

Uses of hypnosis in pediatric anesthesia and pediatric headaches: a literature review

by

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ABSTRACT

Uses of hypnosis in pediatric anesthesia and pediatric headaches: a literature review

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Background: *Managing pain and anxiety is a significant challenge for pediatricians. Infants, children, and teenagers – especially those with severe needle phobia -- can experience significant degrees of stress and anxiety prior to and after surgery, and during vaccinations or venipunctures. Headaches and migraines – another significant source of pain and anxiety for children and adolescents – can be difficult to treat with conventional pharmaceutical approaches. Hypnotherapy, or the use of hypnosis to achieve a therapeutic outcome, has a long history of providing some degree of somatic analgesia and anxiolysis.*

Objective: *The objective of this study is to critically review the literature dealing with hypnosis as a therapeutic tool in pediatric anesthesia and pediatric headaches.*

Methods: *A large database of medical and psychological publications (PubMed) was searched for studies in which hypnosis was used either for pediatric anesthesia/analgesia or for pediatric headaches. Those studies were then manually curated for their pertinence to hypnosis and pediatrics. They were subsequently classified according to the level of evidence that they provide in favor of hypnosis as a treatment modality.*

Results: *At this time, there is a relatively strong literature arguing in favor of hypnosis for peri-procedural pain relief and anxiolysis. There is limited evidence, however, to suggest that hypnosis can or should be used in scenarios that normally require general anesthesia. While there is increasing evidence to suggest a role for hypnosis in the management of recurrent headaches in children, there is as yet little substantial evidence to suggest a role in migraine headaches, despite one promising study.*

Conclusion: *Given the increased popularity of complementary and alternative medicine (CAM), hypnotherapy is likely to be increasingly incorporated into the repertoire of tools for managing pain, anxiety, and headaches, perhaps in combination with relaxation, mindfulness, and biofeedback approaches. Additional studies of hypnosis, in specific clinical settings such as immobilization for radiotherapy, ophthalmologic procedures, and migraine headaches are needed. A more standardized approach to hypnotic induction by the hypnosis community would allow for more rigorous studies and trials.*

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I. Introduction

My anecdotal experience with hypnosis

I was first introduced to the use of medical hypnosis (also known as hypnotherapy) during my year abroad through the International Medical Exchange Program (IMEP) in France and Switzerland in 2016-2017. The first case I witnessed was during a rotation in a pediatric bone marrow transplant unit at Necker Hospital in Paris. A 13-year old girl receiving a bone marrow transplant needed a nasogastric tube placed, and the nurses were unable to place it after multiple attempts. A child psychiatrist with training in hypnosis was consulted to see if hypnosis could be used to place the tube. With the girl's consent and cooperation, the psychiatrist-hypnotist brought her into a hypnotic trance using verbal imagery involving a tropical island where she would be playing with her best friends. The child was lying in bed with her eyes closed and the hypnotist was at bedside holding the child's hand, while a nurse was a few feet away preparing the nasogastric tube. The hypnotist further developed the verbal imagery by suggesting that, as she was playing in the waves with her friends, a series of large waves started hitting her and her friends in the face, causing a tickling sensation in her nose. As the hypnotist was making this suggestion, the nurse began to insert the nasogastric tube. Unfortunately, the sensation of the tube was sufficiently jarring to awake the patient from the trance and the tube could not be advanced any further. After some additional coaxing, the tube was passed without requiring a new hypnotic suggestion.

This first exposure, though unsuccessful, was eye-opening in several ways. First, it exposed me to a new anxiolytic technique for patients, one with no side-effects and few

requirements other than time (on the order of a half-hour for this procedure), a soothing voice and enough creativity to generate appropriate positive verbal imagery as a function of the patient's age and understanding. Second, I discovered that the success of the technique was highly dependent on cooperative and, to some extent, hypnotizable patients. And third, it suggested that hypnosis could be used quite broadly to achieve some degree of analgesia while improving doctor-patient rapport.

My second exposure to hypnosis came in the medical-surgical adult intensive care unit at the Geneva University Hospital. In contrast to the pediatric bone marrow transplant unit in Paris where hypnosis was delivered by a specialized child psychiatrist, the Geneva ICU had made it a priority to offer hypnosis training to attending physicians, fellows, residents, and nurses. At the time of my rotation, one attending and several fellows were certified hypnotists and several residents and nurses were going through the certification process. Hypnosis was used in various forms throughout this ICU. The most common use was a combination of hypnosis with local anesthetic for painful procedures. For example, a patient was admitted to the ICU for respiratory distress and was found to have a left-sided pleural effusion requiring a chest tube. The attending at the time had been certified in hypnosis and his fellow was in the process of earning her certification, so it was decided that the resident would place the chest tube under attending supervision, using lidocaine for local anesthesia, while the fellow provided hypnosis in the form of distraction and relaxation. The patient, who had a large collection of bonsais at home, reported minimal pain as he was distracted during the entire procedure by the fellow who engaged him in a distracting discussion about his bonsais. The only painful component of the procedure,

as I watched it unfold, was the piercing for the parietal pleura but this pain was very short-lived as the patient immediately went back to discussing a particular bonsai of his. The following week, he was readmitted for a right-sided pleural effusion under a different attending who had no interest in hypnosis. The attending proceeded to place a chest tube with local anesthetic but without hypnosis. The patient recalled the second chest tube as being more painful than the first.

This second exposure to hypnosis in Switzerland taught me that hypnosis is an umbrella term that encompasses a large number of different techniques involving everything from trance and suggestion to distraction and breathing techniques. This variety of approaches makes it a versatile tool but also makes research into its efficacy difficult as every practitioner takes a slightly different approach and considers certain practices to be “hypnotic” in nature where another practitioner would not.

Defining Hypnosis

Hypnosis refers to an ancient form of complementary and alternative medicine (CAM) that has been defined as “a natural state of focused concentration coupled with a relative suspension of peripheral awareness” (Spiegel and Moore). It can be useful to think of hypnosis simply as an altered state of consciousness and to think of hypnotherapy as hypnosis being used for a therapeutic goal (R. Anbar).

Traditionally, an act of hypnosis involves three components or phases: absorption, dissociation, and suggestibility. Absorption is an initial phase involving a high degree of focused concentration – in the early days of hypnosis, this state of concentration was

achieved by focusing on a swinging pocket-watch. This phase is also known as ‘hypnotic induction’. As a result of this absorption or extreme focus, a second element or phase – dissociation – occurs in which one is suspended from one’s immediate environment. A third phase, suggestibility, emerges as a result of the dissociation and involves openness to new suggestions (Saadat and Kain).

Brief History of Hypnosis

The history of hypnosis is a long and somewhat complicated one that has been told in a number of excellent works (Pintar, Judith; Lynn). Here, I outline elements of that history that seem essential for understanding the present-day landscape of hypnosis worldwide.

The activity of hypnosis seems to date back to the earliest days of human civilization. There is evidence to suggest that nearly all ancient cultures – Sumerian, Persian, Chinese, Indian, Egyptian, Greek, and Roman – used a trance-like phenomenon for healing purposes (John Mongiovi). For example, in ancient India, and to some extent in ancient Greece, it was common for the sick and dying to seek out healing in so-called “sleep temples” or “dream temples” where an activity akin to hypnosis was said to provide healing (ibid.; Clevendon).

The ancestor of modern-day hypnosis emerged in the late Middle Ages and early Renaissance. Called “magnetism”, the theory held that passing magnets over a patient’s body could help unblock certain blockages in the humors, which in the Aristotelian-Galenic system of medicine, were thought to explain nearly all illnesses. Magnetism was

first made popular by the Swiss doctor Paracelsus (1493-1541) who would pass magnets over the bodies of his patients and achieved a certain reputation for healing them in this way (Siddiqui, Mehta, and Khan). While it remained outside the mainstream of medicine, magnetism nevertheless persisted into the 18th century and early 19th centuries (Clevedon). Maximilian Hall, a Jesuit priest and Royal Astronomer of Vienna (1720-1792), helped to maintain the popularity of magnetism through various reported cures supposedly achieved by passing magnetized steel plates over the bodies of his patients and inducing a trance-like state in so doing (ibid.). One of his students, Franz Mesmer (1734-1815), an Austrian physician, trained as a magnetist and while practicing in Austria, Switzerland, and Germany, found that he could induce a trance by simply passing his hands over patients, without using these magnetic plates (Ellis). He concluded, incorrectly, that it was either him or an invisible magnetic fluid in space -- a kind of ether -- that was responsible for the trance. This technique of hand placement to induce a trance by displacing invisible fluid he called “animal magnetism” (ibid.).

