



# Nursing intervention in the care of Autistic adolescents with commu- nication disorder

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**Nursing intervention in the care of Autistic adolescents with communication disorder**  
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**Abstract**

Communication disorder is one of the myriad impairments that autistic individuals experience. Although the challenge has been widely studied among children, limited information exists about it among adolescents. Frustration from the inability to communicate leads to outbursts in this group. Also, most of the individuals with this disorder are forced to live dependent lives, and are rarely considered for employment. Moreover, nurses are not sure of how to intervene for adolescents with a communication disorder. They end up using interventions whose effectiveness is unknown. This thesis took an evidence-based approach to explore the communication disorder in autistic adolescents. The Russwurm and Larrabee model of evidence-based practice was utilized throughout.

Four articles were identified, and they provided crucial information about the effectiveness of alternative and augmentative communication, computer-based interventions, and social stories trainings. Two of the articles were systematic literature reviews, which provide a higher certainty of evidence than other types of research such as Randomized Control Tests. Overall, the three interventions were found to be effective in enhancing both communication and motor skills in adolescents.

An implementation procedure is provided to ensure that the interventions are adopted and integrated into the nursing practice. By adopting these interventions, the quality of life for the adolescents will improve due to several factors. First, they will stop depending on others for assistance in communication. Secondly, improved communication will increase their chances of getting employment. Thirdly, better communication will reduce stress on their physical and mental systems, and they can in turn focus on improving other impairments such as motor skills.

**Keywords:** Nursing Intervention, Autistic Adolescents, Communication Disorder

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## 1 Introduction

Communication disorder is one of the spectra challenges that adolescents with autism spectrum disorder (ASD) have to deal with. The American Psychiatric Association (APA) (2013) noted that ASD is a developmental disorder epitomized by difficulties in social interactions, repetitive behavioural patterns and communication. Phillips and Phillips (2010) emphasized that providing care to people living with ASD is challenging meanwhile Searcy (2011) stated that it is daunting. Moreover, there are documented records of ASD patients requiring extended sedation during hospitalization to allow for appropriate treatment (Hadin and Berkenbosch, 2018).

Communication with victims of ASD is vital in giving high quality nursing attention. As noted above, communication disorder is a hallmark of ASD. Clinical performances are diverse. Taser-Flusberg, Lord and Paul (2005) estimated that 20-50 percent of people with ASD fail to develop purposeful communication. To give high quality nursing interventions and care to adolescents with ASD, nurses need to comprehend the development of communication and how this varies in people with autism spectrum disorder, the theoretical aspect of ASD and their influence on communication, and practical ways of enhancing the communication with this group. The possible interventions come at a time when technology is deeply rooted in various sectors, affecting everyone's day-to-day lives.

## 2 Purpose and Research Question

The purpose of this study are two-fold: the first is to explore nursing interventions for the care of autistic adolescents with communication disorder and secondly, to synthesize the literature and recommend the most effective nursing intervention for autistic adolescents with communication disorder.

The aim of this thesis is guide the nurses to a better understanding of how they can intervene for autistic adolescents with a communication disorder. It will fill in the gap that exists on the information related to nursing care for autistic adolescents since most of the previous studies focused on children. It will also show the role of the nurse in the various methods of interventions. The findings may also show that a good intervention can improve the quality of life of autistic adolescents with communication disorder.

The synthesized information can also act as a guide for nursing students and practicing nurses aiming at enlightening themselves with in autism. The policy developers can also use the information presented in this study to make favorable amendments to existing policies or enact new legislations. Finally, autistic adolescents with communicative disorder will benefit from improved care as a result of the insight of this study. It could lead to a better quality of life if the methods and findings are adopted, integrated and implemented in in their care plan. An

improvement in their communication could also lead to better chances of finding employment and reduce their dependency levels.

## 2.1 Research Question (PICO)

PICO is a technique used to structure research questions in nursing and related medical fields. It allows easier finding of information using various databases. The P denotes population, I describes the intervention, C calls for comparison and O represents outcome. In this studies, the PICO question is: What are the nursing interventions in the care of autistic adolescents with a communication disorder? The population is adolescents; the intervention is nursing interventions, the comparison is the typical adolescents and the outcome is an evidence-based model for nursing intervention.

This evidence based practice (EBP) thesis is organized into five major chapters. The second chapter represents the background review of literature as well as the methods used in searching and collecting the data (articles). Chapter three utilizes EBP approach to analyze the selected articles and chapter four summarizes the analysis. Chapter five represents an evidence-based model for nursing intervention in the care of autistic adolescents with communication disorder.

## 2.2 Need for the study

As noted earlier, ASD is one of the most prevalent neurodevelopmental illnesses with an incidence rate of 1 in 59 children by 2018 in the United States, and 1 in 185 in Finland as at 2019. ASD is typically diagnosed at childhood, usually at preschool. A table on prevalence rate in various developed countries is presented below. Behaviour-based diagnosis is the most common (it is worth mentioning here that there is no particular lab or genic test for ASD) and depends on recorded primary deficits linked to communication, social interaction and restrained and repetitive behaviour. Diagnosis made by clinical service providers, most often by behavioural providers and paediatric nurses is based on recorded symptom patterns in these realms.

There are many diagnostic and screening tools to aid in measuring and documenting autistic symptoms, with studies increasing using such methods, coupled with clinical diagnosis to precisely describe, measure and infer the heterogeneity in ASD cases. In addition to deficits to main symptom domains, numerous people with ASD also exhibit deficits in intellectual skills, atypical sensual performances, or other sophisticated psychiatric and medical conditions and signs which may include motor deficits, anxiety and aggression, among others.

According to Fombonne (2003), more than 55.000 people aged between 15-17 years have ASD. For some, main symptoms of ASD (communication disorder, social interaction and impulsive behaviours) may show improvement with interventions over time (McGovern and Sigman, 2005). Nevertheless, impairment usually persist over the individual's lifespan, although the

developmental expression may vary (Seltzer, Shattuck, Abbeduto, 2004). As kids grow up to adolescents and young adults, developmentally useful interventions to improve core impairments may increase, but the treatment usually focuses on enhancing adaptive behaviours that can promote or enable independent living (Seltzer et al., 2004). Interventions must take into consideration the fact that different signs may come up with adolescence and the interaction with new developmental problems (such as post-secondary education, vocational engagement and independent living). Particularly, nurses and care providers have to decide on intervention that takes into account a broad range of educational, behavioural and clinical aspects.

Present data indicates that the obtainment of employment or independent living in ASD adults varies with issues that foretell the ability to live and labour independently not well recognized (Seltzer et al., 2004). More so, the few studies on results for young adults and adolescents with ASD show challenges in meeting indicators of typical independence, such as employment for most of these persons Seltzer MM GJ, Taylor JL, Smith L, Orsmond GI, Esbensen A, Hong J. (2011). Notably, most adults with ASD live independently; needing significant support; less than a third are regularly employed; most co-habit with their parentages in supported living; and the employed ones are very so often in occupations that pay lesser than standard wages (Ballaban-Gil, Rapin, I., and Tuchman 1996; Billstedt, Gilberg, and Gillberg, 2005; Eaves and Ho, 2008; Taylor and Seltzer, 2011). Partly due to this high dependence levels, most people with ASD will need some backing up or intervention, often intensively, as they transition to adolescence and adulthood. Nurses are in central position to provide such support and interventions.

The predicted expenses of non-medical and medical upkeeps like day-care and special needs' schools are incredibly high. One research estimated that the overall annual societal per capita expense of treating and helping an autistic individual on average is \$3.2 million and about \$35 billion for a full birth group of people with autism (Ganz, 2007). A health care utilization research in a health plan with a group of individuals found increased costs of medication in older kids with ASD when compared to younger ones, and same-aged adolescents with ASD. Other costs of care were also greater in this group, plus a higher hospitalization rate (Croen, Najjar, and Ray, 2006).

Costs of employment and transitional courses are also more expensive for adolescents and young adults with ASD. A recent evaluation of a United States state-funded and federal vocation rehab plans exhibited that people enrolled with ASD were amongst the most expensive of the nine cohorts of disability evaluated, with costs even greater for those with another comorbidity in addition to ASD. Nevertheless, the study revealed that ASD individuals had a higher employment rate (40.8%) compared to individuals with other forms of disability, although they earned lower wages and had fewer working hours than those of the other groups of disabilities.

Although fewer researchers have studied this stage of development specifically, one of the researches indicates that symptoms and behaviours seen while adolescents are in high school declined or came to a halt after they left (Taylor and Seltzer, 2010). Many young adults lose access to services, depending on school or age, and many services available to the adults need waiting list (Howlin, Alcock and Burkin, 2005). The absence of services available to facilitate successful transitioning of adolescents with ASD to adulthood has been elaborated by various researchers (Howlin, 2005) and it is becoming a core topic in the mainstream media (Harmon, 2011). To date, the particular interventions and plans that result in better adaptive, societal and employment results for people with ASD as they shift to adulthood are comprehended vaguely.

Moreover, it is not explicit how such results are best evaluated in light of heterogeneity and the broad spectrum of deficits linked to ASD such as communication (Seltzer et al., 2004; Taylor, 2011). This deficiency of statistics restricts the capability of people, families, physicians and service systems to give the requisite care to optimize the quality of life and reduce expenses linked to ASD throughout the lifespan. This thesis therefore seeks to fill this gap by providing insights into some of the best interventions that nurses can offer to autistic adolescents. Given the broad spectrum of disorders under ASD, it is only possible to focus on one at a time, and the choice was made on communication disorder.



