Explore 22 (2026) 103416

Contents lists available at ScienceDirect

EXPLORE

journal homepage: www.elsevier.com/locate/jsch

Original Research

Genomic correlates of self-reported psychic experiences: An exploratory analysis

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ARTICLE INFO

Keywords:
Psychic experiences
Genetics
Single nucleotide polymorphisms (SNPs)
Calcium signaling
Consciousness
Neurobiology
Extraordinary human capacities

ABSTRACT

Background: Psychic experiences are widely reported across cultures, yet their potential biological underpinnings remain poorly understood. Survey research suggests such experience may run in families, raising the possibility of genetic contributions. This study explored associations between genomic variation and self-reported psychic experiences.

Methods: Participants ($N = 102$) were English-speaking adults with at least one psychic experience and access to direct-to-consumer genetic data. Self-report measures assessed psychic experiences, paranormal beliefs, mental health, and personality. Raw genetic microarray files were standardized, quality-controlled, and analyzed using a Random Forest classifier to distinguish participants with low versus high psychic experience scores. Feature importance was assessed using permutation-based out-of-bag error, with *p*-values estimated from 200,000 random permutations and corrected using the false discovery rate (FDR).

Results: Participants were predominantly educated Caucasian females from the United States, reporting high paranormal beliefs and moderate levels of psychic experiences. Most first experiences occurred before age 24, and 82% reported family members with similar experiences. Genomic analysis identified 212 single-nucleotide polymorphisms significantly associated with psychic experience scores (FDR < 0.05). The strongest association was observed for rs10410488, mapping to *ARHGEF18*, a gene involved in calcium-dependent dendritic growth. Other significant RSIDs mapped to genes implicated in calcium signaling, brain structure, microtubule dynamics, estrogen pathways, and retinoic acid signaling.

Conclusions: This exploratory study identified candidate genetic variants associated with self reported psychic experiences, but these findings should be considered preliminary. Future research with larger, more diverse cohorts and refined analytic methods will be essential to clarifying the genetic and neurobiological underpinnings of psychic phenomena.

Introduction

The inheritance of physical traits has been recognized for as long as human history has been recorded. Intellectual abilities, too, have long been debated in terms of their heritability, with certain mental traits regarded as advantageous for individuals and societies. Even before Mendel's work on dominance and recessiveness, families and cultures noted patterns of cognitive differences passed down through generations. Evolutionary biologists have since linked the inheritance of intellectual and personality traits, such as dominance, aggression, and leadership, to the competitive success of primate groups in the struggle for survival. Combinations of physical skill, intellect, and social influence have historically shaped group fitness and cultural development.

Although the heritability of physical and intellectual traits has been extensively studied, research on the inheritance of psychic abilities remains far less developed. Anecdotal accounts and cultural traditions have long assumed such inheritance,[1] yet systematic investigations are rare.[2] For example, Cohn[3,4] examined the Scottish tradition of "second sight," reporting that individuals with this ability were more likely to have relatives with the same experiences, and pedigree data sometimes

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https://doi.org/10.1016/j.explore.2026.103416
Received 13 November 2025; Received in revised form 2 April 2026; Accepted 6 April 2026
Available online 7 April 2026

suggested an autosomal dominant pattern of inheritance. A handful of other studies have also explored potential biological correlates. Twin studies found mixed evidence for higher concordance in telepathy performance among identical compared to fraternal twins.[5,6] Neppe and colleagues examined relationships between psi experiences, genetics, and temporal lobe functioning, and conducted familial studies suggesting associations between subjective paranormal experiences and neurophysiological factors.[7–9] Collectively, these pioneering efforts point to possible hereditary or neurobiological influences on psychic experiences, but the evidence base remains extremely limited.

