



## Neurological Pathways Supported by Grounding

Koniver L\*

Intuition Physician LLC, SC, USA

### Abstract

Exposure to nature has an immense, positive effect on the wellbeing of the human body, including on healthy brain function. Numerous studies have shown improved physical and mental health from time spent in nature, including through the healing practice of grounding. Grounding, or touching the human body to the earth outside, is a holistic health practice that has shown promising whole-body benefits that include neurological benefits. This review article examines the different cognitive and mental health benefits from grounding the body and suggests possible pathways for the earth to support neurologic health, improve mood, and even support intrinsic brain functions such as decision making, mental clarity, and deeper contextual understandings.

**Keywords:** Grounding; Earthing; Cognition; Mental Health; Sleep Quality; Anxiety; Depression; Mood

### The Healing Power of Nature

There has been an explosive amount of medical literature in the last few decades describing the huge impact that nature, and a lack of exposure to nature, has on our mental health. With this comes non-clinical terms like nature deficit disorder, nature deprivation, nature gap, the biophilia hypothesis, and return-to-nature practices like forest bathing, attention restoration theory, ecotherapy and grounding. Looking at research over a ten-year period on nature-based interventions, researchers have found a significant correlation between exposure to nature and improved mental health and cognitive function [1]. Another study found a direct correlation between exposure to nature during childhood and mental health as an adult, suggesting nature has a profound impact on our brains that lasts a lifetime [2]. Yet another study found that being exposed to green spaces in childhood protected against a wide variety of psychiatric disorders as an adult [3].

Exposure to nature can also affect our mental health even when we are well into adulthood. One study found that moving to an area with less green spaces resulted in declining mental health, and moving to an area with more green spaces significantly boosted mental health [4]. Being physically near plants is so impactful to our mental and physical health that it turns out, even just seeing a plant can significantly impact our recovery from stressful health events. We have such an innate need to be submersed in a world with foliage and plants around us that a study found that patients who simply had a view of plants through a window while recovering from surgery had better moods, used less pain medications, had less surgical post-op complications, and even decreased their length of stay in the hospital [5]. Another study found that the act of simply transplanting a potted plant from one container to another lowered the participants stress levels and significantly decreased their blood pressure [6]. Another study found that workers who had potted plants in close proximity to them while working took less sick leave off from work and enjoyed increased productivity [7].

Nature has a powerful impact specifically on our neurologic health. One study found that daily gardening decreased dementia risk by an incredible 36% [8], while a follow up study found that gardening actually increased levels of brain nerve growth factors like Brain-Derived Neurotrophic Factor (BDNF) and Vascular Endothelial Growth Factor (VEGF) [9]. Another incredibly interesting study found that a gardening intervention program significantly boosted levels of the brain neurotransmitters tryptophan and serotonin, which are necessary for healthy sleep patterns and mood stabilization [10]. An extensive systemic review of 22 studies looking at the health impact of working with plants found that gardening significantly reduced anxiety levels, anger levels and depression rates, decreased tension, stress levels and boosted mood... all while simultaneously improving life satisfaction and boosting overall quality of life [11].

### Inflammation and Mood

We know that inflammation is one of the clinical pathways that affects mood, and inflammation

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#### \*Correspondence:

Laura Koniver, Heart Centered Healing,  
Intuition Physician LLC, Fort Mill, SC  
29708, USA,

E-mail: koniverMD@gmail.com

Received Date: 24 Feb 2023

Accepted Date: 15 Mar 2023

Published Date: 20 Mar 2023

#### Citation:

Koniver L. Neurological Pathways  
Supported by Grounding. *Open J  
Neuro Neurosci.* 2023; 1(1): 1002.

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even plays a role in clinical depression. One medical study found that increased inflammation in the body worsens symptoms of clinical depression [12], and other studies find that inflammation plays a key factor not only depression but also in fatigue, noting that higher levels of blood markers of inflammation were found to be directly correlated with a variety of depressive symptoms, including sleep difficulty, decreased energy levels, decreased motivation and changes in appetite. That study found higher levels of inflammation contributed to cognitive changes such as loss of pleasure in activities previously found pleasurable (anhedonia), depressed mood, lowered feelings of self-worth, decreased ability to concentrate, and even suicidal thoughts [13].