### 3 Theoretical Framework

The Centre for Disease Control (CDC) (2018) noted that there was a 15% upsurge in figures of children with autism from previous years, to 1 child in 59 in the United States. Worse still, the growth is still an undercount of actual figure since higher rates were recorded where researchers had complete access to the school records. In New Jersey for example, an increase of 20% (1 in 34 children) was recorded. However, the rates in Finland are much lower, with one in every 185 people being autistic as of 2019 (Autism Rates by Country Population, 2019). Nevertheless, these findings reflect the significance of devising ways to manage the symptoms of autism, notably, communication, which is the main focus of this paper.

#### 3.1 Nursing Intervention

Interventions are ways or actions taken to improve a particular condition. Nursing intervention in autism therefore refers to various activities that can be used to improve the conditions of autistic people. There are a number of interventions available for use, depending on the theory behind the cause of ASD, nature and severity of autism, and the accompanying symptoms. For instance the theory of mind explains autism in terms of impairment in the brain development, and the interventions that focus on brain development such as pretend play maybe applied. The interventions maybe classified as behavioural, developmental, combined, alternative interventions, family-based interventions and medical interventions amongst others. The behaviour-based actions aim at teaching children new behaviours using structured and specialized techniques. Most of the methods in this category are widely supported by literature, making them most commonly used forms of intervention.

Developmental interventions aim at teaching autistic kids to form positive and expressive associations with others. The communicative disorder, which is the primary focus of this thesis is covered in developmental interventions. The combined interventions are a mixture of developmental, behavioural, new information about ASD, and also typical development. They are usually the best approaches since they bring together the functional aspects various types of interventions. Family-based interventions stress that family involvement is key to enhancing support for autistic adolescents. The kids spend most of their time with members of the family, hence, they have the most significant influence of the child's development. Family-based interventions focus on equipping the family members with requisite information on what they can do to help their autistic kids, emphasizing the importance of a good professional relationship between professionals (such as special education teachers, nurses, speech therapists, etc.) with the family members.

Another type of intervention is therapies. These target specific disorders in the autistic individual. For example, occupational therapy is used to develop daily living skills while speech

therapy aims at improving the adolescent's social and communication skills. It is worth noting that treatments are used as part of, or in conjunction with other interventions. Medical interventions focus on using different types of medications to improve symptoms of ASD. For example medications such melatonin, circadin used to improve sleep disorders. It is worth mentioning at this point that there are no medications that completely cure autism, some have been proven to improve the symptoms. Alternative interventions refer to a wide range of interventions rarely applied in the medical sector due to lack of scientific research supporting their use. Apart from these types of interventions, there are other forms of interventions such as music therapy, though there are minimal evidence on their suitability and effectiveness.

Nursing interventions maybe in any of the main types of interventions outlined above. They refer to the actions that nurses can take to care for adolescents with ASD. They may range from diagnosis to the actual provision of care. This paper synthesizes by examining or reviewing the various articles written about nursing interventions for autistic adolescents with communication disorder, in order to come up with some evidence-based models/interventions that nurses can use in their quest to enhance the quality of life for adolescents with ASD.

### 3.2 Communication Disorder

A communication disorder is the inability to receive, send, process, and make a comparison of verbal or nonverbal behaviour (Gupta, 2015). The disorder may be demonstrated in processes such as hearing, speech, and language, and ranges from mild to severe. Clinical populations such as those with intellectual disability, Aphasia, and Autism exhibit one or more types of communication disorders. There are different forms of communication disorder, though they may not necessarily point to autism as their root cause. However, there are specific forms of communication disorder that depict autism.

Repetitive or rigid language is a form of communication disorder in which an adolescent with ASD speaks meaningless and unrelated things when engaged on a specific topic. It could be that they are narrating the different alphabets or counting within a specific range of numbers repeatedly even if the topic of the conversation has nothing to do with counting or alphabets. Rigid language is demonstrated by ASD adolescents by way of echolalia. If for example a nurse asks the adolescent that "are you hungry?" and food is presented to him, that adolescent will understand "are you hungry" as a code to get food. When next he needs food, he will say "are you hungry?" expecting to be given food. This also referred to as reversal of pronoun.

Poor nonverbal communication skills is another form of communication disorder linked to autism. Autistic individuals are unable to understand certain gestures and body language. They may avoid eye contacts, seem to be uninterested in a conversation by trying to be focused on

something else and can also be inattentive. The lack of language skills, non-mastery of gestures and body language to complement for the absence of oral skills leads to frustration in their attempt to express a feeling, receive a message or request a need. The frustration is manifested in anger, shouting or violence with ensuing consequences (Kasari, C., Brady, N., Lord, C., & Tager-Flusberg, H., 2013)

Uneven language development is a type of communication disorder in which though the child can speak or even read, he still do not have a regular level of ability and their communication development is usually uneven. Such an adolescent can quickly develop a great vocabulary in a specific area of interest such as a hobby. He may also have a good memory of the things he just heard and may even read but do not understand what he has read. Individuals with this form of communication disorder often do not respond to speeches of caregivers nor respond to their own names. For this reason, some are deemed to be hearing-impaired.

Narrow interest and exceptional abilities is individuals with ASD are able to communicate deeply on a specific topic of interest by way of monologue, but are unable to maintain a two-way conversation on the same topic. Such individuals maybe talented in maths, music or drawing. According to Kasari et al. (2013) about 10 percent of children with autism show great skills and high abilities in particular areas such as maths, music and memorization.

### 3.3 Age of Adolescence

Although the understanding of who really are adolescents varies among different communities, some marking adolescence by a rite of passage such as circumcision, it is widely accepted that adolescence begins at the start of puberty and ends when puberty is over, marked with profound social changes and responsibilities. Encyclopaedia Britannica defines adolescence as: "Transitional phase of growth and development between childhood and adulthood." It adopts the age range for adolescence as 10-19 as defined by the world health organization (WHO). This age range equally falls within the WHO definition of young individuals as individuals aged between 10 and 24. Other sources define adolescence to be individuals aged between 13 and 19 (teenagers). However, this thesis adopts the conventional age range of 10-19 years to define adolescents (Robards & Bennett, 2013).

## 4 Literature Review

This section presents the general theories of communication development. It lays the ground-work for understanding how communication develops in typical individuals on one hand and how it develops with autistic individuals on the other hand. The arguments which explains the occurrence of autism are also presented. Lastly, the linkage between communication disorder and motor skill development is presented.

### 4.1 Communication Development

Communication is the process of exchanging information in various ways with others. According to Heflin and Alaimo (2007), it is not restricted to language, but also incorporates non-verbal cues and synthesis of symbols. It entails decoding a message and the ability to code one for others. Although it is a complex process, it occurs very fast. Before diving into communication in adolescents, it is important to understand how the process usually develops from an early age.

An adolescent with a typical development usually undergoes three phases of communication, starting from childhood. The first one is intentional communication where he/she uses vocalization and gestures to elicit attention or meet a need. The second phase is the utilization of early language when interacting with others, meeting needs or to elicit attention and this is referred to as the symbolic phase. The final stage is called linguistic communication and it is the most complicated. It is the capability to interact with others in full conversations, using different types of communication (Neons & Van Berckelaer-Onnes, 2004). Adolescents with ASD can exhibit differences with typical development ones from their infancy. For example, typical development infants start social interactions through crying, eye gaze, and facial recognition (Eposito & Venut, 2010). However, kids who develop ASD later, perhaps at adolescent level, usually prefer to stare at objects or people, notice sections of objects rather than the entire, and tend to fixate on single rather than multiple items (Heflin & Alaimo, 2007). At 6-7 months, the typical development kids start using vocal utterances and babbling while those of later diagnosed with ASD tend to babble less often, seem unaware of language and are often perceived to be hearing-impaired (Helin & Alaimo, 2007). In the final phase of infancy, typical development children start gesturing to communicate needs or wants. It is worth noting that gesturing is an early form of intentional communication. On the other hand, children with ASD use gestures less frequently and in fewer types of communication (Heflin & Alaimo, 2007).

Pre-schoolers and toddlers get involved in three forms of behaviour that aid in communication development, language and social skills. These include engaging in motor imitation, symbolic play and joint attention which are necessary for developing skills. Language skills are preceded by motor imitation. Young ones start to imitate actions they observe in adults and

other kids. To be able to imitate the action correctly, accurately or in the appropriate setting, young ones must discern how the other individual want them to act. They have to develop a conception of the other individual's mind. However, kids with ASD maybe sluggish or inaccurate in imitating others since they misunderstand the gist of symbols/behaviours or they ascribe meaning erroneously (Tager-Flusberg, Paul and Lord, 2005).

Joint attention refers to the aptitude to interact with other people. Kids can observe what other kids are inclined to and attract another's devotion in that deed. Social engagement involves the sharing of information as well as emotions. These sustained engagements with peers result in the development of language (Bolick, 2008). The extent that ASD kids engage with peers can be used to predict future communication, such as adolescence (Tager-Flusberg et al, 2005). More so, ASD kids request joint attention and respond to peers' invitation for joint attention less frequently (Chiang, 2008)

Symbolic or Object Play in infancy aids in developing representation of symbols and is vital to growth of verbal skills. Pretend play with items grows naturally and turn out to be more sophisticated as time progresses in typical development kids. The understanding of signs help in the understanding language. However, Heflin and Alaimo (2007) noted that ASD adolescents are less probable to engage in symbolic play which in one way or the other interferes with their communication development and skills.

