EFEIA FOUNDATION

EHS Global Census

Cross-Survey Analysis **with Sensitivity Profiles**

Analysis Date: December 15, 2025

Complete Dataset: 94 individuals

Analysis Depth: Multi-dimensional correlation, risk stratification, sensitivity profiling, and phenotype identification

2025

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EHS GLOBAL CENSUS 2025
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Executive Summary

This report presents findings from Phase One of the EHS Global Census, a comprehensive survey-based assessment of electromagnetic hypersensitivity (EHS) across 286 participants from 20+ countries. The analysis integrates data from three surveys covering lifestyle and EMF exposure patterns (Survey A), symptom profiles (Survey B), and sleep quality (Survey C), plus detailed environmental sensitivity assessments.

Key Findings

1. **Biological vulnerability matters more than exposure level.** Environmental sensitivities explain 21.1% of symptom variance ($r = 0.460$), while EMF exposure alone explains 17.3% ($r = 0.416$). This suggests that who you are biologically may be more predictive than what you are exposed to.
2. **EHS rarely occurs in isolation.** 76% of EHS-reporting participants have other environmental sensitivities. Those with any additional sensitivity show 67% higher symptom scores. More sensitivities correlate with worse symptoms ($r = 0.321$, $p = 0.002$).
3. **Sleep disruption is the strongest correlate.** The symptom-sleep relationship ($r = 0.633$, $p < 0.001$) is the most robust finding in the dataset. This bidirectional relationship suggests sleep may be a critical intervention point.
4. **Eight distinct phenotypes identified.** Participants cluster into four primary exposure-symptom patterns (Healthy Baseline, Resilient, Reactive, Overexposed), each subdivided by sensitivity burden, suggesting personalized approaches may be needed.
5. **44.7% require professional-level intervention (moderate risk or higher).** These individuals are recommended for Phase Two assessment (instrumental measurement and architectural evaluation).

Survey Score Overview (Complete Cohort, n=94)

Survey	Scale	Mean Score	% of Maximum	Interpretation
A: Multiple Habits & Sensitivities	0-106	35,4	33,4%	Moderate exposure
B: 25 Common Symptoms of EHS	0-250	74,5	29,8%	Mild-moderate symptoms
C: Sleep Disorders	0-163	67,6	41,5%	Moderate sleep disturbance
Composite	0-518	177,4	34,3%	Very Mild risk category

1. Purpose and Scope

1.1 Objective

This report provides an early-stage evaluation of EHS risk based on self-reported survey data. It is designed to identify individuals who may benefit from more comprehensive assessment, characterize the population seeking EHS evaluation, and generate hypotheses about EHS mechanisms that warrant further investigation.

1.2 EFEIA Protocol Phase One

Phase One of the EFEIA Protocol consists of standardized survey instruments administered prior to any physical measurements. This approach serves several purposes: establishing baseline symptom profiles before intervention, identifying patterns that inform subsequent measurement priorities, and enabling risk stratification to allocate Phase Two resources appropriately. Phase One findings are perception-based and do not constitute clinical diagnosis.

1.3 Participant Overview

Parameter	Value
Total Enrollment	286 participants initiated surveys
Complete Cohort	94 completed all three surveys (33% completion rate)
Gender Distribution	74% Female, 26% Male
Age	Mean 44.2 ± 11.0 years (range: 21-73); peak symptoms 40-49 years
Geographic Distribution	20+ countries; 85% Spanish-speaking, 15% English-speaking
Collection Period	August - December 2025
High-risk requiring intervention	23,2% (Nearly 1 in 4 need professional support)

Note on Risk Classification: This composite score-based classification (23.2% high-severity) measures current symptom burden intensity. A separate phenotype-based classification (Section 6) identifies 46% of participants as having patterns requiring professional intervention, including individuals whose composite scores are moderate but whose exposure-symptom pattern indicates need for clinical support. **Both metrics are clinically useful**: composite scores indicate urgency, while phenotypes guide intervention type.

2. Methodology

2.1 Survey Instruments

The EHS Global Census employed three standardized surveys administered sequentially:

- **Survey A: Multiple Habits & Sensitivities (Scale 0-106, n=283)**

Evaluates technology usage and EMF exposure, sleep hygiene and device practices, nature exposure and grounding, hydration/nutrition/resilience factors, and sensory sensitivities.