Mesmer’s successes were many, including curing a young pianist of hysterical blindness (Clevedon). But his performance of animal magnetism before large crowds that included medical practitioners, combined with his excessively theatrical showmanship, led many scientists and doctors to belittle and discredit his work (ibid.). For these spectacles, he was widely derided by the local scientific community and a pejorative term – “mesmerism” – from which we get the verb “to mesmerize”, was coined to mock his work (ibid.). After having exhausted his options in Austria, he made the move to Paris where his animal magnetism was met with great enthusiasm. He became quite popular

in the French upper class and royal court, whom he would invite to special salons. There he would use dim lighting to produce a hypnotic mood and would have music played on Benjamin Franklin's newly-invented glass harmonica, which he believed was an excellent instrument for moving the magnetic fluid (Gallo and Finger). Admirers of Mesmer at this time included Wolfgang Amadeus Mozart, who composed music for the glass harmonica for Mesmer's sessions, and the Queen of France, Marie-Antoinette (Gallo and Finger)¹.

Unlike his wife, King Louis XVI was skeptical of mesmerism and asked the French Academy of Sciences to investigate animal magnetism. The academy assembled a committee that included luminaries of the day including Benjamin Franklin (who was spending his last days in France), Antoine Lavoisier, Jean Bailly (mayor of Paris at the time), and Dr. Joseph Guillotin (Kihlstrom).² Franklin being in poor health, the investigation took place on his property at Passy in France. Mesmer, determined to distance himself from this investigation, sent one of his students, Dr. D'Eslon, to represent him at the investigation – in doing so, he could take credit if animal magnetism was found to work but could also say that his student did not do the magnetism properly if it was found to fail. Franklin devised an experiment that is now considered one of the first forms of a placebo-controlled trial (Herr). D'Eslon was asked to magnetize a tree – similarly to magnetizing a human by applying one's hands to move this invisible magnetic fluid. Then

¹ Mozart seems to have ultimately reneged on Mesmer. In the first act of his opera *Così fan tutte*, an actor is comically raised from the dead through the use of magnets, a jab at mesmerism if ever there was one (Steptoe).

² There is considerable irony in the fact that both Lavoisier and Bailly would die at the hands of Dr. Guillotin's invention, the guillotine. There is also considerable irony in the fact that Franklin's undoing of Mesmer led to the drop in popularity of Franklin's instrument, the glass harmonica, which at that time was known solely as a musical instrument for mesmerism (Gallo and Finger).

a local twelve-year old boy who had not seen the magnetism take place was asked to embrace a number of trees, including the magnetized tree, and report on the tree's magnetism. The boy went from tree to tree and reported greater degrees of magnetism the further he moved away from the magnetized tree. It was concluded that animal magnetism was not real and that its prior successes were due to self-delusion or natural resolution of disease processes (ibid.). Mesmer's reputation never recovered and he returned to Switzerland where he eventually passed away (Ellis).

Nevertheless, despite Franklin's demonstration, mesmerism continued to hold considerable influence in Europe through the early 19th century. One of Mesmer's students, the Marquis Armand de Puysegur, picked up where Mesmer left off and was the first to obtain deeper states of trance through animal magnetism, similar in nature to somnambulism or sleep-walking (Ellenberger). He achieved this without passing hands over patients but only with words and suggestion. This approach was then picked up by surgeons in France and England for anesthesia. Récamier, a French surgeon and founder of modern gynecologic surgery, pioneered hypnoanesthesia in 1821 by performing surgery on patients in mesmeric coma (Androutsos et al.). Dr. Elliotson, famous for promoting the use of the newly-invented stethoscope in England, was a mesmerist who promoted his techniques – to the horror of his colleagues at the University College of London – to medical students and achieved hypnoanesthesia for surgery at his Mesmeric Infirmary (Todd). However, despite these apparent initial successes, this trend of performing surgery under hypnosis ended almost as quickly as it began with the

discovery of chloroform as an anesthetic in 1847 by James Simpson, which soon became the dominant anesthetic in battlefields and operating rooms worldwide (Wawersik).

The next significant chapter in the history of hypnosis occurred over a period of thirty years, both in England and in France. In England, a Scottish ophthalmologist named James Braid accidentally found that intense focus on a single idea or object – what he called “monideism” – was sufficient to induce “neuro-hypnotism” from the Greek for “nervous sleep” (Kravis). He published his ideas in 1841 and in so doing effectively buried mesmerism: animal magnetism became hypnotism (ibid.). While monideism, from our current perspective, seems an accurate description of what is going on in various forms of trance, the term hypnotism to refer to the patient’s state is perhaps a poor choice of words because hypnosis is really quite the opposite of sleep even though it appears sleep-like to the external observer.

In France, a similar shift in understanding of hypnotic phenomena had begun 30 years prior to Braid’s publication but had gone largely unnoticed. In 1813, two years before the death of Mesmer, an Indo-Portuguese priest by the name of Abbé Faria returned from India where he had learned certain oriental hypnotic techniques and began to work with the Marquis de Puysegur (Roberts). It was Abbé Faria who first suggested, like Braid some 30 years later and against the ideas of Mesmer and de Puysegur, that the power of hypnosis lay not in the hypnotist but in a force generated by the mind of the patient (ibid.).

Abbé Faria’s theories laid the groundwork for what would later be called ‘the School of Suggestion’ or the ‘Nancy school’, named after the town of Nancy in France

where many of its adherents trained. The Nancy school, led by Ambroise Auguste Liebaault, held that hypnosis was a normal psychological phenomenon similar in appearance to sleep that arose in response to suggestion and had nothing to do with magnetism (Laxenaire). Liebaault published his work in 1866 in a book entitled *Sleep and Its Analogous States* (Clevedon). This book and the stories of his cures led an internist named Hippolyte Bernheim to visit Liebaault. Initially skeptical of Liebaault's theories, Bernheim was so impressed with his approach that he quit his work as an internist to dedicate himself to hypnosis (ibid.). Bernheim in turn introduced hypnosis to the medical world thanks to a book entitled *Suggestive Therapeutics*. These two individuals – Liebaault and Bernheim – laid the foundation for contemporary hypnosis by establishing it firmly as a by-product of suggestion (Laxenaire).

Around the time of the Nancy school's creation, a rival school of hypnosis was developing under the famous neurologist Jean-Martin Charcot at the La-Pitié Salpêtrière Hospital in Paris, which would become known as the 'Salpêtrière school' of hypnosis (Piechowski-Jozwiak and Bogousslavsky). The Salpêtrière school believed that hypnosis was the result of neurological stimulation, a kind of "artificially-induced hysterical neurosis" (Chertok, "Hysteria, Hypnosis, Psychopathology: History and Perspectives"), while the Nancy school held that hypnosis was a natural state available to anyone using his or her free will and unrelated to hysteria (Clevedon). This rivalry between the schools lasted several decades. Ultimately, despite the fame and celebrity of the Salpêtrière neurologists (including Joseph Babinski and Gilles de la Tourette), it was the Nancy

school that won out. Today, hypnosis is largely held to be a common phenomenon not requiring a particular neurological or physical external stimulus.

Perhaps because of the illustriousness of Charcot and his hypnotic work on hysteric patients (Piechowski-Jozwiak and Bogousslavsky), the reputation of hypnosis continued to grow and attracted distinguished scientists. Pierre Janet, a student of Charcot, worked on many aspects of hypnosis and was the first to describe various important psychological phenomena such as a transference, dissociation, and psychological trauma, leading many to consider him one of the fathers of modern psychotherapy (Bühler and Heim; Haule). His intellectual opponent in many regards was Sigmund Freud. Freud had studied hypnosis under both Charcot at the Salpêtrière school and under Bernheim at the Nancy school (Chertok, “Freud and Hypnosis: An Epistemological Appraisal”). Freud, though initially inspired by hypnosis, is said to have been too impatient for hypnosis and abandoned it entirely. As a consequence, an entire generation of psychoanalysts – in contrast with Janet’s psychological analysts (Bühler and Heim) – considered hypnosis as little more than a curious artifact of history and established a long-lasting prejudice in the psychoanalytic community against hypnosis (Clevedon).

A student of Bernheim, Emile Coué, went on to produce what is known as “the new Nancy school” or the “school of auto-suggestion” (Laxenaire; Yeates). He is in many ways the founder of the self-help movement, having taught thousands of patients to help themselves through daily positive affirmation – his most famous phrase, taken up in the United States by Napoleon Hill, was “day by day, in every way, I am getting better and

better” (Hill). The “Coué Method” as it is still known today, is used worldwide and forms the basis of many psychological self-help theories.

