

DISSERTATION FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD)

**Complementary and Alternative Medicine (CAM) for Children with Autism
Spectrum Disorders (ASD)**

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List of Abbreviations

AAT – Animal-Assisted Therapy

ABA – Applied Behavior Analysis

ADDM – Autism and Developmental Disabilities Monitoring Network

ADL – Activities of Daily Living

ASD – Autism Spectrum Disorder

CAM – Complementary and Alternative Medicine

CDC – Centers for Disease Control and Prevention

DSM-5 – Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

ESDM – Early Start Denver Model

FDA – Food and Drug Administration

HICs – High-Income Countries

HLS-EU-Q16 – European Health Literacy Survey Questionnaire (16 items)

IQ – Intelligence Quotient

KSA – Kingdom of Saudi Arabia

LMICs – Low- and Middle-Income Countries

MENA – Middle East and North Africa

NCCIH – National Center for Complementary and Integrative Health

NDBIs – Naturalistic Developmental Behavioral Interventions

NIH – National Institutes of Health

OR – Odds Ratio

OT – Occupational Therapy

PDA – Pathological Demand Avoidance

PDD – Pervasive Developmental Disorder

PDD-NOS – Pervasive Developmental Disorder Not Otherwise Specified

PECS – Picture Exchange Communication System

PRT – Pivotal Response Treatment

PUFA – Polyunsaturated Fatty Acids

RCT – Randomized Controlled Trial

SI – Sensory Integration

SCOPE – Short Child Occupational Profile

SLT – Speech and Language Therapy

TCM – Traditional Chinese Medicine

WHO – World Health Organization

1. Introduction

1.1 Background and Rationale

Autism spectrum disorders (ASD) or autism are defined on the basis of neurodevelopmental disorders which affect the domain of communication, social interaction, and behavior (Lord et al., 2018). ASD affects an estimated global population of around 67 million individuals (Zeidan et al., 2022). The term "autism," was derived from the ancient Greek word "autós," which means "self." The purpose of this term was to describe the disconnection from reality that is exhibited by patients who suffer from schizophrenia.

The prevalence of ASD is approximately 67 million worldwide, approximately 1 in 31 children has been diagnosed with ASD based on estimates from the Autism and Developmental Disabilities Monitoring (ADDM) Network of the Centres for Disease Control and Prevention (CDC). However, monitoring the prevalence of autism globally is a substantial difficulty due to various factors. So far, 86.5% of all instances of ASD have been documented in High-Income Countries (HICs), which make up only 20% of the global population. There is a lack of population-based studies undertaken in Low- to Medium-Income Countries (LMICs), which may not accurately depict the impact of ASD (Zeidan et al., 2022). However, most of the Arabic countries have shown the highest rates of autism compared to western countries or developed countries. Qatar identified to have the highest autism rate, with 151.2 per 10,000 (1 in 66) children according to the global Health Data Exchange (World Population Review, 2023). Studies figured out that the prevalence of ASD has dramatically increased over the last few decades (CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network) (Maenner et al., 2023). This noticeable increase can be referred to several reasons, such as the improvements regarding the early diagnosis and the screening services and methods, in addition to other factors which can be related to the risk factors in some cases, like increasing the proportion of giving birth in older ages (Kodak & Bergmann, 2020). This increase creates an urgent need worldwide for finding effective treatments, therapeutic methods, or alternative techniques which help parents and families of children with autism to deal with this disorder (Hong & Iakoucheva, 2023).

1.2 Complementary and Alternative Medicine (CAM): Overview and Rationale

Complementary and alternative medicine (CAM) refers to a collection of therapeutic methods and practices, both biological and non-biological in nature (NCCIH, 2023; Perrin et al., 2012). The use of CAM is widespread worldwide; 10 to 76% of the general population tends to utilize CAM with a wide variation in cultural, geographic, socioeconomic factors (Höfer et al. 2019). Patients and families often seek CAM as an alternative therapy option in order to avoid the use of medications and the potential adverse effects that accompany them (Senel, 2009). This is true regardless of the severity or complexity of the diagnosis, as parents strive to explore all available therapeutic options for their child (Solomon & Chung, 2012).

Despite widespread use, only a limited number of CAM interventions have demonstrated empirical validity, while many remain inadequately studied or are contradicted by existing evidence. Authoritative reviews, including the National Autism Center report (2015), conclude that behavioral interventions are the only interventions with sufficient evidence to support their effectiveness in adults with ASD over the age of 22 (Barnhill et al., 2016). In particular, the Lovaas model of Applied Behavior Analysis (ABA) remains one of the most rigorously evaluated approaches, with consistent evidence indicating improvements in adaptive functioning, educational attainment, and IQ when delivered through structured, individualized programs (Lovaas, 1987; Machado et al., 2025). Importantly, these outcomes have been replicated across multiple controlled studies, distinguishing ABA from most CAM approaches in terms of methodological robustness.

By contrast, evidence supporting CAM interventions for ASD is highly heterogeneous and often methodologically weak. Although some studies report potential benefits of dietary supplements, vitamins and minerals, cannabinoids, camel milk, sensory integration (SI)–based therapy models, and music therapy (Aran et al., 2021; Kandeel et al., 2024; Lyu et al., 2025), these findings must be interpreted with caution. Many studies rely on small samples, non-randomized designs, subjective outcome measures, or parental reports, thereby increasing susceptibility to placebo effects, expectancy bias, and confirmation bias. Furthermore, outcomes are frequently limited to short-term behavioral changes, with little evidence of sustained functional improvement or generalization across developmental domains.

1.3 Research aims and objectives

The primary aim of this dissertation is to systematically investigate parental attitudes toward the use of CAM for children diagnosed with ASD in Arabic population. Specifically, the study seeks to examine the extent and patterns of CAM utilization, the types of CAM modalities employed, and parents' expectations regarding their perceived benefits and limitations in managing ASD-related symptoms.

In addition, this research aims to explore the challenges encountered by parents when accessing, selecting, and implementing CAM therapies, as well as their levels of satisfaction with CAM use and perceived outcomes for their children. The study further seeks to identify and analyze the sociodemographic, cultural, and health-related factors associated with CAM utilization, including parental beliefs, access to conventional healthcare services, and sources of information influencing decision-making.

A core objective behind starting this dissertation is to generate evidence-based insights that can support parents, caregivers, and healthcare professionals by providing reliable and scientifically grounded information regarding CAM use in ASD. By doing so, the study aims to contribute to informed decision-making, reduce the risk of reliance on unverified or commercially driven claims, and promote safer, more transparent, and ethically sound use of CAM interventions for children with ASD within Arabic countries.

1.3.1 Objectives

1. To examine parents' attitudes, beliefs, and perceptions toward complementary and alternative medicine (CAM) therapies used for children with autism spectrum disorder (ASD) across selected Arabic countries.
2. To determine the prevalence and patterns of CAM utilization among parents of children with ASD in Jordan, Saudi Arabia, Kuwait, Qatar, and Libya.
3. To identify the most commonly used CAM modalities and analyze the sociodemographic, medical, and contextual factors (including child-related characteristics) influencing CAM use.
4. To explore parents' sources of information and decision-making processes regarding CAM therapies, including the role of healthcare professionals, social networks, and digital media.
5. To assess parental health literacy and quality of life and examine their association with CAM utilization and therapy-related decision-making.
6. To explore in depth the perceptions and experiences of mothers of children with ASD regarding CAM use, including perceived benefits, challenges, emotional burden, and cultural influences.
7. To illustrate, through a focused case study, the potential role of a selected CAM modality (music therapy) in supporting developmental, behavioral, and psychosocial outcomes for a child with ASD and their family.

Main Research Question

1. What are the patterns, determinants, and parental perceptions of complementary and alternative medicine (CAM) use among children with ASD in Arab countries?

Sub-Research Questions

2. What is the prevalence and frequency of CAM use among children with ASD in the selected Arab countries?
3. Which types of CAM therapies are most commonly used by parents of children with ASD?
4. What socio-demographic and clinical factors are associated with CAM use among children with ASD?
5. What is the relationship between parental health literacy and the use of CAM therapies?
6. What are the primary motivations, expectations, and decision-making processes influencing parents' use of CAM therapies for their children with ASD?
7. What sources of information do parents rely on when making decisions regarding CAM use?
8. What challenges and barriers do parents encounter when accessing or using CAM therapies?
9. How do parents perceive the effectiveness and outcomes of CAM therapies for children with ASD?

10. What developmental and behavioral changes may be observed following the application of music therapy in the presented case study?

2. Literature review

2.1 Autism spectrum disorders Epidemiology and Public Health Impact

Autism is a neurodevelopmental disorder classified under pervasive developmental disorders (PDDs) in the Diagnostic and Statistical Manual of Mental Disorders fifth edition (DSM V). Other disorders under this category include Asperger's disorder, PDD not otherwise specified (PDD-NOS), Rett syndrome, and childhood disintegrative disorder (Genovese & Butler, 2023). The primary and fundamental observable indication of autism is a deficiency in communication and social abilities, which can be identified by impaired receptive and expressive language, as well as inappropriate developmental and social skills, also they exhibit repetitive stereotypic behaviors and have extremely limited interests (Genovese & Butler, 2024). In 1943, child psychiatrist Leo Kanner provided the initial account of Autism Spectrum Disorder (ASD), wherein he saw 11 children exhibiting severe social disengagement and an inability to establish typical interpersonal connections. He classified them as having early infantile autism (KANNER, 1943).

The name "autism" originated from the ancient Greek word "autós," which translates to "self." The word was coined to delineate the phenomenon of patients with schizophrenia displaying a detachment from reality (Frasch et al., 2023).

2.1.1 Diagnosis of ASD

The disparities in diagnosis rates have also resulted in differences in the prevalence of ASD among different racial and ethnic groups, including the Middle East and North Africa (MENA) and Gulf regions. Consequently, there is still a significant disparity between the available data and the implementation of effective strategies for caring for individuals with Autism Spectrum Disorder (ASD) in low- and middle-income countries (LMICs) (Alshaban et al., 2019).

Currently, there is a lack of standardized and consistent criteria for evaluating and diagnosing autism. Confirmation cannot be obtained through a blood test, brain scan, or any other objective examination. Diagnosis requires meticulous examination of an individual's behavior by skilled clinical experts. Furthermore, even if a simple binary test were available, many countries especially low- and middle-income countries do not possess the necessary resources to carry out evaluations. Moreover, middle east countries fail to monitor or disclose their autism prevalence (Hyman & Kroening, 2023).

2.1.2 Core symptoms of ASD

Research indicates that social communication deficits encompass impairments in social-emotional reciprocity, diminished utilization or integration of nonverbal communicative behaviors such as eye contact and facial expressions, and difficulties in forming, sustaining, and comprehending relationships, which are primary symptoms of Autism Spectrum Disorder (APA, 2013). The second core domain includes repetitive physical actions or verbalizations, rigid adherence to routines, narrowly focused or obsessive interests, and heightened or diminished responses to sensory stimuli (World Health Organization [WHO], 2019). These symptoms generally manifest early in development, although they may not become completely evident until social expectations surpass individual capabilities, and they exhibit considerable variability in intensity and expression among individuals (Centers for Disease Control and Prevention [CDC], 2023). The variability in symptom presentation supports the understanding of autism as a spectrum, with functional impact shaped by cognitive capacity, language development, and comorbid diseases.

2.1.3 Treatment of ASD

There is a wide array of treatments and procedures that lie beyond the scope of mainstream medicine which used to help families and children with ASD. These therapies may encompass methods derived from traditional medicine, mind-body practices, dietary interventions, nutritional supplements, and sensory-based procedures. While several complementary and alternative medicines (CAM) have undergone extensive research and have been incorporated into conventional healthcare practices, there are others that continue to be a subject of controversy or do not possess strong scientific support (Famitafreshi & Karimian, 2018).

2.1.4 Mainstream and conventional therapies in the treatment of ASD

Until recently, there is no universal remedy for autism; instead, the main objectives of therapies are to promote development, improve functioning, and elevate quality of life. Globally, an array of evidence-based therapy is employed, usually tailored to the individual's specific strengths and shortcomings. The therapies encompass Applied Behavior Analysis (ABA), Early Start Denver Model (ESDM), Speech and Language Therapy (SLT), Occupational Therapy (OT), Pivotal Response Training (PRT), and various Naturalistic Developmental Behavioral Interventions (NDBIs), all of which prioritize immediate and continuous intervention. Despite existing constraints in research and accessibility, the utilization of these conventional medicines is increasing in Arab nations (Contaldo et al., 2019; Leaf et al., 2020).

Pharmacological alternatives are widely available for addressing symptoms and comorbidities such as irritability, aggression, hyperactivity, anxiety, sleep disturbances, and seizures (Jung & Lee, 2025). FDA-Approved Medications for Severe Behavioral Problems, Aggression, and Irritability Related to ASD: Aripiprazole and Risperidone. Furthermore, further research and assessment are required to determine the efficacy of novel pharmaceutical treatments such as lurasidone, brexpiprazole, and cariprazine for ASD (Hesapcioglu et al., 2020).

2.1.5 Complementary and Alternative Treatment Methods Used in Patients with ASD

Different types of CAM are spreading all over the world; it ranges from simple natural herbs or food supplements to risky, life-threatening practices such as chelation (James et al., 2015). In addition, CAM has been administered and used for various diseases and disorders including ASD (Bahmani et al., 2015). In the case of ASD since no cure and no clear cause until recently, parents of the children with autism always trying to find out all the therapy methods and treatment options in order to decrease the side effects of the medications in addition to control the associated symptoms such as sleep disturbances, self-harm and agitation, however, the efficacy, clarity, and cost of therapy and care are subjects of debate. (Höfer et al., 2016).

Decades ago, people who suffered from illnesses were prone to use natural remedies for healing, most of the people think that everything natural is better than chemical or non-natural, however, with the advancement in medical science and research, several perspectives tried to gather most of those natural remedies and therapies and categorized them under the umbrella of CAM which includes all therapeutic practices or products which are not referred to conventional medicine (Akins et al., 2010).

Neurodevelopmental disorders such as ASD, are characterized by a wide range of behaviors and might change as a person grows and develops new abilities. Consequently, doctors diagnosed with autism and associated diseases may provide families with confusing information on their child's condition and its prognosis. Because of this lack of clarity, families may seek out alternative treatments that are not grounded in conventional medical or psychological theory (Konopka, 2013). Nevertheless, most of the CAM therapies which are commonly used among adults and children are not evidenced based and need further rigorous research and investigations (Bahar et al., 2013). Some CAM practices, such as Arabic medicine, are culturally based and influenced by the beliefs of the people who live in that culture and deeply rooted in cultural and religious contexts, for instance Hijama Cupping therapy is a traditional Arabic ritual that uses cups to apply suction on the skin. Its purported health benefits include improved blood flow, less inflammation, and enhanced detoxification even for healthy persons with a multi-purpose method for improving health and alleviating pain (Hasbani et al., 2021). Another practice Tibb al-Nabawi, also known as prophetic medicine, is an Islamic medical system that draws from the life and teachings of prophet Muhammad. Diet, praying, herbal medicines, and particular medical interventions specified in Islamic texts are all included in Tibb al-Nabawi (Stevenson, 2017). Also Ruqyah, known as spiritual healing, is an Islamic practice that involves reciting prayers and passages from the Quran in order to bring both physical and mental well-being. Some people take it to treat physical ailments, but more often than not, people turn to it for its purported spiritual and psychological benefits.

There are also different CAM products which are widespread in Arabic culture, such as camel milk (Swelum et al., 2021), black seeds which also called black cumin or *Nigella sativa* (Kooti et al., 2016), and Myrrh which is resin obtained from trees of the *Commiphora* genus, all are used for therapeutic purposes such as immune boosting, skin problems, anti-inflammation and antioxidants

(Younis, 2023). In addition, and strangely, Camel Urine has also been used for some benefits in the Middle East and North Africa for its special characteristics and components which can possess antiplatelet activity according to different laboratory studies (Salamt et al., 2021).

The availability of knowledge has significantly expanded in recent years, paralleled by an increased inclination of patients or caregivers to actively engage in the health issues affecting their life. As there is no medical cure, until recently, families of children with Autism experience a heightened want to explore all possible options and take risks, even if they possess extensive medical knowledge about the status of their child. Furthermore, several studies on non-pharmacological therapy options revealed that some CAM proved to have auspicious outcomes which being promising alongside with conventional medicine (Lopez-Rangel & Sm, 2005, Mondal et al., 2023)

The majority of parents with children who have autism are interested in implementing specialized diets such as casien-free, gluten-free, soy-free, and low-carbohydrate diets. These dietary choices are commonly adopted within this community (Christison & Ivany, 2006). Additionally, parents often incorporate food supplements and vitamins as essential components of their child's therapy. However, it is important for parents to be aware that eliminating certain nutritional elements and imposing restrictive eating habits on their child can lead to malnutrition, which is highly undesirable in the case of autism (Jyonouchi et al., 2002). Furthermore, it is crucial to note that incorrect dosage or excessive intake of certain vitamins or minerals can have varied effects and may interact with other medications, resulting in unfavourable side effects (Quan et al., 2021).