Survey research from our laboratory also supports familial trends in psychic experiences. In two large surveys, the majority of respondents reported relatives with similar experiences, and those with family histories endorsed a greater breadth, strength, accuracy, and frequency of abilities.[10,11] These familial patterns were especially pronounced for less common abilities, such as pyrokinesis (a purported ability to generate or control fire), trance channeling (entering an altered state of consciousness to convey information perceived as coming from beyond the self), and geomancy (claimed sensitivity to geographic energy features). Extending beyond survey methods, we also conducted a case-control genetic study comparing 13 high-performing psychics with 10 age, gender, and race-matched controls, which revealed a conserved non-coding DNA region near a brain-expressed gene in the psychics, suggesting potential genetic contributions to psychic ability.[12]

Building on this prior work, the present study was designed as an exploratory methodological investigation of potential genetic correlates of self-reported extraordinary human experiences. Because full genome-wide association studies remain cost-prohibitive, we utilized genetic data that participants had already obtained from direct-to-consumer testing services (e.g., 23andMe, Ancestry.com). These genomic files were analyzed alongside survey data measuring psychic abilities and related constructs. This approach enables an initial, cost-effective exploration of potential genetic correlates of reported psychic experiences within a larger research program examining the biology of extended human capacities.

Methods

We recruited candidates globally through the Institute of Noetic Sciences (IONS) membership base (~50,000 individuals), our extended social networks (~500,000 people), and previous participants who had consented to be contacted for future studies. Interested individuals were directed to a SurveyMonkey.com landing page containing: (1) a study description; (2) a link to the consent form; (3) instructions and links for obtaining genetic data from direct-to-consumer providers; (4) a link to the online survey; and (5) a reminder to have their genetic data file ready before beginning. At the end of that page, participants were routed to the consent form, which they were required to read and acknowledge before proceeding. Contact information for study staff was provided for participants with questions prior to enrollment.

Eligible participants were adults (>18 years old), English-speaking, willing to complete questionnaires, had experienced at least one psychic phenomenon that they believed transcended the normal boundaries of time and space, and possessed genetic data available for sharing with IONS. Exclusion criteria included inability to understand English, absence of psychic experiences, or lack of the required genetic data file. Although psychotic and dissociative symptoms were assessed, these were not used as exclusion criteria, as individuals with psychic abilities may score higher on the CAPE-15 (see Measures) without reaching pathological thresholds.[11,13] All participants signed an informed consent to participate in the study, and all study activities were approved and overseen by the Institutional Review Board at the Institute of Noetic Sciences (IORG#0003743).

After providing consent and passing screening, participants proceeded to complete a survey battery consisting of the measures described below.

Measures

Demographics. Participants reported age, gender, race/ethnicity, relationship status, education, income, and country of birth to provide a comprehensive description of the study sample.

Psychic Experiences. Self-reported psychic experiences were assessed using a measure adapted from Wahbeh and McDermott.[11] Participants responded to 28 items assessing the breadth and frequency of experiences. Binary endorsements (experienced = 1, not experienced = 0) and frequency ratings (0–5) were summed to create a composite psi score (*PsiSum*), ranging from 0 to 100. Higher scores indicate a greater prevalence and intensity of reported psychic experiences. PsiSum was used in subsequent analyses.

Psychotic Symptoms. The Community Assessment of Psychic Experiences–Positive Scale (CAPE-P15)[14] was used to assess subclinical positive psychotic symptoms, including persecutory ideation and bizarre experiences. The scale demonstrates strong internal consistency (Cronbach's $\alpha = 0.85$ for frequency, 0.86 for distress) and predictive validity for generalized distress ($r = 0.52$).[15]

Dissociation. Dissociative symptoms were measured using the Dissociative Experiences Scale–Taxon (DES-T).[16] This eight-item measure uses percentage-based responses and distinguishes pathological dissociation with a cutoff score of 30, yielding an 87% positive predictive value. The scale demonstrates good internal consistency (Cronbach's $\alpha = 0.75$).

Noetic Experiences and Beliefs. The Noetic Experience and Belief Scale (NEBS)[17] evaluates beliefs in, and experiences of, paranormal and noetic phenomena. Participants rated 10 domains (e.g., intuition, telepathy) on a 0–100 slider scale for both belief and experience. The NEBS shows excellent reliability (Cronbach's $\alpha = 0.90$ for beliefs, 0.93 for experiences) and strong test–retest reliability ($r = 0.83$ and $r = 0.77$, respectively).