ASD infants who attain functional communication frequently exhibit atypical kinds of communication such as neologisms, echolalia and reversal of pronouns. This type of development is attributed to the inadequate understanding of meanings and use of figurative types of language (Heflin & Alaimo, 2007). Usually, these children possess the vocabulary and syntax to excel in standard language tests, but face difficulties in real world communication situations because they lack the real comprehension of meaning (Paul and Wetherby, 2005).

Neon & Van Berckelaer-onnes (2004) noted that the deficits in ASD are usually explained as qualitative impairments. The frustration resulting from the inability to connect with other people can lead to behavioural outbursts in some adolescents. These manners have a broad spectrum of variation and could lead to loud vocalizations, self-harming habits or aggressiveness. The behaviours are viewed as a communication type when there is a disjoint in the process, and the needs of the young adolescent are unmet (Bronsard, Bothal and Tordjman, 2010).

#### 4.2 The Theory of Mind

This concept offers a rationale for most of the practical aspects of communication in kids and adolescents with ASD. The first subset of the idea is the *weak central coherence theory* which

details a mind that only sees information in parts rather than in whole. The storage and retrieval information are separate. It is particular and non-generalized to other instances. Happe & Frith (2006) noted that the ASD mind is inclined to process pieces of information rather than deriving the broader meaning of data. Given that communication needs several parts of information from distinct sources to be contextualized and analysed rapidly, a weak central coherence is disadvantageous. Neon & Van Berckelaer-Onnes (2005) posit that this theory is the most appropriate when explaining all communication challenges, including the receptive and expressive associated with ASD. The argument can also be used to describe neologism or delayed echolalia in ASD. ASD adolescents do not generally understand the denotation of the full message plus its context for the first time. Instead, they ground on a section of the message; perhaps a phrase. They may reiterate that phrase later while trying to capture the meaning and milieu of the initial message, but their recollected section is insufficient to be meaningful to other people.

The second subset of the mind theory is the *weak executive function theory*. This is the function that enables an individual to strategize, unify, perform multiple tasks, make high level choices and inhibit impulses. It allows suppleness in learning and thinking. In the absence of executive function, it is challenging to alter thinking after learning an idea (Barbaum, 2008). Prizant, Wetherby, Rubin, and Laurent, (2003) noted that communication needs high suppleness and adaptation over time since language advances in sophistication. Pronoun reversal is one illustration of communication deficit in ASD. After an adolescent with ASD hears “Do you need a book?” and the book is provided, it is challenging for them to adjust their communication when requesting. So the adolescent may repeat what he heard initially, “You need a book?” rather than stating “I need a book”.

#### 4.3 Relationship between motor skills and communication disorder

This section examines literature about the relationship between communication disorders and motor skills. Any relationship between the two has an influence on the interventions that nurses can use on autistic adolescents with communication disorders. The association between communication deficits and motor skills has attracted the attention of scholars in the last decade. Gernsbacher, Dauer, Geye, Schweigert, Hill, and Goldsmith, (2008) found out that language deficits are correlated with manual-motor and oral-motor skills in ASD, and that the association between them is likely to neurological (Hill, 2001) or genetic (Bishop, 2001) in origin. Nevertheless, much of the studies omitted persons with ASD to prevent the influence of co-morbidities, such as repetitive and rigid manners, and meagre social skills. In addition, most of the research on language and speech in ASD involved infants and younger kids, rarely addressing adolescents. There is also the question of if any particular aspect influences the inception of communication impairment, and sustains them across the ASD progress.

A developing frame of studies indicate that manual-motor, oral-motor skill growth and fundamental perception-motor deficits may affect language, speech, and social skills in persons with ASD (Bhat, Landa, & Galloway, 2011; MacDonald, Lord, and Ulrich, 2013). It is worth mentioning here that motor delays at one and half years can be used to predict ASD severity at age three for children of a family with history of autism (Brian, J., Bryson, S., Garon, N., Roberts, W., Smith, I., Szatmari, P., & Zwaigenbaum, L., 2008). Although most of the children do not display any symptoms until about six months, a broad set of motor, attention behaviours and social communication at 12 months can predict future diagnosis (Tager-Flusberg, 2010). Moreover, the connection of expressive and receptive language and motor impairments aid in the differentiation of kids into language aptitude categories (minimally fluent, moderately fluent and highly fluent) (Gernsbacher et al., 2008). In spite of this, the solitary motor impairment presently incorporated in the diagnostic procedures for ASD are stereotypical, repetitive motor movements (American Psychiatric Association, 2003). Although unclear, the repetitive behaviours are motor stereotypes like flapping of hands, hand mannerisms and body rocking (McCleery, Elliott, Sampanis, & Stefanidou, 2013). Challenges with gross and fine motor impairments and postural control also often occur simultaneously with ASD (Bhat et al., 2011). A comprehensive literature review of children at high risk of autism by Rogers (2009) showed that motor issues are frequent impairments in that group. Additionally, the research showed that some of the subtle repetitive motions begin before communication and social impairments. Thus there is extensive evidence that the motor system influences the occurrence of ASD.

Some of the earliest motor-related behaviours to develop and which have a linkage to the development of communication are imitation of facial expression, and vocal imitation. They commence within the first-six months of life (Iverson & Fagan, 2004). The period is when kids start to participate in harmonized routines with a caregiver, acting as the foundation of interpersonal communication and social reciprocity (Colonesi, C., Zijlstra, B. J., van der Zande, A., & Bogels, S. M. 2012). Importantly, Yirmiya, N., Gamliel, I., Pilowsky, T., Feldman, R., Baron-Cohen, S., & Sigman, M. (2006) noted that there is minimal communication synchrony (simultaneous verbal interchange) during mother-infant engagements in high-risk siblings of kids with ASD. These findings provide further supports that social, speech-language skills are correlated with motor skills in ASD.

A range of studies shows evidence of the influence of the motor system in speech perception. Fadiga, L., Craighero, L., Buccino, G., & Rizzolatti, G. (2002) used Transcranial Magnetic Stimulation (TMS) to show an increase in motor captured potentials from the listener's tongue when the words evoked strong tongue movement. Thus phonetic perceptions activates the left hemisphere associated with the production of speech such as the premotor cortex and auditory sections like superior temporal gyrus (STG) (Zatorre & Binder, 2000). The observa-

tions are aligned with the fact that speech production involves the generation of internal motor models of speech which are then compared with incoming data. More recent research by Kuhl, P. K., Ramirez, R., Bosseler, A., Liotos Lin, J, & Imada, T. (2014) showed that infant display sensitivity to motor speech gesticulations and rely on these during phonetic perception. Also, research has demonstrated that non-linguistic oral motor skills influence a child's non-verbal processing ability, which is used to measure phonological processing. These findings indicate that language learning and impairments may have their origin in the capability to perform sophisticated sensory-motor transformations. Thus nursing interventions for autistic adolescents with communication disorder should involve interventions that enhance motor coordination (such as placing items on paper, chowing the adolescent hot to button and unbutton his clothes and clapping hands).

In addition, Webster, R. I., Erdos, C., Evans, K., Majnemer, A., Kehayia, E., Tordadottir, E., Evans, A., & Shevell, M. I. (2006) demonstrated that children selected on the premise of language challenge also exhibited significant motor comorbidity. It is therefore not surprising that in a subcategory of kids with ASD, communicative deficits seem to arise from primary motor and aural-motor factors. More so, in kids with standard non-verbal IQ, imitation and vocal skills at infancy are better predictions than joint attention for language skills at age five. Given that motor impairments in autistic individuals can vary from fundamental skills like pointing, to more refined ones like imitation and articulation, Belmonte, M. K., Saxena-Chandhok, T., Cherian, R., Muneer, R., George, L. & Karanth, P. (2013) recommended that motor skills be evaluated across the entire range for ASD persons. Thus, nursing interventions of adolescents with communicative disorders should also check for impairments in motor skills and other interventions (if there are any), will be examined and brought to light in the later part of this thesis.

In summary, early motor capabilities seem to influence the growth of social skills. Moreover, the level of intellectual impairment coupled with motor, language and social deficits appear as aggregate markers that foretell ASD and intervention results (Mody & Belliveau, 2012). Nonetheless, while IQ is implicated in ASD and IQ has an association with language, deficits in IQ do not significantly influence the heterogeneity in the language capability of ASD adolescents. Kjelgaard and Tager-Flusberg (2001), for instance established that there were adolescents with ASD who had low IQ but possessed the standard language skills, as well as adolescents with a language deficit but high IQ. They therefore concluded that cognitive capability and language can be dissociated in adolescents with ASD. In spite of that, controlling for IQ in studies is still necessary since low cognitive ability may skew the findings contributing to inferior performance among the low functioning participants.



## 5 Data Collection

This section details specific methods used in obtaining articles for answering the PICO question. It is the core of this research. The procedures in this section are adopted from Glasper, Carpenter, and Jepson (2012).