2.2 Family context of children with ASD

2.2.1 Parental coping and family dynamics after diagnosis

Upon confirming the diagnosis, it is normal to go through the stages of grieving and denial, followed by acceptance and realization of the fact. Subsequently, adaptation and modifications in all aspects of family relations become imperative (Ozturk et al., 2014).

This includes handling the increasing demands of daily life, providing care, managing therapies, and coping with unpredictable behaviors. Dealing with the social stigma often places parents in a stressful environment, resulting in heightened levels of stress and anxiety. An adaptable approach that meets emotional, behavioral, and developmental requirements is very necessary, while also taking into account the well-being of the entire family. However, numerous parents endeavor to cultivate coping strategies and resilience, which frequently arises from the necessity to adjust to their child's distinct requirements (Ventola et al., 2017).

The additional responsibilities might threaten the marital relationships by dividing the tasks and responsibilities, potentially requiring one member of the couple to cease employment, education, or socializing to provide better care for the child. This situation may lead to conflicts or even the breakdown of the relationship. Furthermore, social burdens also contribute to social isolation and a dread of participating in social events or family gatherings (Faraji-Khiavi et al., 2021).

Not only parents but also siblings are affected by the presence of autism in the family. They experience a range of intense emotions, including emotional instability, empathy, patience, and a strong sense of compassion. Additionally, they may also experience negative feelings such as neglect, jealousy, or embarrassment, particularly when the autistic behaviors occur in public (Kheir et al., 2012).

The rising expenses of therapy sessions, particularly those related to CAM, pose a financial burden. This often results in parents either skipping therapy sessions or seeking care from unqualified providers. Additionally, some individuals resort to using inexpensive and unsafe CAM products as an affordable solution. Moreover, families must reallocate their budgets to cover all expenses and needs without compromising the quality of therapy and care (Dababnah & Parish, 2013).

Even the location where the family used to live before the diagnosis might be affected, as many families are compelled to relocate in order to have better access to therapy and rehabilitation centres. This often involves moving to a different city or even a different country where more advanced therapy options are available (Marriott et al., 2021).

Stakeholders and policy makers in the healthcare system should take concrete actions to support and advocate for parents and families in their therapy journey (Doyle et al., 2022). This support should focus on emotional assistance, effective communication, practical strategies, planning workshops, and community involvement (Habayeb et al., 2023). These efforts aim to enhance resilience and foster a nurturing environment for both the child with autism and their parents.

2.2.2 Quality of life of parents with ASD children

Raising a child with (ASD) may be both fulfilling and demanding, since it brings up distinctive obstacles that can greatly affect parents' overall well-being. These issues involve all aspects of life, including emotions, social interactions, finances, and physical health, which often result in higher levels of stress and decreased overall well-being (Mello et al., 2019). Many factors have been recognized as contributors for the stressors that families might experience; one of the main factors is when there is a delayed or uncertain diagnosis which reported to cause high levels of stress among parents, particularly in the assessment period when the diagnosis is not yet confirmed, which might create a fake hope, and as soon as the diagnosis is confirmed, the family previously expected life and roles will be negatively affected (Wang et al., 2020). Moreover, the efforts and the energy they spend on advocating and coordinating their children treatment-related issues and decisions concerning their work desires and identities might be also affected as a result of the new family circumstances; they also feel more frustrated when their child does not respond appropriately across settings, especially in public places (Cheng et al., 2022).

Recent research suggests that parents of children with autism have a lower perceived quality of life compared to parents of typically functioning children. By addressing the factors that can improve the quality of life for parents, such as having a reliable source of information about effective therapies for children with ASD, parents have a greater ability to provide the best care for their children and support their overall development. This process ultimately enhances the well-being and quality of life for the entire family (Neijs et al., 2024).

2.3 Complementary and alternative medicine

2.3.1 Development of Complementary and alternative medicine

In the 19th century, herbal remedies were the dominant available therapies before the medical or conventional medicine become differentiated (Khalikova, 2022). Herbal medicines were administered frequently as part of routine medical prescriptions which administered not necessarily by medical practitioners or physicians, but also encompassed groups such as holy healers (Ng et al., 2023). In certain cultural contexts, individuals afflicted with illness and disease were able to avail themselves of a solid base of mutual assistance and communal backing, wherein the human experience was perceived in a comprehensive manner (Bynum & Porter, 1997). Moreover, cultural and geographical aspects influence the therapeutic practices being categorized as conventional or unconventional and that is dynamically changed with time.

Some countries used both conventional and traditional medicine in a parallel way and both are considered part of the mainstream medical practice such as the Ayurveda, a medical system that dates back more than 5,000 years and originated in India (Eisenberg et al., 1993). Its practitioners believe that illness results from an imbalance in the body and that this imbalance may be corrected via the use of herbal treatments and other holistic methods (Payyappallimana & Venkatasubramanian, 2016). In addition, Traditional Chinese Medicine (TCM) has also been practiced for more than 3000 years, and it consists of acupuncture, moxibustion, and herbal remedies all harmonized to achieve holistic therapeutic outcomes. TCM practices are also taught to physicians in China, as their credentials encompass not just clinical (Western medicine), but also dental medicine, public health, and TCM, while few provinces in Canada and some states in USA utilize TCM as part of professional associations and regulatory colleges (Gu & Pei, 2017).

The utilization of Complementary and Alternative Medicine (CAM) has exhibited substantial worldwide disparity, which is shaped by cultural, economic, and healthcare system determinants. Usage patterns differ greatly worldwide, since they are influenced by cultural norms, availability of healthcare services, and personal choices. Approximately 65-80% of the world's population utilizes CAM, with variations in prevalence influenced by traditional medical practices and modern healthcare systems. In the United States annually, between 33% and 40% of persons utilize different kinds of CAM for most of the health conditions (Yap et al., 2020). In Canada, an estimated 25% to 50% of individuals report using CAM, including massage therapy, chiropractic treatments, and herbal remedies, as their most commonly used methods of healthcare (Sealock et al., 2020). A comprehensive analysis conducted in Europe in 2022 examined 40 studies from 21 European countries, encompassing national and cross-national surveys conducted between 2010 and 2019. The analysis focused on the utilization of CAM. The findings revealed that the reported prevalence of CAM usage within the preceding 12 months ranged from 24% to 71.3% (Lee et al., 2022). In Asia, China, Traditional Chinese Medicine (TCM) is utilized by more than 80% of the

population, while in India, approximately 70% of the population utilizes Ayurveda and other traditional medical methods (Zhao et al., 2023). In Africa, approximately 80% of the population depends on conventional medicine. Herbal remedies, acupuncture, homeopathy, traditional Chinese medicine were the most commonly mentioned according to the studies

While in the Arabic countries the situation CAM use underlies different aspects, religious believers and traditional rituals showcase a diverse heritage of utilizing herbal cures, traditional therapies, and spiritual practices as part of the Prophetic medicine, also known as Al-Tibb Al-Nabawi, which encompasses a diverse range of natural medicines, dietary recommendations, and spiritual rituals that are deeply based in Islamic history. It offers a comprehensive approach to health that complements contemporary medical procedures, embodying a timeless fusion of faith and health. The increasing interest in traditional and complementary medicine has led many Muslims to turn to the teachings of Prophetic medicine for inspiration and guidance in their quest for well-being (El-Seedi et al., 2019).

Most of the practices mentioned in Al-Tibb Al-Nabawi are already part of the NCCIH classification, like food supplements such as Black Seed (*Nigella sativa*), Honey and cupping Hijama, in addition to some religious practices like fasting and and Ruqia which is reciting specific verses of the Holy Quraan for protection, healing, and mental peace, The Prophet Muhammad (PBUH) said, “Make good use of the two remedies: honey and the Qur’an” (Owens & Sami, 2015).

However, CAM is widely employed in Arabic countries, with utilization rates varying from 40% to 90% among different populations. The elevated prevalence is influenced by the cultural familiarity, ease of access, and perceived advantages of traditional health methods. In Kingdom of Saudi Arabia KSA 60-75% of the population are using CAM (Aboushanab et al., 2019), in United Arab Emirates UAE the prevalence is around 50-80 % of the general population according to different studies (Radwan et al., 2020). In Jordan 50-60% of the population reports CAM use (Adib-Hajbaghery et al., 2021).

The utilization of CAM therapies, such as acupuncture, homoeopathy, and chiropractic, has experienced a notable surge in popularity within Western countries. For instance, in the United States, the utilization of CAM had a significant surge in the 1990s. In 1997, the number of visits to CAM practitioners was predicted to be 243 million more than the projected number of visits to all primary care physicians in the United States. France and Germany had the highest rates of CAM usage among eight European nations in 1992. Approximately 49% of the population in France and 46% in Germany had utilized some type of CAM (Fjær et al., 2020).

A recent study analyzed data from 21 nations over a period of more than three decades following the end of the communist experiment in Eastern Europe. The study provides evidence that the European continent continues to be divided when it comes to the alternative healthcare industry. The presence of non-conventional healthcare practices serves as evidence of a clear distinction between Eastern and Western Europe. In Eastern countries, 5.5% of respondents reported visiting

a CAM healthcare practitioner in the last year, totaling 531 persons. In Western Europe, 11.6% of participants reported visiting a CAM healthcare practitioner (Souček & Hofreiter, 2022).

In India, there are around 240 institutes that offer a graduate-level degree in Ayurvedic Medicine and Surgery, so practitioners receive state-recognized, institutionalized training, however, this kind of training is not offered in the United States under national regulations (Patwardhan et al., 2011).

However, the comprehension of human illness has expanded greatly along with the growth of science-based medicine and the medical discipline (Patwardhan, 2015). A growing number of specializations emerged in the medical field as biomedicine took the main place. Surgical specialization was one example; other areas of medical expertise included infectious disease, human development, and mental health. Furthermore, the current drug industry owes its origins to the isolation and synthesis of the active elements of medicines derived from plants, which began in the nineteenth century (Bhadra et al., 2015).

Many non-Western cultures, including those listed above, do not differentiate between traditional and mainstream medicine in the same way that western countries do, so the terminology like "complementary," "alternative," and "integrative" are originate from western world (Kemppainen et al., 2017).

2.3.2 Global prevalence of CAM use

According to different studies, CAM usage is widespread worldwide (Perrin et al., 2012; Saral et al., 2022). A survey has revealed that more than 50% percent of the parents of ASD children are using or have used at least one of CAM practices to substitute or together with conventional medicine (Saral et al., 2022). Diets, food supplements and vitamins in addition to probiotics, were the most used CAM among parents, in which they believe that if there is no benefit at least it will not cause harm (Perrin et al., 2012). Although the amended studies did not report any significant adverse events, it is important to consider that certain therapies, such as exclusion diets, may be linked to potentially detrimental long-term side effects. Indeed, it has been observed that CAM demonstrates a satisfactory safety profile during a limited timeframe. However, the ongoing progress of information on evidence-based practices (EBPs) stems from the established need of research pertaining to the demographics, key traits, and intervention research associated with autism. Simultaneously, the exists of interventions that lack substantial evidence of their efficacy yet are still characterized as "innovative" remains a notable gap in current knowledge (Hume et al., 2021).

Until recently we have only limited data regarding attitude of parents toward CAM use and prevalence of CAM use for ASD children in the Arabic countries, where the prevalence and needs are increasing with time. One study conducted in Jordan found that 47% of the parents were using CAM modalities for their children, and the parents with higher education level were more likely to access rehabilitation services (Masri et al., 2020). Another cross-sectional study carried out in Saudi Arabia found that more than half of adults indicated that CAM can help in ASD symptoms management (Khalifa et al., 2023).

2.4 Main types of complementary and alternative methods

Complementary, alternative, and integrative medicine are often interfering or misidentified (Hanson et al., 2006). However, they can be understood in relation to conventional medicine; integrative medicine integrates conventional and complementary/alternative therapies to offer a comprehensive approach to healthcare, and it seeks to combine evidence-based treatment with suitable and safe complementary and alternative therapies, while complementary medicine is used in conjunction with conventional treatment, and alternative medicine is used in place of conventional treatment (Ni et al., 2023). The ambiguity in delineating the extent of CAM is pervasive in the literature, resulting in a broader and less precise CAM framework.

The National Center for Complementary and Integrative Health (NCCIH), part of the National Institutes of Health (NIH) in the United States, previously categorized complementary and alternative medicine into five major groups. These categories help to provide a framework for understanding these diverse approaches and practices to healthcare. However, these categories are not mutually exclusive, and different complementary and alternative practices may fit into more than one category. Moreover, as the field of complementary and alternative medicine is continually evolving, the NCCIH also stresses the significance of doing thorough scientific studies to assess the efficacy and safety of these practices.

According to NCCIH complementary approaches can be categorized based on their three main therapeutic input, which refers to how the therapy is administered or given whether nutritional, physical, psychological or a combination of two of them, like mindful eating or dance therapy. However, other major categories can be used as framework to organize the diverse numerous practices which come under the umbrella of CAM.

The previously used 5 CAM categories:

1. Mind-Body Medicine:

- Practices that focus on the interactions between the brain, mind, body, and behavior.
- Examples include meditation, mindfulness, yoga, hypnotherapy, and biofeedback.

2. Biologically-Based Practices:

- Natural substances, including herbs, dietary supplements, and probiotics, are utilized to enhance overall well-being.
- Herbal supplements, vitamins, and dietary modifications fall into this category.

3. Manipulative and Body-Based Practices:

- Methods that encompass the manipulation or mobilization of the body to enhance physical and mental health.
- Examples include chiropractic care, massage therapy, osteopathic manipulation, and acupuncture.

4. Energy Medicine:

- Methods that utilize the body's energy fields to enhance equilibrium and well-being.
- Practices like acupuncture, Reiki, and therapeutic touch fall into this category.

5. Whole Medical Systems:

- Alternative medicine refers to comprehensive systems of philosophy and practice that have developed apart from, or alongside, conventional medicine.
- Examples include Traditional Chinese Medicine (TCM), Ayurveda, naturopathy, and homeopathy.

2.4.1 Classification of CAM

The NCCIH use three main categories (Table 1).

Table 1: Three main categories of CAM methods

CAM Category (NCCIH)	Description	Common Examples	Primary Health Focus
Nutritional Approaches	Interventions based on dietary intake, natural products, and nutritional supplementation aimed at supporting physiological function, preventing disease, or managing symptoms.	Vitamins and minerals, herbal medicines, probiotics, dietary supplements, special diets	Metabolic health, immune function, gastrointestinal health, chronic disease management
Physical Approaches	Therapies involving physical manipulation or movement of the body to improve alignment, reduce pain, and enhance physical function.	Chiropractic care, massage therapy, acupuncture, osteopathy, yoga, tai chi	Pain management, mobility, musculoskeletal health, rehabilitation

Psychological Approaches	Mind–body interventions focusing on interactions between mental processes and physical health to enhance emotional regulation and well-being.	Meditation, mindfulness-based stress reduction, hypnosis, guided imagery, biofeedback	Mental health, stress reduction, emotional regulation, psychosomatic conditions
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Source: Adapted from National Center for Complementary and Integrative Health (NCCIH, 2024).

2.5 Common CAM Modalities Used in ASD

CAM includes a broad range of health practices, products, and interventions that are used alongside or instead of conventional treatments. Among families of children with ASD, CAM use is widespread and continues to increase globally. The most commonly reported CAM approaches include dietary interventions, nutritional supplements, herbal products, sensory-based therapies, music therapy, animal-assisted therapy, spiritual healing practices, and traditional cultural remedies (Perrin et al., 2012; Saral et al., 2022).

Dietary modifications and nutritional supplements represent some of the most frequently utilized CAM approaches. Parents often adopt gluten-free, casein-free, ketogenic, or elimination diets and may use vitamins, minerals, probiotics, omega-3 fatty acids, antioxidants, and herbal products to manage behavioural, gastrointestinal, and developmental symptoms. Although some studies have reported potential benefits, evidence regarding effectiveness remains inconsistent, and concerns regarding nutritional deficiencies and inappropriate supplementation have been raised (Cheng et al., 2017; Kočovská et al., 2017; Alsufiani et al., 2022).

Several physical and psychological CAM approaches have also been investigated for children with ASD. These include sensory integration therapy, music therapy, mindfulness-based interventions, and animal-assisted therapy. Such interventions aim to improve communication, social participation, emotional regulation, sensory processing, and quality of life. While some studies have demonstrated promising outcomes, methodological limitations and variability in intervention protocols continue to limit definitive conclusions regarding efficacy (Bharathi et al., 2019; Schaaf et al., 2017; O’Haire, 2017).

In Arab countries, cultural and religious influences play an important role in CAM utilization. Traditional and faith-based practices such as Hijama (cupping therapy), Ruqyah (spiritual healing), herbal medicine, black seed (*Nigella sativa*), honey, and other interventions associated with Al-Tibb Al-Nabawi (Prophetic Medicine) are frequently used. The popularity of these approaches reflects the strong influence of cultural traditions, family beliefs, and religious values on healthcare decisions and treatment-seeking behaviours (El-Seedi et al., 2019; Hasbani et al., 2021).

Other CAM modalities, including acupuncture, osteopathy, homeopathy, hyperbaric oxygen therapy, and chelation therapy, have also been explored in ASD management. However, current evidence supporting these interventions remains limited, inconsistent, or controversial. In some cases, concerns regarding safety and adverse effects have been raised, emphasizing the importance of professional guidance and evidence-based decision-making when considering CAM use (Yenkoyan et al., 2023; Fischer et al., 2022; Posadzki et al., 2022).