Personality. Personality traits were assessed using the Brief Five Inventory–10 (BFI-10).[18] This concise measure of the Big Five dimensions (extraversion, agreeableness, conscientiousness, neuroticism, and openness) contains two items per trait. Despite its brevity, it retains acceptable psychometric properties relative to longer versions.

Genetic data submission. At the conclusion of the survey, participants were asked to upload their raw genomic microarray data from direct-to-consumer testing services (e.g., 23andMe, AncestryDNA). These platforms, while not intended for clinical or diagnostic use, provide predictive data with reported accuracy ranges, with company-to-company differences reflecting variations in SNP sets and calculation methods.[19] Because SurveyMonkey.com has file size limitations, uploads were handled through Wufoo, an add-on that supports larger files. Each participant was assigned a unique random study ID displayed at the end of the survey. Participants copied this ID into a Wufoo text box before uploading their genetic file, ensuring alignment with the corresponding survey data. Data were collected anonymously via a HIPAA-compliant SurveyMonkey.com system, with participants allowed to complete the survey only once. As a backup, genetic data were also stored in the IONS Dropbox account through Wufoo. All files were anonymized, and any identifying information was permanently deleted.

Genomic data processing. Each of the 102 genetic files was imported into MATLAB 2023 (MathWorks, Inc.) using a custom script that automatically detected the source platform (e.g., 23andMe, AncestryDNA), extracted relevant genomic content, and standardized file formats. It then matched genetic records with the corresponding survey data, resolved discrepancies, and consolidated all usable records into a master dataset. From the initial >600,000 single-nucleotide polymorphisms (SNPs), 55,075 RSIDs present across all participants were identified. Survey data were reformatted to align with the genetic dataset, with each row representing a participant and each column representing a survey variable.

Data analysis

PsiSum Classification. Because of the large number of RSIDs (>55,000), regression with individual PsiSum scores was not feasible. Attempts using a Random Forest regression model also failed to converge. Therefore, a classification approach was employed. The 102 participants were divided at the median, with the 52 participants with the lowest PsiSum scores categorized into a "low" group and the 52 participants with the highest PsiSum scores categorized into a "high" group, creating two classes suitable for classification.

Genetic data preprocessing. Following data harmonization (see Genomic Data Processing), additional preprocessing steps were applied before analysis. Each genetic marker was automatically examined for data quality. For markers with more than two variants, all less common variants beyond the second most frequent were recoded to match the second most frequent, effectively binarizing the data. Markers with fewer than 10 occurrences of any variant were excluded to ensure sufficient representation. After quality control, 53,870 RSIDs were retained.

Genetic data quality assessment. Quality control procedures confirmed adequate representation across genetic markers, with most variants present at sufficient frequency and low levels of missingness per participant (see Supplemental Figure S1).

Classification of low vs. high psi score

A Random Forest classifier was trained using MATLAB's *TreeBagger* function to model the relationship between genetic markers (predictors) and PsiSum class labels. The ensemble consisted of 200 decision trees, each trained on 70% bootstrapped samples (FBoot = 0.7). To reduce overfitting and improve generalization, we set the minimum leaf size to 10 (MinLeafSize = 10) and limited the maximum number of splits per tree to 500 (MaxNumSplits = 500). At each split, a random subset of 5000 predictors (NumPredictorsToSample = 5000) was selected, which helped reduce correlation across trees.

Feature importance was assessed using out-of-bag (OOB) permutation. The *OOBPermutedVarDeltaError* quantifies the increase in classification error when values of a given feature are randomly permuted, with larger increases indicating greater feature importance. Each RSID was assigned a corresponding feature importance value. Importantly, the Random Forest classifier identifies genetic variants that contribute most to distinguishing high versus low PsiSum groups. However, this approach does not provide the direction of association (i.e., whether a given allele is linked to higher or lower PsiSum scores). Future analyses using regression-based models will be needed to clarify allele-specific effects.

