

Exploring Factors That Influence Children's Growth and Development During a Pandemic

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Abstract

The potential long-term impacts of natural or man-made disasters on children and adolescents have been the subject of numerous scientific research studies over the past decades. Since the rise of the COVID-19 pandemic, however, it has become even more important to continue these investigations in order to address the special needs of our youth. While the virus itself appears to cause less pathology in them compared to adults, the effects go beyond the disease itself. The pandemic has caused extremely high levels of stress for both the children and their families. As a result, special attention has to be given to the possible long-term impacts on their growth and development. It is very important for physicians and other healthcare providers to recognize the signs and symptoms of stress and monitor for physical and mental health inequities, and to be able to provide support when help is needed. Identifying culturally effective solutions and reaching out to community based organizations or partners for resources and programs with which families identify is an important part of this healing provision. Mind-body therapies and practices such as meditation, visualization, breathing exercises, Movazeneh[®], and Tamarkoz[®] are effective complementary therapies that can be utilized in pediatrics and help children and adolescents learn self-care skills that they could apply throughout their lives. Health providers should become educated in these safe and noninvasive techniques themselves, and consider them as possible therapeutic approaches for the treatment of stress in their pediatric patients.

Keywords

stress, Covid-19, mind-body therapies, meditation, children, development, growth, Tamarkoz[®], mental health, pandemic

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The potential long-term impacts of epidemics, pandemics, and other forms of natural or man-made disasters on children and families have been the subject of numerous scientific research studies over the past few decades. There have always been inherent difficulties in conducting these types of studies due to the ethical, practical, and methodological challenges that they present. Since the rise of the COVID-19 pandemic, however, it has become even more important to continue these investigations in order to address the needs of our youth. While the virus itself appears to cause less pathology in children compared to adults, for our society's youngest members the effects of this pandemic go beyond the disease itself. Special attention has to be given to the consequences and the long-term impacts on children's growth and their development.¹

The Sustainable Development Goals (SDGs) adopted by the world's leaders in 2015 interlinked global goals

designed by the United Nations as a blueprint for achieving a better and more sustainable future for all of us.² These 17 ambitious goals set out a vision of a world free from poverty, hunger, and disease. Children's health is one of the most important issues within these goals and is at the top of the agenda. The SDGs cannot be achieved without the realization of children's rights to equality, health, education, and wellbeing. During disasters of any kind, it is our youth, particularly the underprivileged and impoverished youth, which are at the greatest risk. Children under the age of 18 years are a particularly vulnerable population when exposed to such events, vulnerable beyond the immediate trauma and harm.³ As we

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have seen with the recent COVID-19 pandemic, children can be affected physically, mentally, emotionally, socially, and through their educational process. In addition, they can be affected differently during a disaster depending on their age. Environmental influences can modify genetic predispositions and affect learning capacities and adaptive behaviors, as well as lifelong physical and mental health and adult productivity.⁴

The human fetus is subject to a host of potential teratogens in utero ranging from infections to a variety of environmental influences. Numerous animal and human research studies have shown that both objective and subjective prenatal distress experienced by pregnant mothers have resulted in cognitive, behavioral, motor, and physical development effects on the newborn. It is also known that the brain doubles in size and babies undergo an extraordinary rate of development during their first year of life.⁵ This crucial early development of the brain depends significantly on social experience, input, and stimulation. A responsive, healthy, stress free, and positively nurturing environment will support the development of language, cognition, the emotional, and social capacities of a baby's brain and its rapidly unfolding architecture. Thus, from the moment a child is born, socialization plays an important role in their development, from learning how to interact with others to language and other interpersonal skills like sharing. Babies born during the COVID-19 pandemic, however, may never have met anyone other than their parents. These babies have not benefited from the stimulus of social contact that is vital to their development. During the early years of life, the anatomical brain structures that govern personality traits, learning processes, emotions, and the ability to cope with stress are established, strengthened, and made permanent. If unused, these structures atrophy. The nerve connections and neurotransmitter networks that are forming during these critical years are influenced by negative environmental conditions as well, such as lack of stimulation, child abuse, or violence within the family. Therefore, how humans develop and learn depends critically and continually on the interplay between an individual's genetic endowment and the nurturance and stimulation that are provided or withheld. Human development hinges on the interplay between nature and nurture and is on a continuum, well into adulthood and beyond.⁶⁻¹⁰ Unfortunately, this important aspect of a child's development is significantly affected during a prolonged and global natural disaster such as the COVID-19 pandemic.