Overall, CAM use among families of children with ASD remains common worldwide. Despite growing interest in these interventions, the evidence supporting many CAM therapies remains insufficient. Therefore, healthcare professionals should provide balanced, culturally sensitive, and evidence-based information to help families make informed decisions regarding CAM utilization and its integration within comprehensive autism care.

Music therapy and Sensory Integration

Children diagnosed with ASD may exhibit or acquire musical abilities such as the ability to recognize pitch, segment chords, and memorize melodies. These capabilities have been identified as distinctive gifts of individuals with ASD (Heaton, P. 2003). ASD children often face difficulties in communication and expression. However, the deliberate use of auditory stimuli can potentially improve brain responses, leading to the development of vocabulary and speech in these children. Structured music therapy facilitates the expression of emotions and sentiments in children with autism, despite their usual difficulties with communication and expression, by utilizing songs, melodies, and musical instruments. One possible reason for the improved social and communicative abilities observed in research on music therapy and ASD (Lim & Draper, 2011) is that it enhances these skills.

Wan et al. (2010) propose that playing music can activate certain brain areas associated with mirror neurons. This activation has the ability to enhance the replication of actions and contribute to diverse facets of cognitive development in persons diagnosed with ASD. The Shared Affective Motion Experience paradigm, proposed by Overy and Molnar-Szakacs in 2009, suggests that the experience of music goes beyond just a simple aural stimulus and instead involves purposeful and expressive motor actions. Therefore, engaging in musical activities has the capacity to stimulate the brain circuitry that governs motor control, specifically the mirror neuron system.

The application of pitch and rhythm in music can potentially stimulate the mirror neuron system and improve the process of imitation through sound-motor mapping. An illustration of this principle is frequently seen in the use of Melodic Intonation Therapy for those with language

ability. This therapy technique utilizes the melodic and rhythmic qualities of specific musical phrases to stimulate vocalization and motor responses (Albert et al., 1973); (Norton et al., 2009). Furthermore, it is often suggested that the feeling of musical emotions is a result of the interaction between pitch and rhythm (Huron, 2008). The study conducted by Lundqvist et al. (2008) found that certain audio cues trigger involuntary facial expressions in individuals who are listening. The brain's simulation mechanism is associated with the emotional and physical responses to music, as demonstrated by the activation of brain regions such as the human frontoparietal mirror neuron system during emotionally induced states generated by music (Koelsch et al., 2006).

The article by Bharathi et al. (2019) argues that anticipated musical structures are crucial for the development of new abilities in children with ASD, as well as for promoting motor self-assurance, as suggested by Broughton and Stevens (2009). Moreover, music therapy effectively alleviates stress by establishing a serene and enjoyable atmosphere that instills a sense of safety and comfort. In addition, engaging in musical activities that often involve the integration of rhythm, pattern recognition, and memory recall can contribute to the enhancement of cognitive functions such as concentration, attentiveness, and memory. Participating in musical instrument performance and rhythmic exercises might enhance fine motor skills and coordination (Quintin, 2019).

Music therapy can be advantageous for children with ASD as a rehabilitative intervention to enhance their motor, linguistic, and personal abilities, resulting in increased personal satisfaction (Kornysheva et al., 2010).

Sensory integration SI is the neurological process by which the human body organizes and interacts with reactions from both the body itself and the environment. In recent decades, sensory integration therapy has gained significant popularity as a prevalent practice in the field of complementary and alternative medicine, particularly in the Arabic world. Its primary purpose is to effectively regulate and manage the symptoms related to ASD (Wang et al., 2022). Numerous studies have been conducted to evaluate and tackle the true efficacy of this therapy (Bodison & Parham, 2017). Additionally, SI interventions have been regarded as one of the most reliable CAM treatments, particularly among parents of children with autism. This is due to its perceived safety, painlessness, and the engaging and enjoyable methods employed, which enhance its acceptability, especially when the diagnosis is confirmed at the age of 2 years (Thye et al., 2018).

SI techniques are employed when a child exhibits challenges in processing sensory inputs, which impede their engagement in daily activities such as sleep, play, dressing, eating, and social interaction. These difficulties also hinder their ability to respond effectively in other therapy sessions, thereby impacting the overall outcomes and impeding the child's progress. Research has indicated that children diagnosed with autism spectrum disorders exhibit a notably elevated prevalence of sensory processing difficulties, estimated to be around 65-70% (Posar & Visconti, 2018).

2.6 Factors Affecting CAM Use

Upon the various therapy options available worldwide for controlling ASD and its comorbid syndrome, parents and families of children with ASD face significant challenges when it comes to finding the most effective therapy options to manage the symptoms and its associated conditions (Vandana et al., 2023). The abundance of information available worldwide regarding the efficacy, safety, and potential side effects or risks of these therapies often leads to doubts and hesitation. Consequently, parents invest considerable time, money, and mental and physical energy in ensuring that the chosen therapy is appropriate, beneficial, and safe, regardless of whether it is scientifically approved. Their ultimate goal is to help their child become self-reliant and secure a better future (Hopf et al., 2016).

The determinants influencing the utilization of CAM can be categorized into two main factors: family-related and child-related. The parental factors primarily encompass the family's beliefs and attitudes, including cultural, religious, and personal beliefs such as overprotective tendencies or adherence to specific religious or cultural practices for managing illnesses or disorders. Additionally, other factors include financial implications, educational attainment, literacy level, as well as coping mechanisms, problem-solving abilities, life skills, and social support (Goel et al., 2018).

Table 2: Determinants Influencing CAM Use in Children with ASD

	Factor Category	ASD-Specific Determinants	Relevance to CAM Use in ASD
Family-related	Cultural and religious beliefs	Faith-based healing, traditional remedies, religiously endorsed practices	Influences CAM selection in ASD within Arab and global contexts (Masri et al., 2019; Al-Rowais, 2020)
Family-related	Parental attitudes	Preference for natural therapies, concern about medication side effects	CAM perceived as safer or more holistic (Hanson et al., 2007; Goel et al., 2011)
Family-related	Caregiver burden	Stress, hope-driven decisions, desire to try all options	Higher burden associated with

			increased CAM use (Green et al., 2006)
Family-related	Education & health literacy	Ability to interpret medical information	Higher literacy linked to informed CAM decisions (Alwhaibi et al., 2016)
Child-related	ASD severity	Communication and behavioral challenges	Greater severity linked to increased CAM utilization (Wong & Smith, 2006)
Child-related	Comorbidities	GI issues, seizures, sleep disturbances	CAM often used for symptom management (Levy et al., 2017)

On the contrary, the factor related to children is of utmost importance in the context of ASD. While all children with ASD may exhibit certain common traits, each case is unique and requires personalized treatment plans. According to existing literature, factors such as the severity of symptoms, presence of comorbid conditions, response to conventional therapy, and the child's medical history of adverse reactions to substances, significantly influence parents' decisions regarding CAM options (Trudeau et al., 2019). Additional factors, such as the accessibility of health care consultants, therapy providers, insurance coverage, distance or location of services, reputable centres or references, and the collaboration of health care providers in assessing or providing information about CAM use, as well as the dynamics of the health care system, can significantly impact the utilization of CAM among the general population. Ultimately, comprehending these characteristics can assist healthcare practitioners, policymakers, and researchers in facilitating well-informed decision-making and guaranteeing that families are provided with unbiased, scientifically-supported information regarding CAM therapies. In addition, by thoroughly considering these variables, families can make more knowledgeable decisions regarding the incorporation of CAM into their holistic treatment strategies for autism (Shuai et al., 2020).

A study held in Jordan in 2019, addressing the factor affecting parental use of CAM found that the level of educational attainment correlate with higher tendency of CAM use, in addition to the accessibility to rehabilitation services (Masri et al., 2020). Another large sample size study held in

USA between 2014-2015 included 352 parents using mixed method survey, reported that the age of the child with ASD negatively affect the decision of using CAM, in addition to parental beliefs about autism itself, the living area, and medication use which were found to positively affect the use of CAM (Lindly et al., 2017). The younger child age and the educational status of the parents found to be common associated factors correlate with CAM use in several studies (Owen-Smith et al., 2015). In Europe the situation is not that different as shown in Salomone et al. (2015) study which included 1680 parents of children with ASD who were recruited to fill an online survey, the results also confirmed that socioeconomic factors and parental use of conventional medicine in addition to the educational attainment might contribute to the therapy decision and choices.

A recent cross-sectional study conducted in Saudi Arabia examined the viewpoints of 4311 Saudi adults regarding the utilization and efficacy of CAM for ASD. The study found that females, who comprised two-thirds of the participants, were more inclined to use CAM compared to males. Additionally, individuals with higher levels of education and those residing in central regions with greater access to therapy options were more likely to utilize CAM, as opposed to those living in the northern and southern regions (Khalifa et al., 2023).

Despite the absence of a cure for ASD, there is a constant emergence of various modalities, therapies, and practices aimed at assisting and supporting children and families. Numerous aspects come into play while identifying and implementing the appropriate therapy.

2.7 Health literacy and CAM use

Health literacy encompasses the capacity to acquire, comprehend, and use health-related knowledge in order to make well-informed choices regarding one's well-being (Lindly et al., 2021). It can be classified into three fundamental categories: Functional Literacy, which refers to the capacity to possess basic reading and writing abilities necessary for comprehending health information. Communicative Literacy refers to the ability to effectively obtain and utilize health information in various circumstances, requiring advanced cognitive skills. The ability to critically analyze and utilize information to make informed decisions and take control over health issues is essential in developing critical literacy (Vovou et al., 2020).

Parents of children with ASD require a strong awareness of healthcare systems, treatment options, and successful advocacy in order to meet their children's needs (Smith et al., 2020). Regarding therapy, the concept of health literacy can become more intricate while managing autism, as it typically entails a combination of many therapies, drugs, and modalities. Hence, having a strong understanding of health-related information enables parents to effectively manage their child's healthcare by coordinating care among different healthcare providers and comprehending the various treatment options that are accessible (Westerveld & Paynter, 2021). In addition, parents who possess a high level of health literacy are more capable of assessing the advantages and disadvantages of various therapies, such as CAM. Moreover, they are able to make well-informed decisions, seek advice when considering any kind of CAM, and actively engage in the planning and implementation of their child's care. Moreover, it is essential to have a comprehensive understanding of healthcare rights and educational entitlements in order to effectively advocate for

individuals. Additionally, it is important to be knowledgeable about the rights of the child and to be able to handle logistics. On the other hand, managing comorbid conditions that often require extra effort and knowledge which is necessary when dealing with autism (Born et al., 2019).

The intricate nature and uncertainty regarding ASD, along with the diverse array of therapy choices and inconsistent study results regarding CAM practices and their effectiveness, in addition, the care provided to children with ASD is often fragmented, involving multiple specialists such as pediatricians, neurologists, occupational therapists, speech therapists, physiotherapists, and behavioral therapists (Pushkarenko et al., 2021). Coordinating this care, sharing information, and delivering it effectively is challenging, requiring parents to constantly stay up-to-date and educate themselves. Moreover, in the Arabic speaking countries or families who do not speak English or come from varied cultural backgrounds may have extra challenges when it comes to accessing and comprehending health information (De Leeuw et al., 2020).

In order to ensure better access for information regarding the therapy, there should be availability of workshops, support groups, and an easily accessible online learning platform. Parents should be given accurate and easily understood information about autism, how to navigate healthcare systems, and the available treatment options. This information should be provided by specialists in the field. Additionally, healthcare providers should actively encourage parents to participate in support groups where they may share their experiences, resources, and advise with other parents (Khateeb et al., 2019).

A very recent study has shown the importance of health literacy in shaping healthcare decisions among families of children with ASD. The study showed that parental health literacy influences the ability to access, understand, evaluate, and utilize health information related to ASD interventions and other services (Beyaz & Öznurhan, 2026). Parents with higher levels of health literacy were more likely to engage in informed decision-making, communicate effectively with healthcare professionals, and navigate complex healthcare systems. The authors emphasized that health literacy plays a critical role in treatment selection, service utilization, and the evaluation of health-related information, particularly in environments where families are exposed to large amounts of information from healthcare providers, social media, and community networks. These findings support the growing recognition of health literacy as an important determinant of healthcare behaviors and treatment decisions among parents of children with ASD. The findings of this study are particularly relevant to the present research, which identified a significant relationship between parental health literacy and CAM utilization. As parents increasingly seek information regarding ASD interventions from multiple sources, adequate health literacy may facilitate critical evaluation of treatment claims, improve communication with healthcare professionals, and support evidence-based decision-making regarding CAM use (O. J. Lindly et al., 2021).

2.8 Research Gap and Conceptual Framework

Despite the increasing prevalence of ASD and the widespread use of CAM among affected families, research conducted in Arab countries remains limited. Existing studies have primarily focused on prevalence estimates and specific CAM modalities, while comparatively little attention has been given to parental decision-making processes, health literacy, quality of life, communication with healthcare professionals, and the influence of cultural and religious beliefs on CAM utilization.

Furthermore, few studies have adopted a mixed-methods approach capable of integrating quantitative evidence regarding CAM prevalence and associated factors with qualitative insights into parents' lived experiences and motivations. Consequently, important questions remain regarding why parents choose CAM therapies, how they obtain information, how they evaluate effectiveness, and how cultural context shapes these decisions.

This dissertation seeks to address these gaps by examining CAM use among parents of children with ASD in selected Arab countries through a mixed-methods framework that combines quantitative, qualitative, and case-study approaches.

The framework below proposes that parental characteristics, family-related factors, child-related factors, and cultural and religious influences shape parental decisions regarding CAM use. CAM utilization may subsequently influence perceived child outcomes, symptom management, parental satisfaction, and family quality of life.

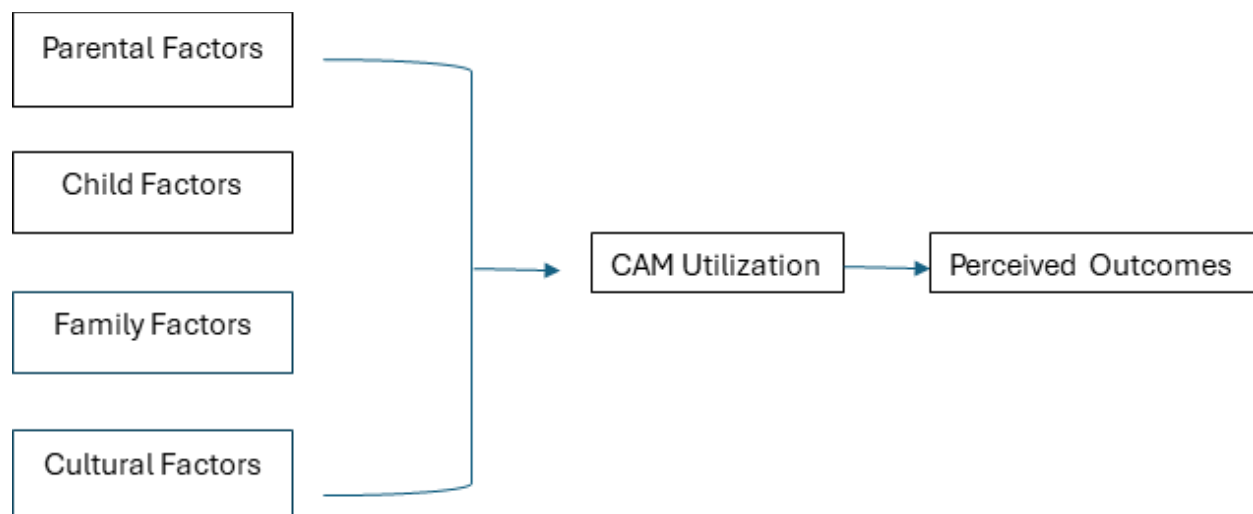


Figure 1. Conceptual framework of factors influencing complementary and alternative medicine (CAM) utilization among parents of children with Autism Spectrum Disorder (ASD).

3. Research Methodology

A mixed method was used in this study. Three research were conducted:

- A quantitative survey aimed to investigate the parents' CAM usage for their ASD children in Arabic countries. Moreover, we investigated the associated factors of children (age, gender, medical variables of the children, and parent's sociodemographic factors and health literacy) influencing the CAM usage among parents for ASD children.
- A qualitative research which aimed to survey the perceptions and experiences of mothers of children with ASD using CAM.
- A case study of a child with ASD and the benefits of music therapy as CAM.

3.1 Cross-sectional quantitative study

3.1.1 Sample and Sampling method

This cross-sectional study employed a **convenience sampling strategy**. Five Arabic countries were purposively selected based on their inclusion among the top ten countries with the highest reported prevalence of ASD, according to the Global Health Data Exchange and World Population Review (2023). The selected countries were **Qatar, the Kingdom of Saudi Arabia (KSA), Kuwait, Jordan, and Libya**.

Participant recruitment was coordinated through the **Autism Academy of Jordan**, the largest autism center in Jordan, in collaboration with the **Jordanian Association for Autism**. These institutions facilitated connections with one autism center in each of the participating countries, resulting in a total of **five centers**, one per country.