In the 1930’s, a German neurologist Oscar Vogt – founder of what became the Max Planck Institute for Brain Research in Berlin and known for his work on the histology of the thalamus – was heavily inspired by the work of Abbé Faria and Emile Coué (Satzinger). He took an interest in the sleep-like state of hypnosis and noted that hypnosis could induce physiological states of relaxation with subjective feelings of warmth and heavy arms, which alleviated, among other things, headaches and stress. Another German doctor – a psychiatrist named Johannes Schultz – went on to combine Vogt’s work with Coué’s autosuggestion (Ziolkowski). Reversing Vogt’s approach of achieving relaxation by hypnosis, Schultz derived a technique to induce hypnosis by suggesting to his patients that they were feeling warm and that their arms were feeling heavy through a series of six basic exercises (Kanji). His approach, called autogenic training, remains very popular worldwide.

By the start of the 20th century, despite continued work on hypnosis by a number of European figures, including the Russian Nobel-prize winner Pavlov, the advent of psychoanalysis and the use of chemical anesthesia had led European scientists to lose interest in hypnosis (Clevedon). As a result, the development of hypnosis in the 20th century took place almost entirely in the United States.

A central figure in the American development of hypnosis is Milton H. Erickson (1901-1980) (Gorton). Trained as a psychotherapist, Erickson developed his own unique style of psychotherapy that made intense use of hypnosis combined with “metaphors,

imagery, confusing statements, surprise, and humor” (Clevedon) to achieve therapeutic results. The founder of the American Society of Clinical Hypnosis, Erickson believed – as most Ericksonians still believe today -- that hypnosis generates a uniquely altered state of consciousness for which there are external symptoms or markers. Ericksonian hypnotists also hold that indirect suggestions to the patient are superior to direct suggestions, and that client hypnotizability has more to do with the hypnotist’s skill than the intrinsic hypnotizability of the patient (Matthews). Erickson’s repertoire of hypnotic tricks is still being taught worldwide in schools of hypnotism that bear his name.

Two admirers of Erickson’s work – Richard Brandler (an information scientist) and John Grindler (a linguistic professor) – put together a cognitive-behavior technique based on Ericksonian principles, called Neuro-Linguistic Programming (NLP). NLP is based on human neurology (neuro-), our expression of our ideas and concepts (linguistic), and behavioral theory (programming) (Oldham). Like Ericksonian hypnotherapy, NLP is used worldwide.

Hypnosis training in North America and Europe

With this overview of the history of hypnosis in mind, it is interesting to note the large diversity of practices of hypnosis in English-speaking North America and Europe. I intentionally limit the scope of my analysis to these two regions not only for the sake of

tractability but also because my clinical experiences involving hypnosis have occurred largely in those two geographic regions.

In the United States, there are no explicit federal regulations governing the scope of practice and training of hypnotists. Each state is responsible for legislating on the scope of practice. In table I-2, you will find a breakdown of pertinent legislation by state.

Table I-1: Hypnotherapy Regulations by State in the United States

Regulation Status	States
No regulations	Alabama, Delaware, Georgia, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Nebraska, North Dakota, Oklahoma, Oregon, Pennsylvania, South Dakota, Vermont, Virginia, Wisconsin
No explicit ban or regulation but certain laws pertaining to practice	Alaska, Arkansas, Arizona, District of Columbia, Hawaii, Maryland, Mississippi, Missouri, Montana, New York, Ohio, South Carolina, Tennessee, Texas, West Virginia, Wyoming
Explicit laws on practicing hypnotism	California, Colorado, Connecticut, Florida, Idaho, Illinois, Minnesota, New Jersey, New Hampshire, New Mexico, Nevada, North Carolina, Rhode Island, Utah, Washington

Reference: (Guild and Reserved)

Given the potential for widely differing training from state to state because of the absence of federal regulation, it is interesting to note that the major societies of hypnosis in the United States have all adopted the pre-requisite of a graduate level degree in a health-care discipline (medicine, psychology, nursing, etc...) prior to hypnosis training. This approach has been to some extent duplicated in Canada where certain major associations also require graduate-level training in a health care profession. For the major Canadian associations, certification by the American Society of Clinical Hypnosis (ASCH)

is sufficient for membership. In Table I-1, you will find the major hypnosis training societies of North America with their associated pre-requisites and their training methodology (e.g. hours of training, supervised practicum).

Table I-2: Hypnotherapy training by country in English-speaking North America

Country	Certifying Agencies and Professional Organizations	Prerequisites	Duration of training
USA	National Board for Certified Clinical Hypnotherapists	Graduate-level degree in a health-care discipline	50 hours, including 18 hours of supervised hypnosis
USA	American Society of Clinical Hypnosis (ASCH)	Graduate-level degree in a health-care discipline with licensure in their state	20 hours of beginner coursework, 20 hours of intermediate coursework, 20 hours of individualized training, 2 years of independent practice
USA	Society for Clinical and Experimental Hypnosis	Graduate-level degree in a health-care discipline with licensure in their state	40 hours of workshop training, 2 years of clinical hypnosis beyond a basic course
Canada	Canadian Hypnosis Association	No graduate-level degree requirement	2 workshops over 1 year; 200 hours of hypnosis under senior supervision
Canada	Canadian Society of Clinical Hypnosis	Graduate-level degree in a health care discipline	Introductory workshop; no minimum hour requirement (per website)
Canada	Canadian Federation of Clinical Hypnosis (CFCH)	Graduate-level degree in a health-care	Introductory workshop through CFCH or ASCH,

		discipline with licensure in their province	no minimum hour requirement (per website)
Canada	Association of Registered Clinical Hypnotherapists	No graduate-level degree requirement	225 hours of total training time including 75 hours of practicum; completion of competency exam

References: (The National Board for Certified Clinical Hypnotherapists)(American Society of Clinical Hypnosis) (Society for Clinical and Experimental Hypnosis) (Association) (Canadian Society of Clinical Hypnosis) (C. F. of C. Hypnosis) (Canada)

Like the US and Canada, European countries, both in and outside the European Union, have no overriding set of regulations restricting the practice and scope of hypnotists. However, in contrast with North America, European countries have by and large taken a different approach to training and certification. Rather than require graduate level training in a health care profession, most European countries have established medical and non-medical societies of hypnosis with separate training routes. As a result, it would seem that European doctors, psychologists, dentists, and nurses receive a certain kind of hypnotic training while non-medical laypersons receive a different kind of training. It is difficult to tell whether this two-tiered approach to training hypnotists in Europe has had any kind of consequence in terms of the reputation or reliability of hypnosis in Europe.

Another difference between Europe and English-speaking North America is the existence of a standardized European certificate in hypnosis provided by the European Society of Hypnosis. The European society of hypnosis unites 38 different societies from 20 countries and offers a standard minimum curriculum, which can be found in Table I-3

along with the added requirements of each individual hypnosis society. What is striking in table I-3 is the sizeable difference between these different societies in terms of training duration and pre-requisites. In Austria, for example, the Society of Applied Depth-Psychology and General Psychotherapy – which trains its members in hypnosis – requires 300 hours of theoretical coursework followed by 1600 hours of supervised practicum, culminating in a thesis and colloquium presentation. Contrast that with the Milton Erickson Society in Austria which only requires 60 hours of supervised training for certification. Some countries, like Germany and Switzerland, are more standardized in their requirements and expectations but the general rule in Europe seems to be the absence of rules and a large degree of freedom when it comes to designing a curriculum for hypnosis training (e.g. Austria, Italy).

