# A Comparative fMRI Study of Brain Responses to the Faradarmani Consciousness Field in Women and Men

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## Abstract

Based on Taheri's theory introduced in the 1980s, Consciousness is defined as the fundamental element of the universe from which information, matter, and energy spring forth. In this perspective, there are various T-Consciousness Fields (TCFs) with non-physical entities that their influence can be recorded through laboratory experiments. In the current study, the effect of one type of these fields named Faradarmani Consciousness Field (FCF) was investigated. Functional magnetic resonance imaging (fMRI) technique has been widely used to understand the functional activities and cognitive behavior of the brain during task or resting states. Here, 30 random volunteers (15 females, 15 males; 20 to 50 years of age) took part, and the exposure to FCF and without this treatment was considered as task and rest, respectively. While previous studies have examined the behavior of the brain in response to FCF, a comparison of the effects of this Field on the brains of men and women has not been conducted. Exploring the sex-related effects of FCF on the human brain can reveal new and different aspects of the functioning of these innovative non-material and non-energetic fields in the scientific realm. According to the results of the present study, 89% of all voxels showing activity change in both genders are associated with a reduction in activity, with 97% of these changes occurring in women's brains. In contrast, activated areas represent 11% of all voxels showing activity change, and 85% of these belong to the male brain. The most dominant function of the activated areas in both sexes is related to the motor cortex, controlling and managing voluntary movements and skeletal muscles. Following this, functions such as memory (visual and spatial) and attention are associated with the activated areas. These findings provide valuable insights into the differential effects of FCF on the brains of men and women, shedding light on the specific areas and functions that are influenced by this non-material and non-energetic field.

**Keywords:** Brain, fMRI, mind, Sex-related difference, Faradarmani Consciousness Field

## Introduction

Functional Magnetic Resonance Imaging, or functional MRI (fMRI), measures brain activity (Karahanoğlu et al., 2015). This technique relies on the fact that neuronal activation is associated with cerebral blood flow. In other words, when a region of the brain is in use, blood flow to that area increases. The fMRI, based on the Blood Oxygen Level Dependent (BOLD) signal, is the most important non-invasive method for measuring the spatial location and intensity of human brain function (Bright et al., 2019). During the past decades, research on the mind-body interventions, such as yoga, Tai Chi, breath regulation techniques, etc. have been showed that the influence of these techniques can be associated with different neural patterns and even altered gene expression involved in inflammatory reactions (Fox et al., 2014; Buric et al., 2017). According to a study, the mindfulness meditation practitioners showed a lower frontal gamma activity related to default mode network (Berkovich-Ohana et al., 2012). Conversely, it has been indicated that mindfulness increased brain activity in various regions (Wheeler et al., 2017).

When it comes to gender-dependent differences in brain structure, menstrual cycle is one of the various factors (Pletzer et al., 2010). Not only have several studies reported a correlation between the concentration of estrogens and the volume of medial temporal lobe (Steventon et al., 2023), but this also has been shown to contribute to cognitive function (Cutter et al., 2003). Additionally, women at menopausal age face a higher risk of dementia (Gilsanz et al., 2019). Moreover, Allen and colleagues (2002) have reported that the total brain and most major substructures, such as hemispheres, frontal and parietal lobes, left insula, and cerebellum, are significantly larger in men, although the proportional sizes of individual regions relative to the total hemisphere volume are similar in both genders (Allen et al., 2002).

It has been found that the volumes of gray and white matter also differ based on gender. Women have a higher percentage of gray matter, while men have a higher percentage of white matter and cerebrospinal fluid (CSF) (Gur et al., 1999). While evidence supporting gender differences in brain morphometry exists, some studies contradict these findings. For instance, a study has reported a greater percentage of gray matter as a proportion of the total intracranial volume in men compared to women (Farokhian et al., 2017).

Some studies suggest that gender may have a significant impact on various cognitive functions, including emotions, memory, perception, and more (Cahill, 2006; Zhang et al., 2019). It appears that men and women may have different approaches to encoding memories, perceiving emotions, recognizing faces, solving specific problems, and making decisions. In essence, bridging the existing gap between the substantial structural similarities in the brains of both genders and the enumerated differences requires justification. Functional brain investigations have been conducted with this goal in mind.

As the brain is believed to control cognition and behaviors, gender-related functional differences may be associated with the specific gender-related brain functions. However, based on existing studies, prominent functional differences in the brain related to behavior are not consistently observed between the two genders. According to the Institute of Medicine (US) Committee on Understanding the Biology of Sex and Gender Differences, it seems that gender differences in the human brain are mostly attributed to prevailing beliefs about gender differences in cognitive abilities and functions, such as the belief in better verbal skills in women and better spatial abilities in men (Wizemann and Pardue, 2001). In men, IQ is associated with the volume of gray matter in the frontal and parietal lobes. On the other hand, in women, the intelligence quotient (IQ) is associated with the volume of gray matter in the frontal lobe and the Broca's area, which plays a role in language. This suggests that men and women use different regions of the brain to achieve similar intelligence quotients (Haier et al., 2005).