Parents of children diagnosed with ASD were approached through these centers and screened for eligibility. A total of **200 parents** (approximately 40 from each country) were assessed for eligibility. Of these, **154 questionnaires** were returned. After data screening, **142 completed questionnaires** were included in the final analysis (Figure 1).

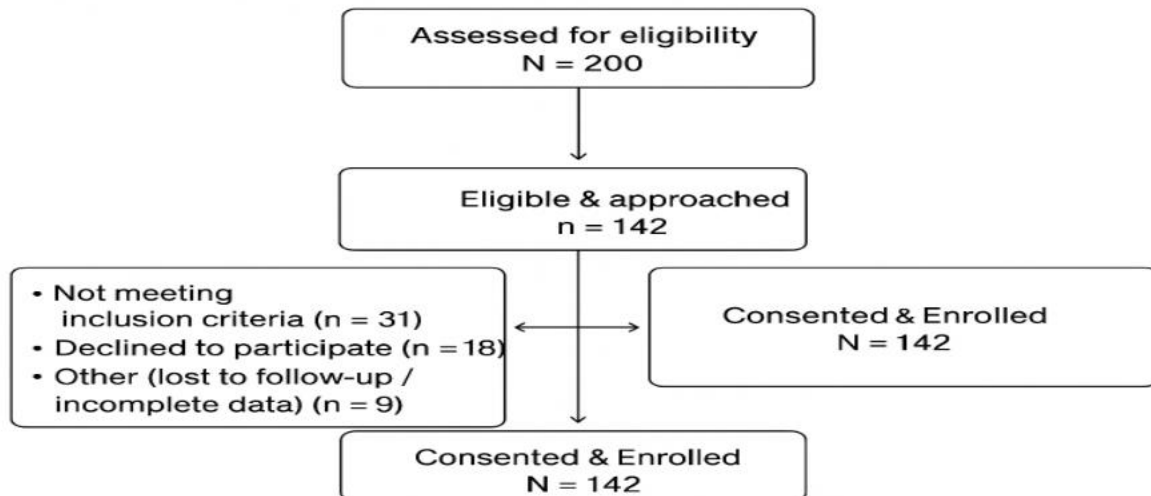


Figure 2: Flowchart of the sampling for quantitative study

Survey Development and Data Quality Procedures

Prior to full-scale data collection, the questionnaire underwent pilot testing to evaluate clarity, relevance, comprehensibility, and completion time. Feedback obtained during the pilot phase was used to refine item wording and improve questionnaire usability.

Data quality procedures included screening for duplicate submissions, incomplete responses, and logical inconsistencies. Cases with substantial missing data were excluded from analysis. For questionnaires containing limited missing values, available data were retained for analyses where appropriate.

Participation was voluntary and anonymous. No identifying information was collected. Participants were informed that they could discontinue participation at any time without consequence.

Selection of Participating Countries

Qatar, Saudi Arabia, Kuwait, Jordan, and Libya were selected because they represent diverse geographical, socioeconomic, and healthcare contexts within the Arab region. In addition, available epidemiological evidence indicates increasing recognition and diagnosis of ASD within these countries. Including participants from multiple Arab countries allowed exploration of CAM use across different cultural and healthcare environments while maintaining a common linguistic and cultural framework.

3.1.2 Survey distribution

We distributed the printed document regarding the survey to the persons responsible of the centers in the 5 countries between January 2022 and July 2022. Recruitment was conducted through autism centers, rehabilitation facilities, parent support groups, and online platforms related to ASD. This multi-channel recruitment strategy enhanced the reach and diversity of the sample. The parents received the information about the study and the link of the survey in a printed document. The eligibility criteria for the study included parents who had a child diagnosed with ASD at least 6 months prior to the study. The exclusion criteria were to provide incomplete information in the questionnaire or not fulfil the inclusion criteria.

3.1.3 Study Instrument

A cross-sectional survey was designed using a self-administered, Google Forms internet-based questionnaire. The questionnaire was developed in English and translated by an expert to Arabic and checked by two experts in the field of ASD. The introduction part of the questionnaire consisted a detailed information about the aims of the study, the voluntary participation consent and contact details.

The next section included the questions divided into 7 parts:

1. Demographic data of parent's (age, number of children, family income, educational level, residence place) and their child with autism (age, gender, child' age when the diagnosis was received).

2. Parents' health literacy was measured with HLS-EU-Q16 (Pelikan et al., 2014; Bas-Sarmiento et al., 2020) 16 items using a 5-point Likert scale (ranging from 'very easy' to 'very difficult'. The categories "very difficult", "fairly difficult" and "neutral" are scored as 0, and the categories "fairly easy" and "very easy" are scored as 1. Overall scale value was calculated as summed scores. All respondents answered for all 16 questions. Scores varied between 0 and 16. Three levels of health literacy categories were applied: inadequate (0-8), problematic (8-12) and sufficient (13-16).

3. Clinical characteristics of child with autism reveal:

- The exact diagnosis (categories: Autistic disorder, Asperger's syndrome, pathological demand disorder PDA, childhood disintegrative disorder, pervasive developmental disorder (not otherwise specified),
- The comorbid syndromes of the child with ASD (epilepsy, attention deficit hyperactivity disorder, sleep disturbances, feeding problems, others),
- The child's verbal ability level (choosing one from the categories: Does not talk, Uses single words, Uses two- or three word phrases, Uses sentences with four or more words, Uses complex sentences).

4. CAM use by child with ASD: The list of CAM developed by the commonly used therapies in the Arabic countries (Masri et al., 2019; Aljawadi et al., 2020; Khalifa et al., 2023), classified by

(NCCIH, 2023) and other authors . The CAM practices contained (a) biologically based therapies (multivitamins, vitamins, special diets (e.g. gluten free, casein free), dietary supplements, honey, almond, dates, algae and herbs, oxytocin, chelation therapy, hyperbaric oxygen therapy) (b) Mind-body interventions (biofeedback, music therapy, pet therapy, holding therapy, aroma therapy) (c) alternative medical systems or complete systems of therapy/medicine (homeopathy, acupuncture, acupressure, massage, deep massage packing therapy, cupping), (d) manipulative and body-based methods (facilitated communication, osteopathy, sensory integration therapy). Parents were asked to select CAM therapies that were ‘used in the last 6 months’ and were ‘ever used’ and assess their effectiveness on a 5-point Likert-type scale ranging from 1 (not effective at all) to 5 (very effective). We have grouped together not effective at all (1) and not effective (2) categories to not effective, and effective (4) and very effective (5) categories to effective group.

5. Information sources regarding CAM (categories: social media, friends, families who have children with autism, doctor, rehabilitation therapists, TV/radio, others).

6. Reasons of CAM use: Parents were asked to indicate their reasons of their child’ CAM use. (responses: To decrease side effects of medications. I am not certain that CM alone can help. Positive experiences recommended by many families. It makes me feel satisfied that I have the ability to control my child health choices. Stress reduction that I have tried everything possible to help my child. I feel frustrated about my child very slow prognosis. Some practices are scientifically proven due to their effectiveness. To increase the effectiveness medical therapy. To increase the quality of life of my child.)

7. Disclosure of CAM use for the doctor: Parents were asked to indicate whether they had informed the doctor about their child’s CAM use (categories: yes, no, just for the successful ones) and if did not what was the reason (categories: It is not important for the doctor to know. I've never been asked about it, so I never talked about it. Doctors have little knowledge of complementary treatments. I was afraid that the doctors do not approve it so it should be stopped.)

3.1.4 Validity and reliability of the instrument

Two academic experts in the field of ASD, and 10 parents were asked to fill and review the questions to determine if they are appropriate, comprehensible, and understandable before being distributed.

Reliability of the HLS-EU-Q16 Instrument

Health literacy was assessed using the validated European Health Literacy Survey Questionnaire (HLS-EU-Q16), which has been widely applied in international public health research. The instrument measures individuals’ perceived ability to access, understand, evaluate, and apply health-related information in healthcare, disease prevention, and health promotion contexts.

To evaluate the internal consistency reliability of the HLS-EU-Q16 questionnaire within the current study sample, Cronbach’s alpha coefficient was calculated. The obtained reliability

coefficient demonstrated acceptable to good internal consistency, indicating that the instrument was suitable for assessing health literacy among the participating parents of children with ASD.

The instrument demonstrated good internal consistency reliability within the current sample (Cronbach's $\alpha = 0.84$).

Statistical methods

We used descriptive statistics to present the baseline characteristics of the sample and the prevalence of CAM use. Multiple binary logistic regression models were used to identify the association between CAM use and gender of children, age groups of children, education level of parents, monthly family income, the comorbidity (have or do not have), side effects of the medications (no, or only one side effect, or more than 1 side effect), verbal abilities of children and health literacy. One year of children were excluded from the association analysis because in this age they cannot talk. Odds ratios (OR) and 95% confidence intervals were calculated to determine strength of association. The statistical analysis was performed using SPSS (version 23.0), Intercooled Stata v17 (StataCorp. 2021. Stata Statistical Software: Release 17. College Station, TX: StataCorp LLC), and Microsoft Excel 2018. The significance threshold was set at <0.05 .

Ethics approval and consent to participate

Ethical approval for this study was obtained from the relevant institutional and professional bodies in each participating country prior to data collection. Approval was granted by the Jordanian Association for Autism in Jordan, Hamad Medical Hospital (Department of Occupational Therapy) in Qatar, and through the Autism Academy of Jordan in collaboration with partner institutions in the Kingdom of Saudi Arabia, Kuwait, and Libya.

The study was conducted in accordance with the ethical principles outlined in the **Declaration of Helsinki** and adhered to internationally accepted standards for research involving human participants. Given the quantitative, survey-based design of the study, participation involved minimal risk.

Participation was voluntary, and informed consent was obtained from all participants prior to inclusion in the study. Parents or legal guardians of children diagnosed with Autism Spectrum Disorder were provided with clear information regarding the purpose of the study, the procedures involved, and their rights as participants.

Data were collected anonymously using a structured questionnaire. No personally identifiable information was obtained. All data were treated confidentially, stored securely, and used solely for

research purposes. Participants were informed of their right to withdraw from the study at any stage without any consequences.

3.2 Methods of the qualitative study

The study employed a qualitative research design to explore the experiences of mothers of children with ASD navigating their perspectives concerning CAM use, information sources, disclosure with doctors, and challenges in CAM use. The study used semi-structured interviews to gather in-depth data from participants, enabling rich, detailed accounts of their experiences.

Inclusion and Exclusion Criteria

The qualitative component of this study employed purposive sampling to recruit parents of children diagnosed with Autism Spectrum Disorder (ASD) from selected Arab countries. Participants were recruited through autism support centers, rehabilitation facilities, online parent support groups, and personal referrals.

To ensure the relevance and appropriateness of the collected data, the following inclusion criteria were applied:

- Parents or primary caregivers of a child formally diagnosed with Autism Spectrum Disorder (ASD);
- Parents residing in one of the selected Arab countries included in the study;
- Parents aged 18 years or older;
- Parents who had experience using at least one form of complementary and alternative medicine (CAM) for their child with ASD;
- Parents who were able to communicate effectively in Arabic or English;
- Parents who voluntarily agreed to participate and provided informed consent.

The exclusion criteria included:

- Parents of children without a formal ASD diagnosis;
- Parents with no experience using CAM therapies for their child;
- Individuals who were not primary caregivers of the child;
- Parents who were unable to participate in an in-depth interview due to language or communication barriers;
- Participants who declined audio recording or did not provide informed consent.

Purposive sampling was selected because it allowed the recruitment of participants with direct experience and rich knowledge relevant to the research topic. The qualitative sample size was determined based on the principle of data saturation, whereby interviews continued until no substantially new themes, perspectives, or experiences emerged from the data. This approach

ensured sufficient depth and diversity of parental experiences while maintaining methodological rigor and analytical relevance.

The qualitative sample included parents from different socio-demographic and educational backgrounds to maximize variation in experiences, perceptions, and decision-making processes related to CAM use among children with ASD.

3.2.1 Interviews and Data Collection Process

Data were collected using semi-structured, in-depth interviews with mothers of children diagnosed with ASD. A self-developed semi-structured interview guide was used to ensure consistency across interviews while allowing participants the flexibility to elaborate on their experiences. The interview guide was developed based on a comprehensive review of previous qualitative and quantitative studies examining CAM use among children with ASD (Masri et al., 2019b) and was aligned with the aims of the present study.

The interview guide consisted of two main sections. The first section collected demographic and clinical information, including maternal age, marital status, educational level, household income, and child-related characteristics (age, age at diagnosis, specific ASD diagnosis, and comorbid conditions). The second section explored mothers' experiences with CAM, including types of CAM used, perceived benefits and risks based on personal experience, sources of information, communication and disclosure to healthcare professionals, and mothers' hopes, concerns, and fears regarding available therapy options.

Interviews were conducted individually via Skype, which enabled participation regardless of geographic location and allowed mothers to engage in a familiar and private environment. Interviews were scheduled at a time most convenient for each participant to minimize burden and encourage open discussion. Each interview lasted approximately 25–30 min and was audio-recorded with participants' permission.

3.2.2 Data Analysis

Qualitative data analysis was conducted using NVivo 12 software following a thematic analysis approach (Attar et al., 2023). All interviews were transcribed verbatim and reviewed multiple times to ensure accuracy and familiarity with the data. Initial familiarization involved repeated reading of transcripts to gain an overall understanding of participants' narratives.

The interview guide was developed after a structured review of relevant literature investigating CAM use in ASD populations, which informed the formulation of interview questions in alignment with the study's aims. An inductive coding approach was employed, allowing themes to emerge directly from the data rather than being imposed on a priori.

Two independent researchers conducted the qualitative analysis. Each researcher initially coded the transcripts separately, generating preliminary codes, themes, and subthemes. The researchers then met to compare findings, discuss discrepancies, and refine the thematic structure. Through

iterative discussion and consensus, final themes and subthemes were agreed. NVivo's node function was used to organize and categorize data into themes, while query and word-frequency tools supported the identification of patterns and relationships across interviews. Codes and themes were continuously reviewed and refined throughout the analysis process to ensure coherence and depth.

To enhance rigor and objectivity, reflexivity was explicitly considered. The researchers acknowledged their professional backgrounds in working with children with ASD and their families and actively reflected on how these experiences could influence interpretation. Regular peer discussions and collaborative analysis were used to minimize bias and strengthen analytical credibility.

Trustworthiness of the Qualitative Findings

Several strategies were employed to enhance trustworthiness. Credibility was strengthened through prolonged engagement with the data, repeated review of interview transcripts, and independent coding by more than one researcher. Dependability was enhanced through systematic documentation of coding decisions and analytical procedures. Confirmability was supported by maintaining an audit trail and discussing coding discrepancies until consensus was achieved. Transferability was facilitated through detailed descriptions of participant characteristics, study context, and thematic findings, enabling readers to assess the applicability of findings to similar populations.

3.3 The Case Study

Finally, a case study of a child with ASD undergoing music therapy as form of CAM for six months period was conducted aimed to explore how music therapy can help children with ASD, to facilitate the discovery of musical abilities and how it can improve different areas of development, e.g., motor function, communication, social skills, and emotional expression.

Observational and Evaluation Procedures

To evaluate the effects of music therapy on the child with Autism Spectrum Disorder (ASD), systematic observational methods were applied throughout the intervention period. Observations focused on behavioral, communicative, emotional, social, and motor-related developmental indicators relevant to the therapeutic objectives of the case study.

The case study primarily aimed to provide an in-depth exploratory understanding of the potential supportive role of music therapy in ASD management rather than to establish causal relationships or generalizable clinical outcomes. Therefore, the findings should be interpreted within the contextual and exploratory nature of qualitative case study research. The primary observational domains included:

- verbal communication skills;
- non-verbal communication and eye contact;
- social interaction and engagement;

- emotional expression and emotional regulation;
- repetitive movements and stereotypical behaviors;
- attention span and concentration;
- behavioral flexibility and responsiveness;
- motor coordination and participation in therapeutic activities;
- memory and task recall abilities.

Observations were conducted during therapy sessions and documented regularly using descriptive field notes and reflective session records. Changes in the child's behavior and developmental functioning were evaluated longitudinally across the intervention process.

The observational assessments were based on:

- the frequency and intensity of repetitive behaviors;
- the child's responsiveness to musical interaction;
- participation in structured and unstructured therapeutic activities;
- verbal and non-verbal reactions during sessions;
- the child's level of emotional engagement and social responsiveness.
-

To enhance methodological credibility and triangulation, the observed developmental changes were evaluated from multiple perspectives, including:

- the music therapist conducting the intervention;
- the occupational therapist involved in the child's care;
- parental observations and feedback regarding behavioral changes observed outside therapy sessions.

Parental feedback was considered particularly valuable in assessing the transferability of therapeutic improvements to the child's daily environment and social functioning.

3.3.1 Case Scenario

Our case: KH was born in 2007 after a normal delivery with no complications. At the age of three, he could articulate whole sentences but exhibited problems in reciprocal communication of his emotions, atypical social behaviors, and repetitive gestures. He was diagnosed with ASD by a child neurologist after having been examined several times by a rehabilitation therapist and clinical psychologist. After the autism diagnosis, his parents decided to go to Jordan in 2018 to receive intervention therapy at the Autism Academy of Jordan, as it is one of the best centers in the region.