### 5.1 Data Collection Using the Databases

The researcher mainly used Medline, PsycINFO, and CINAHL. The strategies used include keywords such as autistic adolescents, nursing interventions, communication disorder and technology in nursing intervention. The results were limited to articles published from 2000 (though some articles referred the researcher to other articles published earlier than 2000). They had to be journal articles and published in the English language. They also had to contain abstracts and be free of charge. The search yielded over 4000 unique records. About 100 contained all the keywords. The writer then skimmed over the abstracts of those articles and further reduced them to 10 based on their objective, methodology and findings. So 10 of the articles were fully read and four were selected for critique (detail analysis and assessment), which will be detailed subsequently in this paper. The four articles chosen fulfilled the purpose or aims of this thesis, and also provided direct answers to the PICO research questions. Glasper et al. (2012) pointed out that an undergraduate evidence-based practice (EBP) thesis could utilize 3-5 articles. It is also worth mentioning that the researcher noticed that some materials, although listed in EBSCO, were only partly available. In such cases, the writer used the Google search engine to find the said articles from other scientific databases.

Unpublished or grey literature was found using websites belonging to the relevant mental health and communication organizations such as Mayo Clinic, World Health Organization (WHO) amongst others, governmental departments or health ministries, main social science sites, just to name a few. Most information in these sites provided insights that reinforced the information already found journal articles. It was thus preferable to rely on the articles since information on websites are susceptible constant changes as a result updating of the websites or withdrawal of license or their domain.

### 5.2 Inclusion and Exclusion Criteria

The writer used the PICO question in his quest to hit the right targets. The table below shows a summary of the inclusion criteria. Studies which failed to meet the exclusion criteria were excluded.

Category	Criteria
Study Population	Young adults/adolescents with ASD (communication disorder) or care providers for ASD adolescents

Interventions	Nursing interventions aimed at improving core ASD symptoms (communication deficits, motor impairments) that affect independent functioning, adaptive behaviour, or the transition to adulthood
Comparisons	Typical development adolescents, other interventions, placebo
Outcomes	Communication and language, interaction/social skills, development of academic skills, family outcomes including satisfaction and distress, and motor outcomes.
Time period	Research articles published from 2000 to 2019 that contained no limitation on outcome timing
Setting	Clinical settings, educational (school nurses), and also residential.
Language of Publication	English Only
Acceptable evidence (e.g design of the studies)	<p><u>Acceptable Designs</u></p> <p>Observational studies, control trials, retrospective and prospective case studies, systematic literature reviews, meta-analysis</p> <p><u>Study Size</u></p> <p>Statistically significant sample sizes depending on the researcher's stated population size.</p> <p><u>Other Criteria</u></p> <ul style="list-style-type: none"> <li>• Research must factor in one or more of the following <ul style="list-style-type: none"> <li>○ Treatment intervention targeting ASD core symptoms, primarily communicative disorders.</li> </ul> </li> <li>• The articles must incorporate extractable data on valid outcomes, including data given in tables and text (Vs singly in figures)</li> <li>• Studies must provide aggregate data (Vs. only data for each participant)</li> </ul>

**Table 1: Inclusion Criteria**

The literature was assessed by factoring both the practical efficiency of the intervention and confidence that was accorded to the selected articles. The level of confidence that the detected result of an intervention will be stable is given as the evidence strength and ranges from insufficient to high. The four articles selected (which are presented in the next section), were all of high confidence. It is important to mention here that the strength of evidence details the appropriateness of the present study is based on quality and quantity, and the level to which the full body of existing research gives a reliable and accurate prediction of the effect. Therefore, interventions that have shown advantages in few studies but are yet to be replicated using comprehensive research designs will have low or insufficient evidence

strength to explain the research body. In cases like this, future studies may establish that the intervention is either effective (by affirming its implementation) or vain (by quashing it entirely and making a whole new proposal which is parallel to the said intervention).

For accessing the evidence strength, the writer utilized the guidelines presented in the Effective Health Care Program's Methods Guide for Effectiveness and Comparative Effectiveness Reviews (2008). They are based on four areas which include effective precision, bias risk, consistency in the effect's direction and explicitness in establishing the desired outcome. The summary of the parts used in accessing the strength of evidence for articles in this paper is outlined below.

Domain	Explanation
Risk of bias	<p>Refers to the degree to which the studies considered for a particular outcome/comparison are sufficiently shielded from bias (i.e., good internal validity). It is examined using two primary factors:</p> <ul style="list-style-type: none"> <li>• Design of study (for example observational studies of randomized controlled trials (RCTs))</li> <li>• The overall quality of the studies considered</li> </ul> <p>The quality rating (poor/fair/good) carried out for individual studies give the info for this determination</p>
Consistency	<p>Refers to the level to which given effect sizes from the studies considered seem to take the same direction of effect. It can be examined via two main elements which include&gt;</p> <ul style="list-style-type: none"> <li>• Narrow range of effect sizes</li> <li>• Same sign of effect sizes (i.e., are on the same side of "no effect.")</li> </ul>
Directness	<p>It examines if the evidence directly associates intervention to health outcomes. When carrying out a comparison of two treatments, directness means that head-to-head trials quantify the most vital health or outcomes. The evidence is indirect when:</p> <ul style="list-style-type: none"> <li>• Two/more bodies of evidence are used in comparing interventions A and B. (For example, studies of A vs other interventions and B vs other interventions rather than A vs B)</li> <li>• Intermediate or surrogate outcomes are used.</li> </ul> <p>Indirectness means that two or more bodies of evidence are required to correlate the interventions to the observed critical outcome. Noteworthy, directness may be dependent on the desired results.</p>

Precision	Precision refers to the level of certainty around an effect prediction concerning a particular outcome. For example, in a meta-analysis, the accuracy is the confidence interval about the summary effect size.
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**Table 2: Domains used to access the strength of evidence**

Based on the criteria described in table 2 above, the four articles presented below were identified. They met all the requirements and these will be used in the evidence-based practice critique (data analysis) in forthcoming chapters.

Criteria	Article 1	Article 2	Article 3	Article 4
<b>Author, Journal (Peer-Reviewed), and Permalink or Working Link to Access Article</b>	Schlosser, R. W and Wendt, O. American Journal of Speech-Language Pathology, 17, 212-230.	Elder, J. H and Brown, A. B. Pediatric Nursing, 40 (5).	Manzari-Tavakori, F., Hosseini, S. E., and Karimi, L. Report of Health Care, 1 (2), 28-37.	Ramdoss, S., Lang, R., Mulloy, A., Franco, J., O'Reilly, M., Didden, R., and Lancioni, G. Journal of Behavioural Education, 20, 55-76
<b>Article Title and Year Published</b>	Effects of Augmentative and Alternative Communication Intervention on Speech Production in Children with Autism: A Systematic Review. 2007.	Communication in Autism Spectrum Disorder: A Guide for Pediatric Nurses. 2014	The effect of Social Story Telling on Motor Skills and Verbal Communication among Children and Adolescents (5-17 Years Old) with Severe Autism Spectrum Disorder. 2018	Use of Computer-Based Interventions to Teach Communication Skills to Children with Autism Spectrum Disorders: A Systematic Review, 2011.
<b>Research Questions (Qualitative)/Hypothesis (Quantitative), and Purposes/Aim of Study</b>	The purpose of the systematic review was establishing the impacts of AAC intervention on	The article aims at guiding nurses on how to communicate with autistic indi-	Owing to the limited number of studies on the influence training in social skills and their connection to motor skills and verbal	The systematic review aimed at providing an examination of studies involving the use of computer-

	speech production in autistic children.	viduals, especially those with a communicative disorder.	communication, especially in adolescents and children, the researcher carried out the exploration to fill that gap.	based interventions (CBI) to teach communication skills to autistic kids.
<b>Design (Type of Quantitative, or Type of Qualitative)</b>	Systematic Review	Theoretical (Expert Opinion) Approach.	Semi-experimental with pretest-posttest. It used a quantitative approach, with statistical tests of covariance and significance at $p$ less than 0.05.	Systematic Review
<b>Setting/Sample</b>	Nine single-subject experimental designs with 27 participants and 2 group studies of 98 participants	The study is based on a qualitative review of the literature.	All autistic children aged 5-17 in Sirjan City between March 2017-March 2018. A sample of 16 participants was selected using random sampling.	10 ( $n=70$ ) studies on CBI passed the inclusion criteria and were analyzed
<b>Methods: Intervention/Instruments</b>	The systematic literature review used electronic databases to find articles on the subject from 1975 to May 2007.		The GARS autism rating scale was the research tool used.	Four health-related electronic databases such as ERIC, Medline and PsycINFO were used for the searches
<b>Analysis</b>	Data extraction was facilitated by a coding manual and form	Rather than analyzing studies or data, the authors provide recommendations and guidelines	The researchers carried out covariance analysis from the pre-test and post-test data.	Several statistical measures and calculations were done for the analysis. They include the Hedges' $g$ , the Nonoverlap of All Pairs (NAP), and Percentage of

		from a theoretical perspective.		ALL overlapping Data (PND).
<b>Key Findings</b>	The researchers found out that AAC interventions do not hinder the production of speech. Noteworthy, most studies found an enhancement of speech production. Nevertheless, a more critical analysis showed that the gains were modest.	The researchers provide guidelines on how to handle autistic individuals based on history, sensory stimuli, sending and receiving messages, handling communication breakdowns, and outbursts.	Training in social skills greatly enhanced motor skills and verbal communication in the selected sample at a level of p less than 0.001 in comparison with the control group.	The key finding was that all the studies reported an improvement in communication when CBI methods were used
<b>Recommendations</b>	The researchers recommended that future studies should be hypothesis-driven. More so, they stated that predictive characteristics such as motor skills and prior limitations in speech should be explored.	The researchers recommend that nurses consider the adaptations presented therein to facilitate effective communication with autistic individuals.	The researchers recommend that nurses and other caregivers consider social skills training to improve verbal communication and motor skills.	The researchers noted that poor experimental designs reduced the certainty of the evidence for six of the ten studies, and thus, future studies should focus on more comprehensive designs that can inform confidence in the results.
<b>Explanation of How the Article Supports EBP/Capstone Project</b>	The article provides concise information about the effectiveness	Information on nursing interventions for autistic adolescents with		The advancement in technology has led to better lives in several professions, including