To evaluate statistical significance, the PsiSum class labels of all 102 observations were randomly permuted relative to the RSIDs, and the Random Forest classifier was rerun. This process generated 200,000 permutation-based null estimates of OOBPermutedVarDeltaError, which were used to compute *p*-values via the percentile method (one-tailed, as the analysis focused solely on identifying features of high importance). Because thousands of RSIDs were tested simultaneously, we applied the Benjamini and Hochberg false discovery rate (FDR) procedure[34] to correct for multiple comparisons. FDR control is widely used in genomic and other high dimensional analyses because it limits the expected proportion of false discoveries while generally retaining greater power than more conservative family wise error procedures such as Bonferroni.[35] The FDR correction was then applied, yielding 212 RSIDs that fell below the 0.05 threshold. For comparison, a two-tailed test identified 190 RSIDs of high importance and none of low importance.

Effect sizes were calculated parametrically, by comparing observed values to the mean and standard deviation of the null distribution. Because effect sizes and *p*-values were derived using different methods (parametric vs. percentile), they may vary even when the *p*-value remains constant.

Results

Participants

A total of 583 volunteers began the survey. Of these, 191 declined consent, and 290 did not provide a usable genetic file. The final analytic sample, therefore, included 102 participants who both submitted genetic data and completed the survey.

Demographic characteristics are summarized in Table 1. Participants were predominantly educated Caucasian females from the United States with moderate income levels. Average dissociative and psychotic symptom scores indicated no evidence of mental health pathology. Paranormal beliefs were generally high, while reported paranormal experiences were moderate. Most participants reported their first psychic experience before the age of 24 (n = 88, 86.3%), and the majority

Table 1
Participant demographics and self-report survey data.

Measure	Level	Values *N*, % or Mean, SD *N* = 102
Gender	Female	73, 72%
	Male	29, 28%
Age (years)		48.3, 14.1
Education (years)		16.4, 3.2
Relationship Status	In relationship	54, 53%
	Not in relationship	48, 47%
Racial Identification	Caucasian	87, 85.3%
	African American	7, 6.9%
	Hispanic	4, 3.9%
	Native American	2, 2.0%
	Asian or Pacific Islander	2, 2.0%
Income	$0-$49,999	37, 36.3%
	$50,000-$99,999	31, 30.4%
	$100,000-$149,999	13, 12.8%
	$150,000-$199,999	11, 10.8%
	$200,000 and up	11, 10.8%
Country	United States of America	81, 79.4%
	United Kingdom	7, 6.9%
	Canada	4, 3.9%
	Germany	4, 3.9%
	None of the above	4, 3.9%
	Australia	1, 1.0%
	India	1, 1.0%
Personality	Extraversion	3.0, 1.2
	Agreeableness	3.5, 1.0
	Conscientiousness	4.0, 0.8
	Neuroticism	2.7, 1.1
	Openness	4.2, 0.8
Dissociative Experiences		9.8, 13.7
Psychotic Symptoms	Frequency (0–3)	0.34, 0.31
	Intensity (0–3)	1.1, 1.1
Medications	No	84, 82.4%
	Yes	18, 17.6%
Paranormal Beliefs		86.6, 12.0
Paranormal Experiences		64.8, 19.8
Age Experiences Began	0–10	57, 55.9%
	10–15	12, 11.8%
	16–24	19, 18.6%
	25–45	13, 12.8%
	46–60	1, 1.0%
Family Members with Similar Experiences	Yes	84, 82.4%
	No	18, 17.6%

Notes. Values are reported as mean (SD) for continuous variables and n (%) for categorical variables. PsiSum = composite score of self-reported psychic experiences (see Measures). CAPE-P = Community Assessment of Psychic Experiences–Positive scale; DES-T = Dissociative Experiences Scale–Taxon; BFI-10 = Brief Five Inventory–10.

indicated that family members had similar experiences ($n = 84$, 82.4%). Only two participants were twins (the survey did not ask if they were identical or fraternal).