To estimate the severity of the child's autism, the Gilliam Autism Rating Scale—Third Edition (GARS-3) was used (Robinson, 2020). This scale can be used between ages 3 and 22 and provides four levels of probability of having ASD: level 0, with an Autism Index ≤ 54 , “unlikely”; level 1, with an Autism Index between 55 and 70, requiring “minimal support”; level 2, with an Autism

Index between 71 and 100, “very likely” and requiring substantial support; and level 3, with an Autism Index ≥ 101 , “very likely” and requiring very substantial support. KH’s initial assessment on the GARS-3 indicated a score of 68 at level one, signifying a need for minimal assistance in August 2018.

One month later, the occupational therapist at the facility noticed that KH consistently exhibited repetitive movements, which impeded his ability to accomplish various tasks. Interestingly, one of his repetitive movements observed by the occupational therapist during states of irritation, excitement, happiness, or sadness involves him moving his fingers up and down as if playing an imaginary piano. This caught the therapist’s attention, prompting a recommendation to purposefully utilize this movement for piano training and to initiate music therapy sessions. Before the initiation of the music therapy program, he had little interest in music during his developmental phases, as mentioned by his parents, and had no previous experience or exposure to musical training. Following an evaluation by the music therapist, KH was recommended music therapy sessions for six months. The established goals of the music therapy were controlling the repetitive movements and behavior. During the therapy, no additional complementary or alternative medicine practices were administered, and no new medications were added or removed from his therapy plan.

3.3.1.1 Music Therapy Sessions

The music therapy was received from September 2018 to February 2019 at the Autism Academy of Jordan, which is one of the leading centers in Jordan, established in 2004 as the first center dealing particularly with autism, supervised and implemented by a music therapist who has a bachelor’s degree in music therapy. KH and the therapist met once a day for twelve weeks, followed by twice a week for the next twelve weeks. A session lasted forty-five minutes. The music therapy room was equipped with a piano, keyboard, and various percussion instruments.

During the six months of therapy, no other complementary, alternative, or conventional therapies were added or removed from his therapeutic plan.

Session Structure

A session had three main parts, as follows: warm-up, piano activities, and cool down.

- Warm-Up (10–15 min): dependent on the case

The warm-up part consisted of simple finger exercises on the piano to build fine motor skills and the incorporation of familiar melodies to encourage KH’s participation and engagement.

- Piano Activities (25 min)

This part involved an improvisation section followed by song learning. During improvisation, KH was encouraged to improvise on the piano, exploring different sounds and rhythms. This allowed him to express himself without the pressure of structured music. During song learning, the therapist introduced simple songs, focusing on repetition and pattern recognition as it is the way KH is keen to learn. After KH learnt to play short melodies, the complexity gradually increased as he gained some confidence.

- Cool Down (10 min)

KH played soft, calming music on the piano while reflecting on the session during this part. This helped him regulate his emotions and provided a peaceful end to the activity.

4. Results

4.1 Results of the Quantitative study

4.1.2 Sociodemographic characteristics of the parents

A total of 142 parents of children with ASD were involved in the survey. The average age among fathers was 44.5 years (range: 23-67 years), and it was 38.8 years among mothers (range: 23-66 years). More than 60% of the parents had higher education level. The monthly income of most family was less than 500 \$ (Table 1).

4.1.3 Sociodemographic characteristics of the children with ASD

Most of the children were male, the average age of the patients was 8.4 years (range: 1-17 years). About 70% of them were between age of 5-14 years, and one fourth of them were between age 1-4 (Table 4). The average age of children at the time of diagnosis was 2.5 years (SD 1.1). The average number of siblings was 3. (SD 1.27).

Table 4: Demographic characteristics of parents and children with ASD

Sociodemographic data	N (%) (N=142)
Age of parents	
Father	
23-29	5 (3.5%)
30-39	34 (23.9%)
40-49	69 (48.6%)

≥50	31 (21.8%)
Dead father	3 (2.1%)
Mother	
23-29	14 (9.9%)
30-39	65 (45.8%)
40-49	53 (37.3%)
≥50	10 (7.0%)
Place of resident	
City	120 (84.5)
Village	22 (15.5)
Level of education of parents	
Father	
Primary school	17 (12.0%)
Secondary school	38 (26.8%)
Higher education	87 (61.3%)
Mother	
Primary school	10 (7.0%)
Secondary school	37 (26.1%)

Higher education	95 (66.9%)
Monthly family income	
≤500\$	55 (38.7%)
501-1000\$	23 (16.2%)
1001-1500\$	16 (11.3%)
≥1500\$	18 (12.7%)
I prefer no answer	30 (21.1%)
Number of siblings	
One child	19 (13.4%)
2-3	59 (41.5%)
>3	64 (45.0%)
Sex of child	
Male	117 (82.4%)
Female	25 (17.6%)
Age of children with ASD	
1-4 years	33 (23.2%)
5-9 years	49 (34.5%)
10-14 years	54 (38.0%)

>15 years	6 (4.2%)
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4.1.4 Clinical characteristics of children with ASD

The majority of children were diagnosed with autistic disorder (125; 88.0%). More than 40% of them were not able to talk. The most frequent comorbidity (77.5%) among children were attention deficit hyperactivity disorder (ADHD), and about one third of them suffer from feeding problems and sleep disturbances (Table 5).

Table 5: Clinical characteristics of children with ASD

Characteristics	N (%) Total N = 142
Diagnosis	
Autistic disorder	125 (88.0%)
Pathological demand disorder	8 (5.6%)
Asperger syndrome	7 (4.9%)
Other	2 (1.4%)
Child verbal ability	
Does not talk	58 (40.8%)
Uses single words	23 (16.2%)
Uses two- or three word phrases	27 (19.0%)
Uses sentence with four or more words or complex sentences	34 (24.0%)

Comorbidity	
ADHD (Attention deficit hyperactivity disorder)	110 (77.5%)
Feeding problems	51 (35.9%)
Sleep disturbances	44 (31.0%)
Epilepsy	10 (7.0%)

4.1.5 Parents' health literacy

44.4% of the parents' health literacy was inadequate, 24.5% was problematic and 28.2% was sufficient.

4.1.6 CAM use among children with ASD

A total of 88.7% of the parents used some forms of CAM for their children. The most commonly ever-used main CAM groups of therapies were the biological based therapies (75.4%) and the mind-body interventions (59.9%), while the multivitamins (71; 50.0%) and the holding therapy (58; 40.8%) were the most common used single therapies. We also have to mention that about 30% of the respondents used of honey, vitamin B6 and fish oil in the ever-used group (Table 6). Among the diets mainly the gluten free and low sugar diets were applied by the parents.

In the last 6 months the most frequently used therapies were the facilitated communication (21.1%), use of fish oil (12.7%) and the holding therapy (10.6%).

Table 6: CAM use and effectiveness of CAM modalities among children with ASD

	CAM use		Effectiveness of CAM use**		
	Used in the last 6 months N (%)	Ever used N (%)	Not effective N (%)	Neutral N (%)	Effective N (%)

Biologically based therapies	50 (35.2)	107 (75.4)			
Multivitamin	4 (2.8)	71 (50.0)	26 (38.8)	32 (47.8)	9 (13.4)
Honey	2 (1.4)	46 (32.4)	25 (58.1)	12 (27.9)	6 (14.0)
Vitamin B6	0 (0)	43 (30.3)	18 (45.0)	17 (42.5)	5 (12.5)
Fish oil	18 (12.7)	42 (29.6)	31 (55.4)	13 (23.2)	12 (21.4)
Dates	10 (7.0)	33 (23.2)	23 (56.1)	14 (34.1)	4 (9.8)
Almond	9 (6.3)	30 (21.1)	39 (100)	0	0
Algae and herbs	7 (4.9)	26 (18.3)	23 (74.2)	4 (12.9)	4 (12.9)
Vitamin B12	12 (8.5)	24 (16.9)	18 (48.6)	14 (37.8)	5 (13.5)
Diets (total)	20 (14.1)	32 (22.5)			
Gluten free	6 (4.2)	36 (25.4)	24 (58.5)	7 (17.1)	10 (24.4)
Low sugar	8 (5.6)	33 (23.2)	25 (62.5)	8 (20.0)	7 (17.5)
Egg free	4 (2.8)	32 (22.5)	21 (63.6)	11 (33.3)	1 (3.0)
Soy free	3 (2.1)	30 (21.1)	19 (61.3)	6 (19.4)	6 (19.4)
Casein free	8 (5.6)	29 (20.4)	25 (71.4)	5 (14.3)	5 (14.3)
Hyperbaric oxygen therapy	4 (2.8)	29 (20.4)	23 (74.2)	4 (12.9)	4 (12.9)
Chelation	8 (5.6)	26 (18.3)	22 (66.7)	3 (9.1)	8 (24.2)

Oxytocin therapy	8 (5.6)	16 (11.3)	20 (83.3)	2 (8.3)	2 (8.3)
Mind-body interventions	30 (21.1)	85 (59.9)			
Holding therapy	15 (10.6)	58 (40.8)	21 (30.0)	16 (22.9)	33 (47.1)
Pet therapy	6 (4.2)	39 (27.5)	16 (38.1)	14 (33.3)	12 (28.6)
Music therapy	8 (5.6)	29 (20.4)	20 (57.1)	8 (22.9)	7 (20.0)
Aroma therapy	2 (1.4)	28 (19.7)	16 (59.3)	4 (14.8)	7 (25.9)
Biofeedback	7 (4.9)	20 (14.1)	19 (73.1)	5 (19.2)	2 (7.7)
Alternative medical systems or complete systems of therapy/medicine	31 (21.8)	58 (40.9)			
Massage	6 (4.2)	31 (21.8)	19 (51.4)	8 (21.6)	10 (27.0)
Cupping	12 (8.5)	24 (16.9)	23 (65.7)	5 (14.3)	7 (20.0)
Acupuncture	4 (2.8)	23 (16.2)	23 (85.2)	2 (7.4)	2 (7.4)
Packing therapy*	7 (4.9)	22 (15.5)	14 (51.9)	5 (18.5)	8 (29.6)
Deep pressure	10 (7.0)	20 (14.1)	20 (74.1)	3 (11.1)	4 (14.8)
Acupressure	5 (3.5)	20 (14.1)	21 (84.0)	3 (12.0)	1 (4.0)
Homeopathy	9 (6.3)	17 (12.0)	20 (76.9)	2 (7.7)	4 (15.4)

Manipulative and body-based methods	39 (27.5)	66 (46.5)			
Sensory integration therapy	12 (8.5)	29 (20.4)	22 (53.7)	7 (17.1)	12 (29.3)
Facilitated communication	30 (21.1)	25 (17.6)	21 (39.6)	11 (20.8)	2 (39.6)
Osteopathy	8 (5.6)	19 (13.4)	19 (73.1)	4 (15.4)	3 (11.5)
Other		19 (13.4)			

*The total number of responds in this case was less than 142.

**Contains only those respondents who reported some effects of a given CAM method.

Holding therapy (47.1%) and facilitated communication (39.6%) were found to be the most effective therapies. However, most of CAM therapies were not effective according to the respondents. Less than 40% of respondents indicated that the holding therapy, pet therapy, facilitated communication and multivitamins were not effective for their ASD children.

We wanted to know why parents use CAM practices for their children with ASD. The most important reasons to use CAM for parents were the stress reduction that they have tried everything possible for their child (49; 35.5%) and to increase the quality of life of their children (45; 32.6%). About one third of the parents (40; 29.0%) selected the option “positive experiences recommended by many families”. More than one fifth of the parents reported that they wanted to decrease the side effects of medications (32; 23.2%), they were not certain, that conventional therapy alone can help (33; 23.9%) and it makes their feel satisfied that they have the ability to control their child health choices (29; 21.0%). Less, than 20% of the parents selected the options “I feel frustrated about my child very slow prognosis (18.1%). Only a small part of the respondents chosen “Some practices are scientifically proven due to effectiveness” (8.7%), and “To increase the effectiveness medical therapy “(5.8%).

4.1.7 Disclosure of CAM use

Majority of the parents (67.6%) disclosed all types or some types (successfully used) of CAM methods used for treatment of their children. When we asked if you did not inform the doctor about the CAM use what are the reasons for this one third of the parents (31.7%) reported that they have

never been asked about the use of CAM, therefore never talked to doctor about it, and another one third (28.2%) thought that the doctors have little knowledge about CAM. About 15% was afraid that the doctors do not approve it so it should be stopped (14.1%) or believed that this information is not important for the doctor to know (14.1%).

4.1.8 Information sources of CAM

Almost 60% of parents obtained information on CAM through social media (59.2%) and 30.3% of them got their knowledge from families who have children with autism. The other information sources were as follows: rehabilitation therapists (20.4%), friends (18.3%), doctors (16.9%) and TV/radio (7.7%).

4.1.9 Association between sociodemographic, medical factors, health literacy, quality of life of parents and CAM use

No association was found between the child age groups, education of mother and father and use of main types of CAM (Table 7). Only the male gender of the child found to be increased to use of alternative medical systems or complete systems of therapy (OR=4.05 [1.16-14.19]).

We have not found significant association between medicine use, side effects of medicine or the number of comorbidity and CAM use. The better verbal ability of child increased the chance to use some biologically based therapies (use short/complex sentences: OR=6.25 [1.34-29.16]), mind-body interventions (use short/complex sentences: OR=6.18 [1.92-19.92]) or manipulative and body-based methods (use single words or 2-3 word phrases: OR=6.02 [2.18-16.72]; use short/complex sentences: OR=14.85 [4.03-54.74]) compared to those children who do not talk. Sufficient health literacy rate showed a significant correlation with alternative medical systems or complete systems of therapy (OR=2.78 [1.08-7.17]).

Table 7: Binary logistic regression analysis of sociodemographic, medical variables, health literacy and quality of life of parents by main CAM groups (N=137)

CAM group	Factor	Level	Adjusted odds ratio [95% Confidence interval]	p-value
Biologically based therapies	Child gender	male/ <u>female</u>	0.91 [0.28-2.95]	0.881

	Child age groups	5-9/ <u>2-4</u>	1,29 [0.30-5.62]	0.733
		10-14/ <u>2-4</u>	0.71 [0.22-2.34]	0.574
		≥ 15 / <u>2-4</u>	N.C.	
	Education mother	High school/ <u>Primary education</u>	0.40 [0.05-3.50]	0.410
		Higher education/ <u>Primary education</u>	0.66 [0.08-5.65]	0.706
	Education father	High school/ <u>Primary education</u>	2.30 [0.44-11.97]	0.324
		Higher education/ <u>Primary education</u>	1.06 [0.20-5.69]	0.946
	Medicine use	Used/ <u>Never used</u>	1.97 [0.61-6.38]	0.458
	Side effects of medicine	Yes/ <u>No</u>	1.05 [0.31-3.57]	0.942
	Comorbidity	≥ 2 / <u>0 or 1</u>	0.52 [0.20-1.36]	0.183
	Verbal ability	Use single word or 2-3 word phrases/ <u>Do not talk</u>	1.25 [0.48-3.26]	0.649
		Use short/complex sentences/ <u>Do not talk</u>	6.25 [1.34-29.16]	0.02
	Health literacy	Problematic/ <u>Inadequate</u>	0.76 [0.25-2.37]	0.639

		Sufficient/ <u>Inadequate</u>	0.84 [0.29-2.47]	0.757
Mind-body interventions	Child gender	male/ <u>female</u>	1.10 [0.39-3.07]	0.856
	Child age groups	5-9/ <u>2-4</u>	1.55 [0.54-4.48]	0.415
		10-14/ <u>2-4</u>	1.14 [0.39-3.40]	0.807
		≥ 15 / <u>2-4</u>	0.37 [0.05-2.57]	0.318
	Education mother	High school/ <u>Primary education</u>	1.58 [0.27-10.37]	0.576
		Higher education/ <u>Primary education</u>	2.48 [0.42-14.85]	0.319
	Education father	High school/ <u>Primary education</u>	1.29 [0.29-5.62]	0.740
		Higher education/ <u>Primary education</u>	1.18 [0.26-5.44]	0.829
	Medicine use	Used/ <u>Never used</u>	1.13 [0.41-3.17]	0.812
	Side effects of medicine	Yes/ <u>No</u>	1.80 [0.61-5.28]	0.284
	Comorbidity	≥ 2 / <u>0 or 1</u>	1.34 [0.58-3.09]	0.50
	Verbal ability	Use single words or 2-3 word phrases/ <u>Do not talk</u>	2.41 [1.00-5.85]	0.051

		Use short/complex sentences/ <u>Do not talk</u>	6.18 [1.92-19.92]	0.002
	Health literacy	Problematic/ <u>Inadequate</u>	1.85 [0.67-5.18]	0.244
		Sufficient/ <u>Inadequate</u>	0.84 [0.33-2.14]	0.712
Alternative medical systems or complete systems of therapy and practice	Child gender	male/ <u>female</u>	4.05 [1.16-14.19]	0.028
	Child age groups	5-9/ <u>2-4</u>	1.05 [0.33-3.35]	0.932
		10-14/ <u>2-4</u>	1.96 [0.60-6.36]	0.264
		≥ 15 / <u>2-4</u>	4.37 [0.55-34.82]	0.163
	Education mother	High school/ <u>Primary education</u>	3.55 [0.45-27.98]	0.230
		Higher education/ <u>Primary education</u>	4.22 [0.54-32.98]	0.170
	Education father	High school/ <u>Primary education</u>	0.97 [0.20-4.64]	0.974
		Higher education/ <u>Primary education</u>	0.62 [0.12-3.09]	0.559
	Medicine use	Used/ <u>Never used</u>	1.98 [0.69-5.64]	0.201

