberg, H., & Joseph, R. M. (2003). Identifying neurocognitive phenotypes in autism. *Biological Sciences*, *35*(14), 303-314.

Tarnowski, K. J., Rasnake, L., Mulick, J., & Kelly, P. (1989). Acceptability of behavioral interventions for self-injurious behavior. *American Journal on Mental Retardation, 93* (3) 575-580

Tarnowski, K. J., & Simonian, S. J. (1992). Assessing treatment acceptance: The abbreviated acceptability rating profile. *Journal of Behavior Therapy and Experimental Psychiatry, 23*(2), 101-106.

Tzanakaki, P., Grindle, C., Hastings, R. P., Hughes, J. C., Kovshoff, H., & Remington, B. (2012). How and why do parents choose early intensive behavioral intervention for their young child with autism? *Education and Training in Autism and Developmental Disabilities, 6*(2) 58-71.

Thomas, K. C., Ellis, A. R., McLaurin, C., Daniels, J., & Morrissey, J. P. (2007). Access to care for autism-related services. *Journal of Autism and Developmental Disorders, 37*(10), 1902-1912.

Thornton, S., & Calam, R. (2011). Predicting intention to attend and actual attendance at a universal parent-training programme: A comparison of social cognition models. *Clinical Child Psychology and Psychiatry, 16*(3), 365-383.

Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of Advanced Nursing, 48*(4), 388-396.

Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and Applications, 5*, 147-158.

Tonge, B., & Brereton, A. (2011). Autism spectrum disorders. *Australian Family Physician, 40*(9), 672-677.

Travis, J., & Geiger, M. (2010). The effectiveness of the picture exchange communication system (PEC) for children with autism spectrum

disorder (ASD): A South African pilot study. *Child Language Teaching and Therapy*, *26*(1), 39-59.

Troyb, E., Rosenthal, M., Eigsti, I. M., Kelley, E., Tyson, K., Orinstein, A., ... & Fein, D. (2014). Executive functioning in individuals with a history of ASDs who have achieved optimal outcomes. *Child Neuropsychology*, *20*(4), 378-397.

Uwaezuoke, S. N. (2015). Autism spectrum disorder in children: The disparities between the developed and developing countries. *Autism Open Access*, *5*(3), 1-5.

Vernon, M., & Rhodes, A. (2009). Deafness and autistic spectrum disorders. *American Annals of the Deaf*, *154*(1), 5-14.

Virués-Ortega, J. (2010). Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose–response meta-analysis of multiple outcomes. *Clinical Psychology Review*, *30*(4), 387-399.

Walker, D. R., Thompson, A., Zwaigenbaum, L., Goldberg, J., Bryson, S. E., Mahoney et al., (2004). Specifying PDD-NOS: a comparison of PDD-NOS, Asperger syndrome, and autism. *Journal of the American Academy of Child & Adolescent Psychiatry*, *43*(2), 172-180.

Walsham, G. (1995). Interpretive case studies in IS research: nature and method. *European Journal of Information Systems*, *4*(2), 74-81.

Waples, R. S., & Gaggiotti, O. (2006). What is a population? An empirical evaluation of some genetic methods for identifying the number of gene pools and their degree of connectivity. *Molecular Ecology*, *15*(6), 1419-1439.

Watson, J. B. (1913). *Psychology as the behaviourist views* it. psycnet.apa.org

Watson, L. L., & Vogel, L. R. (2017). Educational resiliency in teen mothers. *Cogent Education*, *4*(1), 1-22.

Webster, A., Cumming, J., & Rowland, S. (2016). Defining the problem. In Empowering parents of children with autism spectrum disorder: Critical decision-making for quality outcomes (pp. 9-26). Springer. doi:10.1007/978-981-10-2084-1_2

Werner, E., & Dawson, G. (2005). Validation of the phenomenon of autistic regression using home videotapes. *Archives of General Psychiatry*, *62*(8), 889-895.