The nature of consciousness and its place in science have received much attention in the current century. Many philosophical and scientific theories have been proposed in this area. In the1980s, Mohammad Ali Taheri introduced novel fields with non-material/

non-energy nature named Taheri Consciousness Fields (TCFs). In this perspective, T-Consciousness is one of the three existing elements of the universe apart from matter and energy. According to this theory, there are various TCFs with different functions, which are the subcategories of a networked universal internet called the Cosmic Consciousness Network (CCN). The major difference between the theory of TCFs and other theoretical concepts about consciousness is related to the practical application of the TCFs. These fields can be applied to all living and non-living creatures, including plants, animals, microorganisms, materials, etc. (Taheri, 2013).

In this study, we investigated the influence of Faradarmani Consciousness Field (FCF), as a type of TCF, on the brain in both genders highlighting its distinction from mindfulness and meditation methods. Previously, the changes in brain activity were evaluated under these non-physical fields (Taheri et al., 2022 a, b, c), and the novel aspect of the current study is the comparison of obtained data between men and women.

## Material and Methods

### Application of FCF

In the present study, neural imaging using the fMRI method was conducted on the brains of two groups of 15 Faradarmani practitioners, including both men and women (a total of 30 individuals). This imaging was performed during the Faradarmani Connection as the test task. The task-fMRI analysis of the two populations aimed to differentiate the brain activities of participants while they are under the treatment of the FCF, as task performance (test) and in a resting state (without the effect of FCF). This study has been approved by the Ethics Committee at Iran University of Medical Sciences (Approval ID: IR.IUMS.REC.1399.293).

### Statistical analysis

In task fMRI analysis paired T-test was used to form contrasts and p-value was set at 0.05. FDR corrected for cluster level (cluster threshold) and $p<0.001$, uncorrected for voxel level (height threshold).

## Results

The results of this study regarding brain regions in distinct genders and the analysis of fMRI tasks were examined using the Statistical Parametric Mapping (SPM12) software package. In the tables of this section, the number of voxels, peak MNI coordinates, the MNI peak region, peak intensity, and the precise location of the MNI peak region in the hemisphere and brain lobe are detailed separately for each gender. The contrast presented in the tables is the Task-Rest contrast, indicating changes (increase or decrease) in the activity of brain regions during the task compared to the control. This effectively demonstrates the impact of the FCF on the brain in the male and female populations separately.

Before examining the brain by gender, Figures 1 and 2 first present, based on a previous study (Taheri et al., 2022c), the regions of activation and deactivation in the population without gender differentiation. As shown in Figure 1, the frontal-parietal lobes of both hemispheres of the brain exhibited a significant increase in activity during this task. On the other hand, the temporal and occipital lobes of both the left and right hemispheres became deactivated during the connection with the Faradarmani Consciousness Field.

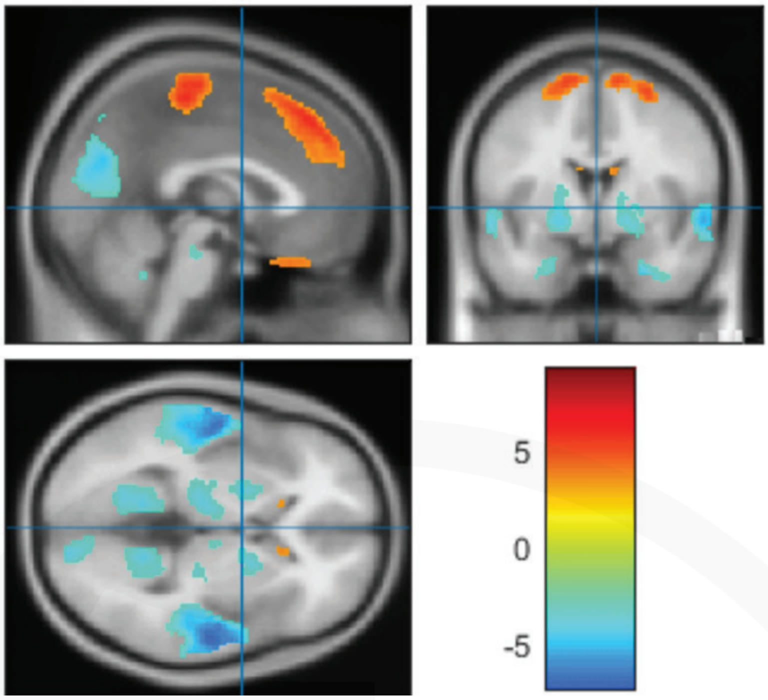


Figure 1. Brain regions activated and deactivated under the influence of the Faradarmani Consciousness Field in the population of Faradarmangars from the previous study (Taheri et al., 2022c), without gender differentiation (red indicates increased activity, and blue indicates decreased activity).

The 3D visualization of the brain regions activated and deactivated during the task (Taheri et al., 2022c) is shown in Figure 2.