	<p>of AAC interventions. These are actions that seek to replace or augment natural speech by providing and training users to use various devices such as speech generating devices, and graphic symbols. Speech generating devices are technological applications, and thus, the article may provide insights into technological applications that nurses can use to intervene for autistic individuals.</p>	<p>a communicative disorder is scarce. Most studies focus on particular interventions and children. This is one article that tries to provide a guide to nursing on how they can intervene. Coupled with other materials, it will be useful in developing an evidence-based model of intervention.</p>	<p>This article is one of the few which examine the adolescent population with autistic disorders, specifically communication. It also explores the link between motor skill development and communication disorders. It is key to answering the PICO question in that the interventions provided herein will target both motor skill development and communication.</p>	<p>nursing. With computers at the core of technology advancement, this study provides insights on how nurses and caregivers can use technology to intervene for autistic adolescents with a communication disorder. If the CBI methods are indeed useful, then nurses can collaborate with software developers and other professionals to make more programs that can help the adolescents.</p>
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## 6 Data Analysis

This section is aimed at analysing the data collected from the selected articles especially the part highlighted on the last section of the previous paragraph. The researcher seeks to find evidence of effective interventions to nursing care of autistic adolescents with communicative disorders. The evidence herein found will then be used in developing an evidence-based model for nursing intervention in the later part of this paper. The literature analysis follows Parahoo model of literature critique (Parahoo & Heuter, 2013). The model provides several questions to evaluate the research in each stage. For instance, the model suggests that the researcher should examine whether the title describes the study accurately and if the literature review and the significance for the study justifies the need to conduct the research.

### 6.1 Augmentative and Alternative Communication Intervention (AAC)

Schloser & Wendt (2007) carried out systematic literature to evaluate the effects of augmentative and alternative communication (AAC) intervention on speech production in autistic children. AAC methods aim to supplement natural handwriting/speech or replace it entirely. They can be categorized as aided or unaided. Supported types are further divided into exchange-based models like picture exchange communication system and selection-based models like non-electronic communication boards, speech-generating devices and graphic symbols.

The research by Schloser & Wendt (2007) had several key findings. First, none of the studies reported a decline in speech production as a result of using AAC intervention. This finding therefore disproved previous studies and assumptions that AAC methods inhibit production of speech. Nevertheless, as Baldin (2007) posited, the possibility that AAC intervention methods inhibits speech production cannot be entirely ruled out since studies with some negative findings are rarely prioritized in publishing.

A crucial second finding by Schlowwer & Wendt (2007) was that the AAC methods lead to modest gains in speech production. However, after applying the PND technique suggested by Scruggs, T. E., Mastropieri, M. A., Cook & Escobar, (1986), the authors found that the interventions were in the ineffective range. They attributed this finding to differences in individual variables and heterogeneity of the children with autism. Future studies might therefore be needed to clarify or elucidate the effects of variables such as prior vocal imitation skills in the results. The finding that AAC intervention methods did not yield any impact on speech production, such as in Yoder & Layton (1988) could have been caused by low statistical power since the studies had only 15 participants each. With a greater number, the effectiveness of AAC intervention could be understood more clearly or better still, reaffirm that AAC methods could actually lead to modest gains in speech production.



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Thirdly, the researchers isolated two types of AAC for comparison. The first was that Picture Exchange Communication System led to better outcomes than the Pre-Linguistic Milieu Teaching and Responsive Education for a range of non-nominative words and nominative spoken communicative acts. It is worth of note that the effects were realized for unprompted speech rather than experimenter elicited speech. The finding also emphasized the importance of examining child's characteristics that can predict speech production before the intervention. For instance, children who had gone through high object exploration treatment showed a higher growth rate for the nominative words spoken compared to the children who started the intervention with lower object exploration treatment. The finding also showed the relationship between motor skills and communication development.

Even though the systematic review found mixed results concerning the effectiveness of AAC interventions, several hypothesis show that these interventions are worth implementing. First, behavioural theorists posit that usage of manual signing and spoken words as the stimuli, coupled with a re-enforcer, will cause the child to produce manual signs and natural speech. This hypothesis is based on the notion of automatic reinforcement by Skinner (1975). Moreover, Frost & Bondy (2002) noted that Picture Exchange Communication System enhances speech through automatic reinforcement. Secondly, theories centring on motoric interventions show that AAC methods may lead to enhancement of speech. For example, achieving a certain level of automaticity in production and selection of messages leads to decrease in physical demands, consequently increasing production of speech. Also, AAC techniques may result in a reduction in pressure to speak, thus reducing the stress in all system that must be integrated to generate speech, thereby leading to enhanced speech production.

The acoustic effects of using speech-generating devices may also lead to enhanced speech production. The output produced by the devices for instance, increases exposure to models of speech and consistent acoustic exposure from one model to the other. This may capture the

child's attention and imitation, enhancing speech development. Although the hypothesis reported here are yet to be tested in practice, the theoretical background is solid enough to confirm the benefits of AAC interventions. As noted further, Schlosser & Wendt (2007) did not find any speech inhibition as a result of using AAC methods, meaning these intervention methods are safe for adoption and implementation.

## 6.2 Suggested Theoretical Interventions

Brown and Elder (2014) noted that autistic children have a challenge in proxemic, vocalic, and kinesthetic features of communication. Vocalic communication denotes the nuances of language such as tone inflection, idioms, puns, and non-literal language. Autistic children are unable to comprehend messages in a vocalic setting. Kinesthetic communication is made up of gesturing, body language, and facial expression, and is frequently misunderstood as unimportant signals by autistic children. Proxemic communications entail the notions of personal boundaries and space, and also give difficulties to autistic children. The authors conclude that generally, autistic children face a challenge in sending and receiving messages.

The researchers advise that nurses should first seek the history of communication from the parent or caregiver to know the best method of communicating with the child/adolescent. Secondly, the researchers caution on making several assumptions. First, the nurse should not assume that the child cannot communicate and should thus make every effort to communicate with them. Secondly, the nurse should not assume that non-verbal autistic children cannot comprehend language. There have been records of autistic individuals detailing their frustration over the nurse's failure to communicate on the notion that they did not understand/hear spoken language since they could not express themselves. Thirdly, they warn that nurses should not assume people with autism have lower IQ. Studies on the IQ of autistic individuals have reported varying findings, with some reporting that the prevalence of low IQ among the autistic population is as high as 75 % and others as little as 31 % (Chairman et al., 2011; CDC, 2014).

Brown and Elder (2014) noted that as many as 80 % of autistic individuals have several sensory impairments. In some situations, the sensory system may be hyper and hypo in others. Noteworthy, several repetitive behavioural tendencies in ASD could be adaptive for the sensory variations being experienced. Also, autistic individuals are often hypersensitive to smell. They also have challenges with auditory processing and respond best to visual communication. In light of these impairments, the researchers noted that reducing the total number of stimuli the autistic individual is exposed to when communicating helps them to be more focused. The nurses should also examine the setting for potential sensory barriers. Environmental factors such as non-verbal behaviour (gesturing, touching the patient), smells (blood, alcohol wipes,

cleaning solutions), noises (such as noisy waiting room), lights (flashing or bright), and textures (such as a tongue depressor) may cause sensory overload to autistic people, and should be regulated.

The researchers suggest several adaptations when sending and receiving messages from children with ASD. First, they note that the sensory pathway is usually the most preferred in autistic children and hence, visual adaptation can enhance understanding. Examples of visuals include videos and pictures of objects. Also, speakers should speak at a slower pace and lower tone and gaze directly at the autistic individual. It is also vital to focus on one topic at a time and segment the descriptions into chunks to provide adequate time for processing. Brown and Elder (2014) note that the nurse should exercise directness, avoid expecting that the patient will make immediate responses, and try as much not to use open-ended questions since they are difficult for ASD children to process. Besides, the language should be concise with straightforward structure for sentences and devoid of exaggerations, metaphors, slang, and analogies. The nurse should also exercise patience when expecting a response from a kid with ASD.

Brown and Elder (2014) also make several suggestions on how to handle communication breakdown and outbursts in autistic individuals. Communication breakdowns take place when the message being transmitted is received improperly. They are signified by ignoring requests, incorrect responses to requests and asking for clarifications. The repair strategies are several, and they include repetitions and recasts. Noteworthy, a recast is a new composition of the initial message. The researchers emphasize the importance of being alert when communicating with ASD kids so that the speaker can identify signs of outbursts. More so, autistic children rarely initiate repairs, and thus the nurse should always attempt to make them first so that the autistic individual imitates.