Wolf, M. M. (1978). Social validity: the case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis*, 11, 203-214. DOI: 10.1901/jaba.1978.11- 203

Woods, M. (2011). *Interviewing for research and analysing qualitative data: An overview*. Massey University Press.

World Health Organization. (2013). *Meeting report: autism spectrum disorders and other developmental disorders: from raising awareness to building capacity*: World Health Organization, Geneva, Switzerland 16-18 September 2013.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd.) Sage.

Yin, R. K. (2018). *Case study research and applications*. Thousand Oaks, CA Sage.

Yokoyama, K., Naoi, N., & Yamamoto, J. I. (2006). Teaching verbal behavior using the picture exchange communication system (PECS) with

children with autistic spectrum disorders. *The Japanese Journal of Special Education*, *43*(6), 485-503.

Yusoff, S. A., & Nor, M. Y. M. (2018). Hubungan Budaya Optimis Akademik Guru Besar dengan Kualiti Guru Sekolah Rendah di Daerah Kuala Langat. *Selangor Humaniora Review*, *2*(2), 16-28.

Zachor, D. A., Ben-Itzchak, E., Rabinovich, A. L., & Lahat, E. (2007). Change in autism core symptoms with intervention. *Research in Autism Spectrum Disorders*, *1*(4), 304-317.

APPENDICES

APPENDIX: A

INTERVIEW GUIDE FOR TEACHERS

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

DEPARTMENT OF EDUCATION AND PSYCHOLOGY

Interview guide for a study on the topic: Application of Applied Behaviour Analysis in the Treatment and Education of Children with Autism Spectrum Disorder in Ghana: Parents and Teachers' Perception of Outcome.

Dear sir/Madam

Thank you for agreeing to take part in this study which seek to gather information on the topic: The Application of Applied Behaviour Analysis in the Treatment and Education of Children with Autism Spectrum Disorder in Ghana: Parents and Teachers' Perception of Outcome**.** The study is primarily for academic work, and therefore you are assured of confidentiality and anonymity in all the information that you provide. Thank you once again for your time and participation.

Section A **Background characteristics of participant**

i. To begin our discussion, can you please tell me a little about yourself?

Probe (age, highest level of education, marital status, number of yes teaching in the school).

ii. Have received training in ABA? Probe (level of ABA qualification, Behaviour technician or Behaviour Analyst)

Section B: Impact of ABA intervention on the behaviour change in children.

What behaviour changes if any have you seen in your child following the ABA intervention?

Probe

i. Have you observed any change in self-help/ daily living skills (brushing teeth, toileting, dressing etc)?

ii. Have you observed any change in your child' communication / Speech?

iii. Have you observed any change in Repetitive Behaviours of your child? (hand and ear flapping, banging head against wall, body rocking, jumping, spinning, pacing back and forth repeatedly).

iv. Have you observed any change in gross and fine motor skills of your child? (sitting, standing, walking, running, hairbrusing, lacing shoe, writing, holding pencil, buttoning shirt, cutting etc.,)

v. Have you observed any change in your child social skills? (play behaviour with other children)

vi. Have you observed any change in Obsessive/Ritual/ Routine Behaviours of your child? (fixations on certain activities and objects like eating in same bowl, sleeping at same place, playing with objects and getting upset when routine is changed etc.,).

vii. Have you observed any change in problem behaviour in your child? (throwing temper tantrums, emotional outburst etc.,).

viii. Have you observed any change in Sensitivity to light and touch of your child?

ix. Have you observed any change in attention or concentration on activities and other engagements?

Section C: Impact of ABA intervention on the work of teachers

i. Aside ABA have used other type of intervention to teach children with ASD?

ii. How has ABA helped you an autism educator?

iii. Have you experienced any challenges as a teacher using ABA in Ghana?

iv. Tell me about how ABA affected your relation with children in your home environment

Section D: Appropriateness of the techniques involve in the ABA interventions

i. Tell me what you think about the ABA techniques used for your child (Probe for appropriateness)

ii. Do you feel like your child is being conditioned or programmed to behave in a certain way unlike his other children without Autism?

iii. Would you recommend ABA to other teachers in special education?