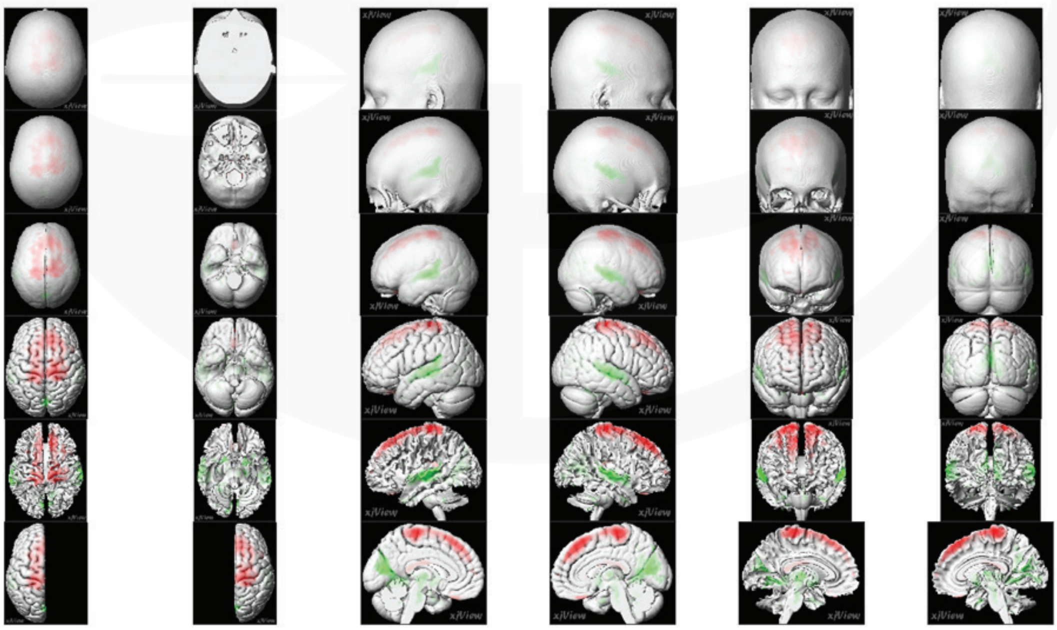

Figure 2. 3D view of the brain in the population of Faradarmangars from the previous study (Taheri et al., 2022c) during the fMRI task, shown from all directions (top, bottom, sagittal, and posterior views).

Following the analysis conducted in the previous study, the present study examines the same data with the population divided into two groups: women and men, as presented below. Figures 3 and 5 display three contrasts of the data obtained in this study for both genders: task contrast, rest contrast, and task–rest contrast. Since the brain also shows activity during the resting state, and part of the observed activity during the task is inherently and naturally present, the task–rest contrast compares brain activity voxel by voxel between the task and rest states and highlights statistically significant differences. This essentially reflects the impact of the task, or interaction with the FCF, on the brain.