In slightly older children, many may not have had the opportunity to play with other children and missed the learning that comes from this type of direct interaction. This is due to the widespread daycare and school

closures in an effort to slow down the spread of the disease. Therefore, in addition to the limitation of their exercising and reduced physical activities, they simply did not get the cognitive and social stimulation that they would normally get outside their home, resulting in delayed social skills. Additionally, some families have had to separate for a prolonged period of time when a caregiver or a family member became ill. Some may have had to deal with the grief of losing a loved one due to the disease. For many parents, financial strain has also become a major stressor during the COVID-19 pandemic. For those who lost their jobs, paying rent or putting food on their table and providing for their children's needs has been a significant struggle. With housing and food insecurities, the rates of domestic abuse and neglect can therefore increase. Children spending more time in such toxic home environments, where the adults are more stressed than usual, can sustain a huge blow to their sense of well-being, resulting in a much higher stress level for them compared to normal pre-pandemic times.¹¹⁻¹³

Studies comparing the symptoms of post-traumatic stress in parents and children confined in pandemic situations with those of families in normal routines indicate that the stress levels are 4 times higher for children who have been in quarantine.¹⁴ These children do not have the opportunity to escape their home environment due to the closures, and are thus less likely to be identified and supported by schools or social services due to the lack of contact with other adults outside their home. Also, the only support that many parents received has been mostly online since the visits to their doctor's offices or support groups have been drastically reduced. This lack of support structures for families, the financial pressures, and the reduction in contact with health professionals and social workers have resulted in greatly increasing a child's or baby's risk of harm, maltreatment, and even death. A recent cross-sectional study published in the *Journal of American Medical Association* found that the mental disorders and suicidal ideation amongst adolescents aged 14 to 20 years were significantly higher than in comparative studies, with approximately one third of the adolescents reporting suicidal thoughts 1 year after the pandemic began. Additionally, the mental well-being and life satisfaction were significantly lower in 2021 compared with 2018. Depressive symptoms, anxiety symptoms, insomnia, and disordered eating were significantly higher than prior to and in the beginning of the COVID-19 pandemic.¹⁵ These issues have always existed but the current pandemic has made them even more visible and much higher in numbers. There are now more families that are struggling and experiencing poverty, exposing more children to its negative effects,

thereby affecting their development and trajectory into adulthood.

Delayed language skills and social skills may be some of the short term effects for our babies and children, but they do not cover the full scope of the long-term consequences of growing up in the Covid-19 pandemic. In young children who experienced a natural disaster like the current one, studies have shown an increase in acute illnesses and higher somatic symptoms.¹⁶ Others have shown that these disasters can negatively affect the brain's anatomy and functioning, inhibiting learning, concentration, and memory processes resulting in learning problems at schools.¹⁷ In older children and teenagers, a subpopulation that already was dealing with issues of self-esteem and pressures of adolescence, the impact has been even greater; the psychological toll on the younger generation that was already experiencing soaring rates of depression, anxiety, and suicide before the pandemic, has been skyrocketing. Half of all mental disorders develop before the age of 15 and the majority of people who die by suicide annually are under 18 years (www.americashealthrankings.org). Since the pandemic halted critical mental health services, many children and adolescents are left feeling afraid, lonely, anxious, and concerned for their future as a result of social isolation presented by the pandemic. According to the World Health Organization (WHO; <http://www.who.int/en/>), the pandemic has disrupted or halted critical mental health services in 93% of countries worldwide, while demand for mental health support has increased. Research has shown that as many as 50% of children report post-traumatic stress symptoms such as difficulty sleeping or concentrating, hypervigilance, and symptoms of anxiety and depression. These chronic mental health symptoms have been observed among children even 4 years after disastrous events.¹⁸ The stress, grief, isolation, fear, and feelings of uncertainty created by the current pandemic can wear anyone down, but children and teenagers have had an especially hard time in coping emotionally, and the pandemic crisis has strained an already challenged behavioral health infrastructure.