Self-report psychic experiences

Table 2 presents the number and percentage of participants endorsing each psychic experience. The five most commonly reported were claircognizance, clairempathy, precognition, clairvoyance, and lucid dreaming. The least frequently endorsed were psychokinesis, psychophony, levitation, psychic surgery, and pyrokinesis. Every participant endorsed at least one experience, with a minimum of three experiences per individual ($M = 16.3$, $SD = 5.8$; range = 3–28). The mean PsiSum score was 40.0 ($SD = 18.0$).

Genetic associations

The 20 RSIDs with the largest effect sizes are presented in Table 3, ordered from highest to lowest. The remaining significant RSIDs are provided in the Supplemental Materials. Among the RSIDs, the first (rs10410488) showed the strongest association with PsiSum, with an effect size of 20.8 and an FDR-adjusted p-value of 0.000001, whereas the other top variants each had corrected p-values of 0.026. RSIDs were annotated to their nearest genes using standard genomic databases to support the interpretation of significant findings in the Discussion.

Discussion

This exploratory study represents one of the first efforts to examine potential genetic correlates of self-reported psychic experiences using direct-to-consumer genomic data. Beyond the genomic findings, several aspects of the participant sample are noteworthy. The majority of participants were highly educated Caucasian females from the United States, consistent with demographics observed in other psi-related surveys (e.g., see Wahbeh & Radin, 2018). Participants reported relatively high levels of paranormal belief and moderate levels of paranormal experience, and most indicated that their first psychic experiences occurred before age 24. A striking 82% also reported that family members had similar experiences, reinforcing prior findings that psi phenomena often cluster within families. Psychological measures indicated no evidence of psychopathology, as dissociative and psychotic symptom scores fell within non-clinical ranges. Together, these survey data suggest that participants in this study were psychologically healthy, engaged in psi experiences from a relatively young age, and frequently observed familial transmission of such abilities.

Building on these participant characteristics, our exploratory genomic analyses identified specific RSIDs associated with PsiSum, the composite score of psychic experiences. The strongest association was observed for rs10410488, which showed a large effect size and no missing data. While the precise basis underlying psi talent remains unknown, these preliminary findings raise the possibility that reported psychic experiences may correlate with identifiable genetic and neurobiological features. Given the exploratory nature of the study and the limited sample size, these associations should be interpreted cautiously and viewed as hypothesis-generating rather than confirmatory. Among the top findings, dendritic growth and calcium signaling emerged as the most plausible biological themes and are considered in more detail below.

One line of exploration has examined whether psi phenomena could involve sensitivity to electromagnetic fields (EMFs). Voltage-gated calcium channels (Cavs) in humans are activated by radiofrequency EMFs,[20] and Hosseini proposed that Cavs may act as molecular receivers in brain-to-brain communication.[21] Supporting this possibility, biologically generated radiosignals have been observed in *Drosophila*,[22] and ultra-weak biophoton emissions are well documented in cellular systems.[23] However, EMFs alone are unlikely to account for all psi

Table 2
Self-reported psychic experiences in descending order of endorsement.