- **Survey B: 25 Common Symptoms of EHS (Scale 0-250, n=141)**

Comprehensive 25-symptom inventory covering neurological (headache, pressure, numbness), cognitive (concentration, memory), psychological (nervousness, irritability), sleep/energy (fatigue, insomnia), and physical (skin, cardiovascular, sensory) domains.

- **Survey C: Sleep Disorders (Scale 0-163, n=113)**

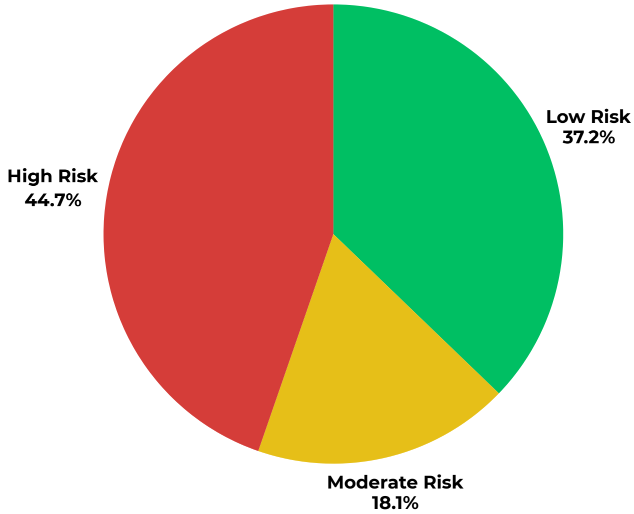
Assesses sleep quality and duration, sleep disruption patterns, daytime functional impact, sleep-related conditions (bruxism, RLS, nightmares), and circadian rhythm integrity.

Composite Score: 0-518 (sum of all three surveys)

2.2 Scoring and Risk Categorization

Risk categories for the Composite Score (0-518 scale):

Risk Category	Score Range	n	%	Intervention Level
Risk-Free	0-142	10	10,6%	None needed
Very Mild	143-188	25	26,6%	Lifestyle guidance
Mild	189-238	17	18,1%	Coach support
Moderate	239-288	23	24,5%	Professional evaluation
Severe	289-339	14	14,9%	Intensive intervention
Catastrophic	340-518	5	5,3%	Urgent multidisciplinary



Aggregated Risk Levels:

- **Low Risk (Risk-Free + Very Mild):** 35 participants (37.2%)
- **Moderate Risk (Mild):** 17 participants (18.1%)
- **High Risk (Moderate + Severe + Catastrophic):** 42 participants (44.7%)

2.3 Statistical Methods

- Pearson correlation coefficients with significance testing (p-values)
- Variance explained calculated as $R^2 = r^2$
- **Significance levels:** * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
- Complete case analysis for integrated findings (n=94)
- **Software:** Python 3.x with pandas, numpy, scipy

2.4 The Completion Paradox

A critical methodological finding emerged from analysis of completion patterns:

Completion Status	n	%	Interpretation
All 3 surveys	94	33%	Healthiest third, sustained assessment capacity
2 surveys	21	7%	Moderate difficulty
1 survey only	171	60%	Highest burden, could not sustain

Severity Comparison:

Completion Group	Survey A	Survey B	Survey C
All 3 surveys	35,4	35,4	67,6
1 survey only	39,0	35,4	87,2
Difference	10%	15%	29%

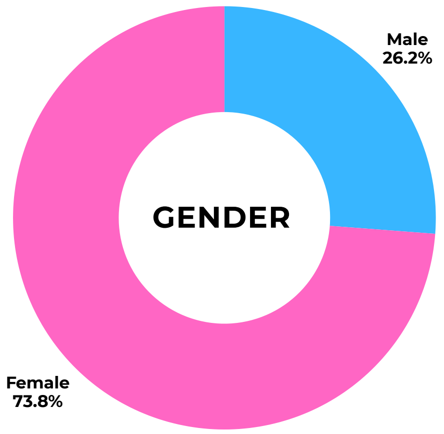
Interpretation: The most affected 60% of participants could not complete all three surveys. Sleep problems showed the largest gap (+29%) because severe sleep disruption impairs cognitive function, energy, and stamina needed to complete complex assessments. This suggests complete cohort findings may underestimate true population burden by 10-30%.