Section F:

Is there anything else you would like to add?

APPENDIX: B

INTERVIEW GUIDE FOR PARENTS

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

DEPARTMENT OF EDUCATION AND PSYCHOLOGY

Interview guide for a study on the topic: Application of Applied Behaviour Analysis in the Management and Education of Children with Autism Spectrum Disorder in Ghana: Parents and Teachers' Perception of Outcome.

Dear sir/Madam

Thank you for agreeing to take part in this study which seek to gather information on the topic: The Application of Applied Behaviour Analysis in the Treatment and Education of Children with Autism Spectrum Disorder in Ghana: Parents and Teachers' Perception of Outcome**.** The study is primarily for academic work, and therefore you are assured of confidentiality and anonymity in all the information that you provide. Thank you once again for your time and participation.

Section A: Background characteristics of Participants

i. To begin our discussion, can you please tell me a little about yourself?

Probe (age, highest level of education, marital status, number of children, main occupation, residence).

ii. Can you tell me something about your child? **Probe** (At what age did you discover he/she had Autism? where and who

diagnosed him/ her formally of the condition? How old is your child how?

iii. How long has your child been receiving ABA intervention?

iv. Were you given any education or training on ABA intervention? **Probe** (Where, by whom and how long)

Section B: Impact of ABA intervention on the behaviour change in children.

What behaviour changes if any have you seen in your child following the ABA intervention?

Probe

i. Have you observed any change in self-help/ daily living skills (brushing teeth, toileting, dressing etc)?

ii. Have you observed any change in your child' communication / Speech?

iii. Have you observed any change in Repetitive Behaviours of your child? (hand and ear flapping, banging head against wall, body rocking, jumping, spinning, pacing back and forth repeatedly).

iv. Have you observed any change in gross and fine motor skills of your child? (Sitting, standing, walking, running, hairdressing, lacing shoe, writing, holding pencil, buttoning shirt, cutting etc.,)

v. Have you observed any change in your child social skills? (Play behaviour with other children)

vi. Have you observed any change in Obsessive/Ritual/ Routine Behaviours of your child? (fixations on certain activities and objects like eating in same bowl, sleeping at same place, playing with objects and getting upset when routine is changed etc.,).

vii. Have you observed any change in problem behaviour in your child? (throwing temper tantrums, emotional outburst etc.,).

viii. Have you observed any change in Sensitivity to light and touch of your child?

ix. Have you observed any change in attention or concentration on activities and other engagements?

Section C: Impact on Family life

Overall, would you say ABA had a positive or negative impact on your life as a parent and the other siblings? **Probe** (Impact on family finances, worry/stress, work load, independence, confidence etc)

Section D: Appropriateness of the techniques involve in the ABA interventions

i. Tell me what you think about the ABA techniques used for your child (Probe for appropriateness)

ii. Do you feel like your child is being conditioned or programmed to behave in a certain way unlike his/ her other sibling without Autism?

iii. Would you recommend ABA to other parents?

Section C:

Is there anything else you would like to add?

APPENDIX: C

INFORMED CONSENT FORM

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

DEPARTMENT OF EDUCATION AND PSYCHOLOGY

Consent Form for a study on the topic: Application of Applied Behaviour Analysis in the and Education of Children with Autism Spectrum Disorder in Ghana: Parents and Teachers' Perception of Outcome.