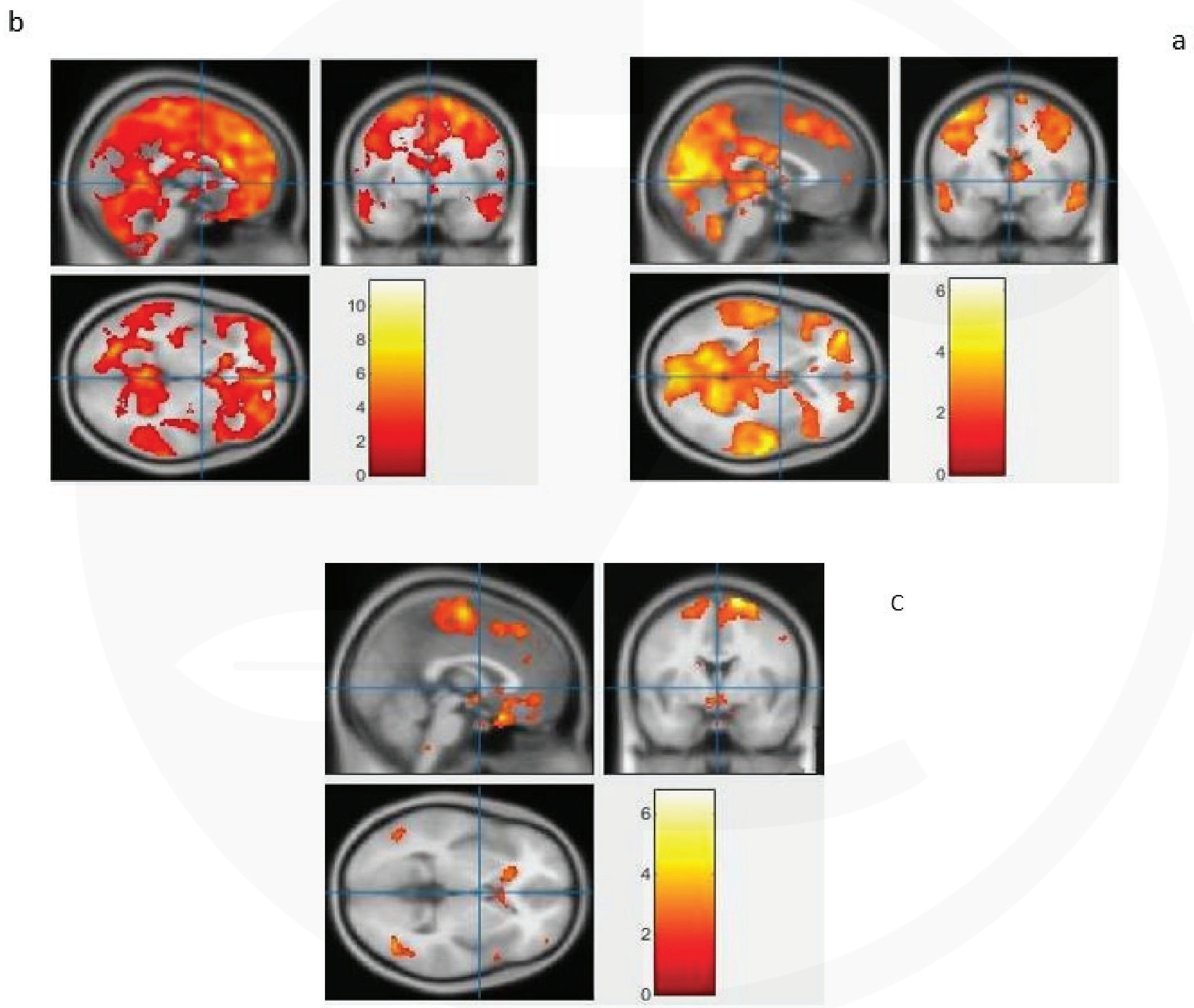


Figure 3. Representation of Brain Voxels in States (a) Rest of Men, (b) Task of Men, and (c) Task-Rest of Men.

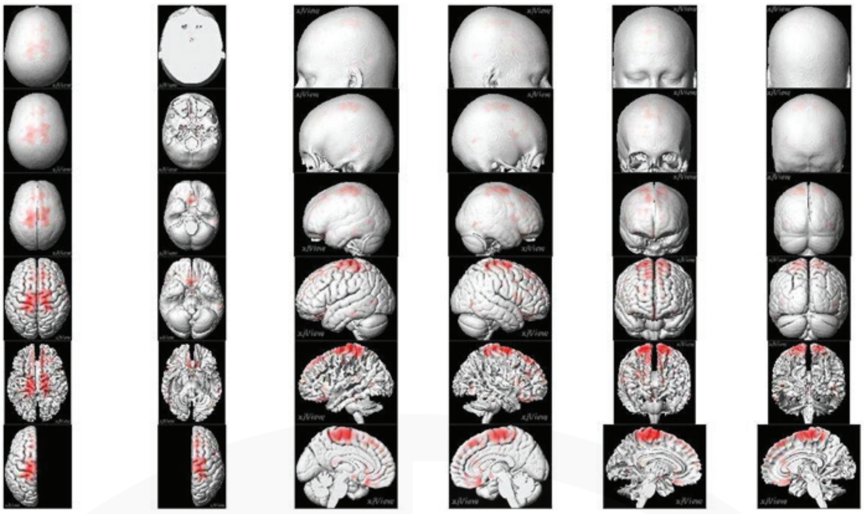

Figure 4. Three-Dimensional Render of the Male Brain in the Task-Rest Contrast.