As more people get the COVID-19 vaccines, there is growing hope that these pressures will ease. But the struggles and the hardships brought on by the pandemic will likely continue to impact families for some time to come. It is very important for parents and healthcare providers to recognize signs of stress in the children. These may include fussiness, irritability, and feeding issues in babies, or sleep problems, hitting, biting, aggression, and changes in behavior in school aged kids. Bedwetting recurrence after they had already been potty trained, a loss of interest in activities, changes in

appearance, lack of hygiene, and increased risk taking behaviors such as drug and alcohol use may be seen in the older adolescent age groups.¹⁹ The American Academy of Pediatrics (AAP) interim guidance statement supporting the emotional and behavioral health needs of children and adolescents and their families outlines continued and emerging challenges that children face as the pandemic continues and discusses how pediatricians and other health professionals can assist families. Amongst the recommendations are screening for emotional and behavioral responses and children's needs in the context of typical development, encouraging participation in physical activities, socializing safely with peers by following local, state, and national guidelines for physical distancing, and appropriate allocation of resources, particularly to underserved communities and children with special health care needs. AAP also recommends continued monitoring of health inequities by identifying culturally effective solutions and reaching out to community-based organizations or partners for resources and programs with which families identify.²⁰

An example of such programs is presented by the Sufi Psychology Association and their spiritually integrated psychotherapy approaches. Their model involves the inclusion of the soul and a holistic view of the human being into contemporary psychology. This paradigm utilizes the psychological modalities such as cognitive behavioral therapy or developmental psychology in order to address the symptomology, but also uses additional Sufi methods and practices in order to address the true identity of the human being and the underlying connection to the Source. Their approach to psychology is based on self-knowledge and unique experience. This puts the power in the hands of the individual and encourages each person to search for the truth of their being and for that which gives them purpose and true value. By recognizing that as a single unit of existence various aspects of the human being affect one another, the Sufi Psychology method reminds the individuals of their spiritual dimension and directs their focus inward. This approach helps the individuals to recognize that there is more to a person than just their physical dimension, their thoughts, and emotions. The resultant deeper understanding of one's identity, abilities, and strengths brings a sense of confidence, stability, and balance.^{21,22} A practice-based study in 2018 followed patients of psychologists and clinicians who utilized Sufi Psychology in an outpatient setting. The results showed that the patients' self-reported levels of distress (therapeutic, relationship, psychological, spiritual, and critical distress) were significantly reduced after the therapeutic sessions. Furthermore, the same amount of change was reported

regardless of the clinician that was conducting the therapy session.²³ The teachings of Sufism also emphasize the importance of being “in the moment” and of “being present” at all times. The number one way that parents can support their children is simply to be present and to spend time with them. They should talk with them, listen to them, find out about their feelings, be supportive and non-judgmental, and tune into their needs. In general, it helps just to be present and available for them during these difficult times. Hug them and use calming words such as love, peace, and joy. Take a walk in nature and play with them. Parents can also try to find ways to have fun and to laugh with their children. Laughter is one of the best ways to release stress and feel good. The chemicals that are released in the body through laughter can help with reduction of tension and pain. Additionally, self-care through practicing mindfulness, prayer, meditation or meditative movements, visualizations, deep breathing, and other stress reducing techniques such as Tamarkoz® (Sufi meditation) can be excellent tools for healthcare professionals as well as their patients and families. They can be useful methods that help the entire family build coping skills.^{24,25} All of these methods have been researched extensively and shown to have powerful therapeutic benefits in pediatrics.

Guided imagery or visualization for example, is a therapeutic technique that has been used for centuries. By creating images in the mind, a person can reduce pain, stress, and other symptoms associated with his or her condition depending on the specificity of the visualization exercise. It is a powerful mind-body technique that invokes all of the senses. It involves envisioning a certain goal in order to help the individual with either the particular tasks or skills that they are trying to learn, or a skill that they want to master, or to help them cope with a particular health problem that they are facing. This relaxation technique for both the mind and the body requires sitting or lying down in a preferably quiet place, and imagining a peaceful and calming setting such as a forest, a park, or a beach. It is not invasive and has the flexibility of being used in different age groups (preschool to adulthood) and in various outpatient or inpatient settings.²⁶ Studies have shown that it can help in managing anxiety, stress reduction, and depression, as well as help reduce pain, lower blood pressure and lessen nausea, or recurrent abdominal pain.^{27,28} In fact, guided imagery has been shown to produce measurable physiologic changes in stress and immune biomarkers.²⁹ It can also help with sleeping and gives people a better sense of control and overall well-being. A randomized clinical trial that used weekly interactive guided imagery for a 12-week lifestyle intervention in 29 Latino