Table I-3: Hypnotherapy training in certain European countries and Israel

Country / Region	Professional Organization	Prerequisites	Training Duration
Europe	European Society of Hypnosis – uniting 38 constituent societies in 20 European countries	No prior training required	European Certificate of Hypnosis (ECH) requires 50 hours of foundational training, 50+ hours of supervision, two years of clinical work following training; 100+ hours of continuing education (over unspecified period)
Austria	Milton Erickson Society for Clinical Hypnosis and Brief Therapy	Psychotherapists, doctors, dentists, students of psychotherapy	60 hours of supervised hypnosis, multiple seminars
Austria	Austrian Society of Applied Depth-Psychology and	No prior training required	300 hours of theoretical coursework, 1600 hours of supervised hypnotic work, a

	General Psychotherapy		thesis and a colloquial presentation
Finland	Tieteellinen Hypnoosiry, Vetenskaplig Hypnos rf	No prior training required	organized by The University of Tampere together with Society of Scientific Hypnosis; includes basic courses and a three-year education in hypnotherapy
France	Association Française d'Hypnose	No prior training required	Various durations of training but no certifying examination nor minimum number of supervised hours
France	Milton H Ericsson Institute Occitanie Toulouse	Medical and paramedical professionals only	154 hours of training, no specified examination
Germany	Deutsche Gesellschaft für Ärztliche Hypnose und Autogenes Training	Medical doctors specializing in psychiatry or psychosomatic therapy	184 total hours of supervised and unsupervised training, no specified examination
Germany	Deutsche Gesellschaft für Hypnose	Psychotherapists, doctors, dentists	184 total hours of supervised and unsupervised training, no specified examination
Germany	Deutsche Gesellschaft für zahnärztliche Hypnose	Dentists	184 total hours of supervised and unsupervised training, no specified examination
Germany	Milton Erickson Gesellschaft für Klinische Hypnose	Psychotherapists, doctors, dentists, students of psychotherapy	184 total hours of supervised and unsupervised training, no specified examination
Israel	Israeli Ministry of Health	Requires license from Israeli Ministry of Health to practice medicine,	Graduation certificate from hypnosis studies at Israeli university or private hypnosis school recognized by the Ministry of Health

		dentistry, or psychology	
Italy	Association Atelier Dell'Anima – Centro Studi Di Psicologia Del Profondo E Ipnosi Clinica	No prior training required	Day-time and night-time courses but without a specified course structure towards certification, no specified examination
Italy	Associazione Medica Italiana Studio Ipnosi	Psychotherapists, doctors, dentists, students of psychotherapy	220 h of coursework per year for 4 years, no specified examination
Italy	Centro Italiano di Ipnosi Clinico-Sperimentale	No prior training required	Coursework over 3 weekends with a thesis requirement, no specified examination
Italy	Societa Italiana Di Ipnosi	No prior training required	4 years, 500 hours per year, of which 150 per year are clinical supervision
Italy	Scuola de Psicoterapia Psicosintetica ed Ipnosi Ericksoniana H. Bernheim	No prior training required	4 years, 500 hours per year, broken down into 278 of lectures, 150 of clinical supervision, 27 of workshops, 45 of supervised clinical groups, and 40 hours of psychotherapy per year
Spain	Spanish Society for Ericksonian Hypnosis	No prior training required	Unspecified
Spain	Sociedad Catalana de Hipnosis Clínica y Psicoterapia	Unspecified	Unspecified
Switzerland	Gesellschaft für klinische Hypnose Schweiz	Graduate-level training in health care profession	280h over 3 year training schedule involving individual training and supervision
Switzerland	Institut Romand d'Hypnose Suisse	Graduate-level training in health care profession	280h over 3 year training schedule involving individual training and supervision

Switzerland	Swiss Medical Society for Hypnosis	Graduate-level training in health care profession	280h over 3 year training schedule involving individual training and supervision
UK	National Council of Hypnotherapy (NCH)	No prior training required	Hypnotherapy practitioner diploma (HPD) through NCH-accredited school; 3 years of practice with 300 client hours including 18 hours of direct supervision by NCH-accredited hypnotist
UK	Register for Evidence-Based Hypnotherapy and Psychotherapy (REBHP)	No prior training required	120 classroom hours through REBHP-approved training school or HPD
UK	British Society for Clinical and Academic Hypnosis	Graduate-level training in health care profession	60 academic credits for a Bachelors of Science in Clinical Hypnosis but unclear whether this qualifies for practice

References: (E. S. of Hypnosis) (“Milton Erickson Society for Clinical Hypnosis and Brief Therapy”) (“Austrian Society of Applied Depth-Psychology and General Psychotherapy”) (“National Council of Hypnotherapy”) (“International Society of Research and Education in Communication – Cooperation – Liaison Strategies”) (“Osterreichische Gesellschaft Für Wissenschaftliche Hypnose”) (REBHP) (Health) (S. M. S. for Hypnosis; Suisse; Médicale; S. S. for E. Hypnosis; Scuola de Psicoterapia Psicosintetica ed Ipnosi Ericksoniana H. Bernheim; Centro Italiano di Ipnosi Clinico-Sperimentale; Associazione Medica Italiana Studio Ipnosi; Clinica; I. S. of Hypnosis; “Deutsche Gesellschaft Fur Arztliche Hypnose Und Autogenes Training”; Deutsche Gesselschaft für Hypnose; Hypnose; Institute; D’Hypnose; Hannu Lauerma)

In both English-speaking North America and Europe, hypnosis is not reimbursed by insurance unless it is provided by a health care provider such as a doctor, dentist, psychotherapist, or nurse. In both geographic regions, hypnotists who provide their services without a graduate-degree in a health-care profession usually prefer to establish a cash-for-service system with their patients. In the United States, it is unclear whether

HIPAA considerations apply to hypnotists but the major societies of hypnosis recommend to their members to comply with HIPAA regulations as best as possible and to maintain a secure private HIPAA-compliant note-system when taking care of patients (Guild and Reserved).

Neurological Correlates of Hypnotic Responding

The brain activity associated with hypnosis is far from well understood (Jiang et al.). It is, in fact, not altogether clear that a distinct neurophysiological state underlies hypnosis. It has been suggested that the hypnotic state is a simple by-product of expectation and social influence (Sadler and Woody; Mazzoni et al.). This socio-cognitive explanation of hypnosis relies on the importance of expectation, with the very use of the word “hypnosis” and its many cultural associations exerting an undue influence on cognition and behavior in the patient, more so than a change in a neural or mental state (Lynn et al.; Lynn, Laurence, and Kirsch). Evidence for this view comes from research that shows that when test subjects are told to enter a hypnotic state, low hypnotizables (i.e. patients with limited ability to enter a hypnotic trance) tend to focus on everyday concerns while high hypnotizables (i.e. patients who readily enter hypnotic states) focus on exceptional positive experiences, neither of which seems like a particularly unique and consistent brain state (Cardeña et al.). This divide about whether the hypnotic state corresponds to a unique brain state – called the “state versus non-state” debate – has been ongoing for several decades and has been a major point of contention in hypnosis.

Researchers favoring the “state” view of hypnosis have eagerly applied all sorts of brain imaging and recording technologies to patients in varied states of hypnosis or hypno-analgesia. At this time, the latest evidence from fMRI, PET and EEG studies seems to indicate that the hypnotic state – in its various stages -- involves changes in activity of certain brain circuits. Multiple studies have found that hypnosis is associated with decreased activity of a brain network called the default mode network or DMN. Associated with internal attention and mind-wandering, the DMN includes the posterior cingulate cortex (PCC) and other midline brain areas including the medial prefrontal cortex (mPFC) (Mason et al.; Christoff et al.). These brain areas making up the DMN are activated and connected during rumination and rest, but are deactivated whenever task-associated concentration, as in hypnotic induction, is required (Seeley et al.; Supekar et al.; Greicius and Menon).

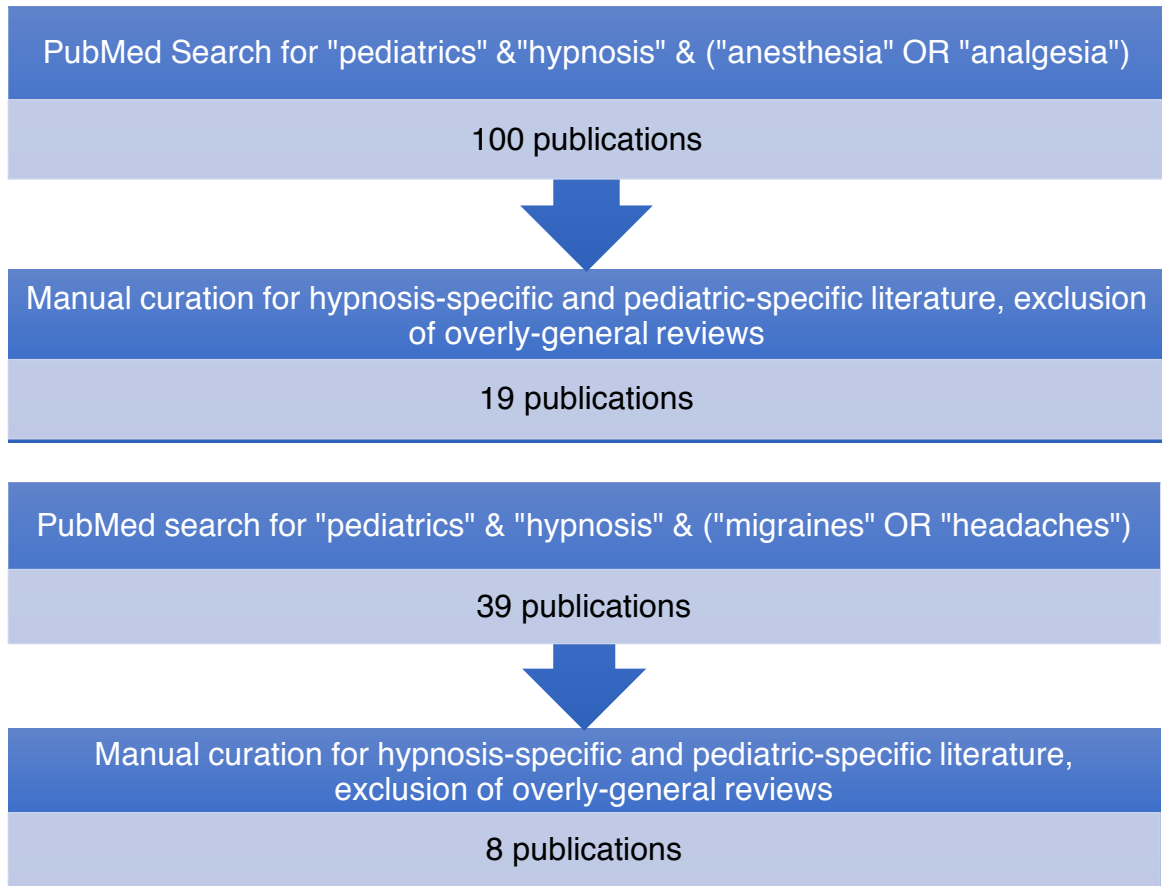
Also associated with hypnosis is the activation of two large brain systems involved in higher-order cognition. The first, called the central executive network (CEN) or executive control network (ECN), consists of bilateral dorsolateral prefrontal cortices (DLPFC) and the superior parietal cortices (Jiang et al.). It is usually recruited during periods of focused attention and memory-associated tasks, as in hypnotic induction (Seeley et al.). The second brain system, called the salience network (SN), comprised of the dorsal anterior cingulate cortex (dACC), frontoinsula cortex, and certain subcortical regions like the hypothalamus, is also involved in tasks requiring concentration and focus (ibid.; Jiang et al.).