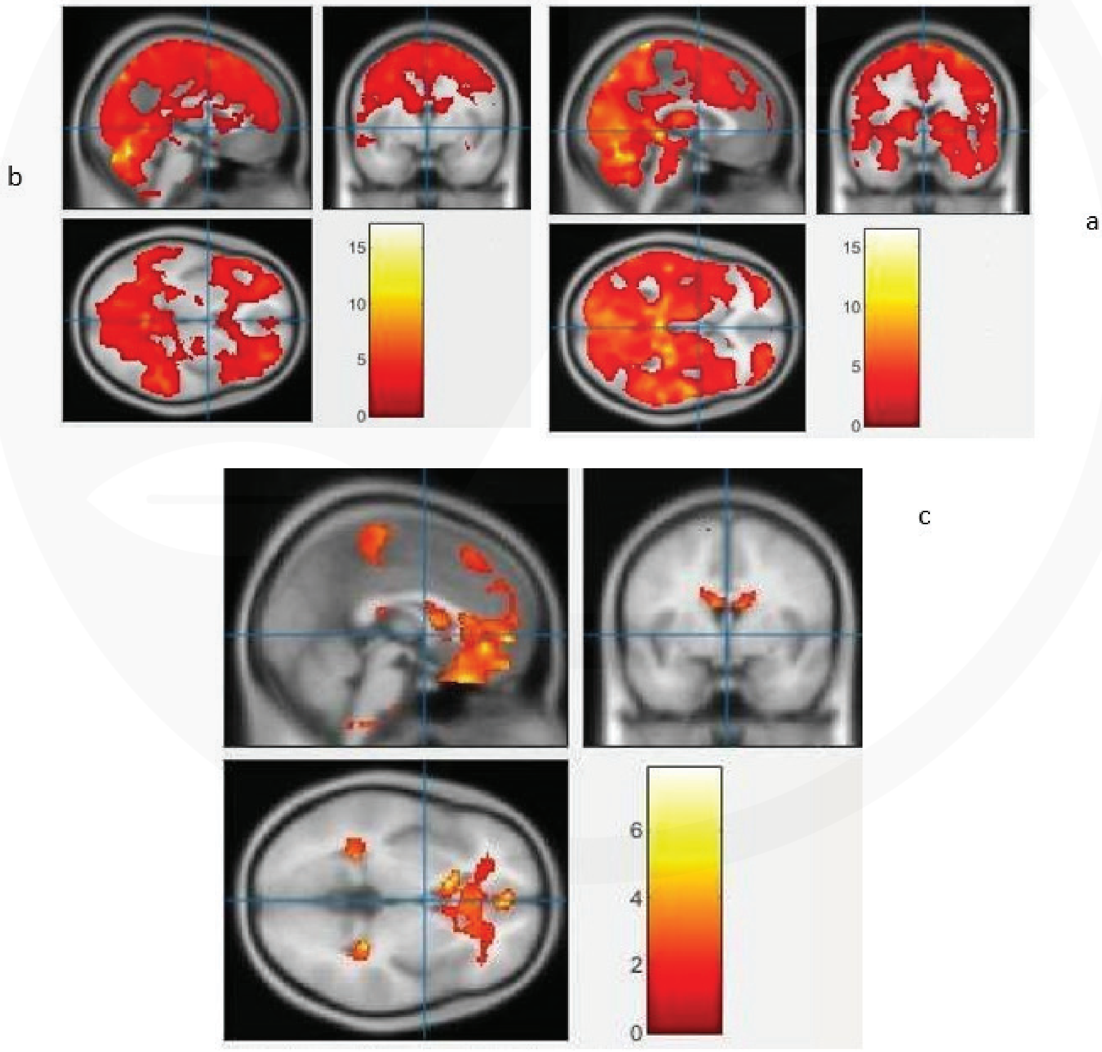


Figure 5. Representation of Brain Voxels in States (a) Women at Rest, (b) Women at task, and (c)Task-Rest of Women.

In these figures, alongside the display of active regions, a color bar indicating the intensity of activity is presented, and the corresponding color code allows for an understanding of the activity intensity. As evident, the task results in an increase in yellow points in the brain, clearly visualized in the Task-Rest contrast. Information regarding color-coded voxels, including location, intensity, region, and recognized function in the brain, is provided in tables specific to each gender. Additionally, Figures 4 and 6 render three-dimensional representations of the male and female brains in the Task-Rest contrast, illustrating the involved brain areas during interaction with the FCF within the natural brain structure. These figures specify their locations in the brain cortex and other regions with details not visible in the previous figures. The presented data is further organized by gender for better comparison.

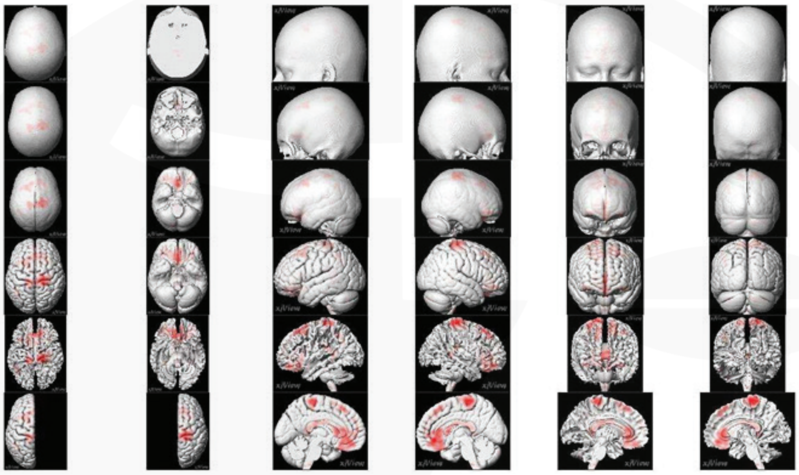

Figure 6. Three-Dimensional Render of Women's Brain in Task-Rest Contrast.

**Effect of FCF on the male brain activity**

The data presented in this section pertains to the brain activity of the male group during connection to FCF. As observed in Table 1, in the Task-Rest contrast, an increase in activity is evident in four clusters and two regions, predominantly in the precentral gyrus and with the highest voxel count. Additionally, in males, during interaction with FCF, a decrease in activity is observed in the posterior cingulate gyrus.