3. Participant Profile

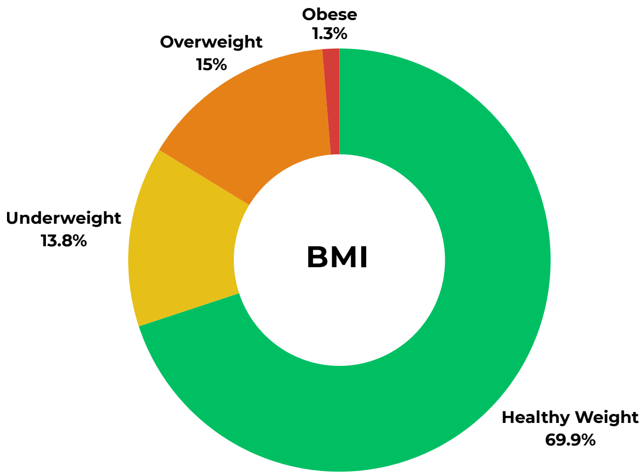
3.1 Individual Survey Populations

Survey Stage	n	% of Initial
Total Enrollment	286	100%
Completed Survey A	283	98,9%
Completed Survey B	141	49,3%
Completed Survey C	113	39,5%
Complete Cohort (All 3 Surveys)	**94**	**33%**

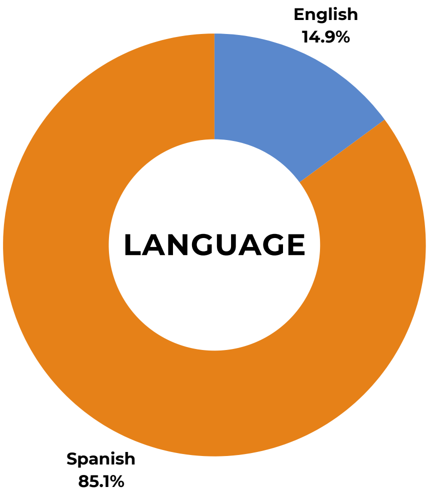
3.2 Demographics (Complete Cohort, n=94)



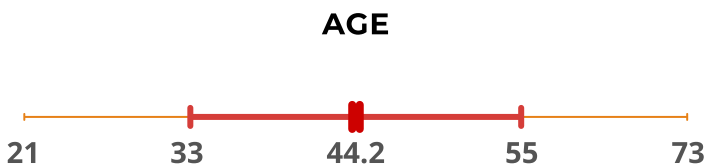
73.8% Female (69), 26.2% Male (25)



70% Healthy Weight, 13.8% Underweight, 15% Overweight, 1.3% Obese



85.1% Spanish (80), 14.9% English (14)



Mean 44.2 ± 11.0 years, range 21-73 years

3.3 Environmental Sensitivity Profile (n=92)

76.1% report at least one environmental sensitivity beyond EMF:

Sensitivity Type	Prevalence	Correlation with EHS (r)	Significance
Scents/Perfumes	57%	0,240	*
Season Changes	48%	0,362	*** (Strongest)
Lactose Intolerance	35%	0,341	***
Food Additives	32%	0,289	**
Sun Exposure	22%	0,225	*
Multiple Skin Allergies	19,6%	(immune marker)	-
Histamine/DAO Deficiency	174%	(amplifies all)	-
Sorbitol	16%	0,286	*