Psychic Experience	Endorsed ($N = 102$)	% Endorsed
Claircognizance or Knowing - the empathic ability to feel what needs to be done in any given circumstance, often accompanied by a feeling of peace and calm, even in the midst of a crisis. Having the ability to understand or know something without any direct evidence or reasoning process.	95	93.1
Clairempathy- To feel emotions of another person or non-physical entity (also known as empath).	90	88.2
Precognition, premonition and precognitive dreams - A form of clairvoyance when the objects of perception is distant in time; Perception of events before they happen; the empathic ability to feel when something important is about to happen (often this can be a feeling of inexplicable dread or doom).	89	87.3
Clairvoyance or Extrasensory perception (ESP) - Clear vision, to visually perceive using the "mind's eye."	87	85.3
Lucid dreamer – Ability to have awareness while dreaming. Knowing that you are dreaming while asleep.	87	85.3
Telepathy- Communication of thoughts or ideas by means other than the known senses, mind-to-mind communication; the ability to read people's thoughts.	82	80.4
Clairaudience- To hear from sources broadcast from spiritual or ethereal realm using the "inner ear."	78	76.5
Clairsentience- Clear sensation or feeling within the whole body without any outer stimuli related to the feeling or information.	78	76.5
Animal Communication - The empathic ability (beyond the five physical senses) to hear, feel and communicate with animals.	75	73.5
Clairalience- To smell a fragrance/odor of substance or food which is not in one's surroundings.	72	70.6
Mediumship- To mediate communication between spirits of the dead and living; the empathic ability to feel the presence and energies of spirits.	71	69.6
Emotional Healing - The empathic ability to feel, heal, transform or transmute them).	70	68.6
Aura Reading- Perception of energy fields surrounding people, places and things.	65	63.7
Nature empath- The empathic ability to read, feel and communicate with nature and with plants.	63	61.8
Astral Projection (or astral travel)- An out-of-body experience in which a purported "astral body" separates from the physical body and is capable of traveling outside it.	63	61.8
Retrocognition or post-cognition - Knowledge of a past event which could not have been learned or inferred by normal means.	62	60.8
Physical Healing - The empathic ability to feel other people's physical symptoms in your own body (and often the ability to heal, transform or transmute them).	61	59.8
Geomancy - The empathic ability to read the energy of places and of the land, such as Ley lines.	59	57.8
Remote Viewing- The practice of seeking impressions about a distant or unseen target.	56	54.9
Channel- Communication of information to or through a physically embodied human being from a non-physical source.	55	53.9
Psychometry or psychoscopy or clairtangency- Clear touching; Obtaining information by touching or concentrating on an object; the empathic ability to receive energy, information and impressions from objects, photographs or places.	50	49.0
Automatic Writing or Psychography- Writing produced without conscious thought, produced by or under the influence of a spirit.	44	43.1
Clairgustance- Clear tasting, to taste without putting anything in one's mouth.	40	39.2

(*continued on next page*)

Table 2 (*continued*)

Psychic Experience	Endorsed (N = 102)	% Endorsed
Psychokinesis or telekinesis - The ability to manipulate objects by the power of thought.	32	31.4
Psychophony - a spirit talks using the voice of a medium (can be the same as channeling)	25	24.5
Pyrokinesis- The ability to create and/or manipulate fire through the concentration of mind.	7	6.9
Psychic Surgery- Removal of diseased body tissue via an incision that heals immediately afterwards.	6	5.9
Levitation- to float in the air, defying gravity.	5	4.9

Notes. Values represent the number (n) and percentage (%) of participants endorsing each psychic experience (N = 102). Participants could endorse more than one experience. PsiSum = composite score of self-reported psychic experiences (see Measures).

Table 3
Top 20 significant RSIDs related to PsiSum score.

	RSID	Gene (nearest/association)	Effect Size
1	rs10410488	ARHGEF18 (dendritic growth/branching)	20.8
2	rs10767843	ARHGAP35 (calcium signaling regulator)	19.2
3	rs10484946	CDH13 (cell adhesion; upstream Cav regulation)	18.4
4	rs11015068	SLC1A2 (glutamate transporter; calcium signaling)	17.2
5	rs8007684	INPP5A (intracellular calcium regulation)	15.9
6	rs6597976	PLCB1 (calcium signaling, phospholipase pathway)	15.5
7	rs4148441	CAMK1G (calcium/calmodulin kinase; responds to elevated calcium)	14.6
8	rs1886956	CLCA1 (chloride channel; activated by NMDA receptor–mediated calcium influx)	14.0
9	rs2278844	WWOX (brain structure; epilepsy/schizophrenia association)	13.9
10	rs10887679	ERC1 (synaptic protein; neurodevelopment)	13.5
11	rs1039122	DLG2 (synaptic scaffolding; neurodevelopment)	13.4
12	rs2774920	TNR (tenascin R; neuronal extracellular matrix/ brain architecture)	13.4
13	rs10466815	FMN1 (formin-1; microtubule and actin dynamics)	12.8
14	rs2836062	NOBOX (oogenesis/estrogen signaling pathway)	12.7
15	rs10490099	ESR1 (estrogen receptor 1; hormonal signaling)	12.0
16	rs11761806	RERE (retinoic acid signaling; neurodevelopment)	11.8
17	rs12123002	ROR1 (retinoic acid-related orphan receptor 1)	11.6
18	rs3982	TNR (tenascin R; neurodevelopment/brain matrix protein)	11.5
19	rs12542396	ERC1 (active zone protein; brain structure)	11.4
20	rs9942677	WWOX (epilepsy/schizophrenia-associated gene)	11.4