Luckily, the connection between mood and inflammation gives us a pathway to help treat it, as decreasing inflammation may help boost mood and improve healthy cognitive function. Medical research is now furthering our understanding that if you decrease inflammation, you can actually help more effectively treat depression. Researchers reviewed 14 randomized, placebo-controlled studies looking at over 6,300 patients and found that adding anti-inflammatory medications to a treatment plan helped to lessen depressive symptoms and resolve depressive episodes better than placebo alone and better than anti-depressants alone [14]. Another study further confirmed these results, finding that lowering inflammation in the body treats depression [15].

Enter the health practice of grounding, a nature-based therapy known to positively impact mood. Grounding is simply directly touching the earth outside, and is a therapeutic healing modality that has been found to have a myriad of health benefits. My clinical experience using grounding to address a wide variety of health issues with patients - including mental health issues - has repeatedly confirmed that grounding positively impacts mood and supports the body's healing response [16]. Decreased inflammation is likely the mechanism of action behind the mood boosting effects of grounding, as grounding has repeatedly been found to decrease whole body inflammation. Grounding has been found to decrease whole body inflammation in multiple studies [17]. One such study on grounding found that subjects who were grounded while exercising had significantly less inflammation and significantly lower cortisol levels than non-grounded subject [18]. Another study found that participants who were grounded had measurable improvements in mood that were significantly higher than the sham-grounded participants [19].

## Grounding and Neurotransmitters

One of the ways that inflammation may impact mood, new studies suggest, is that inflammation lowers dopamine levels in the brain, which may be responsible for the decrease in mood, loss of motivation, and anhedonia. In one study, researchers found a direct correlation between blood markers of inflammation and motivation. They found specifically that inflammation lowers dopamine levels in the brain, that switches the brain from positive to negative thinking [20]. As dopamine drops, the brain switches from feeling capable and motivated to feeling incapable and unmotivated. In general terms, inflammation creates a motivational impairment, and prevents you from thinking optimistically as well as keeps you from accurately assessing what you are capable of. Even if you fully are capable of doing something, the effect of inflammation in your brain may tell you that you are not, so your motivation drops and your outlook dims as a result of chronic inflammation.

Grounding has not only been shown to decrease inflammation, but

it also has been specifically shown to decrease the exact inflammatory cytokines that have a direct impact on our brain dopamine levels. In one important study, researchers found that cytokines such as IP-10, MIP-1 $\alpha$ , and sP-Selectin all decreased in grounded subjects, compared to non-grounded controls. The average drop induced by grounding a patient was a 10% to 20% drop in inflammatory cytokine concentration [21].

And because of the newest research showing that inflammatory cytokines have a direct reflection in our mood and motivation levels, we can see a potential direct explanation for why grounding boosts mood. By decreasing inflammatory cytokines, it's reasonable to suggest that grounding gives a natural dopamine boost to the brain. This powerful, natural anti-inflammatory effect is the mechanism of action behind the earth's ability to elevate mood, boost energy, and brighten outlook.

Know the feeling of spending a morning in your garden or an afternoon walking along the beach and how calm, centered, uplifted and creative your mindset becomes? Grounding your body is at work here, decreasing whole body inflammation, decreasing stress hormones, decreasing inflammatory cytokine levels... completely naturally.

## Grounding and Brain Signaling

On top of decreased inflammation, another powerful mechanism of action of grounding is that it can shift brain signaling nearly instantaneously, as multiple studies on the neuromodulative role of grounding have shown [22,23]. In possibly the most important study on grounding and brain function to date, researchers found that grounding boosted alpha brain wave patterns on EEG within just milliseconds of test subjects becoming grounded to the earth [24]. Another study found that grounding significantly improved sleep quality in patients with the organic brain disease or Alzheimer's [25]. And preliminary animal studies have found that grounding significantly lowered Corticotrophin Releasing Factor (CRF) in rats that were grounded during a 3-week stress challenge, compared to ungrounded rats in the same stress challenge [26].