### 6.3 Social Story Telling

Manzari-Tavakoli, Hoesseini, and Karimi (2018) researched to examine the effect of social storytelling on motor skills and verbal communication among children and adolescents with severe autism spectrum disorder. The study used a semi-experimental approach with pretest and posttest coupled with a control group. The original population of the study was 374 children and adolescents and random sampling was used to select 16 participants. The number of children and adolescents was equal; 8 in each group. The GARS autism scale, which measures social interaction, communication, and stereotyped behaviours, was used by the researchers. The study was valid in that the Cronbach alpha coefficient was 90 % for the stereotyped behaviour, 93 % for communication and 89% for social interaction. The Vineland's social maturity scale was used to ascertain social development; it measures the degree of attention to individual social needs and level of personal responsibility. One hundred seventeen questions

concerning the individual's ability to take care of themselves and their social development were developed.

The researchers used SPSS version 20 to analyze the results, and several statistical measures, such as analysis of covariance (ANOVA), showed statistically significant differences between the control and treatment groups in terms of verbal communication. Specifically, the experimental mean for verbal communication shifted from 1.88 before intervention to 9.25 after intervention. For the control group, the measure before intervention was 1.38, changing to 2.50 after intervention. Thus, the researchers concluded that social skills training improves communication among children with autism spectrum disorder.

Secondly, the research established that the adjusted score of movement was higher in the experimental group compared to the control group. Specifically, the experimental mean shifted from 2.38 before the intervention to 5.63 after the intervention. For the control group, it moved from 2.13 before the intervention to 2.50 after the intervention. Thus, training in social skills increases the movement of autistic children and individuals significantly, at a  $p < 0.05$  level.

#### 6.4 Computer-Based Intervention

Sathiyaprakash Ramdoss, Russell Lang, Austin Mulloy, Jessica Franco, Mark O'Reilly, Robert Didden, Giulio Lancioni (2010) carried out a study to investigate the effectiveness of Computer-Based Interventions (CBI) methods in teaching communication skills to autistic children. The participants ranged from three to fourteen years, with a mean age of 8.2 years. It should be noted that CBI methods are different from AAC interventions, although both involve technology. While AAC methods aim at replacing or augmenting natural speech are tangible devices, CBI interventions are usually software packages installed in computers. For example, software programs that establish clear expectations and routines, minimize distraction and enable autistic individuals to control stimuli are all CBI interventions. Nurses are crucial in software development since they have a better understanding of autistic children and development than software developers. They are also involved in the use of these software or teaching parents how to use them. Nurses providing care in group homes may also be the sole directors in the use of these CBI interventions.

The central key finding was that the CBI interventions improved communication in all the ten studies. Specifically, CBI had a NAP of 96.6 %, a value of 3.898 for the F-statistic derived effect size and derived effect size of measures at 1.015. Repeated measures (pre-test and post-test) and multiple base designs with AB phase pairs were used for a single participant/group in six studies. The finding was that CBI improved the participant's words correctly identified,

correct matches between text and food items, number of vocabulary words, sentence imitation, verbal expression, phonological awareness, communication initiations, and relevant speech. Besides, the studies showed that CBI interventions decreased delayed and immediate echolalia and irrelevant speech.

Compared to person-implemented instructions, two studies showed that CBI led to more significant improvements in vocal imitation percentages. The other two studies examined the effect of components in CBI via component analysis. For example, one compared the impact of a software program that had synthesized speech plus a talking head to a similar software package with the talking head disabled, and found that the talking head led to a higher overall mean of accurate receptive responses collected from across lessons. The other study evaluated the effect of a software with a speech feature with a similar software when the speech feature was disabled and found out that the number of utterances increased significantly from baseline to intervention when the speech feature was on.

However, as noted, the studies in this field are limited, and future research is required to provide more information. The small number of studies made it impossible for the researchers to carry out statistical tests of significance. Analysis of variance would also be unstable due to the limited size. More so, when the certainty of the evidence was rated as conclusive, preponderance, or suggestive, only two of the studies were conclusive. Two were preponderant, and the rest of the six were indicative, owing to the use of nonexperimental designs or failure to control the communication skill-dependent variable in the experiments. Thus, more research with the correct designs may be needed to ascertain the evidence.

## 7 Literature Synthesis

This section presents a synthesis of literature findings about nursing interventions for autistic adolescents with communication disorder. These findings will be used to create an evidence-based model for nursing interventions in the following chapter. The first finding by Schlosser and Wendt (2007) was that AAC interventions did not lead to any decline in speech production. Most of the studies showed modest gains in speech production. Thus, the fear that the interventions inhibit speech production is unwarranted. The Picture Exchange Communication System was also found to be better than representative teaching. It is worth mentioning that AAC interventions involve some devices aimed at augmenting or replacing natural speech. Thus, they may be considered to a certain extent to have aspects of technology.

Another intervention was the CBI. It is a pure application of technology through software programs such as PowerPoint. Ramdoss et al. (2011) found that the CBI interventions led to improvements in communication for all the studies examined. Several hypotheses have been put forward to support the proposition that AAC devices improve communication. An example is that the acoustic effect where adolescents are exposed to the speech-generating devices, which tends to enable them to imitate, leading to enhanced production of speech. Thus, it is reasonable to conclude that technological applications such as the CBI and AAC have positive benefits, and their use by nurses should be encouraged. Nurses can collaborate with software developers by giving them more information on the medical conditions, hence enabling them to design the tools and software appropriately. They can also be taught to use these tools so that they are comfortable using them to care for autistic adolescents with communication disorder. Nurses can also learn using the tools so that they can in turn show the parents and caregivers how to use the tools in cases of family-centred interventions. A model is presented on how nurses can intervene in the next section.

For nurses to intervene appropriately, they must understand the theories behind the development of autism and the experiences of autistic children (Brown and Eder, 2014). To gain a better understanding, the first initiative is to examine the history of the adolescent by talking to the parents or his/her caregiver. With this understanding, nurses can then come up with a suitable way to communicate with the child. Also, nurses should avoid an environment that is overstimulating when dealing with autistic adolescents. For example, flickering lights, a noisy waiting room, or a strong smell should be kept away as much as possible. Besides, nurses need to provide accommodation when speaking to autistic individuals, for example by allowing them enough time to respond to inquiries. When intervening, nurses should avoid making assumptions such as that the client cannot communicate since they cannot express themselves; nurses should instead make effort to communicate with the individual.

Since outbursts and communication breakdowns are frequent with autistic individuals, nurses should be keener when providing intervention; the keenness will help them see any sign of a

breakdown. Also, they should consider reinforcing the information through repetition or recasts. That way, communication will be enhanced.

Severe autism disorder is the worst form of the disease, and many adolescents with this condition face more communication challenges than their counterparts with moderate or mild autism. The group is also greatly limited in motor abilities. However, the study by Manzri-Tavakoli et al. (2011) provided a light at the end of the tunnel by showing that social skills training can improve the communication and motor abilities of adolescents. It can improve their quality of life. How nurses can use social skills training will be discussed in the next chapter.

The four studies evaluated above were all carried by professionals with authority in the field of nursing. Thus, the results provide certainty of evidence. More so, where the evidence was not sure, details were provided. Besides, there are two systematic literature reviews. Proof in the nursing field is organized in a hierarchy, with systematic literature reviews sitting at the top of the due to the extensive proof that they provide. (Yetley, MacFarlane, Greene-Finestone, and Wells, 2016) However, the studies also revealed that there are several gaps to be filled to get more ways on how nurses can intervene for adolescents with a communication disorder. For example, more hypothesis based primary research need to be carried out to ascertain the effectiveness of AAC interventions. Also, the study by Ramdoss et al. (2011) on CBI was carried out in 2010, and with the technology advancing at a rapid rate, more studies need to be carried out to evaluate the effectiveness of recent CBI interventions.

## 8 Discussion

There has been major findings in this thesis convincingly and conveniently pointing to specific ways in which nurses can intervene when caring for autistic adolescents with communication disorder. A question may arise as to which method is most effective. The answer is that there are no proofs that one method of intervention is better than the other. The reason being that communication disorder varies in form and severity. Also, communication disorder is just one of the many symptoms of autism. Before effectively intervening using one or more of the methods of interventions which were the major findings in this thesis, other symptoms must be brought under control as well. The fundamental concept of holistic nursing care appeal to nurses to care for the whole rather than for a part. Therefore, the body, mind and emotions have to be in balance before a successful intervention can be done.

### 8.1 Evidence-Based-Driven Change

This section provides a step by step description of how nurses can intervene for autistic adolescents with a communication disorder. The evidence synthesized from secondary sources in

the previous parts will be utilized in this section. Also, several models for evidence-based practice are available to provide standardized procedures of intervention. According to Wyant (2017) Evidence-Based Models (EBP) arise from the integration of present research, preferences of patient, and clinical expertise to provide individualized care and enhance effective decision making. Nurses are placed in a central role as crucial promoters and adopters of EBP, resulting to change in practice for improved safety and quality.

Although many EBP models exist, they share several similarities. These include identifying a clinical need, reviewing appropriate literature, critically appraising evidence, evaluating the need for practice change, and potential application, and the last step is evaluating the outcome. Examples of common EBP models include the Iowa Model for Evidence-Based Practice to Promote Quality Care, Advancing in Research and Clinical Practice Through Close Collaboration Model, John Hopkins Nursing Evidence-Based Practice Model, and Promoting Action on Research Implementation in Health Services (PARIHS) Framework.