Table 1. Activated and Deactivated Groups (Voxel Count Over One Hundred) in the Male Brain under the Influence of Faradarmani Consciousness Fields in the Task-Rest Contrast.

| MNI Peak Region | BA Region | MNI Coordinate Peak | Peak Intensity | Lobe | Hemisphere | Number of Voxels | Cluster Number | Change in Activity |
|---|---|---|---|---|---|---|---|---|
| **Posterior Cingulate** | 18 | 16 -56 6 | -4.9451 | Limbic | Right | 291 | 1 | Decrease |
| **Precentral Gyrus** | 4 | -22 -24 64 | 6.6983 | Frontal | Left | 473 | 1 | Increase |
| **Precentral Gyrus** | 7 | -16 -42 68 | 5.3964 | **Parietal** | Left | 143 | 2 | Increase |
| **Precentral Gyrus** | Undefined | 16 -24 70 | 6.4762 | Frontal | Right | 159 | 3 | Increase |
| **Superior Frontal Gyrus** | 6 | 16 0 72 | 6.776 | Frontal | Right | 131 | 4 | Increase |

### Effect of FCF on the female brain activity

The data presented in this section pertains to the brain activity of the female group during connection to FCF. As seen in Table 2, in the Task-Rest contrast, there is a decrease in activity in seven clusters and six regions, predominantly in the fusiform gyrus and later in the lentiform nucleus. Additionally, in women, there is a slight increase in activity in the caudate region during the interaction with FCF.

Table 2. Activated and deactivated groups in the female brain (with the number of voxels exceeding one hundred) under the influence of Faradarmani Consciousness Fields in the Task-Rest contrast.

| MNI Peak Region | BA Region | MNI Coordinate Peak | Peak Intensity | Lobe | Hemisphere | Number of Voxels | Cluster Number | Change in Activity |
|---|---|---|---|---|---|---|---|---|
| **Fusiform Gyrus** | 37 | -46 -64 -20 | -10.0637 | Related to the Temporal | Left | 5410 | 1 | Decrease |
| **Superior Temporal Gyrus** | 41 | 48 -16 2 | -10.4179 | Related to the Temporal | Right | 1472 | 2 | Decrease |
| **Lentiform nucleus** | Undefined | -18 -8 2 | -9.081 | Inferior lobe | Left | 649 | 3 | Decrease |
| **Lentiform nucleus** | Undefined | 20 6 6 | -8.0636 | Inferior lobe | Right | 338 | 4 | Decrease |
| **Superior Temporal Gyrus** | 22 | 46 -44 12 | -6.2728 | Related to the Temporal | Left | 147 | 5 | Decrease |
| **Undefined** | 7 | 0 -78 44 | -5.2426 | Undefined | Inter-hemispheric | 100 | 6 | Decrease |
| **Precuneus** | Undefined | 26 -52 46 | -14.0351 | parietal | Right | 243 | 7 | Decrease |
| **Caudate** | Undefined | -16 -28 20 | 7.859 | Inferior lobe | Left | 166 | 1 | Increase |

As shown in Tables 1 and 2, the brain behavior of men in response to the FCF, unlike women, exhibits activation (albeit with around 10% of the number of voxels deactivated in the brains of women). The activated regions in the brains of men cover extensive areas of the Brodmann areas such as 4-7 and 6, while in women, it involves only one area (Caudate).

Indeed, with respect to decreased activity, in the female group, there is a significant decrease in activity in the presence of the FCF in four regions, including the fusiform gyrus, superior frontal gyrus, lentiform nucleus, and precuneus. This is in contrast to the male group, where a decrease in activity is observed only in one region (posterior cingulate).

**Activity related to activated and deactivated regions in the brains of women and men in this study based on previous research.**

To better understand the differences between activated and deactivated regions in the female and male brains, a comparison of regions related to the default mode network and activated and deactivated areas in the Task-Rest contrast in women and men is presented in Figure 5. Alongside this comparative image, the precise areas of the activated and deactivated brain regions in the samples of this study are presented in appendix (Tables 3 and 4), and their correlation with the default mode network is discussed in the discussion section.