	Side effects of medicine	Yes/ <u>No</u>	1.29 [0.42-3.98]	0.655
	Comorbidity	$\geq 2/0$ or <u>1</u>	0.98 [0.40-2.39]	0.961
	Verbal ability	Use single words or 2-3 word phrases/ <u>Do not talk</u>	1.84 [0.72-4.74]	0.206
		Use short/complex sentences/ <u>Do not talk</u>	1.76 [0.58-5.40]	0.320
	Health literacy	Problematic/ <u>Inadequate</u>	1.64 [0.56-4.84]	0.371
		Sufficient/ <u>Inadequate</u>	2.78 [1.08-7.17]	0.035
Manipulative and body-based methods	Child gender	male/ <u>female</u>	1.92 [0.57-6.44]	0.293
	Child age groups	5-9/ <u>2-4</u>	1.43 [0.44-4.62]	0.448
		10-14/ <u>2-4</u>	1.11 [0.34-3.63]	0.860
		$\geq 15/2-4$	4.68 [0.34-65.03]	0.250
	Education mother	High school/ <u>Primary education</u>	2.0 [0.28-14.59]	0.492
		Higher education/ <u>Primary education</u>	6.20 [0.82-45.85]	0.076
	Education father	High school/ <u>Primary education</u>	0.41 [0.08-2.05]	0.275

		Higher education/ <u>Primary education</u>	0.35 [0.07-1.91]	0.228
	Medicine use	Used/ <u>Never used</u>	1.06 [0.34-3.32]	0.925
	Side effects of medicine	Yes/ <u>No</u>	1.93 [0.57-6.53]	0.289
	Comorbidity	$\geq 2/0$ or <u>1</u>	1.21 [0.50-2.95]	0.667
	Verbal ability	Use single words or 2-3 word phrases/ <u>Do not talk</u>	6.02 [2.17-16.72]	0.001
		Use short/complex sentences/ <u>Do not talk</u>	14.85 [4.03-54.74]	<0.001
	Health literacy	Problematic/ <u>Inadequate</u>	2..91 [0.93-9.08]	0.065
		Sufficient/ <u>Inadequate</u>	1.59 [0.58-4.32]	0.364

N.C. – not calculated due to all respondents belonged the same category

Reference groups are underlined. Significant differences were bold.

4.2 Results of the Qualitative Study

4.2.1 Sociodemographic Characteristics of the Sample

A total of twenty mothers of children diagnosed with ASD participated in the study. Their interviews were analyzed using NVivo 12. Mothers' ages ranged from 31 to 56 years, with a mean age of 41.6 years (SD = 6.73). Most participants were married (n = 19), and most had attained tertiary education (n = 13). Household income levels varied across the sample, with most families reporting an average income, while a smaller proportion reported low- or high-income level.

The children with ASD ranged in age from 3 to 18 years (mean = 11.1 years, SD = 5.05), with a mean age at diagnosis of 2.4 years (SD = 0.80). Mothers described their children's conditions using

terms such as “on the spectrum,” “moderate,” or “severe autism,” reflecting both clinical understanding and subjective interpretation of symptom severity. Several mothers reported comorbid conditions, including gastrointestinal disturbances, sleep disorders, sensory sensitivities, and epilepsy, which frequently influenced their decisions to seek CAM therapies.

4.2.2 Patterns of CAM Use and Disclosure to Healthcare Professionals

All participating mothers reported using at least one form of CAM for their child with ASD. CAM practices ranged from commonly used home-based remedies (e.g., dates, olive oil, honey, black seed, food supplements, and vitamins) to less frequently used or specialized approaches, such as camel milk, donkey milk, reishi mushroom, oxygen therapy, cupping (Hujama), royal jelly, jaw deep manipulation, Sabkha application, and the Andalosiah program—a regional holistic approach emphasizing sensory connection with nature, physical affection, and reduced exposure to electronic devices.

CAM use was deeply embedded in cultural, religious, and familial contexts, particularly for remedies perceived as “natural” or mentioned in religious texts. Dates and olive oil were universally used by all mothers, while honey and dietary supplements were also highly prevalent.

Despite widespread CAM use, most mothers (86%, $n = 18$) reported not disclosing CAM use to their child’s healthcare providers. Instead, mothers primarily relied on internet searches, social media platforms, and peer networks as information sources. NVivo word-frequency analysis identified terms such as “Google,” “Facebook,” “group,” “natural,” “improve,” and “hope” as among the most frequently occurring words, underscoring the central role of online communities in shaping CAM-related decision-making.

The financial cost of CAM varied substantially. While some practices were inexpensive and readily available within households, others required significant financial investment, including travel, imported products, or long-term use of supplements.

4.2.3 Thematic Findings from Qualitative Analysis

Thematic analysis yielded three overarching themes, each comprising multiple subthemes that captured mothers’ lived experiences, motivations, and challenges related to CAM use:

- 1. Mothers’ Lived Experiences with CAM—Perceptions of Benefit and Meaning**
- 2. Navigating Information and Decision-Making: Sources of CAM Knowledge**
- 3. Challenges and Barriers in CAM Use**

4.2.3.1 Theme 1:

Mothers’ Lived Experiences with CAM—Perceptions of Benefit and Meaning

This theme reflects how mothers evaluated CAM therapies not only in terms of observable child outcomes but also through emotional, spiritual, and symbolic meanings. NVivo analysis revealed frequent references to “natural,” “safe,” “trust,” and “benefit.”

Subtheme 1.1: CAM Believed as Safe and Natural Therapeutic Option Based on Religious Tradition

Many mothers described CAM as gentle, natural, and spiritually reassuring, often contrasting these approaches with pharmacological treatments perceived as “chemical” or potentially harmful. Remedies rooted in religious tradition were particularly valued, as they provided a sense of moral and spiritual safety.

“Anything from nature can’t hurt him. Honey and black seeds are from the Prophet’s medicine, so I feel safe using them.”

(Mother 7)

Some mothers reported perceived improvements in sleep, behavior, or gastrointestinal symptoms, even when these changes were described as modest. Importantly, even minimal improvements were experienced as meaningful, reinforcing hope and emotional resilience.

“When I gave him camel milk, I saw small changes—he started sleeping better. Maybe it’s not a miracle, but it gave me hope.”

(Mother 11)

Several mothers acknowledged the complexity of attributing outcomes directly to CAM use, noting that factors such as child age, severity of ASD, comorbidities, duration of use, and concurrent therapies could influence outcomes. One mother described systematically documenting her child’s response to camel milk, illustrating parents’ attempts to independently evaluate effectiveness.

Subtheme 1.2: Internal Motivation to Do More for Their Children

Although many mothers of ASD children believed in natural products, uncertainty regarding the effectivity of these therapies was also evident. Some mothers continued CAM use despite inconsistent or unclear outcomes, driven by a sense of obligation to “keep trying.” This theme thus reflects a tension between faith-driven optimism and experiential doubt, with hope serving as a powerful motivator for continued CAM use.

“Sometimes I don’t see change, but I cannot stop. I feel I must keep trying until I see any improvement.”

(Mother 3)

4.2.3.2 Theme 2: Navigating Information and Decision-Making: Sources of CAM

This theme highlights mothers' active but largely unsupported information-seeking processes. Most mothers relied on social media platforms, online forums, and peer recommendations, often due to limited access to reliable, evidence-based Arabic-language resources.

"I learned most things from other mothers online—Facebook groups and WhatsApp."

(Mother 10)

Although the internet was perceived as a valuable resource, it was also described as a confusing and overwhelming information mining possibility.

"The internet has everything, but everyone says something different. I'm afraid to try something not proven."

(Mother 4)

Subtheme 2.1: Seeking Symptom-Specific Solutions

ASD is accompanied by a number of physical and mental symptoms. Mothers frequently sought CAM to address specific challenges such as sleep disturbances, hyperactivity, feeding difficulties, or gastrointestinal symptoms.

"I just want my child to sleep well so both of us can function. I tried anything natural that might calm him."

(Mother 6)

Many participants expressed a strong desire for trusted, centralized sources of CAM information, emphasizing the need for guidance that integrates parental experiences with professional oversight. Despite this need, communication with healthcare professionals was limited, because the participants felt that the doctors did not support the use of CAM methods. The NVivo matrix coding revealed a negative association between CAM use and disclosure to physicians.

"Doctors don't support these methods. They say it's not proven, so I keep it to myself."

(Mother 9)

Subtheme 2.2: Education levels and seeking information

Mothers with higher education levels tended to cross-check multiple sources, while others relied heavily on anecdotal advice from relatives or peers. Participants emphasized that healthcare professionals' lack of CAM knowledge contributed to parents' reliance on informal networks.

4.2.3.3 Theme 3: Challenges and Barriers in CAM Use

This theme captured the main challenges and barriers (e.g., financial, emotional, cultural, and ethical burdens) associated with CAM use. The mothers who want to use one or more forms of

CAM for their ASD children have to face several challenges and barriers. NVivo sentiment analysis indicated that this theme contained the highest concentration of negative emotional expressions, including fear, guilt, and exhaustion.

Subtheme 3.1: Financial and Logistical Burden

Some CAM therapies imposed significant financial strain, particularly when involving travel or long-term dietary interventions.

“We spent so much on diets, supplements, and travel. It’s draining.”

(Mother 5)

Families with limited financial resources tended to rely on home-based remedies, whereas higher-income families were more likely to pursue specialized or imported therapies.

Subtheme 3.2: Emotional Strain, Pressure, and Uncertainty

Mothers described feeling overwhelmed by competing advice from family members, cultural expectations, and social pressures. Some mothers also reported confusion and emotional distress immediately following diagnosis, which intensified their vulnerability to unverified CAM claims.

“They forced me to try a therapy for my son without consulting a doctor. I didn’t feel I had the right to say no.”

(Mother 14)

Subtheme 3.3: Fear of Harm and Responsibility

While mothers actively sought CAM to alleviate symptoms, many expressed fears of causing harm or interfering with conventional treatments. This fear reinforced mothers’ desire for professional guidance and underscored the ethical responsibility they felt toward their children and other families.

“If something works for my child, I can’t recommend it to others. Every child reacts differently, and I’m afraid to cause harm.” (Mother 8)

4.3 Results of the Case study

4.3.1 Progress Monitoring and Outcomes

Noticeable improvements were experienced by the music and occupational therapists as well as his parents during and after the end of the planned therapy sessions. His progression on social interaction, verbal and nonverbal communication, emotional regulation, behavior, motor skills, and memory are summarized in Table 8 and Figure 2.

Table 8: Improvement experienced by the therapists and the parents

Area of Improvement	Music Therapist's Perspective	Occupational Therapist's Perspective	Parents' Perspective
Social Interaction	Increased ability to maintain eye contact during music sessions and engaged with the therapist in reciprocal music activities. By week 6, KH started engaging more with the therapist, sharing his thoughts about what to start with or what we play next.	Improved tolerance for being around other children during group gross motor activities, with reduced stress or anxiety in social settings while playing piano in the public events.	Child initiates greetings and small interactions at family gatherings more frequently with less stressful reactions.
Emotional Regulation	Increasing capacity to correctly link minor melodies with feelings of sorrow and major melodies with sentiments of joy. Shows calming responses to slow-paced music, reducing instances of agitation during therapy; appears more relaxed post-session.	Exhibits a longer calming reaction in tasks that previously triggered frustration; in addition to less frequent reacting impulsively.	Seems less prone to be stressed or agitated at home and can follow a bedtime routine with fewer emotional setbacks by listening to soft piano music.
Nonverbal Communication	More frequent use of gestures (e.g., pointing to instruments or nodding) to express choices, indicating a desire to	Improved understanding of nonverbal cues, when the therapist pretend being distracted or crying; by tapping	More expressive gestures and subtle actions (like little jump) as indicators of happiness.

	communicate without assistance.	on the table or on the therapist laps, increased use of hand signals as simple gestures asking for something like having more treats.	
Verbal Communication	Starts to use simple expressions related to music and initiated verbal exchanges during sessions. Participates in vocal exercises and attempts with occasional use of short, starting letters of words like "more."	Begins using short sounds phrases during activities that involve both speech and movement; like putting colored balls in same color baskets with minimal assistance.	Tries to use words to request favorite activities, like saying "play" when he sees the piano at home.
Behavioral Adaptability	Shows increased patience by waiting turns in mutual music activities, with music cues helping signal when to start and stop.	Greater ability to transition between tasks with minimal agitation; less irritation during hard tasks, follows simple routines when prepared in advance. Ability to participate in public event and playing piano as part of the ceremony with confident.	Parents report a smoother morning routine at home, with fewer difficulties transitioning from one activity to another, better sleep routine after combining the piano music as a bed time ritual.
Motor Skills	Engages with various music instruments, showing precise movement between piano keys with normal pressure needed. Finger dexterity and coordination on the	More able to accomplish tasks such as, buttoning, brushing teeth, tying his shoes with less repetitive finger movement combined with tolerance of minor	Less repetitive movements which affect his eating manners with the spoon stays in his hand without dropping the food with less verbal cues.

	piano enhanced, enabling him to play simple melodies with increased ease by week 10.	discomforts during complex motor tasks.	
Memory	Ability to memorize piano pieces, remember musical patterns, rhythms, and melodies, visual symbols and patterns.	In card memorizing activities, KH became able to memorize up to 6 matching cards out of 10 without verbal cues from the therapist.	No memory difference was mentioned by the parents.

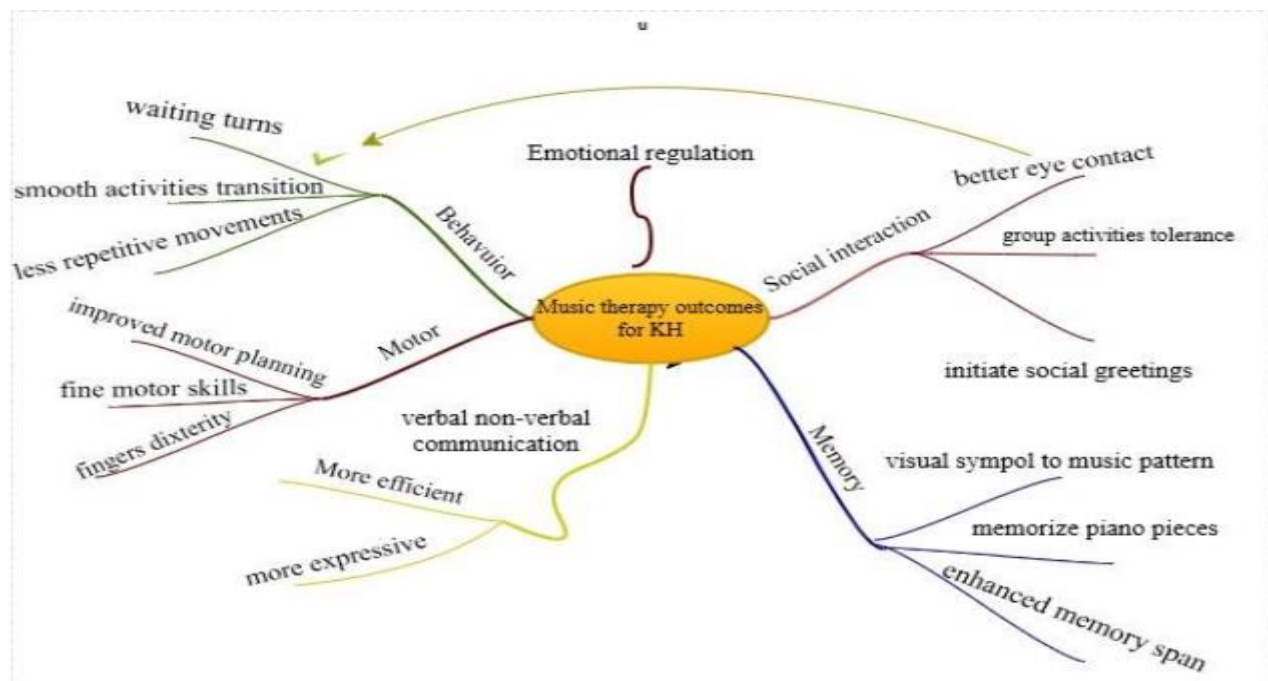


Figure 2: General psycho-social and cognitive outcomes of a child with ASD after six months of music therapy

After the first three months of piano-focused music therapy, KH showed marked improvements in communication, social skills, emotional regulation, and behavioral adaptability. He became more vocal about his feelings and developed a deeper connection with the therapist through shared musical experiences. KH's parents reported that he began exploring the piano at home, treating it

as a close friend, where he could express his emotions without fear and often played pieces he had learned during therapy.