While grounding has been shown to support brain function by decreasing inflammation, boosting mood, and even shifting brain wave patterns, there is an exciting novel pathway that grounding may even help improve mental clarity and help with decision making. Researchers evaluating the coherence between the earth's electrical field (the Schumann Resonance) and the human brain in real time EEG/ELF studies found that there was significant coherence between the electrical activity of the two. Maximum coherence was found in the parahippocampal gyrus of the brain and that coherence was held for long enough for interactive processing to occur between the earth ionosphere and the human brain. Electrical activity from the earth makes a measurable synchronization in our cerebral cortex in such a magnitude that it allowed for real-time coupling between the Schumann resonance and cerebral activity long enough for information processing to occur. The researchers postulate this activity to be the exact amount of time, length of time, amplitude of signaling, and frequency of time required for a "ping" from the planet to our human brains to occur. Researchers found that the frequency of this brain ping is once every 30 sec, which is the brain's short term memory decay time, indicating that the earth provides perfectly timed "micro-guidance", re-orienting us in a subtle way that provides meaning and clarity but not long enough as to disrupt cognitive thought as we navigate daily life [27]. It's even been suggested that

the Schumann resonance acts as a globally available synchronization system to our brains [28]. The duration of coherence was long enough to give rise to the possibility that the earth itself may send electrical signaling, or electrical information our brain, just long enough to allow an intuitive insight, or a flash of understanding to occur, but not long enough to disrupt our stream of consciousness. In other words, it's possible that the earth boosts our ability to receive orienting information without disrupting cognition.

Because of where the electrical activity was the most cohesive - the parahippocampal gyrus of the brain's cerebral cortex - researchers postulate that the parameters of the Schumann resonance may affect intrinsic brain activity in areas of the brain that work to provide spatial awareness and navigation. Research into the parahippocampal gyrus of the brain utilizing fMRI has found that brain damage to that area of the cortex results in patients being able to generically identify images and items that are viewed, but not be able to meaningfully interpret these images. Victims of stroke or other damage to the parahippocampal areas of the brain have a feeling of being lost, disconnected, or un-anchored from the deeper meaning of visual cues and lose purposeful and relevant life navigational tools [29,30,31]. This area of the brain is a highly sensitive early indicator of Alzheimer's disease, showing signs of atrophy prior to other areas of the brain showing changes [32,33]. This area of the brain is responsible for accurate and meaningful interpretation of our surroundings, our environment, and for support in making life decisions in a contextually appropriate way. This gives a very real explanation for why time spent in nature, on the earth, grounded, helps to give rise to a feeling of centeredness, helps to give a deeper perspective on our personal life's journey, and may even help open our subconscious up to reframing and refocusing our life's meaning through these environmental "pings" from our planet. Have you ever spent time in nature when you are mulling over a big life decision, or feeling distraught, overwhelmed or confused, and then you suddenly have a deeper insight, a gut feeling, a pull, or an intuition that provides greater clarity? These studies suggest a direct pathway for the earth to enhance and support our not only our daily decision making, but also connect to our deeper understanding and even our intuitive capabilities through earth-to-brain coherence.

I think of grounding as hitting a reset button, a chance for a pause that brings clarity into focus. By connecting with the earth, we can shift the brain from high strung beta waves to calming alpha wave patterns, decrease inflammation to help improve mood, even possibly help provide greater clarity to our lives, all naturally. And the best part is that the earth is free and always available to you. If you are feeling utterly overwhelmed, confused, or down, all you have to do is walk out your front door, step out of your office, or pull over your car at the nearest rest stop and touch the earth.

## **Introductory Grounding Practices for Mental Health**

Want to give grounding a try when you are feeling uncentered? Here are a few ideas to get you started:

### **If you're feeling overwhelmed, try grounded deep breathing**

It can be as simple as sitting outside on the earth and just taking three deep breaths. Three deep breaths have been shown to support vagal tone and decrease our body's fight-or-flight response, boosting parasympathetic activity, and so has grounding. Combining the two

is a powerful way to calm and center yourself. To go further with it, consider extending the period of time that you are deep breathing by adding a longer session of meditation to your time spent grounded. Focus on breathing slowly in and out, starting with a few minutes and working your way up to 10- or 20-min sessions. You will feel a complete reset of mind and body.

