

SHORT THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD)

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

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1. Introduction

1.1 Background

Autism spectrum disorders (ASD) or autism are defined on the basis of neurodevelopmental disorders that 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 36 children has been diagnosed with ASD based on estimates from the Autism and Developmental Disabilities Monitoring (ADDM) Network of the Centers 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. Low- to Medium-Income Countries (LMICs) need more population-based studies to accurately depict the impact of ASD (Zeidan et al., 2022). However, most Arabic countries have shown the highest rates of autism compared to western countries or developed countries. Qatar identified as having 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 Aim and Objectives

1.3.1 Aim

The primary aim of this study is to investigate the use of (CAM) among parents of children with (ASD) in selected Arabic countries, with a focus on parental attitudes, utilization patterns, and influencing factors.

1.3.2 Objectives

1. To examine parents' attitudes, beliefs, and perceptions toward CAM therapies used for children with ASD.
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 sociodemographic, cultural, and health-related factors influencing CAM use.
4. To explore parents' sources of information and decision-making processes regarding CAM therapies.

5. To assess parental health literacy and quality of life and examine their association with CAM utilization.
6. To explore in depth the perceptions and experiences of mothers of children with ASD regarding CAM use.
7. To illustrate, through a focused case study, the potential role of music therapy as a CAM modality in supporting developmental and psychosocial outcomes.

2. Literature Review

2.1 Autism Spectrum Disorder: 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).

The prevalence of ASD is approximately 67 million worldwide, approximately 1 in 36 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 as having 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).

2.2 Diagnosis of ASD

The differences in diagnosis rates have 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 (ASD) in low- and middle-income countries (LMICs) (Alshaban et al., 2019).

Currently, standardized and consistent criteria for evaluating and diagnosing autism is taking a right path, several standardized assessment tools are available and validated, relies on behavioral evaluation rather than biological indicators. Standardized diagnostic instruments, such the ADOS-2 (Autism Diagnostic Observation Schedule, 2nd Edition), alongside professional judgment, are employed to assess social communication skills, behavioral patterns, and developmental history. However, The lack of objective diagnostic testing hinders early detection, and early intervention. While the confirmation cannot be obtained through a blood test, brain scan, or any other objective examination, diagnosis requires a 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).

2.3 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 ASD (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.

2.4 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).

2.4.1 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).

2.4.2 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. This lack of clarity may lead families to seek alternative treatments that are not based on 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 antithrombotic activity according to different laboratory studies (Salamat 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 the 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).

2.5 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).

2.6 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.

2.7 Gaps in the Literature

Although CAM use in ASD has been widely reported, significant gaps remain in the literature, particularly in relation to Arabic countries. Existing studies often lack cultural sensitivity, focus on single interventions, or fail to examine parental perspectives in depth. There is limited research exploring health literacy, disclosure practices, and the emotional dimensions of CAM decision-making.

This dissertation seeks to address these gaps by providing a comprehensive, culturally informed analysis of CAM use among parents of children with ASD in selected Arabic countries, thereby contributing to evidence-based practice and policy development.

3. Methodology

3.1 Study Design

This study employed a mixed-methods research design to comprehensively investigate the use of Complementary and Alternative Medicine (CAM) among parents of children diagnosed with (ASD) in selected Arabic countries. A mixed-methods approach was chosen to allow for the integration of quantitative and qualitative data, thereby capturing both the prevalence and patterns

of CAM use as well as the underlying parental experiences, beliefs, and contextual factors influencing decision-making.

The methodology consisted of three complementary components: (1) a cross-sectional quantitative survey to assess prevalence, patterns, and associated factors of CAM use; (2) a qualitative study based on in-depth interviews with mothers of children with ASD to explore lived experiences and perceptions of CAM use; and (3) a focused case study examining the application of music therapy as a CAM modality. This triangulation of methods strengthened the validity of the findings and enabled a more nuanced interpretation of results.

3.2 Study Setting and Population

The 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.

The interview 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 **case study** of music therapy effect on social and functional skills was a real case of a child with autism who undergoes music therapy course for a period of 6 months.

3.3 Inclusion Criteria

Parents were eligible for inclusion if they met the following criteria: (1) having a child diagnosed with ASD by a qualified healthcare professional at least 6 months before the study; (2) residing in one of the selected Arabic countries; (3) being actively involved in decisions regarding the child's treatment or therapy; and (4) providing informed consent to participate in the study.

3.4 Quantitative Study Component

3.4.1 Study Design and Data Collection

A cross-sectional survey design was used for the quantitative component of the study. Data were collected using a structured questionnaire distributed both online and in paper-based formats, depending on accessibility and participant preference. The questionnaire was designed to capture demographic characteristics, child-related clinical information, patterns of CAM use, sources of information, disclosure practices, and parental health literacy.

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.

3.4.2 Measures

An online questionnaire was developed based on previous studies in the field of CAM, the questionnaire was developed in English as primary language, translated to Arabic by 2 authorized translators, then it was revised and piloted. seven sections were defined to assess sociodemographic variables, child characteristics, and CAM use, information sources, disclosure and Parents' health literacy which was measured with HLS-EU-Q16: 16 items using a 5-point Likert scale .