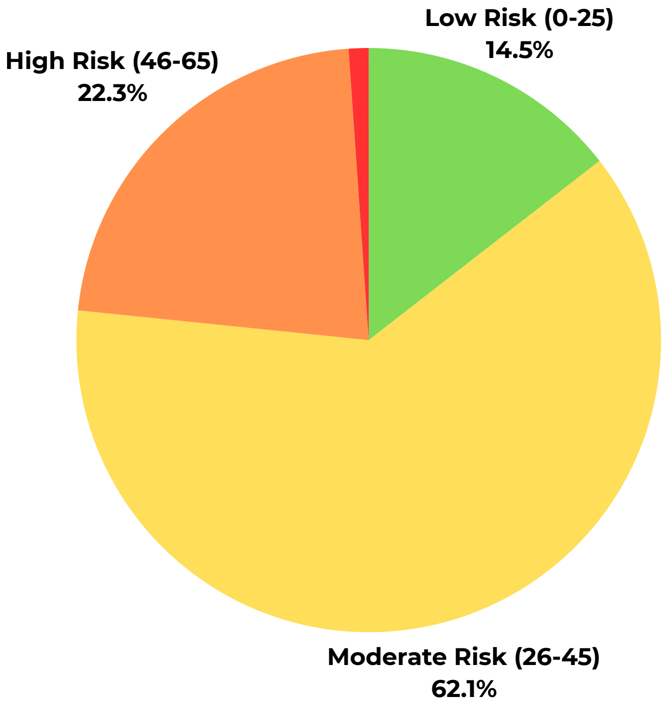
4. Survey Results and Analysis

4.1 Survey A: Multiple Habits & Sensitivities (n=283)

What we measured: Technology use patterns, device proximity habits, sleep environment EMF sources, screen time, outdoor time, grounding practices.

Score Distribution:

Statistic	Value
Mean	35.6 / 106
Median	35,0
Range	13-63
Standard Deviation	9,6
Score as % of Maximum	33,6%



Risk Categories (Survey A specific):

- **Low Risk (0-25):** 14.5%
- **Moderate Risk (26-45):** 62.2%
- **High Risk (46-65):** 22.3%
- **Very High Risk (66+):** 1.1%

What this suggests: Most participants (62%) show moderate EMF exposure patterns typical of modern technology users. Targeted interventions can improve hygiene status.

4.2 Survey B: 25 Common Symptoms of EHS (n=141)

What we measured: Frequency and severity of 25 symptoms across neurological, cognitive, psychological, sleep/energy, and physical domains.

Score Distribution:

Statistic	Value
Mean	76,6 / 250
Median	68,0
Range	5-170
Standard Deviation	43,9
Score as % of Maximum	57,3%

Symptom Severity Distribution:

Severity	Score Range	n	%
Minimal	0-49	43	30,5%
Mild	50-99	57	40,4%
Moderate	100-149	30	21,3%
Severe	150-199	10	7,1%
Catastrophic	200-250	1	0,7%

Top 10 Symptoms by Severity:

Rank	Symptom	Mean Score	High Severity (≥7)
1	Fatigue	5,94	48,2%
2	Concentration problems	5,15	37,6%
3	Nervousness	5,13	38,3%
4	Sleep problems/Insomnia	5,08	38,3%
5	Irritability	4,95	36,2%
6	Memory problems	4,86	34,0%
7	Headache	3,82	24,1%
8	Skin problems	3,67	25,5%
9	Head pressure/numbness	3,40	21,3%
10	Blurred vision	3,04	17,0%

What this suggests: 29.1% report moderate-to-very-severe symptomatology requiring professional evaluation.

High variability (CV 57.3%) indicates enormous individual differences despite similar exposure patterns.