In sum, it seems that from a neurological standpoint, hypnosis is associated with both an activation of brain systems involved in focused concentration (ECN and SN) but is also associated with deactivation of brain circuits responsible for self-related, ruminating thoughts (the DMN) (Landry, Lifshitz, and Raz).

II. Methodology

This thesis is a literature review of the clinical uses of hypnosis in pediatrics, specifically for pediatric anesthesia and pediatric headache and migraines. It is not intended to replicate the thoroughness and rigorous approach of a systematic review. Moreover, this thesis does not represent an effort to answer a specific clinical question nor does it attempt to extract data to power a meta-analysis. The aim here is to get a sense for the primary research in hypnotherapy for pediatric anesthesia and pediatric headaches.

The PubMed database was first searched using the terms “pediatrics” AND “hypnosis”, AND “anesthesia” OR “analgesia” in all fields, resulting in 100 publications. A second search used the terms “pediatrics” AND “hypnosis”, AND “headache” OR “migraine”, resulting in 39 publications. Studies were manually curated and studies not dealing with hypnosis or children were not included. Case reports, clinical studies, meta-analysis, randomized trials, and systematic reviews were included. Non-systematic reviews of a general nature were not included. Studies dealing with abdominal migraines were not included. Each publication was assigned a level of clinical evidence using the Oxford 2011 levels of evidence (OCEBM Levels of Evidence Working Group et al.).



III. Results

For the sake of simplicity, the results for pediatric anesthesia were subdivided into two categories: 'general anesthesia and perioperative pain' and 'analgesia (acute/chronic pain)'. The results for pediatric headaches and migraines were considered as a single category.

Hypnosis in Pediatric General Anesthesia and Perioperative Pain

Publications on hypno-anesthesia, or the use of hypnosis in the setting of general anesthesia and in the perioperative period, suggest that hypnosis can be useful in the setting of pediatrics. On this topic, my literature search resulted in one recent systematic

review, three clinical studies, three case reports, and one expert opinion. The systematic review by Adinolfi et al. suggests that hypnosis is effective for anxiolysis in the perioperative period and for local anesthesia. This review is supported by expert opinion (Cohen-Salmon) and finds some degree of confirmation through three very different case reports. The first (Iserson) case report deals with four children whose angulated forearm fractures were set with hypnosis rather than general anesthesia as the latter was unavailable. A second and much older case report from 1978 (Lewenstein) reports two cases of successful postoperative suture adjustment with hypnosis in the setting of strabismus correction surgery, where general anesthesia was not recommended. A third and more recent case report involves three children who received hypnosis for immobilization in the setting of radiotherapy, again in a setting where general anesthesia was not possible.

Much like the case reports on this topic, the three clinical studies were very different in terms of both study design and topic. The oldest study (Lu), done in 1994, showed that in 13 patients with known histories of violent reactions in the post-operative setting, sedation with a combination of ketamine and hypnosis was effective in reducing postoperative anxiety and violence. However, this was not a controlled trial with a placebo arm or a control arm. A later study in 2006 (Lobe) was a small clinical study in which patients were non-randomly assigned to epidural catheter alone vs hypnosis and patient-controlled analgesia (PCA) for the post-operative pain management of the Nuss procedure for pectus excavatum. Though the patients receiving hypnosis spent fewer days in the hospital and had decreased use of narcotics compared to the epidural group,

the study was undermined by small numbers and the lack of a more typical control arm (i.e. PCA alone vs hypnosis and PCA, for example). The most recent clinical study by Claude et al. (2016) is a retrospective analysis of 132 children who were sedated for radiotherapy either through general anesthesia or through hypnosis. Their team found that in this single radiotherapy center in France the preference for hypnosis over general anesthesia was consistent over time and independent of the kind of radiotherapy.

Overall, these studies are too few in number and too diverse in scope to be able to conclude much with regards to the role of hypnosis in general anesthesia. However, they do suggest that further research is warranted for hypnosis in the perioperative period for orthopedics and ophthalmology and for the purposes of immobilization in the setting of radiotherapy.

Table III-1: Studies involving hypnosis in pediatric general anesthesia

Author & Year	Publication type & Study design	Results
Adinolfi B et al. (2013)	Systematic review (Level 1) <u>Study design:</u> Systematic review of controlled studies involving hypnosis in children for invasive medical procedures	Hypnosis is an effective method to reduce pain and anxiety before, during and after the administration of anesthetics, during local dental treatments, invasive medical procedures and in burn children. Hypnosis can be successfully used to manage recurrent headaches, abdominal pain, irritable bowel syndrome and chemotherapy-related distress.
Iserson KV (1999)	Case report (Level 4)	4 children with angulated forearm fractures who had no possible access to other forms of analgesia during reduction, and in whom hypnosis was used

		successfully. More studies are needed to confirm the use of hypnosis as an analgesic or anesthetic during pediatric fracture reduction
Lewenstein L (1978)	Case report (Level 4)	11 year -old boy and 6 year-old boy, both status-post strabismus correction surgery, were hypnotized for postoperative suture adjustment. The child maintained immobility of the extraocular muscles and cooperated with the surgeon throughout the case. Neither boy reported pain. More studies are needed to confirm the valid use of hypnosis in post-operative suture adjustment in pediatric ophthalmology.
Cohen-Salmon D (2010)	Literature review and expert opinion (Level 5) <u>Study design:</u> The relevant literature since the 1940s has been collected from the Medline database, using the keywords: child, operation, anxiety, distress, postoperative complications, preparation, premedication, parental presence, prevention.	Suggested strategies for reducing child distress include preoperative preparation, premedication, parental presence during anesthesia induction, and interventions affecting the child's environment, such as hypnosis.
Bertoni F et al. (1999)	Case report (Level 4)	We report three cases of children who underwent radiotherapy in 1994 and were treated using hypnosis for set-up during irradiation. Hypnosis was used during treatment to obtain the indispensable immobility. Every single fraction of the radiation therapy was delivered in hypnosis and without the need for narcosis. Hypnosis may be useful in particular situations to prepare pediatric cancer patients during