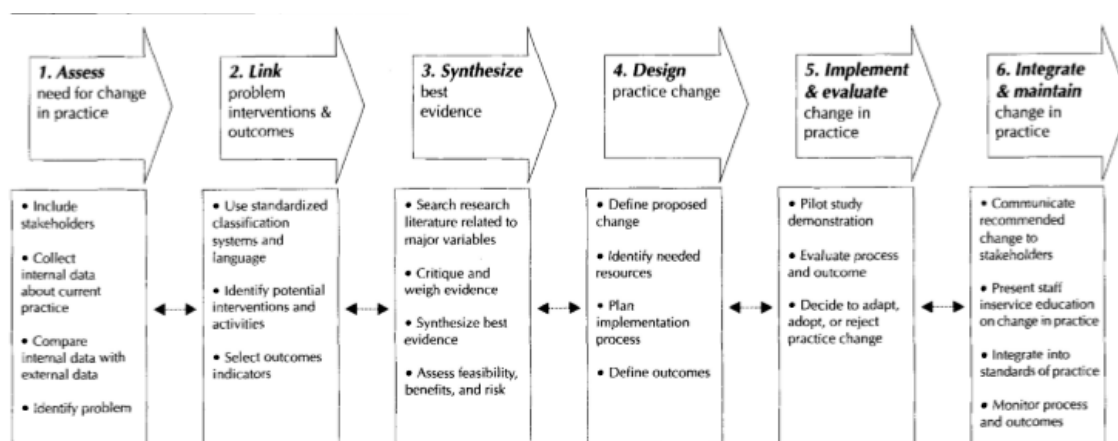


Figure 3. A model for evidence-based practice (Rosswurm & Larrabee, 1999).

This thesis uses the Larrabee and Rosswurm (1999) model for evidence-based practice summarized in the figure above. It contains several steps, which include identifying the need for change, linking the challenge with intervention and outcomes, synthesizing best evidence to inform change, designing the actual adjustment, implementing and evaluating the move, and integrating and maintaining the change. The first step, identifying the need for change, involves collecting internal evidence/data then comparing it with external data to see whether any gaps need change. This was done in the first chapter. It was shown that nurses do not fully understand how they can intervene for autistic adolescents with a communication disorder, especially in light of technological advancement. Besides, it was shown that although the number of autistic adolescents is rising, there is little research about the interventions that



best suit them. Also, it was revealed that most adolescents transition to adulthood living dependent lives, and are often unable to secure jobs. Thus, by understanding effective nursing interventions, nurses will be equipped with information of how they can help this population live an independent life, improve their communication and motor skills; hence, bettering their quality of life. The second step, linking the challenge with interventions and outcomes, was also detailed.

The third step, synthesizing the best evidence to inform change, was also done in previous chapters. Two systematic reviews inclined on technology-based interventions were analyzed. It was shown that AAC and CBI interventions lead to an improvement in communication. It was also shown that social skills training improved both communication and motor skill capabilities. A guide on general practices that nurses should observe when carrying out the interventions was also provided. For example, they should avoid an overstimulating environment, provide accommodation, avoid making assumptions, and obtain a history of the adolescent by consulting the caregiver/parent. Thus, this chapter mainly focuses on step four onwards.

The fourth step in the evidence-based practice model by Rosswurm and Larrabee (1999) is designing the change process. This step relies on synthesized evidence. The first design involves the use of AAC interventions, the second design consists of the use of CBI methods, and the third design consists of the use of Social skills training.

## 8.2 Augmentative and Alternative Communications and Computer-based Interventions

It was found that AAC interventions do not decrease speech acquiring capabilities of individuals. The study also showed that they improved speech production in autistic people. Thus, this section details how nurses can use AAC interventions to take care of adolescents with a communication disorder. As noted before, AAC interventions consist of aided and unaided means. The unaided methods are the non-verbal ways of communicating, such as sign language, gestures, facial expressions, and manual signs. Nurses should take a central role, learn these skills, and teach them to the autistic adolescents so that they can communicate effectively. Also, nurses should be at the forefront of promoting the sign language use, facial expression and gesture use to the caregivers and parents in case of family-centered care. Nurses in group homes for autistic adolescents may be the sole care providers for this group. They should be provided with resources and skills to teach the adolescents these forms of unaided communication. Posters showing the visitors what each sign/gesture means can be placed in strategic locations to guide visitors who may want to communicate with this group.

Secondly, the aided interventions mainly consist of means that require external support, such as computers, tablets with symbols or recorded natural speech, and handheld devices. An example of a handheld device that can be used to intervene is the speech tablet shown below. Nurses should be taught how to use these aided forms of communication. Then, they can

teach the autistic adolescents who they interact with each day to use these devices. Nurses should also collaborate with other professionals such as speech pathologists to gain more insights on how they can use these devices to enhance the communication of the patients. Noteworthy, there is no one specific device for all since the choice will depend on the severity of the condition. Thus, nurses should be flexible and deal with each case individually.

The second method of intervention is Computer Based Intervention (CBI). Although closely related to the AAC intervention above, it is worth noting that these methods rely on use of software. Lofland (2015) lamented that after an advertisement came on TV that iPads could reduce the frustration of autistic adolescents who could not communicate, leading to violent behaviours, many parents rushed to purchase the iPads without knowing what to look for, or how to use them to enhance the communication of the adolescents. Thus, the iPad ended up being used for entertainment. This underlines the important role of health care providers, such as nurses, in educating the parents how to use these devices. What if they do not know how to use them too?

There are unlimited ways in which nurses can apply technology. For most of the autistic children, Lofland (2015) noted that visuals are their first form of communication, and words are second. Technology such as computers or phones makes several kinds of visuals available. Since parents or teachers may be unable to establish which specific types of visuals yield the most significant effects, nurses should at the forefront of carrying out research to determine which ones are the most effective; they have access to large numbers of adolescents who can form key study populations.

Compared to dedicated AAC interventions, nurses should advocate for portable and flexible mobile devices. These are easy to carry and do not are readily acceptable by peers. Thus, adolescents are more likely to be comfortable using them. For adolescents with auditory sensitivity, nurses should advise the parents to consider applications like Noise Down, which reduce the noise level automatically to appropriate levels. Nurses in group homes should also be at the forefront of teaching adolescents how to use these devices.

ASD individuals may have challenges with fine motor skills. Indeed, the studies evaluated showed that communication challenges are associated with motor skills. These impairments in motor skills may make the individuals unable to produce legible handwriting or even words. Technology devices, such as keyboard or speech-to-text device, can be used to simplify the communication of the individual, to reduce their frustration, and improve their quality of life.

Nowadays, millions of apps are available to help autistic children with a communication disorder. However, not all of them are effective, and individualization may be needed to make them useful to adolescents. This realization comes at a time when almost every adolescent

has access to mobile phones. Nurses possess a wide range of knowledge and accurate interpretation of individual requirements, and should thus be involved in the customization of each app to meet the unique needs.

When synthesizing the studies, it was found that AAC interventions can foster the improvement of communication by reducing overall physical demands of the person. The adolescent is then able to focus on communication development. Regarding this, applications and software programs that can help autistic individuals with sequencing tasks exist, such as Visual Schedule Planner, which can reduce the adolescents' struggle to plan and be organized, enabling them to focus on communication development. Nurses should be at the forefront of promoting these applications through various channels, including word of mouth, to the parents when they come for a hospital visit.

It was also found that training in social stories leads to improvement in communication for autistic children with communication disorders. Noteworthy, the training takes time and is best performed by a person who is in close contact with the adolescent, such as the teacher or nurses in a group home. Noteworthy, adolescents with severe ASD may be stigmatized by families leading them to seek shelter in group homes. Nursing care providers can thus develop schedules to teach these people various social skills from day to day.

It is worth noting that different social stories may have different effects on the adolescents and thus, discerning which social stories to use is the responsibility of the nursing care provider. Nurses can also carry out research and write books on social stories that can then be used by teachers to train adolescents.

The interventions will be a shift from current practice where it is not known how to precisely intervene for the adolescents; nurses use various means without ascertaining their effectiveness. Nurses will need to be trained or re-trained on these skills, such as sign language or operating the speech output devices. Thus, resources are required. The nursing curriculum will also need to be altered to accommodate units that teach nurses about the interventions mentioned above. Budgetary allocations will also be required to print materials, posters and adverts aimed at creating knowledge of and increasing the use of the suggested interventions. Therefore, there will be a need to convince the policymakers, government, nursing fraternity, parents and other stakeholders that the interventions are effective and will lead to a better quality of life.

To convince the stakeholders, pilot studies will be required. The pilots will take place for two years in three major hospitals in Finland. In one hospital, nurses will use the AAC interventions, particularly sign language. In the second hospital, nurses will primarily use CBI interventions, which will depend on the need of the child. In the third hospital, nurses will mainly use Social Stories training. Posters will be printed advising parents and other caregivers on

how to use these interventions. At the end of the pilot studies, the data collected will be analyzed and interpreted to find out the effects that these interventions have had on the quality of life, communication, and motor skill development of the adolescent population. Graphs comparing the effectiveness of the group in these hospitals to individuals of same age in other hospitals, and using different approaches, will be plotted. This will provide evidence that indeed these interventions are useful and should be implemented. When presented to lawmakers and policymakers, they will inform a change in the policy to allow teaching of these interventions to nurses and budgetary allocations to cover the associated costs.

The fifth step, according to the Rosswurm and Larrabee (1999) model will be implementing and evaluating the change in practice. As noted, data from the pilot studies will help determine whether the change is necessary or not. The feedback from the nurse pilot study coordinators will also be evaluated when deciding. The opinions of other stakeholders will also be incorporated. Besides, the cost comparisons and associated risks will also be determined from the pilot studies. Since previous reliable studies have shown the effectiveness of these interventions, the researcher believes that the pilot study reports will be positive, and there will be a shift in practice.