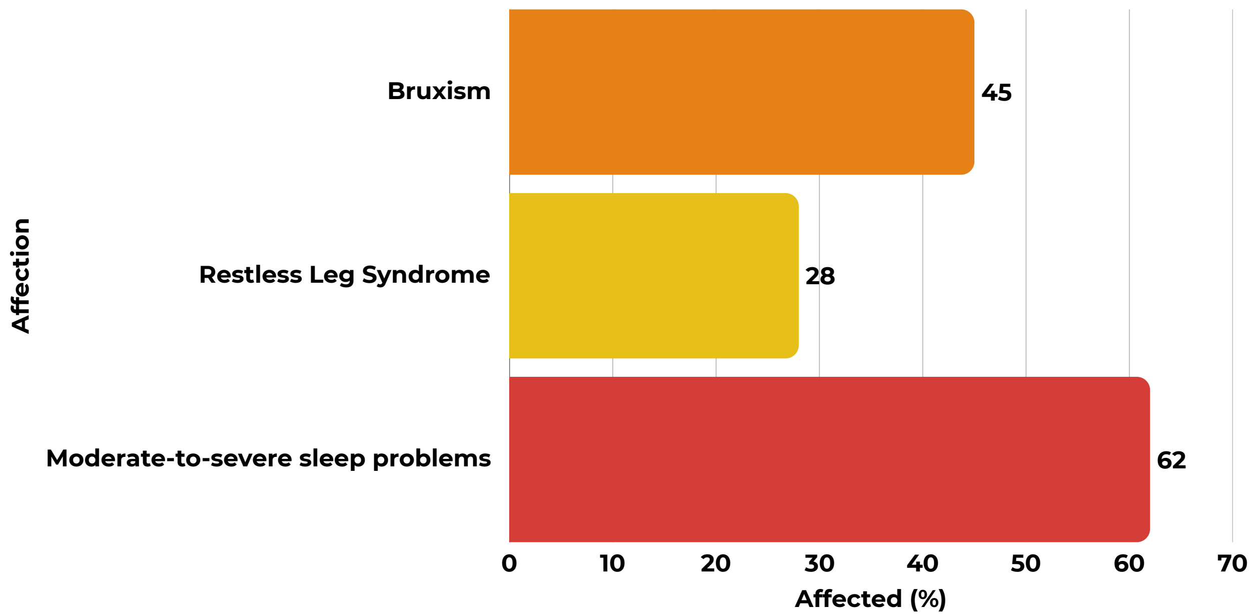
4.3 Survey C: Sleep Disorders (n=113)

What we measured: Sleep duration, latency, awakenings, daytime impact, sleep-related conditions.

Score Distribution:

Statistic	Value
Mean	68,2 / 163
Median	66,0
Range	31-134
Standard Deviation	23,4
Score as % of Maximum	41,8%

Key Findings:



What this suggests: Sleep disruption is nearly universal in this population. Even the best sleepers show some disruption (floor of 31 points). No truly unaffected sleepers in the cohort.

4.4 Integrated Correlation Analysis (Complete Cohort, n=94)

	Lifestyle	Symptoms	Sleep	Sensitivities
Lifestyle	1.000	0.413***	0.294**	0.556***†
Symptoms	0.413***	1.000	0.638*‡	0.465***
Sleep	0.294**	0.638***‡	1.000	0.198 ns
Sensitivities	0.556***†	0.465***	0.198 ns	1.000

Legend: *** $p < 0.001$, ** $p < 0.01$, ns = not significant. † Strongest relationship.
Color intensity: Darker red = stronger correlation

Variance Explained (R^2):

Rank	Relationship	r	R^2	Variance Explained
1	Symptoms ↔ Sleep	0.638***	0,407	40,7%
2	Lifestyle ↔ Sensitivities	0.556***	0,309	30,9%
3	Symptoms ↔ Sensitivities	0.465***	0,216	21,6%
4	Lifestyle ↔ Symptoms	0.413***	0,170	17,0%
5	Lifestyle ↔ Sleep	0.294**	0,086	8,6%
6	Sleep ↔ Sensitivities	0.198 ns	0,039	3,9%

4.5 Detailed Correlation Interpretation

4.5.1 Symptoms ↔ Sleep ($r = 0.638$, $R^2 = 40.7\%$)

This is the dominant relationship in the entire dataset, explaining over 40% of shared variance. The strength of this correlation reveals that sleep disruption and symptom burden are inextricably linked.

What this means clinically:

- For every 1 standard deviation worsening in sleep quality (~23 points), symptom burden increases by 0.638 standard deviations (~29 points)
- The relationship is almost certainly bidirectional: poor sleep amplifies symptoms, and symptoms disrupt sleep
- This creates a vicious cycle that can drive progressive worsening

Mechanistic hypothesis: Both sleep architecture and symptom manifestation depend on balanced autonomic nervous system function. The strength of this correlation suggests a common underlying mechanism—likely autonomic dysregulation—driving both phenomena.

Clinical implication: Sleep optimization should be the #1 intervention priority for EHS management.