3.5 Qualitative Study Component

3.5.1 Study Design

The qualitative component adopted a descriptive phenomenological approach to explore mothers' experiences, beliefs, and emotional responses related to CAM use. This approach was chosen to capture rich, first-person accounts and to understand CAM use within its social and cultural context.

3.5.2 Data Collection

Semi-structured interviews were conducted with mothers of children with ASD who reported CAM use. Interviews were conducted in Arabic, either face-to-face or via online communication

platforms, depending on the participant's availability. An interview guide was utilized to maintain consistency while permitting participants the opportunity to elaborate on significant issues.

Interviews explored motivations for CAM use, sources of information, perceived benefits and challenges, communication with healthcare professionals, and emotional experiences related to caregiving and decision-making.

3.5.3 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.

3.6 Case Study Component: Music Therapy

A focused case study was conducted to illustrate the application and perceived impact of music therapy as a CAM modality for a child with ASD. Music therapy sessions were structured and delivered by a qualified practitioner and tailored to the child's developmental needs.

The case study documented changes in communication attempts, emotional expression, engagement, and family interaction over time. Observational notes and parental feedback were used to monitor progress and outcomes.

4. Results

4.1 Quantitative study

The quantitative component of the study included parents of children diagnosed with ASD from Jordan, Saudi Arabia, Kuwait, Qatar, and Libya. Participants represented a range of sociodemographic backgrounds, including variation in parental age, education level, employment status, and household income. Children with ASD varied in age, symptom severity, and functional abilities, reflecting the heterogeneity of the autism spectrum.

Mothers constituted the majority of respondents, consistent with their primary caregiving role within the studied contexts. Most parents reported being actively involved in decisions regarding their child's treatment and therapy, including both conventional and complementary approaches.

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).

4.1.1 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).

4.1.2 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.

4.1.3 Parents' health literacy

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

4.1.4 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%).

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%).

4.1.5 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%).

4.1.6 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%).

4.1.7 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]).

4.2 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**

4.2.4 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)

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.

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)

Qualitative findings revealed that CAM use was strongly influenced by cultural and religious beliefs. Traditional practices such as cupping therapy (Hijama), spiritual healing (Ruqyah), prophetic medicine, and herbal remedies were frequently mentioned. Parents described these practices as familiar, accessible, and culturally legitimate.

Family members, community networks, and shared experiences with other parents played a central role in shaping CAM-related decisions. Cultural trust often outweighed biomedical recommendations, particularly when conventional therapies were perceived as insufficient or inaccessible.

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. Progress noticed on social interaction, verbal and nonverbal communication, emotional regulation, behavior, motor skills, and memory.

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.

4.4 Summary of Results

In summary, the findings suggest that the use of (CAM) among parents of children with (ASD) in Arabic countries is both highly prevalent and shaped by multiple interacting factors. Nutritional and dietary interventions appear to be the most commonly reported forms of CAM, reflecting parental beliefs in the role of diet and supplementation in improving developmental and behavioral outcomes. However, the patterns of CAM use extend beyond nutritional approaches and are strongly influenced by cultural traditions, religious values, family practices, and community recommendations.

Parental decision-making is further shaped by varying levels of health literacy, access to reliable information, and broader systemic healthcare challenges, including limited specialized services, long waiting times, and the high cost of conventional therapies. In this context, many families turn to CAM as a practical and culturally acceptable option. CAM is rarely used as a complete replacement for biomedical care; rather, it is most often adopted as a complementary strategy alongside conventional treatments. Parents frequently report perceived improvements in their child's behavior, communication, or overall well-being, as well as emotional reassurance and a greater sense of control over their child's condition.

Despite the limited empirical evidence supporting the effectiveness of many CAM therapies, the perceived psychosocial benefits, cultural familiarity, and accessibility of these approaches often outweigh concerns about scientific validation. Overall, CAM use in this population reflects a complex interplay of cultural, social, economic, and healthcare-related factors, highlighting the importance of culturally sensitive communication and evidence-based guidance for families of children with ASD.

5. 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).

Strengths and Limitations

A key strength of this study lies in its mixed-methods design, which allowed for triangulation of quantitative and qualitative findings. Inclusion of multiple Arabic countries enhanced the cultural relevance and breadth of the analysis.

However, 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. 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.

7. New findings and implications

The findings of this study have important implications for clinical practice in the care of children with (ASD) within Arabic countries. Given the high prevalence of (CAM) use, healthcare professionals cannot afford to overlook or dismiss CAM as a marginal phenomenon. Instead, clinicians should acknowledge CAM use as a common component of parental care-seeking behavior and address it proactively within clinical encounters.

Open, non-judgmental communication between healthcare professionals and parents is essential. The limited disclosure of CAM use identified in this study suggests that many parents may be using CAM without professional oversight, potentially exposing children to safety risks, inappropriate dosing, or interactions with conventional treatments. Clinicians should routinely inquire about CAM use in a respectful manner and provide balanced, evidence-informed guidance tailored to each family's cultural context and level of health literacy.