General Information about the Research

There is convincing evidence that Applied Behaviour Analysis (ABA) offers a highly effective form of intervention for children with Autism Spectrum Disorders (ASD) (Smith,1999; Matson & Kozlowski 2011; Reichow, 2012; Miltenberger *et al.*, 2014; Kang, 2019). However, there is less evidence about how parents and teachers perceive and evaluate ABA programs especially in non-western cultures such as countries in South Saharan Africa where the outcome of the intervention on children with ASD is unknown (Ruparelia *et al.*, 2016). There seem to be an apparent lack of literature in the local (Ghanaian) context about how parents and teachers in this category perceive and evaluate ABA intervention programmes. The purpose of this study is to examine the perception of parents and teachers about the application of ABA in the treatment and education of children with ASD in Ghana.

You are selected to participate in this study because the researcher believes that parents and teachers play significant role in the decisions on how to educate their children with ASD, understanding the perception of

parents and teachers towards ABA based intervention for their children living ASD is very important. Also, since parents and teachers are those who spent most times with their children, they are the best people to tell if any behavioural change has occurred in their children following the ABA intervention.

Procedure

To find answers to the questions this study seeks to address, the researcher invites you to take part in this study. Semi-structured Interview will be used to collect the data from participants which are parents and teachers whose children are receiving ABA intervention in Ghana. Each interview will cover an average time period of 25 to 35 minutes per participant. If you accept, you will be required to participate in an interview that would be conducted by the researcher at a place that would be convenient for you, either your home or workplace. The interview questions will cover your understanding of the ABA intervention, your perceived impact of the intervention on the behaviour change in your child, the impact of the intervention on family life of parents and work of teachers and finally your evaluation of appropriateness of the intervention procedures.

Possible Risks and Discomforts

There would be no realistic predictable risks or discomforts to the participants.

Benefits/Significance of the Study

The finding of the study will help parents, teachers, schools, government, NGOs and others stakeholders in ASD education, to make educational practice and policy decision with regard to adopting ABA intervention

in the education and treatment of children with ASD in Ghana. It will also contribute to existing literature on ABA and ASD management.

Confidentiality

The information you provide in this study will be kept safe and used only for academic purpose in the data analysis stage of the study. You are you are assured that; the researcher will protect all information about you and your identity or information shall not be revealed to any third party. The recorded interview, as well as the transcription, would be kept safe with the aid of a software called 'mylockbox app. This is to prevent unauthorised persons from having access to the information gathered and only the researcher would have access to it. Your name, identity will not be revealed in any reports.

Compensation

This study is solely for academic purpose. There is no compensation package either in cash or kind offered for participation.

Voluntary Participation and Right to Leave the Research

Your participation in this study is solely voluntary. You will have the right to withdraw from the study at any point in time when you feel uncomfortable with any of the interview questions being asked. There shall be no penalty if you choose to withdraw from the study.

Volunteer Agreement

The Purpose, methods, procedures, the benefits, risks and confidentiality clause for the research have been read and explained to me by the researcher. I have been given consent to participate in the study as a

volunteer and would answer any about the in the interview to my satisfaction.

Date …….

Signature of Participant……

APPENDIX: D

A SAMPLE OF TRANSCRIBED DATA OF A PARENT

J: My name is XXX. I am a second-year postgraduate student from the Department of Education and Psychology reading M.Phil. Special Education. I have already sent a form letter to you through your school so I believe by now you know about the rationale behind this interview and the research but for the avoidance of doubts this research is about the Practice of ABA in Ghana, I want to know the impact it is having on children receiving it, their parents and the professionals involved. To begin with, tell me something brief. About yourself.

P: *I am a 37 year a teacher. I am a married man living with my wife and children.*

J: Now tell me about your child.

P: *He is 9 years old. He was born with the condition. When he was born in ZZZ hospital he had the condition. The leg, he was not walking and the speech was not coming, all from birth. They made me sent him to the regional hospital for the leg and speech therapy but because my financial strength couldn't sustain me I stopped. However, the school he is in now is helping with the therapy for his leg.*

J: Before bring he to school M, was he schooling somewhere?

P: *No, he was not schooling, he was home. We planned taking him to a special school at XXX but I decided that because XXX is far from where I stay, he decided to bring him to school M.*

JAW: How long has he been receiving therapy at School M?