		irradiation, when lack of collaboration might necessitate the use of general anesthesia and when anesthesia itself is not possible.
Lobe T (2006)	Clinical study (Level 4) <u>Study design:</u> 10 consecutive patients (age range, 12-18 years) underwent the Nuss procedure with the same operative technique. For pain management they were divided into two sequential groups: the 5 patients in the non-hypnosis group were managed with an epidural catheter, and analgesia was supplemented with intravenous or oral narcotics as requested. The second group of 5 patients received instruction in self-hypnosis for postoperative pain management in one or two brief sessions. These patients were allowed patient controlled analgesia and were supplemented with intravenous or oral narcotics as requested.	The patients in the hypnosis group spent an average of 2.8 days in the hospital compared with 4.6 days in the non-hypnosis group ($p < 0.01$). There was also a trend toward less parenteral narcotic use. Postoperative discomfort was better controlled with oral analgesics in the hypnosis group. There were no adverse effects from the hypnosis.
Lu DP (1994)	Clinical study (Level 4) <u>Study design:</u> 13 pedodontic patients were selected for ketamine sedation combined with hypnosis. The patients ranged from 4 to 11 years of age, and all had previous histories of violent emotional reactions before and after dental treatment.	The combination of hypnosis and sedation can be an effective modality in the management of uncooperative pedodontic patients.
Claude L et al. (2016)	Clinical study (Level 4) <u>Study design:</u> Study aimed to evaluate the role of hypnosis in pediatric radiotherapy (RT). Data on 132 children was retrospectively collected on use of	There was significant reduction ($P < 0.1$) in the use of GA after 2008. The use of GA was not significantly associated with the RT techniques. The patients more likely to undergo RT without GA were the oldest and

	general anesthesia (GA) in children < 5 years treated by RT from 2003 to 2014 in a center in Lyon, France. Two time periods, prior to and after 2008, were compared, the latter having seen the introduction of hypnosis alone for anesthesia.	the patients treated for abdominal lesions ($P<0.01$). The study confirms that hypnosis can be used instead of GA in certain pediatric populations.
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References: (Adinolfi and Gava) (Iserson) (Lewenstein) (Cohen-Salmon) (Bertoni et al.)(Lobe)(Lu)(Claude et al.)

Pediatric Analgesia (Acute and Chronic Pain)

The use of hypnosis for acute procedural pain, needle phobia, and chronic pain – especially in the setting of dentistry -- is more robustly documented in the literature than is hypnosis for many other uses. On this topic, my literature search resulted in one recent systematic review, five randomized clinical trials, two non-randomized clinical studies, and two case reports.

The systematic review by Richardson et al. in 2006 looked at a large number of databases, including complementary and alternative medicine databases, to analyze the role of hypnosis in procedure-related pain and distress in pediatric cancer patients. The review found a total of seven randomized clinical trials and one controlled trial, which overall showed positive results with significant reductions in pain and distress through hypnosis. The authors insisted on the need for further research in this area given the methodological limitations of many of these trials.

Included in Richardson's review is a randomized trial by Womack in 1989 which studied hypnosis versus an active cognition approach for procedurally-induced pain and anxiety. Twenty pediatric patients received bone marrow aspiration or lumbar puncture

after having received either hypnosis or an active cognition approach. Pain was evaluated through several pain scales, with pulse and temperature also recorded. Both approaches showed pain reduction, but neither showed anxiety reduction.

Not included in that systematic review was the controlled clinical study of Gokli et al. published in 1994.³ This study looked at the role of hypnosis in calming dental procedural anxiety in 29 children. The children served as their own controls as the procedure (injection of local anesthesia) was performed once with hypnosis and once without. The children were videotaped during the procedure, and their behavior was rated independently by two pediatric dentists using a pain scale. Pulse oximetry data was also recorded during the procedures. The study showed no statistically significant difference in oxygen saturation but did find significant decreases in pulse rate and crying that were attributable to hypnosis and to the patient's age, with younger patients showing improved behavior (less crying) compared to older patients.

Since Richardson's review in 2006, there have been several other published randomized trials. Liossi et al. published a protocol (2006) and results (2009) of a study to compare the use of local anesthesia (EMLA) with the use of EMLA and self-hypnosis for relief of venipuncture pain and anxiety in 45 pediatric cancer patients. Patients were randomized to EMLA alone, EMLA with hypnosis, and EMLA with focused attention. The study showed decreased anticipatory anxiety and decreased procedure-related pain than EMLA alone and EMLA with focused attention.

³ The study by Gokli et al was not excluded from the review. It simply seems not to have been identified within the databases used by Richardson et al

Another randomized trial was published in 2005 by Butler et al. Their team randomized 44 children receiving voiding cystourethrogram (VCUG) to either hypnosis or standard care. The study revealed that hypnosis led to decreased distress as perceived by parents, as perceived by medical staff, and also led to decreased procedure time and easier procedure overall.

Oberoi et al. published the most recent randomized clinical trial in which they randomized 200 6-16-year-olds to either a control group or an experimental group that received hypnotic induction prior to the delivery of local anesthesia. The children were monitored for signs of resistance to the use of local anesthesia as well as for changes in pulse and oxygen saturation at baseline and during the injection of local anesthetic. The results were similar to Gokli's 1994 study with hypnotized children showing significantly fewer signs of physical and verbal resistance and with decreased pulse rate, both attributable to hypnosis.

Another randomized clinical trial is underway in this area. Chester et al. have published a protocol for a randomized study of hypnosis in the setting of pediatric burns. The study will randomly assign children (4 - 16 years) with acute burn injuries presenting for their first dressing application to either medical hypnosis or standard care. The study will look at degrees of stress, anxiety, and speed of wound re-epithelization in the two groups (33 children per arm) until 95% of the wound is fully re-epithelialized.

Finally, a recently published randomized clinical trial by Ramirez-Carrasco et al suggests that the effect of hypnosis on analgesia is relatively minor. In this study, 40 children (5-9 years) were randomized to either hypnosis instructions (through a headset)

or a noise-blocking headset prior to local anesthetic injection. Anxiety and pain were evaluated using the FLACC scale during the delivery of the anesthetic agent. Changes in pulse rate and skin conductance before and during the injection were also recorded. Only a minor statistical difference (decrease, $p = 0.05$) in pulse rate was observed between the control group and the hypnosis group, while FLACC scores and skin conductances were not statistically different between the groups.

Overall, there is a fair amount of evidence to suggest that hypnosis is a helpful adjunct to reduce stress and anxiety during painful procedures that range from venipuncture to local dental anesthetic infiltration. While the examples of hypnosis from the dental literature are relatively abundant, there are fewer trials looking at hypnosis to reduce stress during venipuncture and other painful inpatient procedures. Such studies would prove invaluable as blood draws and other invasive procedures are among the most stress-inducing measures performed on children in the inpatient setting. Multi-center randomized studies looking at combination therapy (e.g. EMLA with hypnosis vs EMLA alone, nitrous with hypnosis vs nitrous alone) would also be a significant contribution to our understanding of how to best alleviate stress and anxiety in our pediatric patients during painful procedures.

Other clinical studies and case reports are documented in table III-2.

Table III-2: Publications regarding hypnosis and pediatric analgesia

Author & Year	Publication type & Study design	Results
Liossi C et al. (2006 & 2009)	Randomized clinical trial (Level 2)	Results confirmed that patients in the local anesthetic plus hypnosis group reported less

	<u>Study design:</u> A controlled trial was conducted to compare the efficacy of a local anesthetic (EMLA) versus a combination of EMLA with self-hypnosis in the relief of venipuncture-induced pain and anxiety in 45 pediatric cancer outpatients (age 6-16 years). A secondary aim of the trial was to test whether the intervention will have a beneficial effect on parents' anxiety levels during their child's procedure. Patients were randomized to one of three groups: local anesthetic, local anesthetic plus hypnosis, and local anesthetic plus attention.	anticipatory anxiety, and less procedure-related pain and anxiety, and were rated as demonstrating less behavioral distress during the procedure than patients in the other two groups. Parents whose children were randomized to the local anesthetic plus hypnosis condition experienced less anxiety during their child's procedure than parents whose children had been randomized to the other two conditions.
Gokli MA et al. (1994)	Controlled clinical study (Level 3) <u>Study design:</u> investigate the acceptance of local anesthetic injection, utilizing hypnosis in 29 children, ages 4-13 years. Each subject was evaluated twice, once utilizing hypnosis before injection, and once without. A double-blind research design was used to avoid effects of expectancy. Subjects in the study were videotaped during the procedure. Their behavior was rated independently by two pediatric dentists, using the North Carolina Behavior Rating Scale (NBRS). Transcutaneous pulse oximetry data were also recorded for each subject. The resulting data were evaluated for statistically significant differences between the two methods and for interrater reliability.	Results showed no statistically significant differences in oxygen saturation due to hypnosis condition, order of treatment, sex, race, or age. Statistically significant differences were found in pulse rate and behavior, attributable to hypnosis condition and age, but not to sex, race, or order of treatment. Pulse rate decreased with hypnosis, as did crying. The hypnosis condition seemed to be more successful with younger children (four to six years old).
Richardson J et al. (2006)	Systematic review (Level 1) <u>Study design:</u> A comprehensive search of major biomedical and	Studies report positive results, including statistically significant reductions in pain and anxiety/distress, but a number of