By the end of the six months of extensive therapy, KH exhibited musical acuity, showcasing the capacity to perceive pitch, rhythm, and tone. He is now able to engage in the facility's scheduled activities; he plays the piano with assurance and performs significantly better than what is typically expected from an autistic child in a public setting. KH's latent potential was significantly augmented during the music therapy sessions, profoundly influencing the quality of life for both KH and his parents. Furthermore, the sense of accomplishment derived from KH's participation in the Autism Academy's programs and events fosters pride in his parents and bolsters their confidence in his future opportunities.

While our case study provides valuable insight into the practical application of a complementary intervention, the observed improvements cannot be attributed exclusively to music therapy. Developmental maturation, concurrent therapeutic interventions, parental expectations, therapist interpretation, and environmental influences may also have contributed to the observed changes. Consequently, the findings should be interpreted as illustrative rather than evidence of treatment effectiveness.

5. Discussion

5.1 Discussion

This dissertation employed a mixed methods design to generate a comprehensive and clinically meaningful understanding of CAM use among families of children with ASD in Arabic countries. By integrating evidence from a multi-country quantitative survey ($n = 142$), in-depth qualitative interviews with mothers ($n = 20$), and an illustrative clinical case study focusing on music therapy, the findings collectively illuminate patterns of CAM utilization, parental motivations and decision-making processes, and perceived child- and family-level outcomes. Together, these three studies provide convergent evidence that CAM use is highly prevalent, deeply embedded in sociocultural and emotional contexts, and—when applied in selected, structured forms—may contribute to improvements in quality of life and functional engagement.

The quantitative findings demonstrated an exceptionally high prevalence of CAM use, with nearly 90% of parents reporting the use of at least one CAM modality for their child with ASD. This rate exceeds those reported in many international studies, where prevalence typically ranges around 50% (Höfer et al., 2016; Wong, 2008), suggesting that CAM occupies a particularly prominent role within healthcare-seeking behaviors in Arabic contexts. Biologically based therapies, especially dietary supplements such as multivitamins, fish oil, honey, and special diets, emerged as the most frequently used interventions (Serafim et al., 2025). This pattern is consistent with prior research indicating that nutritional and supplement-based approaches are among the most accessible and widely adopted CAM therapies for ASD (Khalifa et al., 2023b), reflecting both cultural familiarity and parental perceptions of safety.

A particularly notable quantitative finding was the high utilization of holding therapy, reported by over 40% of parents and perceived as one of the most effective CAM interventions, alongside facilitated communication. This prevalence is substantially higher than that reported in many Western studies and appears to reflect regional professional practices, where occupational therapists commonly integrate holding therapy into routine care. Similar findings have been reported in the United Arab Emirates, underscoring the influence of service availability and practitioner endorsement on parental CAM choices (Alrowais & Alyousefi, 2016). Importantly, families whose children received more intensive conventional therapies were also more likely to use CAM, suggesting that CAM is primarily employed as a complementary rather than substitutive strategy—a pattern consistently observed in ASD research (Pitcher et al., 2023).

Parental motivations for CAM use, identified quantitatively and expanded through qualitative interviews, were multifaceted and closely tied to the lived realities of raising a child with ASD. Parents commonly cited goals such as reducing stress, improving their child's quality of life, minimizing medication side effects, and addressing unmet needs after exhausting conventional treatment options. These motivations reflect the chronic, complex, and often uncertain nature of ASD management, particularly in the absence of a definitive cure. The burden of comorbidities, behavioral challenges, and long-term caregiving demands further amplifies parental openness to exploring alternative and complementary interventions (Smith et al., 2020).

Despite limited empirical support for many CAM modalities, parents frequently perceived biologically based therapies—especially supplements—as relatively low-risk. This pragmatic risk–benefit assessment, also reported in earlier studies (Mortada, 2024), highlights a critical clinical gap: families may prioritize perceived safety and hope over scientific evidence when navigating treatment decisions. These findings reinforce the need for healthcare professionals to engage proactively with families, offering balanced, evidence-informed guidance that addresses both potential benefits and risks, including interactions with conventional treatments (Hume et al., 2022).

Information-seeking behaviors further contextualize these decisions. Although the study sample was relatively well educated, fewer than 20% of parents identified physicians as their primary source of CAM information. Instead, social media platforms and internet-based resources dominated, mirroring international trends in ASD caregiving (Doherty et al., 2024). While these platforms provide emotional support and shared experiential knowledge, they also increase exposure to misinformation and unverified therapeutic claims. Notably, although over two-thirds of parents disclosed CAM use to their child's physician, approximately one-third reported that clinicians had never initiated discussions about CAM. This communication gap underscores the need for clinicians to routinely and nonjudgmentally inquire about CAM use, particularly in regions where such practices are culturally normative (Gosling et al., 2025).

Health literacy emerged as a more meaningful determinant of CAM use than formal education level. While education was not significantly associated with CAM utilization—likely due to the homogeneity of the sample—parents with higher health literacy were more inclined to use alternative or complete medical systems. This finding aligns with prior research linking health

literacy to CAM engagement in chronic conditions (Barnes et al., 2018; Weinert et al., 2020), and suggests that effective clinical communication must be tailored not merely to educational attainment but to parents' ability to access, interpret, and apply health information.

Child-related factors also influenced CAM use; Consistent with previous research, CAM utilization was not significantly associated with child age or sex, with the exception that alternative medical systems were more frequently used among parents of male children (Lindly et al., 2017; Ong, 2019).

The qualitative interviews deepened these findings by capturing mothers' lived experiences, emotional responses, and contextual decision-making processes. Three interrelated themes emerged: perceived benefits and lived experiences with CAM, sources of knowledge and decision-making, and challenges associated with selecting and implementing CAM interventions. Mothers frequently described CAM use as driven by hope, faith, and a desire to fulfill their caregiving responsibilities. Religiously grounded practices—such as honey, black seed, olive oil, and cupping (Hujama)—were particularly prominent and culturally legitimized, aligning with findings from Masri et al. (2019), who emphasized the role of religious identity in shaping CAM use across Arabic societies.

At the same time, mothers' narratives revealed significant emotional ambivalence. While “natural” therapies were often perceived as safer alternatives to pharmacological treatments [26], mothers also expressed anxiety, guilt, and fear of making harmful decisions. This emotional duality highlights the psychological burden borne by mothers as primary caregivers and treatment decision-makers. Reliance on informal information sources was especially pronounced among mothers with lower health literacy, increasing vulnerability to misinformation and unequal exposure to risk (Onur & Muslu, 2025).

Socioeconomic status further shaped CAM selection. Families with limited financial resources tended to rely on traditional, community-based practices perceived as affordable and accessible, whereas families with higher socioeconomic status were more likely to pursue structured, commercially available CAM modalities. Although culturally embedded practices such as cupping are widely accepted, their normalization may reduce critical evaluation of safety and clinical appropriateness, particularly for children with neurodevelopmental disorders (Smith et al., 2020c).

The case study of KH provides clinically grounded insight into how a specific CAM modality—music therapy—can influence multiple domains of functioning in a child with ASD. KH demonstrated improvements in social engagement, behavioral regulation, motor coordination, and participation in daily activities. Importantly, his developing identity as a pianist enabled meaningful social participation, contributing to parental pride and enhanced family well-being. These outcomes align with neuroscientific evidence showing that music activates widespread cortical networks involved in emotion, motor planning, attention, and social cognition (Zhou et al., 2025). Music-based interventions have also been shown to support cognitive processing and facilitate gains in complementary therapies such as speech and occupational therapy (Raja et al., 2025).

KH's response to music therapy is further supported by theoretical models of enhanced perceptual functioning and empathizing–systemizing, which propose that individuals with ASD may demonstrate strengths in structured, rule-based systems such as music (Zarhin & Asher, 2024). Similar cases in the literature document associations between autism, systematization, and exceptional musical abilities (Situmorang, 2025). While such outcomes may reflect both innate predispositions and intensive practice, this case underscores the clinical value of individualized, strength-based CAM interventions when integrated within a broader therapeutic framework (Wu, 2025).

Integration of Quantitative and Qualitative Findings

The mixed-methods design employed in this dissertation enabled a comprehensive understanding of complementary and alternative medicine (CAM) use among families of children with Autism Spectrum Disorder (ASD) in Arab countries. The integration of quantitative and qualitative findings revealed several important patterns that would not have been fully captured through a single methodological approach.

The quantitative findings demonstrated that CAM use was highly prevalent among participating families and was associated with several parental and child-related factors, particularly health literacy. Notably, health literacy emerged as a more influential predictor of CAM use than formal educational attainment. This finding suggests that parents' ability to access, evaluate, and interpret health-related information may play a more important role in therapeutic decision-making than educational qualifications alone.

The qualitative findings provided deeper insight into the mechanisms underlying these quantitative associations. Mothers frequently described an ongoing search for interventions that might improve their child's functioning, particularly when conventional therapies were perceived as insufficient to address all developmental and behavioral challenges. Many participants viewed CAM as an additional opportunity to support their child's development rather than as a replacement for conventional medical care.

The interview data further revealed that CAM-related decision-making was strongly influenced by social networks, family recommendations, online communities, and social media platforms. These findings help explain why healthcare professionals were not the primary source of information for many participants. The qualitative narratives highlighted a communication gap between families and healthcare providers, which may contribute to parents seeking information from alternative sources.

An important theme emerging from the interviews was the perception that many CAM therapies were considered "natural" and therefore inherently safer than pharmacological interventions. This perception appeared to be influenced not only by personal beliefs but also by cultural and religious values embedded within the social context of Arab countries. These findings demonstrate the

importance of considering cultural factors when discussing CAM use and designing family-centered interventions.

The qualitative findings also highlighted several challenges associated with CAM use, including financial burden, uncertainty regarding effectiveness, difficulties accessing reliable information, and emotional pressure experienced by parents. These experiences provide important context for understanding the quantitative patterns of CAM utilization and illustrate the complexity of therapeutic decision-making among families raising children with ASD.

Overall, the integration of quantitative and qualitative findings suggests that CAM use among families of children with ASD is a multifaceted phenomenon influenced by health literacy, cultural beliefs, parental experiences, information accessibility, and perceptions of conventional healthcare services. These findings reinforce the need for healthcare professionals to engage in open, evidence-based discussions with families regarding CAM therapies and to support informed decision-making through accessible and reliable health information.

Answers to the Research Questions

The findings of this dissertation provide clear answers to the proposed research questions.

1. CAM use was highly prevalent among parents of children with ASD in the selected Arab countries.
2. Nutritional approaches, dietary supplements, and other biologically based therapies were among the most frequently used CAM modalities.
3. Several parental and child-related factors were associated with CAM use, with health literacy emerging as one of the strongest predictors.
4. Parents primarily utilized CAM therapies as complementary approaches alongside conventional medical and rehabilitation services rather than as replacements.
5. Decision-making regarding CAM use was strongly influenced by social networks, digital information sources, and parental experiences.
6. Parents reported both perceived benefits and substantial challenges related to CAM use, including financial costs, uncertainty regarding effectiveness, and limited access to evidence-based information.
7. The qualitative findings demonstrated that cultural values, religious beliefs, emotional factors, and parental hope significantly influenced CAM-related decisions.
8. The case study findings suggest that music therapy may contribute positively to selected developmental and psychosocial outcomes; however, further research involving larger samples is required before general conclusions can be drawn.

6. Summary

This dissertation employed a mixed-methods design to provide a comprehensive and clinically relevant understanding of (CAM) use among families of children with (ASD) in Arabic countries. By integrating findings from a multicountry quantitative survey ($n = 142$), qualitative interviews with mothers ($n = 20$), and an illustrative case study focusing on music therapy, the research offers a multidimensional perspective on the prevalence, determinants, lived experiences, and perceived outcomes of CAM use within a culturally specific context. Collectively, the findings indicate that CAM use is highly prevalent, strongly shaped by sociocultural and emotional factors, and, in selected structured forms, may contribute to improvements in child functioning and family quality of life.

The quantitative component demonstrated a remarkably high prevalence of CAM use, with nearly 90% of parents reporting engagement with at least one CAM modality. Biologically based therapies, particularly dietary supplements and special diets, were the most frequently utilized interventions, reflecting cultural familiarity, accessibility, and perceptions of safety. Holding therapy was also widely reported, suggesting the influence of regional professional practices and service availability. Importantly, CAM was most often used alongside conventional interventions rather than as a substitute, indicating a complementary approach to ASD management. Parents' motivations included the desire to improve their child's functioning, reduce stress, minimize medication-related concerns, and address unmet therapeutic needs. However, findings also highlighted a reliance on perceived safety and hope in treatment decision-making, often in the absence of strong empirical evidence.

Information-seeking patterns revealed a substantial dependence on social media and internet-based sources, while physicians were infrequently identified as primary sources of CAM information. Although many parents disclosed CAM use to healthcare providers, a considerable proportion reported that clinicians did not initiate discussions, underscoring a significant communication gap in clinical practice. Health literacy emerged as a key determinant of CAM utilization, exceeding formal education level in predictive importance, suggesting that parents' capacity to access, interpret, and apply health information plays a central role in treatment decisions. Child-related characteristics showed limited association with CAM use, with few significant demographic differences observed.

The qualitative findings enriched these results by illuminating the emotional, cultural, and contextual dimensions of parental decision-making. Mothers described CAM use as a proactive, hope-driven strategy influenced by cultural and religious values and a strong sense of caregiving responsibility. Practices rooted in religious tradition were widely accepted and integrated into everyday care. Nevertheless, mothers also expressed uncertainty, fear of causing harm, and emotional burden, reflecting the complexity of decision-making in the context of limited clear guidance. Socioeconomic factors further influenced CAM selection, with lower-income families tending toward traditional and community-based practices and higher-income families more often accessing structured, commercially available interventions.

The case study provided clinically grounded insight into the potential benefits of a specific CAM modality—music therapy—demonstrating improvements in social engagement, emotional regulation, motor skills, and participation in daily activities, alongside positive effects on family well-being. Although not generalizable, the case highlights the potential value of individualized, strength-based CAM interventions when implemented within a structured and therapeutically integrated framework.

Overall, this dissertation demonstrates that CAM use in ASD within Arabic countries represents a complex phenomenon shaped by cultural norms, emotional motivations, health literacy, and systemic gaps in service provision and clinical communication. The findings underscore the need for culturally sensitive clinical engagement, improved professional training, and accessible evidence-based resources to support safe and informed decision-making. Limitations include reliance on self-reported data, potential selection bias, relatively small and region-specific samples, and the absence of controlled longitudinal designs, which restrict causal conclusions regarding efficacy and safety. Reflexive methodological practices were employed to enhance transparency and minimize potential researcher bias.

Future research should prioritize large-scale, longitudinal, and interdisciplinary studies, including randomized controlled trials, to evaluate the clinical and psychosocial outcomes of CAM interventions in ASD. Strengthening research infrastructure, fostering international collaboration, and developing standardized, culturally responsive evaluation frameworks will be essential to advancing ethical and evidence-informed integration of CAM within autism care.

6.1 Limitation of the Research

Several limitations should be considered when interpreting the findings. The study relied primarily on self-reported data, which may be subject to recall and social desirability bias. Recruitment through autism centers and voluntary participation may have introduced selection bias, potentially overestimating CAM use and limiting generalizability to the wider ASD population. Sample sizes, although adequate for exploratory analysis, remain relatively small and region-specific, reflecting broader challenges in CAM research within Arabic countries, including limited funding, infrastructure, and standardized research frameworks.

Cultural beliefs and social stigma surrounding autism and CAM may have influenced both participation and disclosure, further complicating data interpretation. Additionally, the diversity of CAM modalities and heterogeneity of ASD presentations limit direct comparison across interventions. The lack of controlled or longitudinal designs restricts conclusions regarding efficacy and safety. Despite these limitations, the mixed-methods, multicountry approach provides valuable contextual insight and highlights priorities for future rigorous, evidence-based research.

6.2 Critical Reflexivity

This study acknowledges the importance of reflexivity, particularly given the cultural, emotional, and clinical complexity surrounding CAM use in ASD. The researcher's background in occupational therapy and experience working with children with ASD may have influenced study design, participant engagement, and interpretation of findings. While this clinical perspective facilitated contextual understanding and rapport with participants, efforts were made to minimize bias through cautious interpretation of self-reported outcomes, reflexive analysis, and triangulation across quantitative, qualitative, and case study components. Perceived benefits reported by parents were interpreted as subjective experiences rather than clinically validated effects. Cultural reflexivity was also maintained to ensure that CAM practices were examined within their sociocultural context without compromising scientific neutrality. The case study was presented as illustrative rather than generalizable. Collectively, these measures aimed to enhance the transparency, credibility, and trustworthiness of the findings.

6.3 Practical Implications and Recommendations

Undoubtedly, the research on CAM requires additional thorough investigation through large-scale, randomized controlled trials to assess the effectiveness and safety of different CAM modalities and practices. Furthermore, it is crucial to allocate resources towards creating dedicated autistic research centers in Arabic nations. Additionally, it is necessary to gain government support, foster international collaborations, and establish partnerships with business organizations in order to commit increased funding and resources towards autism research.

The findings of this dissertation have also important implications for healthcare professionals, rehabilitation specialists, policymakers, and public health practitioners involved in the care of children with Autism Spectrum Disorder (ASD).