The sixth and last step will be integrating and maintaining the change in practice. Rosswurm and Larrabee (1999) noted that even the smallest has a domino impact, and the individuals involved often view it as disruptive. Thus, it is key to evaluate the change readiness in hospitals before implementing the recommended changes. People tend to accept change when they are involved in the change process. Thus, the researcher emphasizes the need to engage various stakeholders in different stages of the pilot study. For example, other nurses can be chosen as pilot study coordinators, while the management can be requested to facilitate the pilot studies using the miscellaneous budgetary allocations. The administration will be furnished with concise summaries of the pilot study outcomes. The due procedures for effecting the changes will also need to be observed. Nursing education will also be modified to accommodate learning of the proposed interventions. In-service training of nurses will also ensure that the change is sustained.

### 8.3 Limitations

This thesis has some limitations. First, it was noted that there is scanty literature focusing on autistic adolescents; most of the studies centre on children. As autistic individuals grow, a change in characteristics may occur, and future research needs to focus on this population. More studies may reveal more information about the adolescents, informing better care. Secondly, the success of the proposed pilot studies may depend on several factors which are out of the researcher's control. Hence, they may meet or fail to meet expectations depending on how they are implemented. Thus, the researcher advises that all due procedures be followed

when carrying out the research. Thirdly, the researcher aimed at investigating the nursing interventions for group homes, and a study detailing any successful intervention for this group would have been appreciated. However, an extensive literature search yielded no result for group homes. Adolescent's with severe autism are often stigmatized and find refuge in these group homes, and thus, it is crucial that research be done to investigate the interventions that can be used for this group.

Another limitation of this paper is the fact that the researcher was not able to classify or categorize with certainty how each intervention method could be implemented to specific type of communication disorder. Though with his experience from the field he can easily make suggestions, these suggestions are only guesses because they lack evidence to back them up. All his efforts to search information which could link each of the intervention methods to specific type of communication disorder did not yield substantial results. This thesis cannot therefore explain for example why AAC is the most effective intervention method in the care of autistic adolescent with repetitive and rigid language communication disorder. In his defence however, he believes that since autism in general varies in scope and severity, it is the role of the nurse to work together with the adolescent and understand why a specific intervention should be deployed instead of the other.

#### 8.4 Ethical considerations

This thesis was written following Laurea's thesis guidelines with stringency. Journal articles and all materials borrowed from other writers were acknowledged and duly referenced following referencing guidelines as laid down in Laurea University of Applied Sciences' thesis reference guidelines. In cases where paraphrases were made, they were put into quotation marks as indications that the phrases were used in their original forms. Being an evidence-based practice thesis, no permits were required at any point of the thesis writing. The absence of a working-life partner exempted the researcher of the need for a consents.

### 9 Conclusion

Autistic adolescents face a spectrum of challenges, one being impairment in communication. The inability to communicate leads to frustration leading to violent behavior. The job recruiters also shun them, and as a result, they usually have low chances of employment compared to typical development children. Those employed often receive wages below average. As a result, the majority of people in this group live dependent lives. The problem is worsened since the group gets little attention in the interventions that can be used to enhance their communication. Nurses are also often unaware of the best intervention to use and may continue to apply ineffective strategies.

Due to these challenges, this study sought to investigate the ways nurses can intervene for the autistic adolescents. Through a synthesis of research findings, AAC and CBI interventions, and Social Stories Training were found to be the key most effective interventions to use in enhancing communication. An evidence-based practice model on how these interventions can be implemented in practice has also been developed. If successful, the interventions will improve the quality of life for these adolescents by enabling them to attain functional communication, hence, obtaining employment and living independent lives. The nurses will also benefit through improvement of their skills. Families will be more satisfied with the development of their children.

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## Tables

<b>Table 1: Inclusion Criteria .....</b>	<b>18</b>
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<b>Table 2: Domains used to access the strength of evidence .....</b>	<b>20</b>
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## Appendices

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Appendix 1: Articles chosen for critique

Criteria	Article 1	Article 2	Article 3	Article 4
<b>Author, Journal (Peer-Reviewed), and Permalink or Working Link to Access Article</b>	Schlosser, R. W and Wendt, O. American Journal of Speech-Language Pathology, 17, 212-230.	Elder, J. H and Brown, A. B. Pediatric Nursing, 40 (5).	Manzari-Tavakori, F., Hosseini, S. E., and Karimi, L. Report of Health Care, 1 (2), 28-37.	Ramdoss, S., Lang, R., Mulloy, A., Franco, J., O'Reilly, M., Didden, R., and Lancioni, G. Journal of Behavioural Education, 20, 55-76
<b>Article Title and Year Published</b>	Effects of Augmentative and Alternative Communication Intervention on Speech Production in Children with Autism: A Systematic Review. 2007.	Communication in Autism Spectrum Disorder: A Guide for Pediatric Nurses. 2014	The effect of Social Story Telling on Motor Skills and Verbal Communication among Children and Adolescents (5-17 Years Old) with Severe Autism Spectrum Disorder. 2018	Use of Computer-Based Interventions to Teach Communication Skills to Children with Autism Spectrum Disorders: A Systematic Review, 2011.
<b>Research Questions (Qualitative)/Hypothesis (Quantitative), and Purposes/Aim of Study</b>	The purpose of the systematic review was establishing the impacts of AAC intervention on speech production in autistic children.	The article aims at guiding nurses on how to communicate with autistic individuals, especially those with a communicative disorder.	Owing to the limited number of studies on the influence training in social skills and their connection to motor skills and verbal communication, especially in adolescents and children, the researcher carried out the exploration to fill that gap.	The systematic review aimed at providing an examination of studies involving the use of computer-based interventions (CBI) to teach communication skills to autistic kids.
<b>Design (Type of Quantitative, or Type of Qualitative)</b>	Systematic Review	Theoretical (Expert Opinion) Approach.	Semi-experimental with pretest-posttest. It used a quantitative approach,	Systematic Review

			with statistical tests of covariance and significance at p less than 0.05.	
<b>Setting/Sample</b>	Nine single-subject experimental designs with 27 participants and 2 group studies of 98 participants	The study is based on a qualitative review of the literature.	All autistic children aged 5-17 in Sirjan City between March 2017-March 2018. A sample of 16 participants was selected using random sampling.	10 (n=70) studies on CBI passed the inclusion criteria and were analyzed
<b>Methods: Intervention/Instruments</b>	The systematic literature review used electronic databases to find articles on the subject from 1975 to May 2007.		The GARS autism rating scale was the research tool used.	Four health-related electronic databases such as ERIC, Medline and PsycINFO were used for the searches
<b>Analysis</b>	Data extraction was facilitated by a coding manual and form	Rather than analyzing studies or data, the authors provide recommendations and guidelines from a theoretical perspective.	The researchers carried out covariance analysis from the pre-test and post-test data.	Several statistical measures and calculations were done for the analysis. They include the Hedges' g, the Nonoverlap of All Pairs (NAP), and Percentage of ALL overlapping Data (PND).
<b>Key Findings</b>	The researchers found out that AAC interventions do not hinder the production of speech. Noteworthy, most studies found an enhancement of	The researchers provide guidelines on how to handle autistic individuals based on history, sensory stimuli, sending	Training in social skills greatly enhanced motor skills and verbal communication in the selected sample at a level of p less than 0.001 in comparison	The key finding was that all the studies reported an improvement in communication when CBI methods were used



	speech production. Nevertheless, a more critical analysis showed that the gains were modest.	and receiving messages, handling communication breakdowns, and outbursts.	with the control group.	
<b>Recommendations</b>	The researchers recommended that future studies should be hypothesis-driven. More so, they stated that predictive characteristics such as motor skills and prior limitations in speech should be explored.	The researchers recommend that nurses consider the adaptations presented therein to facilitate effective communication with autistic individuals.	The researchers recommend that nurses and other caregivers consider social skills training to improve verbal communication and motor skills.	The researchers noted that poor experimental designs reduced the certainty of the evidence for six of the ten studies, and thus, future studies should focus on more comprehensive designs that can inform confidence in the results.
<b>Explanation of How the Article Supports EBP/Capstone Project</b>	The article provides concise information about the effectiveness of AAC interventions. These are actions that seek to replace or augment natural speech by providing and training users to use various devices such as speech generating devices, and graphic sym-	Information on nursing interventions for autistic adolescents with a communicative disorder is scarce. Most studies focus on particular interventions and children. This is one article that tries to provide a guide to nursing on how	This article is one of the few which examine the adolescent population with autistic disorders, specifically communication. It also explores the link between motor skill development and	The advancement in technology has led to better lives in several professions, including nursing. With computers at the core of technology advancement, this study provides insights on how nurses and caregivers can use technology to intervene for autistic adolescents

	<p>bols. Speech generating devices are technological applications, and thus, the article may provide insights into technological applications that nurses can use to intervene for autistic individuals.</p>	<p>they can intervene. Coupled with other materials, it will be useful in developing an evidence-based model of intervention.</p>	<p>communication disorders. It is key to answering the PICO question in that the interventions provided herein will target both motor skill development and communication.</p>	<p>with a communication disorder. If the CBI methods are indeed useful, then nurses can collaborate with software developers and other professionals to make more programs that can help the adolescents.</p>
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