adolescents with obesity was associated with statistically significant reduction in salivary cortisol, improved physical activity, and promotion of health behavior change in the treatment group.³⁰ Other studies have shown efficacy of guided imagery for a variety of medical conditions including asthma,³¹ sickle cell disease,³² procedural anxiety,³³ and post-traumatic stress.³⁴ Visualization appears to be a promising complementary and adjunctive therapy for children and adolescents, with very low reports of adverse effects. It is by no means a substitution for the medical treatments of the aforementioned conditions but as a therapeutic intervention, it has positive effects on psychological functioning and pain management. Children, adolescents, and teens can learn to perform these exercises on their own and use guided imagery whenever they need to in order to cope with illness or stressful situations.

Another therapeutic technique that is tangible to everyone is the practice of conscious and controlled breathing. Many women who go through Lamaze classes or other types of natural childbirth training can attest to the positive effects of controlled breathing during labor. Breathing exercises are simply one of the most effective ways to help both kids and adults calm down. Deep breathing is a relaxation technique frequently used in health settings to reduce stress and anxiety. It works by activating the parasympathetic nervous system (part of the nervous system that controls the fight or flight responses and the reactions to stress) as well as redirecting the mind to a different task. The simple act of inhaling and exhaling can create a distraction from anxious thoughts and have a great impact on one's mood. Breathing is an automatic process that may hardly be noticed by most people at any given time, yet it is essential for life and is important for all levels of our existence; cellular, hormonal, and psychological processes. This physiologic activity that is controlled by both voluntary and involuntary mechanisms in the human body has been correlated with the state of our body and mind for thousands of years. Scientific research has only recently been able to support this and show the benefits of proper breathing as well as the negative consequences associated with poor breathing. Dr. Andrew Weil who is a well-known physician and teacher of integrative medicine has said that if he were to be limited to only one piece of medical advice that he could give to his patients, it would be to “breathe properly.”³⁵ Almost every religious and spiritual tradition also focuses on breath as well. Many describe God creating the universe with one breath or breathing life into Adam:

“Then the Lord God formed man of the dust of the ground and breathed

into his nostrils the breath of life and man became a living being.”

—The Holy Bible, Genesis 2:7

In the Sufi tradition, focused and conscious awareness of the breath is essential in concentration and meditation. By keeping attention on the breath, one becomes aware of the present moment and experiences the presence of the heart and the ever-loving breath from the Giver of Life. In the book *Expansion and Contraction Within Being* (Dahm), Sufi Master Molana Salaheddin Ali Nader Angha refers to every breath containing the dimensions of inhalation and exhalation, expansion and contraction; he further states that an important factor in the treatment and healing of diseases is the proper amount of oxygen. A normal breath brings half a liter of air into the lungs whereas with deep breathing, as much as 5 liters of air can be brought in. This results in a much higher available O₂ pressure and hemoglobin saturation, thereby providing a much higher available energy for different systems of the body. Increased available energy will aid in the accelerated rate of cell maturation, proliferation, as well as the differentiation of the immune cells (B and T cells) resulting in the strengthening of the body's immune system. Deep breathing is therefore one relatively simple means of disease prevention and control.³⁶ Learning to breathe correctly and to become aware of each breath helps one to become focused, calm, steady, refreshed, and revitalized. It is a therapeutic resource that is always available to every person, adult or child, in any situation, and at all times. It affects every system within us and is a powerful tool for responses to acute or chronic life stressors. Breath therapy sometimes combined with other healing practices such as biofeedback or meditative movements has been shown to help with some medical problems such as hypertension, migraine headaches, asthma, epilepsy, panic disorder, changes in cholesterol levels, and chronic pain conditions. Deep meditative breathing is one of the main principles and practices of Sufi meditation called *Tamarkoz*[®] that can help one reach a state of harmony and balance.