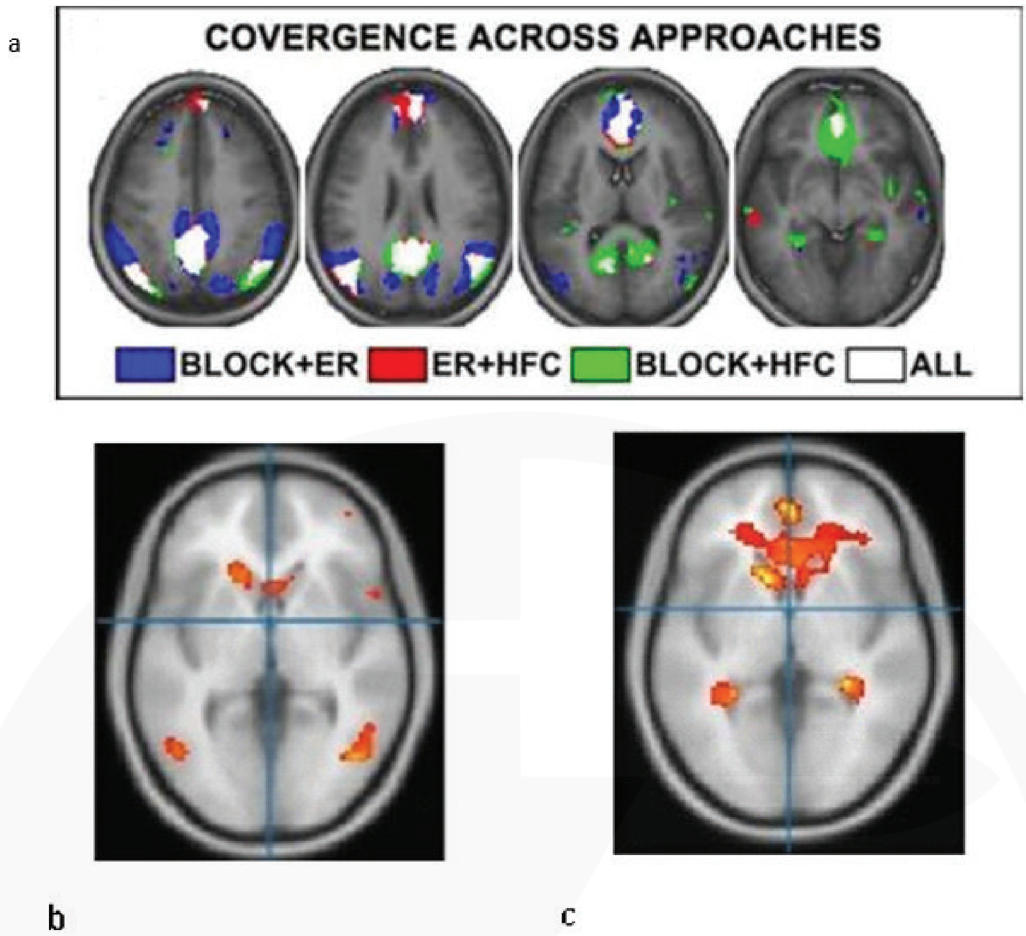


Figure 5. Examination of the correspondence between regions associated with the default mode network and areas of altered activity in women and men in this study. (a) The default mode network, convergently identified by various and distinct fMRI approaches (Buckner et al., 2008). **BLOCK**: Deactivation blocked by task block. **ER**: Deactivation related to event-related tasks. **HFC**: Hippocampal functional connectivity. White areas represent the overlap of various methods. (b) Regions of altered activity in men in this study. (c) Regions of altered activity in women in this study.

Additionally, in the appendix section, comparative tables (Tables 3 and 4) summarize the activated and deactivated regions in the brains of women and men, along with their corresponding features, proportional functionality (if defined with Brodmann's areas), and the way they activate or deactivate in other studies.

## Discussion

The current research investigates the influence of a non-physical field, introduced by Taheri, on the two groups of men and women. Analyzing the changes in the activity of different brain regions based on gender provides a golden opportunity to understand the possible differences in brain activity of males and females under FCF.

Around 89% of the total altered voxels in both genders (97% of which belong to women's brains), are associated with decreased activity. The impact of the FCF in predominantly deactivating the brain is evident in terms of both the number of deactivated regions (8 deactivated regions versus 5 activated regions in total for both genders) and the number of voxels. This result supports a previous study (Taheri et al., 2022c) on the FCF in a combined population of 20 individuals (both men and women). It complements the findings from this research, where the behavioral data of women influenced the overall dataset in the previous combined study. The Default Mode Network becomes active when individuals are left undisturbed to think without external interference or during tasks involving self-related processing (Raichle et al., 2001). According to Garrison et al (2015), this network is less active during activities that require cognitive effort (Garrison et al., 2015). For instance, studies have shown that certain brain regions, during meditation, exhibit less activity compared to control conditions in neuroimaging studies. For example, the main areas of the default-mode network, including medial prefrontal and posterior cingulate cortices, showed a decrease in activity (Brewer et al., 2011). Moreover, it has been identified that meditators showed less activity during meditation compared to rest in the posterior cingulate cortex and precuneus compared to the control group (Kelley et al., 2002; Hehr et al., 2022).

Regarding the activated regions, numerically accounting for 11% of the total altered voxels in both genders (85% of which pertains to men's brains), includes primarily the motor cortex responsible for voluntary movements and skeletal muscles' control and management. Following that, memory (both visual and spatial) and attention are functions of the activated regions in both genders. Although the involvement of the motor cortex in cognitive activities has been mentioned in previous studies (Bhattacharjee et al., 2021; Matheson and Kenett, 2020), the distinct role of these regions in managing human motor activities is unquestionable.

As described in the results section, we understand that out of the total 8 deactivated clusters in both genders, only two deactivated regions show similar trend with the effects of meditation practices on default mode network (Garrison et al., 2015; Kelley et al., 2002). One is in the brains of women (precuneus), and the other is in the sole deactivated region of men's brains (posterior cingulate; however, it is in Brodmann area 18, which is different from the central Brodmann areas of the default mode network).