P. *I think he should be at 2017, he was among the pioneers of the school.*

SECTION B. Impact of applied behaviour analysis intervention on behaviour change in children with autism spectrum disorder in Ghana.

J: He is your son, and you'll be the best person to tell us if there have been any observable behavioural changes when he started receiving ABA intervention at school M. Tell me any changes you have observed in him since he started receiving ABA interventions.

P: *So far, His vocal speech is not is normalised but there is small small improvement in the sound he makes, overall, there has been great improvement in his communication. He has been taught picture exchange communication to help him communicate with us when he wants something done for him or when he wants to do or request for something. He has also been taught simple sign language like all done, I want more, is ok, these have helped us a lot understand him when he needs something and it has helped reduce his tantrum throwing behaviour. So, for his communication I am satisfied with what has been done so far at school M. With the leg, I believe when we began the therapy at ZZZ hospital, if we had continued at that his early years, the right leg would have straightened by now but due to lack of fund I stopped. But school has advised we get another Physio therapy, so we are in the process with school so enable him walk. So far there is improvement. Formerly he could not stand on his feet but now he is able to stand and able to walk when holding a table or a wall.*

J: Tell me about his play behaviour with other children at home:

P: *oh he has been playing with other children since he started ABA, formerly doesn't but School M has taught him that so I have observed that unlike formerly when he does not play with anyone, often isolated, this time he plays with his siblings and other children in the house.*

J: There something called temper tantrum, where he gets angry and through him on the ground when his requested is not granted, have you observed any change with regard to that?

P: *Formerly he used to do that, throw himself on the ground at the leas provocation but things have changed now. When he started schooling at school M there was a training that they gave him, which we parents were also taught to take them through when they are home on vacation. I must say the tantrum has stopped in a long while now. Though he does get upset once in a while, he doesn't throw himself aggressively on the ground as he used to do formerly. For example, those days, when I am taking him to schools he can get upset about his colleague and start hitting him or her but so far, he has stopped.*

J: There are some children with his condition who don't like noisy, they blocked their ears with their fingers or start shouting when they hear nosiy. Does he do that too?

P: *Yes, he does, when we are even in a car and I start playing, Music or turned the radio off, he reacts, by either blocking his ears or turning the radio off.*

J: Has that behaviour stopped or reduced?

P. *Frankly speaking, it has not stopped but the situation has reduced, through school M parent training I have learnt some of the cues in the*

environment that triggers negative behaviour from my child, so I have rather changed with regard to how he reacts to noisy environment because I know reacts, anything we are in the car I don't play music.

J: What about self-help skills like dressing, toileting and brush teeth?

P. *For the dressing he been taught at school M, so he can put on his shirt (top) when given but because he is unable to stand on his two legs for long, he is not able to wear the shorts. For the teeth brushing and toileting he has been taught. He is doing well with that.*

SECTION C: IMPACT OF APPLIED BEHAVIOUR ANALYSIS INTERVENTION ON THE FAMILY LIFE OF PARENTS WITH CHILDREN IN THE AUTISM SPECTRUM DISORDER IN GHANA.

J: There intervention he is receiving, do you think it has been helpful to you and your family?

P: *Yes, it has been. Through ABA, He is able to play with his colleagues at school and siblings at home. His communication has improved through the use of PECS and the basic sign language he is being taught. I must say ABA has been so helpful. We now understand our son better. The burden on my family has lessen. When he was diagnosed of the condition I and his mother worried a lot especially when we were not having treatment for him. However, I can say the worry is no more as we are seeing improvement in the therapy, he is receiving from school M. He is becoming independent in self help skill and it has really reduced the burden of taking care of him.*

SECTION D: THE PERCEIVED APPROPRIATE OF TECHNIQUES APPLIED IN THE APPLIED BEHAVIOUR ANALYSIS INTERVENTIONS IN GHANA.