Mindfulness and meditation are other powerful therapeutic tools that have been shown to be of benefit in the pediatric population.^{37,38} Mindfulness is a mental state achieved by focusing one's awareness on the present moment. It has been shown to benefit children and adolescents with conditions ranging from ADHD to anxiety, autism spectrum disorders, depression, and stress. This simple practice of bringing a gentle and accepting attitude of one's feelings, thoughts, and bodily sensations, and focusing them to the present moment can be used as part of a child's daily routines. It will help them learn to calm their bodies and minds,

create a relaxed and positive environment, and result in improved attention, focus, cognitive development, and behavior. Mindfulness has also been found to enhance social and emotional skills, resilience (<https://www.mindfulschools.org/about-mindfulness/research-on-mindfulness/>), and improved emotional regulation, as well as executive functions.³⁹

Similarly, meditation exercises can be very beneficial for children and help them to relax, focus, and reconnect with their stable, confident, and joyful center. Meditation practices consisting of intentional attention training have become increasingly popular in schools and medical settings and are gaining a foothold in disease prevention and treatment. It's used to rest the mind, body, and the spirit. Meditation has been practiced for thousands of years in order to improve health and well-being and to help deepen our understanding of the sacred and mystical forces of life.⁴⁰ These days, people all over the world are discovering its benefits. It is commonly used for relaxation and stress reduction and its many ancient benefits are just now being confirmed with modern-day research devices such as MRI's or EEG's. It is one of the most widely researched practices and in the recent decades, research on it benefits mentally, physically, emotionally, and spiritually has been steadily rolling in. Numerous books and papers have been written on the topic that is beyond the scope of this article's discussion but in general, the practice appears to have an amazing variety of neurological and psychological benefits. In addition, the evidence supporting its effectiveness and safety in pediatrics is growing. Most of the evidence regarding the specific effects attributable to meditation instruction for kids is based on findings from randomized clinical trials with active control conditions. For example, it's been shown that transcendental meditation leads to decreases in blood pressure and left ventricular hypertrophy among African-American adolescents with prehypertension^{41,42} as well as fewer negative school behaviors such as absenteeism.⁴³ A number of studies in school settings also show improved attention and behavior. Some research has shown benefits for attention deficit hyperactivity disorder (ADHD), anxiety, depression, school performance, sleep, behavior problems, eating disorders, and lower levels of posttraumatic stress disorder (PTSD) symptoms (<http://pediatrics.aappublications.org/cgi/doi/10.1542/peds.2015-2531>). There are also physical benefits as it calms the nervous system and decreases stress hormones. Studies have shown benefits for gastrointestinal symptoms, obesity, headaches, high blood pressure, pain sensitivity, and immune function (<http://www.ncbi.nlm.nih.gov/pubmed/21185525>). The American Academy of Pediatrics (AAP) is now encouraging parents to share meditation with their children and the teachers to incorporate mindfulness training into

their lesson plans (<http://pediatrics.aappublications.org/content/early/2016/08/18/peds.2016-1896>).

Tamarkoz[®] is the 1400-year-old Sufi practice of concentration and meditation and is another technique currently practiced in behavioral medicine. It is based on Sufi principles that teach individuals to live in a state of love, peace, and gratitude. This technique emphasizes the heart as the center of concentration and healing powers, allowing the practitioner to connect to one's inner source of energy. Rumi, an influential 13th-century Persian poet, scholar, theologian, philosopher, and Sufi mystic states:

“The inspiration you seek is already within you. Be silent and listen.”⁴⁴

Tamarkoz[®] differs from other meditative practices in the sense that not only the focus is on quieting down the mind in order to gain momentary serenity, it goes a step further and focuses on the heart; tapping into the source of the being that is more than just mental fluctuations (<https://tamarkoz.org>). This heart-focused practice is unique to the M.T.O. Shahnaghsoudi School of Islamic Sufism. The exercises teach the practitioner to release stress, focus, and gain a better understanding of themselves. The goal is to harmonize all aspects of an individual's being (body, breath, senses, thoughts, and innate energies) and become more balanced, calm, collected and in harmony (www.mtoshahnaghsoudi.org). The key techniques of the Tamarkoz method are mind relaxation, meditative movements (Movazeneh), breathing exercises, deep relaxation, visualization/imagery, and heart Tamarkoz. Movazeneh[®], created by the Sufi Masters Professor Sadegh Angha and Professor Nader Angha, is composed of slow concentrated movements that bring the practitioner's attention to a laser point focus, and aligns the flow of energy within the body. These groups of body poses, stretches, and movements of varied tempo are combined with specific breathing and attentional instructions for optimal effect of creating balance and alignment in the body and its various functions. The exercises are an integral part of the Tamarkoz practice and their usage can especially be beneficial for the youth. During the pandemic, movement and physical activities have been curtailed due to the lockdowns or social distancing. The Movazeneh exercises can therefore be a great tool and resource in order to make the children move, be aware of their bodies, and reduce their stress (www.tamarkozapp.com). These meditative movements bring the body into balance, control and harmony. In his book entitled *Theory I, The Unlimited Vision of Leadership*, Professor Nader Angha teaches that:

“True meditation connects us with the fundamental unity of everything in the universe. . . . The practice of Sufi concentration and meditation provides a remedy for the shortcomings of current organizational and personal transformation theories. It enables individuals to get in touch with their true consciousness. It goes beyond the domain of cognitive change, since it focuses on the unification of mind and heart, and opens the door to the unlimited dimension of human beings. The essence of true education and development leads individuals to a revolutionary paradigm change and fundamental personal and consequently, organizational wide transformation.”⁴⁵

A research study at UC Berkeley has shown that Tamarkoz[®] significantly decreases heart rate and perceived stress, while significantly increasing while significantly increasing positive emotions (joy, love, compassion, amusement, awe, and contentment), and daily spiritual experiences compared to a control group utilizing standard stress management resources from the university's student health center and another control group not using any formal stress management resources.⁴⁶ A follow-up study published recently in *Nature's Scientific Reports* involved an 18-week quasi-experimental design with pre-intervention, post-intervention, and follow-up assessments in university students practicing Tamarkoz[®]. Utilizing a generalized linear mixed model, significant increases in positive emotions and daily spiritual experiences, as well as reductions in perceived stress and heart rate were found in the participants. Additionally, the results showed a significant relationship between positive emotions and daily spiritual experiences despite the fact that approximately 57% of the Tamarkoz group participants were atheists or agnostics.⁴⁷ This provides an important implication that the wellness benefits of this type of Sufi practice can be experienced regardless of religious affiliations or lack thereof. The outcomes of this study are also consistent with the idea that positive emotions may effectively counteract negative emotions and thereby improve psychological resiliency and help in recovery from cardiovascular events induced by negative emotions.⁴⁸ Research done at Kaiser Permanente with patients who had recently undergone a serious cardiac event (such as heart attack, bypass surgery, or angioplasty) showed a statistically significant decline in depression amongst participants of Tamarkoz[®]. Additionally, reports from the cardiology department suggested reduced utilization of medical services from participants in the study.²⁵ The effects of Tamarkoz practice on emotional state and DNA repair efficiency was the subject of yet another study. It showed that those with greater amounts of daily Tamarkoz practice had lower levels of emotional distress and highly functional DNA repair efficiency, which

has tremendous implications for the development of breast cancer.⁴⁹ In addition, the techniques used in Tamarkoz[®] have been shown to relieve both psychological and physiological tensions,⁵⁰ improve cognitive processes,⁵¹ enhance sleep, reduce pain, and increase creativity.⁵² For the developing brains of children, these practices perhaps have even more promise than for adults, but more specific research will probably need to be done for the younger age groups.

Although the current situation with the COVID-19 pandemic is unprecedented and has produced high morbidity and mortality rates within the global population as well as increased risk factors for healthy growth and development among our youth, there are numerous studies that demonstrate children's resiliency and their incredible potential to bounce back and catch up. They can help in their own recovery and be involved in their treatment plan. As the frequency and intensity of pandemics and global disasters increase around the world, scholars and practitioners must consider and be aware of the special needs of children in different age groups. They require different forms of mental, emotional, social, and physical support than adults. Creating activities to promote health and healthy development, encouraging their participation, preventing toxic stress, being supportive, and improving their access to physical, emotional, educational, and spiritual resources can empower them to take steps toward their health and wellbeing.

Author Contributions

KA: contributed to conception or design; contributed to acquisition, analysis, or interpretation; drafted the manuscript; critically revised the manuscript; gave final approval; Agrees to be accountable for all aspects of work ensuring integrity and accuracy.

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