### **If you're feeling sad or depressed, try grounding in morning daylight**

Medical studies on grounding have shown that being grounded can significantly boost our mood, so combining that with morning light exposure can help to take that even further. Light therapy has been actually shown to naturally treat depression as well as a prescription anti-depressant, and both together was superior to either alone [34]. And yes, you can do all three at the same time (take an anti-depressant and use light therapy and grounding, together) for additional benefit. Try to get into a daily routine of taking just a few minutes every morning when you wake up to step outside - you can even take your coffee with you - to greet the day grounded, and feel your mood brighten.

### **If you're feeling stressed out, try grounding on a sidewalk**

More surfaces than you think will ground you - you can get grounded on a city sidewalk just as easily as at the beach. You get just as grounded by touching a metal signpost anchored in the earth as you do by touching a living tree. So, if you are at work, or traveling, or live in an urban setting and just need to take a breather, head outside and find your favorite sidewalk square. Sit down and let your hand touch the sidewalk and allow grounding immediately start calming and centering you. You'll return back to your task at hand feeling much more centered.

### **If you're feeling disconnected, try touching a tree outside**

As discussed previously, studies have found that plants decrease depression and anxiety, decrease stress, decrease pain, and more. You can get all of those benefits by seeking out a favorite tree and taking it one step further by touching it. In fact, all plants that are growing in the ground - including trees, bushes, flowers, even a single blade of grass - are grounded and will ground you instantly when you touch it. So, reach out and hold on to your favorite tree, and visit it often, through all the seasons, to add the healing benefits of grounding for a powerful energy boost and mood lift, and to feel reconnected to the world around you, instantly.

### **If you are feeling a mid-day slump, try eat lunch outside**

One of the best habits you can get into is taking your lunch outside and eating it grounded outdoors, to help you power through the afternoon. EEG studies of brain activity show that connecting to the soothing energy of the earth instantaneously shifts our brain wave patterns and reduces ambient stress levels, so head outside with your lunch and sit at a bench, slipping your shoes off and resting feet on the ground while you eat, or sit on a sidewalk or cement steps, or even simply touch a metal railing while outside on your lunch break, as all of these will ground you. If you are lucky enough to have a park within walking distance, sit at a picnic table and slip a shoe off to touch the ground while you eat, and don't forget that the cement floor of picnic shelters is also grounded.

### **If you are feeling anxious, try going on a grounded walk**

Movement gives your body a natural opioid fix, and other neurotransmitters get a boost too. Endorphins decrease pain and boost a feeling of wellness, serotonin improves mood and decreases anxiety,



and anandamides decrease stress. Exercising grounded will add an even deeper level of support from the earth to keep inflammation lowered and help you feel more centered. Go on a walk barefoot, even if that is just up and down a small patch of grass or a few squares of sidewalk. If you can't go on a walk barefoot, sit grounded outside and move your body in other ways, like giving yourself a foot or neck massage, or doing a few yoga stretches. Grounding helps move the body from fight or flight mode towards feeling calm and safe, so if you feel anxiety approaching, stop everything and touch the earth. Pull over if you are driving, go outside if you are home or at work or in a crowded shop or restaurant and let the stability of the earth ease your panic and calm your anxiety with its power.

### If you are having trouble sleeping, try looking up at the night sky

One of my favorite ways to ground - especially when I've been too busy to ground all day long - is to ground on my way up to bed, standing outside looking up at the stars and moon. Turning my gaze upwards, reconnecting with the wonder of being a human being standing on a rock that spirals through space and seeing the earth for the vast support network it is, feeling your place in this mysterious beautiful alive universe, can't help but lift your spirits for the better. Doing it while grounded helps even more, as grounding helps deepen sleep and allows the sleep you do get to be even more restorative, letting you get deep recovery from stress. So, if realize you are carrying the stress of the day into bed with you, stop. Go outside and look up. When the rest of the world is shut up tight at bedtime, taking a few minutes to ground outside under the night sky is wonderful for clearing the mind, grabbing a few minutes of beautiful fresh air, and preparing your body for sleep.