While deactivated region in men was close to the default mode network or self-directed activity, in women's brains, there were several deactivated regions, including areas associated with visual perception, word recognition, auditory perception, various complex cognitive functions ranging from self-awareness to memory, recall, mental imagery, and emotional responses, which collectively play a role in shaping behavior and personality (Gain, 2018). Among these deactivated regions, the precuneus area has been previously reported as deactivated during meditation in other studies (Yang et al., 2019; Hehr et al., 2022).

The predominance of the degree of deactivation in brain behavior under the influence of FCF and the function of the regions related to cognitive features (in women) and the default mode network or self-nature (in men) indicates two points. First, the role of the brain in this encounter is passive and non-functional, and second, FCF treatment has selectively altered brain activity. It seems that these changes have occurred based on the needs of individuals under FCF treatment.

On the other hand, the interesting similarity in brain behavior between men and women in the activated regions during connection to the FCF is noteworthy. Given that in fMRI techniques, high contrast data registration conditions, immobility, and no movement of the head and body of the samples are necessary, the fact that in both genders, during complete stillness, regions related to motor management and motor cortex are activated implies the influential effect of the FCF on motor control regions during usage, something that is ‘not’ observed in meditation methods. Similar results have been observed in studies using neuroimaging techniques on individuals proficient in martial arts and dance, with the observation of images and films or mental imagery compared to practical activity (Cross and Elizarova 2014; Bläsing et al., 2012).

Researchers across various disciplines, such as biological sciences, neuroscience, and cognitive sciences have always been curious to understand whether the existing and confirmed divergence in behavioral and cognitive characteristics between women and men is rooted in distinct brain structures and functions. Several studies have acknowledged that sexual differentiation of the brain is attributed to several factors, including gene expression, steroid hormones, stress and environmental factors (McCarthy and Arnold, 2011; Beltz et al., 2020).

According to a study, there is a distinctive link between gender inequality in a society and the risk of mental health as well as lower academic achievement in women. This lower outcome was associated with significant differences between the brains of men and women. For example, in gender-unequal countries, women had thinner cortices compared to men, whereas there were even thicker regional cortices in women in gender-equal countries compared to the opposite gender (Zugman et al., 2023). Moreover, the sex differences have been attributed more to the brain size, rather than solely sex effects (Luders and Kurth, 2020). According to Ruigrok et al., 2014 the differences in volume and tissue density were found in the amygdala, hippocampus and insula (Ruigrok et al., 2014). Conversely, other studies have revealed no significant or weak differences in total brain volume between males and females (Wierenga et al., 2018; Jäncke et al., 2015).

The observations in this study confirmed the effectiveness of the FCF on the human brain. In the previous study conducted by our research team, the behavior of brain under this field was screened in a population, with equal number of women and men, without focusing on the gender of participants, and the obtained results indicated that the FCF treatment was more associated with a reduction in brain activity rather than activation of that. According to the current study, it appears that this inactivation is more related to the women. As mentioned above, in this perspective the brain assumes the role of a detector or receiver in its interaction with FCF. While the reasons behind the divergent behaviors of the brain in different genders remain unclear, it seems that FCF treatment has led to the transmission of various information, thereby emphasizing the specific needs of individuals.

Based on Taheri's theory, the thing that guides the activities of neurons is nothing but the mind. To illustrate, like a computer requiring software to regulate hardware's operations, every single part of our universe, including the living cells, needs an operator and software part to perform tasks and function properly. Therefore, altering brain activity under FCF treatment with non-physical entity may help to understand this perspective. Unlike other mind-body exercises like Tai Chi and yoga, which involve breath regulation and training programs, here, participants do not perform any kinds of practice except for fleeting attention to FCF. In other words, receiving this treatment entails no physical intervention but operates through the human mind. With this description in mind, the changed brain activity suggests tantalizingly that something beyond nervous cells, with non-physical entity, interacts with FCF and processes received information. As explained, this software part is described as mind by Taheri. For example, with lower but significant brain activation data in both genders due to the effect of FCF, the behavioral brain shows motor movement activation in conditions where firstly the individuals under the influence of FCF treatment did not previously have prominent physical abilities related to it, and secondly the outcome of brain behavior at the organ level is not observed intentionally or upon the individual's request. This data provides evidence in support of the regulatory influence of the mind on the brain in managing bodily functions.

## Conclusion

This study provides evidence of the influence of FCF on brain activity. Observing more inactivation behavior suggests that the brain plays a passive role in this interaction. This reduced activity can be found much more in female group, indicating varied information transmission under FCF. It means that participants' brains receive specific information based on their needs, leading to altered brain behavior under FCF. More investigations in larger populations are required to understand the different influences of FCF on the brain of both genders. The authors of the present study recommend the additional study of measuring the change of brain metabolites and electroencephalography to know more details of the effect of Faradarmani CF on the brain.

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