Recommendations for Healthcare Professionals

Healthcare professionals should actively and routinely discuss complementary and alternative medicine (CAM) use with parents of children with ASD in a non-judgmental and culturally sensitive manner. Open communication may reduce the likelihood of undisclosed CAM use and promote informed decision-making. Professionals should provide evidence-based information regarding the potential benefits, limitations, and risks of CAM therapies while respecting parental values, beliefs, and cultural backgrounds.

Given that many parents obtain CAM-related information from social media, family networks, and informal sources, healthcare professionals should assist families in identifying reliable and scientifically credible information resources.

Recommendations for Rehabilitation Specialists

Occupational therapists, speech and language therapists, psychologists, behavioral therapists, and other rehabilitation professionals should recognize that CAM use is often motivated by parental hope, a desire to maximize developmental outcomes, and perceived gaps in conventional services. Interdisciplinary collaboration and family-centered care approaches should therefore include discussions about CAM use when developing individualized intervention plans.

Rehabilitation professionals should also receive continuing education regarding commonly used CAM therapies in order to support constructive dialogue with families and identify potentially unsafe or unsupported practices.

Recommendations for Public Health Professionals and Policymakers

Public health authorities should develop culturally appropriate educational materials regarding CAM use in ASD that are accessible to parents and caregivers. Such resources should promote health literacy and support evidence-based decision-making.

Policymakers should consider integrating CAM-related education into professional training programs for healthcare providers working with children with developmental disabilities. Efforts should also be directed toward improving access to reliable information platforms that provide balanced and scientifically validated information regarding CAM therapies.

Recommendations for Future Research

Future studies should employ longitudinal and multi-country designs to examine changes in CAM use over time and to explore causal relationships between parental characteristics, health literacy, and CAM utilization. Further research is also needed to evaluate the effectiveness and safety of commonly used CAM modalities within Arab populations using rigorous experimental and mixed-methods methodologies.

Particular attention should be given to culturally specific CAM practices and their role in parental decision-making, as well as to strategies that improve communication between families and healthcare professionals regarding CAM use.

6.4 Summary of the Dissertation

Introduction

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by persistent difficulties in social communication, social interaction, and restricted or repetitive patterns of behavior. The increasing prevalence of ASD worldwide has resulted in growing demand for effective therapeutic interventions. In addition to conventional medical and rehabilitation services, many families seek complementary and alternative medicine (CAM)

therapies to support the management of ASD-related symptoms. Although CAM use has been widely investigated in Western countries, limited evidence is available regarding its use among families of children with ASD in Arab countries. Therefore, this dissertation aimed to investigate the prevalence, patterns, determinants, and parental perceptions of CAM use among children with ASD in selected Arab countries.

Methods

A mixed-methods research design was employed consisting of three complementary components: a quantitative cross-sectional survey, a qualitative interview study, and a focused case study.

The quantitative study involved parents of children diagnosed with ASD from Qatar, Saudi Arabia, Kuwait, Jordan, and Libya. Data were collected using a structured questionnaire assessing socio-demographic characteristics, CAM use, health literacy, and quality of life. Statistical analyses included descriptive statistics and binary logistic regression analyses to identify factors associated with CAM utilization.

The qualitative component utilized semi-structured interviews with mothers of children with ASD who had experience using CAM therapies. Thematic analysis was conducted to explore parental experiences, motivations, information sources, decision-making processes, and perceived challenges associated with CAM use.

The case study examined the potential role of music therapy as a complementary intervention for a child with ASD. Systematic observations were conducted throughout the intervention period to evaluate developmental and behavioral changes.

Results

The findings demonstrated that CAM use was highly prevalent among participating families. Nutritional interventions, dietary supplements, vitamins, herbal remedies, and other biologically based therapies were among the most frequently used CAM modalities.

Health literacy emerged as a significant predictor of CAM use and appeared to have a stronger influence on therapeutic decision-making than formal educational attainment. Parents primarily reported using CAM therapies as complementary approaches alongside conventional treatments rather than as alternatives to medical care.

The qualitative findings revealed that parental decisions regarding CAM use were influenced by multiple factors, including hope for symptom improvement, cultural and religious beliefs, recommendations from family members and other parents, and information obtained through social media and online resources. Participants frequently reported difficulties accessing reliable information and expressed concerns regarding treatment costs and uncertainty about effectiveness.

The case study findings suggested positive changes in communication, social interaction, emotional regulation, behavioral participation, motor skills, and engagement following the music therapy intervention.

Discussion

The results indicate that CAM use among families of children with ASD in Arab countries is a multifactorial phenomenon influenced by health literacy, cultural context, parental beliefs, information-seeking behavior, and perceptions of conventional healthcare services. The integration of quantitative and qualitative findings highlights the importance of improving communication between healthcare professionals and families, strengthening evidence-based guidance regarding CAM therapies, and supporting informed decision-making.

The findings suggest that healthcare professionals should adopt an open and collaborative approach when discussing CAM use with families. While some CAM therapies may offer supportive benefits when integrated with conventional interventions, the current evidence base remains variable across different modalities. Therefore, greater emphasis should be placed on evidence-based practice, professional supervision, and the provision of reliable health information to families.

Overall, this dissertation contributes new knowledge regarding CAM use among children with ASD in Arab countries and provides practical recommendations for healthcare professionals, policymakers, researchers, and families involved in ASD care.

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8. Keywords

Autism Spectrum Disorder (ASD); Complementary and Alternative Medicine (CAM); Parental Attitudes; Health Literacy; Cultural Influences.

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10. Appendixes

Appendix 1: Interview Questions

Section	Question	Details
Information About You	1. Age (if possible)? 2. Marital status? 3. Education? 4. Family income level?	Average, High, Low
Information About the Child	1. How old is your child? 2. Age at first diagnosis? 3. Specific diagnosis? 4. Does the child suffer from any disorders other than autism?	
Alternative Non-Drug Therapies	1. Have you ever tried any type of non-drug therapies? Please list them! 2. Which of these therapies did you find to have tangible benefits? 3. Which of these therapies did you find to have no benefits? 4. Which of these therapies had adverse and non-beneficial effects?	Examples: camel milk, oxygen therapy, music therapy, nutritional supplements, cupping, honey. - How did you notice the benefits? Behavior, language, etc.? - Duration of therapy and concurrent treatments.

Sources of Information and Selection	1. What or who was your reference for choosing a non-drug therapy? 2. Did you inform or consult your child's doctor before trying it?	If not, why?
Cost of Therapies	1. In your opinion, were these therapies expensive?	Are they accessible to everyone, or require much money/time?
Alternative and Complementary Medicine	1. Would you prefer to avoid drug therapies and use CAM?	If yes, what are the reasons?
Challenges	1. What were the biggest challenges during treatment and rehabilitation?	

Appendix 2. Research Questionnaire

CAM QUESTIONNAIRE

We invite you to take part in an online research study concerning the complementary and alternative medicine (CAM) for children with autism as part of a PhD study in university of Debrecen/Hungary. CAM is defined as a broad domain of healthcare practices, therapies, interventions, modalities, that are not part of the conventional medicine.

Taking part in this study is entirely voluntary and anonym, all the provided information will be used confidentially for research purposes.

Research title: The Complementary and alternative medicine (CAM) use in Arabic countries, and parent's attitudes towards CAM in controlling symptoms of Autism Spectrum Disorders (ASD).

The aim of our study is to survey the attitude towards CAM therapies and to measure the prevalence of CAM therapies used in treatment of children with ASD in Arabic countries. Moreover, to assess the main influencing factors and to evaluate the perceived effectiveness of CAM therapies used in treatment of children with ASD and their quality of life, also we will figure out the main information sources of CAM modalities and finally to survey the health literacy of parents of children with ASD.

Including criteria: Parents of children aged at least two years and who had been diagnosed with ASD at least 6 months prior to start of this study.

I agree the aims of this study and permit the use of the filled questionnaire.

If you have question or comments, please contact me: hatahetmais@gmail.com

Demographic data

1. Age of the Mother ? please indicate if the mother is died!

2. Age of the father? please indicate if the father is died!

3. Level of education of the mother:

Mark only one oval.

- ☐ Primary school
☐ High school
☐ Higher education

4. Level of education of the father:

Mark only one oval.

- ☐ Primary school
☐ High school
☐ Higher education

5. In which type of settlements do you live?

Mark only one oval.

- ☐ City/town
☐ Village/hamlet

6. Family income per month:

Mark only one oval. less

- ☐ than 300\$ 300 -
- ☐ 500\$
- ☐ 501 - 1000\$
- ☐ 1001 - 1500\$
- ☐ More than 1500\$
- ☐ I prefer not to answer

7. How many children do you have (excluding the child affected with autism)?

8. The age of your child with autism:

9. Age of your child with ASD at the time of diagnosis:

10. Gender of the child with Autism:

Mark only one oval.

- ☐ Male
- ☐ Female

QUESTIONS REGARDING THE AUTISM SPECTRUM DISORDER

11. What is the exact diagnosis of your child?

Mark only one oval.

- ☐ Autistic disorder
- ☐ Aspergers syndrome
- ☐ Pathological demand disorder PDA
- ☐ Childhood disintegrative disorder
- ☐ Pervasive developmental disorder (not otherwise specified)

12. Child verbal abilities:

Mark only one oval.

- ☐ Does not talk
- ☐ Uses single words
- ☐ Uses two- or three word phrases
- ☐ Uses sentences with four or more words
- ☐ Uses complex sentences

13. Which medications/drugs used to treat your child in the last 12 month? YOU CAN MARK MORE THAN ONE OPTION!

Check all that apply.

- ☐ For hyperactivity (including methylphenidate and atomoxetine)
- ☐ Sleep aids (melatonin, Risperdal).
- ☐ Abilify (aripiprazole)
- ☐ Anticonvulsants
- ☐ Effexor (venlafaxine)
- ☐ Ziprasidone

Other: ☐ _____

14. Which type of other conventional therapies used in treating your child?

15. Have you experienced side effects during the use of the following medications?
Check all that apply.

	risperdal	methylphenidate	atomoxetine	clonazepam	Tofranil	olanzepam
increased weight	☐	☐	☐	☐	☐	☐
decreased weight	☐	☐	☐	☐	☐	☐
constipation	☐	☐	☐	☐	☐	☐
diarrhea	☐	☐	☐	☐	☐	☐
enuresis	☐	☐	☐	☐	☐	☐
increased liver enzymes	☐	☐	☐	☐	☐	☐
excessive salivation	☐	☐	☐	☐	☐	☐
frequent falls	☐	☐	☐	☐	☐	☐

16. Which type of comorbid syndrome does have your children? YOU CAN MARK MORE THAN ONE OPTION!

Check all that apply.

- ☐ Epilepsy
☐ Attention deficit hyperactivity disorder
☐ Sleep disturbances
☐ Feeding problems

Other: ☐ _____

17. What were your main information sources regarding autism? YOU CAN MARK MORE THAN ONE OPTION !

Check all that apply.

- ☐ Specialized physician
- ☐ Rehabilitation practitioners
- ☐ Social media groups
- ☐ Other families who have similar case
- ☐ TV
- ☐ Internet
- ☐ Special needs teacher
- ☐ Books
- ☐ Awareness workshops

Other: ☐ _____

18. How is having a child with Autism affect your quality of life ? YOU CAN MARK MORE THAN ONE OPTION!

Check all that apply.

- ☐ I had to lose my job
- ☐ Prevents me to continue my education limited
- ☐ social connections
- ☐ Decreased relatives and family visits
- ☐ Have no time for leisure activities
- ☐ Feeling emotionally and physically overwhelmed
- ☐ Less frequent outdoor activities
- ☐ Decreased attention to other responsibilities (my health, other children,.....) Feeling depressed
- ☐ at some points

The Use of CAM

19. Please select which of the CAM practices listed below, have you used for your child with ASD, YOU CAN MARK MORE THAN ONE OPTION! and please rate the effectiveness of each practice you have used in 5 point scale where 1- it is not effective at all, 5- it is very effective.

Check all that apply.

[illegible]

deep pressure therapy	☐	☐	☐	☐	☐	☐	☐
massage	☐	☐	☐	☐	☐	☐	☐
osteopathy	☐	☐	☐	☐	☐	☐	☐
chelation	☐	☐	☐	☐	☐	☐	☐
hyperbaric oxygen therapy	☐	☐	☐	☐	☐	☐	☐
packing therapy	☐	☐	☐	☐	☐	☐	☐
pet therapy	☐	☐	☐	☐	☐	☐	☐
aroma therapy	☐	☐	☐	☐	☐	☐	☐
holding therapy	☐	☐	☐	☐	☐	☐	☐
facilitated communication	☐	☐	☐	☐	☐	☐	☐
homeopathy	☐	☐	☐	☐	☐	☐	☐
oxytocin	☐	☐	☐	☐	☐	☐	☐
cupping	☐	☐	☐	☐	☐	☐	☐

20. What CAM modality you have ever used which is not listed above?

21. Have you informed your doctor about complementary therapies currently or previously used for your child with ASD?

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ just for the successful ones

22. If you have not informed the doctor of your child with ASD about complementary treatments, currently or previously, what was the reason for this? (Please select only one answer!)

Mark only one oval.

- ☐ it is not important for the doctor to know.
- ☐ I've never been asked about it, so I never talked about it.
- ☐ doctors have little knowledge of complementary treatments.
- ☐ I was afraid that the doctors do not approve it so it should be stopped.
- ☐ Other:

23. IN GENERAL How can you reflect your satisfaction about your child responses for the CAM therapies ? 1= not satisfied at all. 5= fully satisfied.

Mark only one oval.

	1	2	3	4	5	
not satisfied	☐	☐	☐	☐	☐	totally satisfied

24. Where did you hear about those practices? YOU CAN MARK MORE THAN ONE OPTION!

Check all that apply.

- ☐ social media
- ☐ friends
- ☐ families who have children with autism
- ☐ doctor advice
- ☐ rehabilitation therapists advice
- ☐ TV/radio

Other: ☐ _____

25. What are the reasons which make you think about CAM for your child with ASD?
YOU CAN MARK MORE THAN ONE OPTION!

Check all that apply.

- ☐ To decrease side effects of medications.
- ☐ I am not certain that CM alone can help.
- ☐ Positive experiences recommended by many families.
- ☐ It makes me feel satisfied that I have the ability to control my child health choices Stress reduction
- ☐ that I have tried everything possible to help my child.
- ☐ I feel frustrated about my child very slow prognosis.
- ☐ Some practices are scientifically proven due to their effectiveness.
- ☐ To increase the effectiveness medical therapy.
- ☐ To increase the quality of life of my child.

Other: ☐ _____

26. Do you feel yourself more satisfied and active part of the therapeutic process when you have the right to choose to try the available types of CAM ?

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Maybe

27. Are you currently concerned a lot, a little, or not at all about a scientific based data base or trusted source of the proved and effective CAM practices?

Mark only one oval.

- ☐ alot
- ☐ a little
- ☐ not at all

28. Have you ever used the CAM therapies for your child with autism to decrease the side effects of the conventional medicine?

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Maybe

Attitudes towards CAM

in this section we are trying to figure out your attitudes towards CAM

29. If you have used CAM modalities or planning to use, whom of the following would you consult or already consulted for your child with autism? YOU CAN MARK MORE THAN ONE OPTION!

Check all that apply.

- ☐ The physician
- ☐ Rehabilitation centre's therapist
- ☐ Parents who have similar case
- ☐ I collect information from social media groups
- ☐ I have never used and I'm not planning to use CAM therapies Other:
- ☐ _____

30. If you have not used complementary therapies for your child with ASD please indicate your reasons in the options below. (YOU CAN MARK MORE THAN ONE OPTION!)

Check all that apply.

- ☐ The doctor didn't recommend it.
- ☐ I don't care about them.
- ☐ I had a personal bad experience with use of CAM therapies.
- ☐ I don't believe in them.
- ☐ There are no scientific evidences of their effectiveness.
- ☐ It is not accessible.
- ☐ It is expensive.

Other: ☐ _____

Quality of life of your children

31. To what extent do you agree with the following sentences regarding the quality of life of your child in the period of using CAM?

Mark only one oval per row.

	Strongly agree	Agree	I dont know	Disagree	Strongly disagree
taking your child for any kind of outing (such as to the park, library, zoo, shopping, restaurants, family visits)	☐	☐	☐	☐	☐
eating a meal as a family together with your child.	☐	☐	☐	☐	☐
less missed days at school or therapy sessions.	☐	☐	☐	☐	☐
doing any kind of Activities of Daily Living without help such as washing hand, brushing teeth, etc....	☐	☐	☐	☐	☐

32. Do you agree that CAM therapies would affect your child with ASD quality of life positively?

Mark only one oval.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly agree

Health literacy

33. How easy would you find it to *

Check all that apply.

	very easy	fairly easy	neutral	fairly difficult	very difficult
find information on treatments of illnesses that concern you?	☐	☐	☐	☐	☐
find out where to get professional help when you are ill?	☐	☐	☐	☐	☐
understand what your doctor says to you?	☐	☐	☐	☐	☐

your health?activities that are good
for your mental well-being?

understand advice on health from
family members or friends?

☐☐☐☐☐

understand information in the
media on how to get healthier?

☐☐☐☐☐

judge which everyday behaviour is

☐☐☐☐☐

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