### Summary

Grounding is an instantly accessible healing tool that can provide immediate support during periods of stress no matter where you are or what you are doing. Whether it's just a few deep breaths as you sit on a patch of grass, taking a walk through a local park, or standing outside at night looking up at the stars... grounding supports your mood and enhances brain function. The earth is waiting out there to center and support you.

So, the next time you are feeling anxious, or having difficulty finding the clarity to make a big decision, or simply feel your mood dive, just go outside. Touch the earth and let nature support you immediately. The earth can hold even your worst of days and remain an immovable source of strength. And the effects of grounding the human body start instantly, so there is no time too short for getting grounded - if it can only be 30 sec, so be it. If it can be 15 min, or 30 min, all the better. If you have one rock outside you can touch, one blade of grass you can touch, one leaf on a tree outside, or one square inch of sidewalk you can stand on, you can be instantly grounded. Even in an urban location, or in the winter, or when you travel... you can and should get grounded outside to help keep your brain functioning at its best.

### References

- Jimenez MP, DeVille NV, Elliott EG, Schiff JE, GE Wilt, Hart JE, et al. Associations between nature exposure and health: A review of the evidence. *Int J Environ Res Public Health*. 2021;18(9):4790.
- Preuß M, Nieuwenhuijsen M, Marquez S, Cirach M, Dadvand P, Triguero-Mas M, et al. Low childhood nature exposure is associated with worse mental health in adulthood. *Int J Environ Res Public Health*. 2019;16(10):1809.
- Engemann K, Pedersen CB, Arge L, Tsirogiannis C, Mortensen PB, Svenning JC. Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood. *Proc Natl Acad Sci U S A*. 2019;116(11):5188-93.
- Alcock I, White MP, Wheeler BW, Fleming LE, Depledge MH. Longitudinal effects on mental health of moving to greener and less green urban areas. *Environ Sci Technol*. 2014;48(2):1247-55.
- Ulrich RS. View through a window may influence recovery from surgery. *Science*. 1984;224(4647):420-1.
- Lee MS, Lee J, Park BJ, Miyazaki Y. Interaction with indoor plants may reduce psychological and physiological stress by suppressing autonomic nervous system activity in young adults: A randomized crossover study. *J Physiol Anthropol*. 2015;34(1):21.
- Bringslimark T, Hartig T, Patil GG. Psychological benefits of indoor plants in workplaces: Putting experimental results into context. *Am Soc Hort Sci Horts*. 2007;42(3):581-7.
- Simons LA, Simons J, McCallum J, Friedlander Y. Lifestyle factors and risk of dementia: Dubbo study of the elderly. *Med J Aust*. 2006;184(2):68-70.
- Park SA, Lee AY, Park HG, Lee WL. Benefits of gardening activities for cognitive function according to measurement of brain nerve growth factor levels. *Int J Environ Res Public Health*. 2019;16(5):760.
- Park SA, Son SY, Lee AY, Park HG, Lee WL, Lee CH. Metabolite profiling revealed that a gardening activity program improves cognitive ability correlated with BDNF levels and serotonin metabolism in the elderly. *Int J Environ Res Public Health*. 2020;17(2):541.
- Soga M, Gaston KJ, Yamaura Y. Gardening is beneficial for health: A meta-analysis. *Prev Med Rep*. 2016;5:92-9.
- Miller AH, Raison CL. The role of inflammation in depression: from evolutionary imperative to modern treatment target. *Nat Rev Immunol*. 2016;16(1):22-34.
- Lee CH, Giuliani F. The role of inflammation in depression and fatigue. *Front Immunol*. 2019;10:1696.
- Köhler O, Benros ME, Nordentoft M, Farkouh ME, Iyengar RL, Mors O, et al. Effect of anti-inflammatory treatment on depression, depressive symptoms, and adverse effects: A systematic review and meta-analysis of randomized clinical trials. *JAMA Psychiatry*. 2014;71(12):1381-91.
- Köhler O, Krogh J, Mors O, Benros ME. Inflammation in depression and the potential for anti-inflammatory treatment. *Curr Neuropharmacol*. 2016;4(7):732-42.
- Koniver L. Practical applications of grounding to support health. *Biomed J*. 2022;2319-4170(22):158-5.
- Oschman J, Chevalier G, Brown R. The effects of grounding (earthing) on inflammation, the immune response, wound healing, and prevention and treatment of chronic inflammatory and autoimmune diseases. *J Inflamm Res*. 2015;8:83-96.
- Brown D, Chevalier G, Hill M. Pilot study on the effect of grounding on delayed-onset muscle soreness. *J Altern Complement Med*. 2010;16(3):265-73.
- Chevalier G. The effect of grounding the human body on mood. *Psychol Rep*. 2015;116(2):534-42.
- Treadway MT, Cooper JA, Miller AH. Can't or won't? Immunometabolic constraints on dopaminergic drive. *Trends Cogn Sci*. 2019;23(5):435-48.
- Müller E, Pröller P, Ferreira-Briza F, Aglas L, Stöggel T. Effectiveness of grounded sleeping on recovery after intensive eccentric muscle loading. *Front Physiol*. 2019;10:35.
- Sokal P, Sokal K. The neuromodulative role of earthing. *Med Hypotheses*. 2011;77(5):824-6.