	specialist complementary and alternative medicine databases was conducted to critically appraise the evidence on the effectiveness of hypnosis for procedure-related pain and distress in pediatric cancer patients. Citations were included from the databases' inception to March 2005. Efforts were made to identify unpublished and ongoing research. Controlled trials were appraised using predefined criteria. Seven randomized controlled clinical trials and one controlled clinical trial were found.	methodological limitations were identified. Systematic searching and appraisal has demonstrated that hypnosis has potential as a clinically valuable intervention for procedure-related pain and distress in pediatric cancer patients. Further research into the effectiveness and acceptability of hypnosis for pediatric cancer patients is recommended.
Butler LD et al. (2005)	Randomized clinical trial (Level 2) <u>Study design:</u> 44 children who were scheduled for an upcoming VCUG were randomized to receive hypnosis (n = 21) or routine care (n = 23) while undergoing the procedure. Outcomes included child reports of distress during the procedure, parent reports of how traumatic the present VCUG was compared with the previous one, observer ratings of distress during the procedure, medical staff reports of the difficulty of the procedure overall, and total procedural time.	Results indicate significant benefits for the hypnosis group compared with the routine care group in the following 4 areas: (1) parents of children in the hypnosis group compared with those in the routine care group reported that the procedure was significantly less traumatic for their children compared with their previous VCUG procedure; (2) observational ratings of typical distress levels during the procedure were significantly lower for children in the hypnosis condition compared with those in the routine care condition; (3) medical staff reported a significant difference between groups in the overall difficulty of conducting the procedure, with less difficulty reported for the hypnosis group; and (4) total procedural time was significantly shorter-by almost 14 minutes-for the hypnosis group compared with the routine car

Womack W (1989)	Randomized clinical trial (Level 2) <u>Study design:</u> This study provided a differential comparison of the efficacy of standardized instruction in hypnosis versus active cognitive strategy for provision of relief from procedurally induced pain and anxiety. 20 pediatric oncology patients participated in the study. They were not informed that hypnosis was one of the strategies. Subjects were screened for hypnotizability and randomly assigned to treatments. Demographic data were collected. Pre-strategy training observations were made during a bone marrow aspiration or lumbar puncture using visual analog scales, the McGill Pain Questionnaire, State-Trait Anxiety Inventory, pulse and temperature readings, and interview. Following strategy training, data were collected during a second BMA/LP using the same measures as employed pre-intervention.	Results indicated that both strategies were effective in providing pain reduction. Neither technique provided for anxiety reduction. Hypnotizability scale scores failed to correlate with degree of pain reduction.
Ramirez-Carrasco A (2017)	A randomized controlled clinical study (Level 3) <u>Study design:</u> 40 healthy children (16 boys and 24 girls) aged 5 to 9 years were randomized to either hypnosis through a headset or standard care (noise-blocking headsets). To be included in the sample, patients must have never received dental care and had to be seeking attention at the Pediatric Dentistry Clinic at the Autonomous University of San Luis Potosí for the first time and their dental treatment had to include a local	A marginal statistical difference ($p = 0.05$) was found in the heart rate between baseline and anesthetic moment, being lower in the hypnosis group. No statistically significant differences were found with the FLACC scale or in the skin conductance ($p > 0.05$).

	anesthetic. Anxiety/pain were assessed with the FLACC scale during the anesthetic moment, as well as heart rate variability and skin conductance before and during the anesthetic moment, between the control and experimental group.	
Oberoi, J et al. (2016)	Randomized clinical trial (Level 2) <u>Study design:</u> 200 6-16-year-olds were randomly allocated to either a control group or an experimental group that received hypnotic induction prior to the delivery of local anesthesia. Subjects were monitored for signs of physical or verbal resistance and changes in pulse rate and oxygen saturation at baseline and upon administration of local anesthetic.	Children under hypnosis exhibited significantly less resistance to administration of local anesthesia ($P < 0.05$). A bi-serial correlation for age and resistance showed a significant positive correlation (0.337) in the experimental group, indicating that resistance in children increases with age, but none was shown between gender and hypnotic suggestibility. There was a significant difference in pulse rate, attributable to the hypnotic condition ($P = .000$), but not in oxygen saturation level.
Gottlieb M (2011)	Case report (Level 5)	10 year old boy received dental abscess extraction under hypnosis combined with oral sedation.
Peretz B (1996)	Case report (Level 5)	An extremely anxious 13-year-old girl was hypnotized using a confusion technique in the setting of dental procedure
Peretz B et al (2000)	Clinical study (Level 3) <u>Study design:</u> 80 children between the ages of 3 – 16 years and who required at least one injection of local anesthesia were monitored. Retrospective examinations of their dental records provided the information regarding the behavior and dental treatment histories of the patients. During the first	Image selection and visualization had no association with gender, age, the parent's assessment of the child's behavior, previous dental experience, behavior (both past and present) or, management techniques (both past and present). The lack of a control arm of this study limits the interpretation of whether or not

	treatment session, before the injection, each child was asked to select a favorite, pleasant memory or image. After an image had been chosen, the patients were asked to concentrate on the image and to visualize it during the procedure.	guided imagery reduces pain and anxiety in the setting of procedures.
Chester SJ et al. (2016)	Protocol for a single-center, superiority, parallel-group, prospective randomized controlled trial <u>Study design:</u> Children (4 to 16 years, inclusive) with acute burn injuries presenting for their first dressing application or change are randomly assigned to either the (1) intervention group (medical hypnosis) or (2) control group (standard care). A minimum of 33 participants are recruited for each treatment group. Repeated measures of pain, anxiety, stress, and wound healing are taken at every dressing change until $\geq 95\%$ wound re-epithelialization. Further data collection assesses impact on posttraumatic stress symptomatology, speed of wound healing, and parent perception of how easy the dressing change is for their child	Results pending

References: (Liossi, White, and Hatira) (Gokli et al.)(Richardson et al.)(Butler et al.)(Womack) (Ramirez-Carrasco et al.) (Oberoi, Panda, and Garg) (Gottlieb) (Peretz) (Peretz and Bimstein)(Chester et al.)

Pediatric Headaches and Migraines

A literature search for the role of hypnosis in pediatric migraines and headaches resulted in one systematic review, one randomized clinical trial, two retrospective studies, one clinical study, two case reports, and one expert opinion.

A systematic review by Holden et al. examined thirty-one investigations published after 1980. Each publication was reviewed using predetermined criteria to evaluate the adequacy of research methodologies. The study concluded that relaxation and self-hypnosis techniques are useful in the setting of recurrent headaches, and that combination treatment with biofeedback methods may also prove useful.

The only randomized trial involving hypnosis in the management of pediatric headaches and migraines was published by Olness et al in 1987. Three treatment arms – self-hypnosis, propranolol, and placebo -- were compared for the treatment of juvenile classic migraine. Twenty-eight children aged 6 to 12 years with classic migraine, not receiving any therapy, were randomized to receive either propranolol (at 3 mg/kg/d) or placebo for a 3-month period and then crossed over for 3 months. After this 6-month period, every child was instructed in self-hypnosis and was asked to use it for 3 months. During the placebo period, each child averaged about 13.3 headaches compared to 14.9 during the propranolol period and 5.8 during the self-hypnosis period. There was a statistically significant association between the decrease in headaches and self-hypnosis training (p-value .045) but no statistically significant change in the subjective or objective measures of headache severity.

While not a randomized or controlled study, a clinical study by Anbar et al. adds to the evidence in favor of hypnosis for the management of pediatric headaches. He and his colleagues studied thirty children with headaches (mean age, 15 years; mean duration of headache occurrence: 3 years). They were instructed in hypnosis-induced relaxation and, through self-reporting, 96% reported decreases in headache frequency and intensity.

A retrospective study by Kohen et al. also suggests a role for self-hypnosis in pediatric headache and migraine management. He and his colleagues reviewed the clinical records of 178 children referred to the Behavioral Pediatrics program at the University of Minnesota from 1998 to 2001 for recurrent headaches. All of these children were taught self-hypnosis for management of their headaches. The severity and frequency of their headaches were recorded before and after the instruction in self-hypnosis. By comparing these self-reports prior to learning self-hypnosis, Kohen et al. found that children reported a decrease in frequency of headaches from an average of 4.5 per week to 1.4 per week ($p\text{-value} < .01$). They also reported a decrease in the intensity of their headaches (scale of 0 to 12) from an average of 10.3 to 4.7 ($p\text{-value} < .01$), as well as a decrease in the average duration from 23.6 hours to 3.0 hours ($p\text{-value} < .01$).