Interdisciplinary collaboration is also critical. Pediatricians, psychologists, occupational therapists, dietitians, and rehabilitation specialists should work together to support integrative care approaches that prioritize evidence-based interventions while accommodating selected CAM modalities with emerging supportive evidence, such as music therapy or sensory-based interventions, when delivered by qualified professionals.

7.1 Implications for Parental Education and Health Literacy

Parental health literacy emerged as a key determinant of CAM decision-making and safe use. These findings highlight the need for targeted educational initiatives aimed at improving parents' ability to access, understand, and critically evaluate health information related to ASD and CAM. Healthcare providers and public health institutions should develop culturally appropriate educational materials that address common CAM practices, clarify their potential benefits and risks, and distinguish evidence-based information from anecdotal or commercial claims.

Empowering parents through education can enhance shared decision-making, reduce reliance on misinformation, and support more informed integration of CAM with conventional care. Improving health literacy may also promote greater transparency and disclosure of CAM use, thereby strengthening therapeutic partnerships between families and healthcare professionals.

7.2 Implications for Health Policy and Regulation

At the policy level, the widespread use of CAM among families of children with ASD underscores the need for stronger regulatory frameworks governing CAM products and services. Many CAM interventions, particularly dietary supplements and herbal products, are readily accessible yet insufficiently regulated in several Arabic countries. Policies should ensure quality control, accurate

labeling, monitoring of adverse effects, and protection against misleading claims, especially when products are marketed for vulnerable populations such as children with ASD.

National autism strategies and healthcare policies should formally recognize CAM use and provide guidance on its safe and ethical integration within conventional care pathways. Investment in professional training programs that enhance clinicians' competence in CAM-related communication and cultural sensitivity is also warranted.

7.3 Implications for Service Development

The findings indicate that dissatisfaction with access to conventional services contributes to CAM use. Expanding the availability, affordability, and quality of evidence-based ASD services may reduce families' reliance on unverified or unsafe CAM practices. Service development efforts should prioritize early intervention, family-centered care, and equitable access across geographic regions.

Integrative service models that incorporate selected supportive CAM modalities under professional supervision may offer a pragmatic approach that aligns with parental preferences while maintaining safety and effectiveness.

7.4 Recommendations for Future Research

This study highlights several areas for future research. Longitudinal studies are needed to examine the long-term outcomes and safety of commonly used CAM interventions in ASD. Rigorous randomized controlled trials should be conducted to evaluate the efficacy of culturally specific CAM practices, including nutritional products frequently used in Arabic contexts.

Further research should also explore strategies to improve parental health literacy and clinician–parent communication regarding CAM. Comparative studies across different cultural settings may provide additional insights into how social and systemic factors shape CAM use.

7.5 New Findings

In summary, our findings indicate that CAM use among families of children with ASD in Arabic countries is common, multifactorial, and deeply influenced by cultural context and parental health literacy. The results underscore the need for improved communication between families and healthcare professionals, culturally sensitive integrative care models, and evidence-informed guidance to support safe and ethical CAM use.

- High prevalence of CAM use among parents of children with ASD across Arabic countries, with most families using CAM alongside conventional treatment.

- Nutritional approaches were the most commonly used CAM modalities, including special diets, vitamins and minerals, supplements, and culturally specific products such as camel milk.
- Cultural and religious beliefs strongly influenced CAM choices, often giving traditional and faith-based practices greater credibility than biomedical advice.
- Parental motivation for CAM use was driven by hope, dissatisfaction with conventional care, fear of medication side effects, and the absence of a definitive cure for ASD.
- Limited disclosure of CAM use to healthcare professionals was common, largely due to fear of judgment, perceived lack of professional knowledge, and assumptions of safety.
- Parental health literacy significantly shaped CAM use patterns, with lower literacy linked to greater reliance on anecdotal and non-evidence-based sources.
- Psychological and physical CAM therapies were perceived to provide psychosocial benefits, particularly in emotional regulation, social interaction, and quality of life.
- The music therapy case study demonstrated positive developmental and family-related outcomes, supporting its role as a complementary intervention.

8. References from Library



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List of publications related to the dissertation

1. Hatahet, M., Sárváry, A.: Arabic Mothers' Experiences Using Complementary and Alternative Medicine for Children with Autism Spectrum Disorder: a Qualitative Study.
Children. 13 (1), 1-14, 2026.
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2. Hatahet, M., Sárváry, A., Sárváry, A.: Music Therapy as a Tool to Unveil Musical Potential or Hidden Savant in Children with Autism: a Case Study.
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9. Keywords

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

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commitment to academic excellence, and I sincerely appreciate the encouragement and trust he placed in me throughout this process.

Finally, I thank everyone who believed in me from the very beginning — especially those who called me “Dr. Mais” long before the title became official. Your faith in me planted the confidence I needed to keep going, and today, that belief has become a reality. Real friends, who believed in me, encouraged me, and reminded me of my worth when the path felt heavy. Your support and kindness meant more to me than I can express.

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