Notes: RSID = reference SNP cluster identification number. Effect size values were calculated relative to the null distribution generated by permutation (see Methods). All p-values were adjusted for multiple comparisons using the FDR method; 212 RSIDs passed the 0.05 threshold, with FDR-corrected p-values being 0.026 for all RSIDs except for RSID rs10410488, which was $p = 0.000001$. The top 20 are shown here, and the remainder are reported in the Supplemental Materials.

phenomena, particularly those reported across large distances or outside conventional spacetime constraints. Still, calcium signaling remains a biologically plausible correlate that could contribute to psi-related states in interaction with other biological processes. This is consistent with broader perspectives on bioelectromagnetic interactions in human experience.[24]

Several of the RSIDs identified in this study were linked to genes that influence how neurons regulate calcium signaling, a key process for communication between brain cells. To interpret the biological significance of our findings, each RSID was mapped to its nearest or most likely associated gene using standard genomic annotation resources. For example, some genes (*ARHGAP35, CDH13, SLC1A2*) help control activity in Cavs, while others (*INPP5A, PLCB1*) fine-tune intracellular calcium levels. *CAMK1G* responds to rising calcium levels, and *CLCA1* is activated by calcium influx through NMDA receptors. Disturbances in these pathways have also been implicated in neuropsychiatric disorders such as schizophrenia (*CAMK1G, INPP5A*), autism (*INPP5A*), and epilepsy (*PLCB1, WWOX*), disorders that often share features with reported psychic experiences.

As noted earlier, rs10410488 emerged as the most statistically significant variant identified. This SNP maps to *ARHGEF18*, a transcriptional activator essential for calcium-dependent dendritic growth and branching in cortical neurons.[25] Its relevance is compelling because it aligns with two major themes emerging from our analysis: calcium signaling and brain architecture. The role of *ARHGEF18* in shaping dendritic morphology suggests it may influence how calcium channels are spatially organized and functionally tuned. In turn, this arrangement could affect neuronal sensitivity to subtle signals in a manner loosely analogous to how an antenna array enhances reception. In simpler terms, *ARHGEF18* may help shape the brain's wiring in ways that make certain individuals more receptive to psi-related phenomena. It is important to emphasize, however, that while our Random Forest approach identified genetic variants most strongly associated with PsiSum classification, it does not specify whether particular alleles are linked to higher or lower scores.

Beyond calcium signaling, other gene clusters identified in our results implicate neurodevelopment and brain structure (ERC1, WWOX, TNR, DLG2), microtubule dynamics (FMN1), estrogen signaling (NOBOX, ESR1), and retinoic acid signaling (RERE, ROR1). Microtubules have been hypothesized to support consciousness through quantum-level interactions with biophotons.[26–28] Estrogen pathways may also be relevant, as some studies suggest that EMFs can influence estrogen biosynthesis[29] and ultraviolet light selectively interacts with estrogen's aromatic A-ring, a structural feature distinguishing it from testosterone.[30] Complementing these biological observations, Mossbridge and colleagues found that reproductive hormonal status predicted performance on precognition tasks, with the strongest effects observed in women in extreme hormonal states such as pregnancy or post-hysterectomy without hormone replacement.[31] These findings suggest that reproductive hormones may modulate psi-related performance, raising the possibility that genetic variation in hormonal pathways contributes to individual differences in psychic experiences.