23. Chevalier G. The effect of grounding the human body on mood. *Psychol Rep.* 2015;116(2):534-2.
24. Zahari ZL, Mustafa M, Rahman NAB, Abdubrani R, Zain MZ. An effectiveness of EEG signal based on body earthing application. *Int J Adv Sci Eng Inform Technol.* 2023;12(2022):2322-6.
25. Lin CH, Tseng ST, Chuang YC, Kuo CE, Chen NC. Grounding the body improves sleep quality in patients with mild Alzheimer's disease: A pilot study. *Healthcare.* 2022;10(3):581.
26. Park H-J, Jeong W, Yu HJ, Ye M, Hong Y, Kim M, et al. The effect of earthing mat on stress-induced anxiety-like behavior and neuroendocrine changes in the rat. *Biomedicines.* 2023;11(1):57.
27. Michael P, Saroka KS. "Human quantitative electroencephalographic and schumann resonance exhibit real-time coherence of spectral power densities: Implications for interactive information processing." *J Signal Inform Process.* 2015;06(02):153-64.
28. Cherry NJ. Human intelligence: The brain, an electromagnetic system synchronised by the Schumann resonance signal. *Med Hypotheses.* 2003;60(6):843-4.
29. Aminoff EM, Kveraga K, Bar M. The role of the parahippocampal cortex in cognition. *Trends Cogn Sci.* 2013;17(8):379-90.
30. Bohbot VD, Allen JJB, Dagher A, Dumoulin SO, Evans AC, Petrides M, et al. Role of the parahippocampal cortex in memory for the configuration but not the identity of objects: Converging evidence from patients with selective thermal lesions and fMRI. *Front Human Neurosci.* 2015;9:431.
31. Li M, Lu S, Zhong N. The parahippocampal cortex mediates contextual associative memory: Evidence from an fMRI study. *BioMed Res Int.* 2016;2016:9860604.
32. Hoesen GWV, Augustinack JC, Dierking J, Redman SJ, Thangavel R. The parahippocampal gyrus in Alzheimer's disease. Clinical and preclinical neuroanatomical correlates. *Ann N Y Acad Sci.* 2000;911:254-74.
33. Echávarri C, Aalten P, Uylings HBM, Jacobs HIL, Visser PJ, Gronenschild EHBM, et al. Atrophy in the parahippocampal gyrus as an early biomarker of Alzheimer's disease. *Brain Struct Funct.* 2011;215(3):265-71.
34. Geoffroy PA, Schroder CM, Reynaud E, Bourgin P. Efficacy of light therapy versus antidepressant drugs, and of the combination versus monotherapy, in major depressive episodes: A systematic review and meta-analysis. *Sleep Med Rev.* 2019;48:101213.