J. What do you think about the appropriateness of the intervention techniques used?

P. *Well, I don't really know if I am the right person to judge the appropriateness of the intervention procedures but I can say I don't have any problem with the procedures use because it does not inflict any pain on my child. The do not use punishment rather reinforcement so I am ok with the intervention procedures.*

SECTION: E

J. Do you have any recommendation to make?

P: I think government should help train more professionals in ABA, and more ABA training should be given to special education teachers in our schools. Because when my son was diagnosed with ASD, if he had received ABA training at that young age, I believe he would have been far ok by now, so we need more ABA professionals and schools in Ghana. Government should champion this course.

APPENDIX: E

A SAMPLE OF CODING SCHEME

MAIN THEME	THEME	CATEGORY OF CODES	EXAMPLE(S) OF RESPONSE PATTERNS
Impact of applied behaviour analysis intervention on behaviour change in children with autism spectrum disorder in Ghana.	General impact of the ABA	ABA has been positive	*As a teacher, when I got to know ABA and understand ABA and me using it to impact life, I see it to be very effective. Because I have seen positive results….*
	Impact of ABA on child's communication	The use of picture exchange communication system	*He has been taught picture exchange communication to help him communicate with us when he wants something done for him or when he wants to do or request for something, these have helped us a lot understand him when he needs something and it has helped reduce his tantrum throwing behaviour. So, for his communication I am satisfied with what has been done so far.*

Impact of ABA on child's challenging behaviours	Challenging Behaviours reduced	*Formerly he used to do that, throw himself on the ground at the least provocation but things have changed now. When he started schools there was a training that they gave him, which we parents were also taught to take them through when they are home on vacation. I must say the tantrum has stopped in a long while now. Though he does get upset once in a while, he doesn't throw himself aggressively on the ground as he used to do formerly. For example, those days, when I am taking him to schools he can get upset about his colleague and start hitting him or her but so far, he has stopped.*

APPENDIX F

INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
FACULTY OF EDUCATIONAL FOUNDATIONS
DEPARTMENT OF EDUCATION AND PSYCHOLOGY

Telephone: 0332091697
Email: dep@ucc.edu.gh

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref:

Your Ref:

14th May, 2021

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

THESIS WORK
LETTER OF INTRODUCTION: MR. JOHN AHORSU WALKER

We introduce to you Mr. Walker, a student from the University of Cape Coast, Department of Education and Psychology. He is pursuing a Master of Philosophy Degree in Special Education and he is currently at the thesis stage.

Mr. Walker is researching on the topic: **"APPLICATION OF APPLIED BEHAVIOUR ANALYSIS INTERVENTION IN THE MANAGEMENT AND EDUCATION OF CHILDERN WITH AUTISM SPECTRUM DISORDER IN GHANA."**

He has opted to collect or gather data at your institution/establishment for his Thesis work. We would be most grateful if you could provide him with the opportunity and assistance for the study. Any information provided would be treated strictly as confidential.

We sincerely appreciate your co-operation and assistance in this direction.

Thank you.

Yours faithfully,

Florence Essuon (Ms.)
Administrative *Assistant*
For: **Head**

APPENDIX: G

ETHICAL CLEARANCE

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
ETHICAL REVIEW BOARD

UNIVERSITY POST OFFICE
CAPE COAST, GHANA

Our Ref: CES-ERB/ucc.edu/v5/21-50

Your Ref: ....

Date: 24th May, 2021

Chairman, CES-ERB
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Vice-Chairman, CES-ERB
Prof. K. Edjah
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Secretary, CES-ERB
Prof. Linda Dzama Forde
lforde@ucc.edu.gh
0244786680

Dear Sir/Madam,

ETHICAL REQUIREMENTS CLEARANCE FOR RESEARCH STUDY

The bearer, John Ahorsu Klakee, Reg. No. EF/SPE/19/0011 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:

Application of applied behaviour analysis in the management of children with Autism Spectrum Disorder in Ghana: Parents and teachers' perception of outcome

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)