In sum, a fair number of studies suggest an important role for hypnosis – especially self-hypnosis combined with biofeedback – in the management of pediatric headaches. The consistent finding, in systematic reviews and various clinical studies, that self-hypnosis leads to decreased frequency and intensity of recurrent headaches should stimulate further research about how best to introduce self-hypnosis to patients in the clinical setting. The literature on hypnosis in the management of migraines, however, is far more sparse. Additional research on hypnosis in migraines is certainly needed as the only study identified in this literature review shows great promise when compared to either placebo or propranolol treatment. Additional case reports and an expert opinion, along with the highlights of these previously-mentioned studies, are featured in table III-3.

Table III-3: Publications on hypnosis in the management of pediatric headaches and migraines

Author & Year	Publication type & Study design	Results
Kohen DP (2011)	Case report (Level 5)	2 adolescents with continuing chronic daily headaches were taught self-hypnosis through careful attention to individual strengths and finding the hypnotic elements within the clinical encounters. Self-reports of intensity, frequency, and duration of headaches described substantial benefit from learning and practicing self-hypnosis after little to no benefit from pharmacologic and other non-pharmacologic therapies. These results and analogous success with several other adolescents with chronic daily headache support the further use of self-hypnosis training for this condition.
Kohen DP et al. (2007)	Retrospective review (Level 4) <u>Study design:</u> A retrospective review was conducted of outpatient clinical records of 178 consecutive youths referred to the Behavioral Pediatrics Program (University of Minnesota) from 1988 to 2001 for recurrent headaches. All patients were taught self-hypnosis for self-regulation. Intensity, frequency, and duration of headaches before, during, and after treatment were measured. Outcomes included number and frequency of visits, types of medication, and nature of self-hypnosis practice.	Compared with self-reports before learning self-hypnosis, children and youths who learned self-hypnosis for recurrent headaches reported reduction in frequency of headache from an average of 4.5 per week to 1.4 per week ($P < .01$), reduction in intensity (on a self-rating scale of 0 to 12) from an average of 10.3 to 4.7, $P < .01$, and reduction in average duration from 23.6 hours to 3.0 hours, ($P < .01$). There were no adverse side effects of self-hypnosis.

Anbar, RD (2008)	Case report (Level 5)	2 adolescents were hospitalized with incapacitating symptoms: one with headache, back pain, and an inability to walk, while the other had headache, musculoskeletal pain, nausea, and emesis. Medical evaluation did not reveal an etiology for the symptoms of either patient. Both demonstrated an immediate improvement of their symptoms with instruction in self-hypnosis-induced relaxation techniques that included favorite place imagery and progressive relaxation.
Anbar RD, Zoughbi GG (2008)	Clinical study (Level 4) <u>Study design:</u> 30 children with headaches (mean age, 15 years) were evaluated for psychosocial stressors and the role of insight generation in the outcome of hypnosis therapy. The mean duration of headache occurrence was 3 years. All of the patients were instructed in how to use hypnosis-induced relaxation to improve their symptoms.	96% reported a decrease in headache frequency and/or intensity following use of hypnosis.
Kroner-Herwig, B (2011)	Expert opinion (Level 5)	There is only scarce evidence on the role of hypnosis and acceptance and commitment therapy in headache management, although they seem to be promising. Future research needs to focus on mechanisms of change, and to extend its view of effects induced by therapy beyond headache improvement to indicators of quality of life.

Holden EW et al. (1999)	Systematic review (Level 1) <u>Study design:</u> Thirty-one investigations published after 1980 were reviewed using predetermined criteria to evaluate the adequacy of research methodologies. A modification of criteria proposed for evaluating the efficacy of psychological interventions for adults (Task Force on Promotion and Dissemination of Psychological Procedures, 1995) was used to evaluate the adequacy of evidence available for individual intervention strategies.	Sufficient evidence exists to conclude that relaxation/self-hypnosis is a well-established and efficacious treatment for recurrent headache. Furthermore, enough evidence exists to conclude that thermal biofeedback alone is a probably efficacious treatment. Other promising interventions have been tested that combine relaxation and biofeedback or integrate other cognitive-behavioral treatment approaches, but are limited by inadequate research
Smith W (1989)	Retrospective observational study (Level 4) <u>Study design:</u> the relationship between intrinsic patient factors and clinical outcome was analyzed in 100 children and adolescents with recurrent headache who were enrolled in a behavioral treatment program.	No correlation between age, sex, headache type, hypnotizability, and clinical outcome.
Olness K (1987)	Randomized clinical trial (Level 2) <u>Study design:</u> Propranolol, placebo, and self-hypnosis were compared for the treatment of juvenile classic migraine. 28 children aged 6 to 12 years with classic migraine who had no previous specific treatment were randomized into propranolol (at 3 mg/kg/d) or placebo groups for a 3-month period and then crossed over for 3 months. After this 6-month period, each child was taught self-hypnosis and used it for 3 months.	The mean number of headaches per child for 3 months during the placebo period was 13.3 compared with 14.9 during the propranolol period and 5.8 during the self-hypnosis period. Statistical analysis showed a significant association between decrease in headache frequency and self-hypnosis training ($P = .045$). There was no significant change in subjective or objective measures of headache severity with either therapy.

References: (Kohen) (R. D. Anbar) (Anbar and Zoughbi) (Kroner-Herwig) (Holden, Deichmann, and Levy; Smith, Womack, and Chen)(Olness)

IV. Conclusion

Managing pain and anxiety is a significant challenge for pediatricians. Infants, children, and teenagers – especially those with severe needle phobia -- can experience significant degrees of stress and anxiety during vaccinations or venipunctures. Headaches and migraines – another significant source of pain and anxiety for children and adolescents – can be difficult to treat with conventional pharmaceutical approaches.

Hypnotherapy, or the use of hypnosis to achieve a therapeutic outcome, has a long history of providing some degree of somatic analgesia and anxiolysis. That history – while in some ways sullied by the charlatanism of people like Mesmer – remains largely a history of heretofore unexplained successes, both in psychological and medical applications. With the increased interest in complementary and alternative medicines in many modern countries, there has been renewed interest in hypnosis, both scientifically and clinically. That interest is likely to combine synergistically with the equally robust growth in relaxation and mindfulness techniques that are well-established in the psychological literature. It is not unreasonable to think that these combinations – hypnosis with relaxation, mindfulness, and even biofeedback – could become part of a multi-modal approach to pain and anxiolysis in the near future.

Given these trends in pain and anxiety management, it would behoove us as a medical and research community to keep an open mind about the therapeutic possibilities of hypnosis and to encourage further research – both clinical and fundamental – in the

applications and mechanisms of hypnosis. From a scientific standpoint, questions about the neural state underlying the hypnotic state ought to remain the central focus, as identifying that state or set of states would allow for more rigorous studies of the analgesic and anxiolytic effects of hypnosis in different scenarios and might grant pain scientists a deeper insight into the neural mechanisms of pain and anxiety.

From a clinical standpoint, it seems clear that uses of hypnosis in both internal medicine and pediatrics are going to continue to multiply. As a result, it will become increasingly important to subject these applications to rigorous examination, including randomized clinical trials. However, the most difficult aspect in evaluating the utility of hypnosis will probably continue to be the wide variety of hypnotic techniques and induction strategies that exist. If hypnosis is to achieve a firm foothold in clinics, at least in North America, its practitioners will likely have to establish a standard set of protocols, suggestions and hypnotic techniques (i.e. a standard approach to hypnotic induction for a certain age group). Standardization would then allow for the study of much larger patient groups in multi-center studies and might even allow the possibility of meta-analysis. Like many medical therapies in which the mechanism of action is not well-understood (e.g. vagal nerve stimulation), it may not be strictly necessary to understand the neural mechanism by which hypnotherapy works in order to have it available in clinics and hospitals. But it should be both possible and desirable to construct large studies of hypnosis – with commonly agreed upon induction approaches or relaxation techniques - - that show sizeable therapeutic effects in various clinical scenarios.

In this literature review, we first reviewed the major studies of hypnotherapy for pediatric anesthesia, including both general anesthesia and procedural analgesia. At this time, there is a relatively strong literature arguing in favor of hypnosis for peri-procedural pain relief and anxiolysis. There is limited evidence, however, to suggest that hypnosis can or should be used in scenarios that normally require general anesthesia. More studies, in specific clinical settings such as immobilization for radiotherapy and ophthalmologic procedures, are needed.

We also reviewed the major studies of hypnosis for headaches and migraines in children. While there is increasing evidence to suggest a role for hypnosis in the management of recurrent headaches in children, there is as yet little substantial evidence to suggest a role in migraine headaches, despite one promising study. Studies of hypnotherapy for migraine headaches specifically would be a positive contribution to the field.

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