Retinoid pathways, meanwhile, have been associated with vivid dreaming and delta-range EEG activity.[32] This is notable in light of Rupert Sheldrake's work on the "sense of being stared at," which builds on the ancient extramission theory of vision.[33] He proposed that perception may extend outward from the brain, projecting awareness into the environment as part of the "extended mind." While speculative, this framework parallels retinoic pathways linked to vision and suggests that genetic variation in these systems could intersect with broader models of consciousness. Future research could explore this possibility.

These findings raise the possibility that psychic phenomena may be correlated with neuronal processes involving Cavs, whose activity is shaped by calcium-regulatory genes and their structural organization in the brain. These systems could potentially interact with biophotonic, hormonal, neurodevelopmental, and structural pathways that have also been discussed in relation to consciousness and altered states. Although the role of EMFs in psi remains uncertain, Cavs and related pathways represent biologically plausible correlates that can be further investigated. Overall, this interpretation remains speculative and hypothesis-generating, but it may offer one possible testable framework for future research.

Limitations

Several limitations should be considered when reviewing these exploratory study results. Standard genomic-wide association studies typically require many thousands (10′s to 100′s) of participants to have adequate statistical power. The relatively small sample size restricts the generalizability of our findings. Participants were recruited from IONS

membership, social networks, and prior studies, which may introduce self-selection bias and limit representativeness. Psi experiences were assessed by self-report, which may be subject to recall or expectancy effects, and we cannot confirm the accuracy of these experiences. The use of direct-to-consumer genetic data introduces variability across platforms (e.g., 23andMe vs. AncestryDNA), including differences in SNP coverage and missing data rates. Although such variability could potentially confound results, this concern does not apply to rs10410488, the most significant variant identified, which had no missing data. The cross-sectional nature of this study precludes causal inference. The large number of SNPs tested increases the possibility of false-positive findings; however, we corrected for multiple comparisons using FDR. Finally, as noted earlier in the Discussion, while the Random Forest classifier identified genetic variants that most strongly distinguished high versus low PsiSum groups, this method does not reveal whether specific alleles correspond to higher or lower scores. Future regression-based analyses are needed to clarify the direction of these associations.

Conclusion

This exploratory study identified specific genetic variants (RSIDs) associated with self-reported psychic experiences, suggesting that genomic data may offer meaningful insights into extraordinary human capacities. The most robust association was observed for rs10410488, which showed a strong effect size. While preliminary, these findings highlight the value of integrating genetic analyses into the study of psi phenomena.

Future research should replicate these results in larger and more diverse cohorts to strengthen generalizability. Exploring analytic approaches beyond binary classification may capture greater complexity in the genetic influences on psi, while combining genetic data with environmental and lifestyle measures could clarify how context and biology interact. Future studies could also refine the psychic experiences evaluated by focusing on the most commonly reported experiences, such as claircognizance, or by using principal components analysis to identify any latent dimensions underlying these reports. These directions point toward a more rigorous and multidimensional science of psi, positioning this work, along with previous studies, as early steps in a field with significant potential.

AI assistance disclosure

The authors used OpenAI's ChatGPT (GPT-5) to assist with writing and editing portions of the manuscript. Specifically, the AI tool was employed to improve clarity, refine grammar and style, reduce redundancy, assist with restructuring sections for readability, and suggest improvements to text. All scientific content, study design, data analyses, interpretations, and final decisions regarding text were provided and verified by the authors.

CRediT authorship contribution statement

Helané Wahbeh: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Arnaud Delorme:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Cedric Cannard:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ryan Rossner:** Writing – review & editing, Writing – original draft, Supervision. **Garret Yount:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Dean Radin:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors have no conflicts of interest to declare.

Acknowledgments

We thank the IONS Science team, staff, members, and donors for their support of this project. We are especially grateful to the participants who generously contributed their time and personal data. We also thank Michael Kriegsman for statistical support. The BIAL Foundation and the Hittman Family Foundation supported this line of research.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.explore.2026.103416.

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