4.5.2 Lifestyle ↔ Sensitivities ($r = 0.556$, $R^2 = 30.9\%$)

This correlation represents the second strongest relationship in the dataset. People with more environmental sensitivities also demonstrate worse EMF hygiene habits (higher Survey A scores). This finding has several possible interpretations:

1. **Sensitized individuals may be more reactive to all environmental stimuli**, including technology, leading to behaviors scored as "worse" EMF hygiene when they're actually protective responses
2. **Poor EMF hygiene over time may contribute to developing multiple sensitivities**—a "total load" effect where chronic EMF exposure depletes adaptive capacity
3. **A common underlying vulnerability (genetic, epigenetic, or acquired) predisposes individuals to both EMF sensitivity** and broader environmental sensitivities
4. **Autonomic dysfunction as a shared mechanism:** dysregulated autonomic function could simultaneously impair the body's ability to adapt to EMF exposure AND other environmental stressors

Clinical implication: Assessment of environmental sensitivity burden should be standard practice in EHS evaluation. The presence of multiple sensitivities may indicate a more severe underlying condition requiring comprehensive environmental medicine approaches.

4.5.3 Symptoms ↔ Sensitivities ($r = 0.465$, $R^2 = 21.6\%$)

Environmental sensitivities explain more symptom variance (21.6%) than EMF exposure habits (17.0%). This challenges the conventional model where EMF exposure is viewed as the primary driver of symptoms.

Revised understanding: Biological vulnerability (reflected in sensitivity burden) may be more predictive of symptom severity than exposure levels alone. Two individuals with identical EMF exposure can have dramatically different symptom burdens depending on their underlying sensitivity profile.

4.5.4 Lifestyle ↔ Symptoms ($r = 0.413$, $R^2 = 17.0\%$)

EMF exposure habits show a moderate correlation with symptoms, explaining 17% of variance. While statistically significant and clinically meaningful, this relationship is notably weaker than the symptoms-sleep connection.

Implication: EMF exposure reduction is necessary but not sufficient. The 83% unexplained variance indicates that individual susceptibility, biological factors, and other environmental influences play substantial roles.

4.3.5 Lifestyle ↔ Sleep ($r = 0.294$, $R^2 = 8.6\%$)

The direct relationship between EMF habits and sleep is surprisingly weak given that 85% of participants keep phones in bedrooms and 40% sleep with phones within arm's reach.

Possible explanations:

- **Blue light confounding:** Survey A doesn't distinguish EMF effects from circadian disruption via screen light.
- **Measurement imprecision:** Phone in airplane mode vs. active transmission scored identically.
- **Multiple sleep determinants:** Stress, caffeine, temperature, sleep disorders, and other factors may dominate.
- **Individual variability:** Some individuals are highly EMF-sleep sensitive while others are relatively unaffected.

Despite the weak correlation, bedroom EMF hygiene remains a priority because it targets the sleep-symptom pathway ($r=0.638$) indirectly.

4.3.6 Sleep ↔ Sensitivities ($r = 0.198$, ns)

This is the only non-significant correlation in the matrix. Environmental sensitivities do not directly predict sleep problems.

Implication: Sensitivities appear to affect symptoms through pathways other than sleep disruption—possibly through direct inflammatory, immune, or neurological mechanisms.

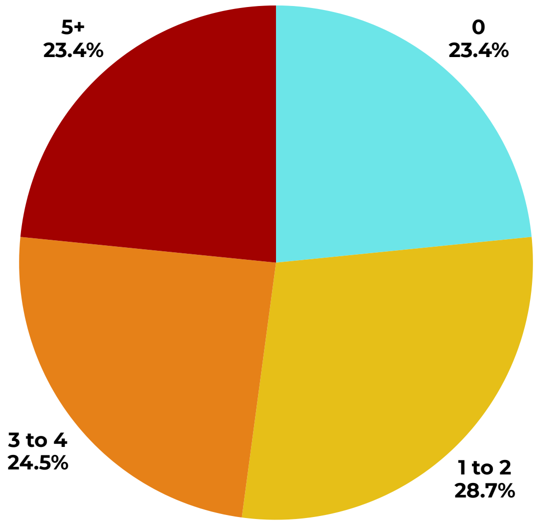
5. Environmental Sensitivity Analysis

5.1 Prevalence

Sensitivity Status	n	%
Mean	73	76,8%
Median	21	23,2%

Over three-quarters of the EHS population report sensitivities beyond electromagnetic fields.

5.2 Sensitivity Count Distribution



Number of Sensitivities	n	%
0	22	23,2%
1 to 2	27	29,5%
3 to 4	23	24,2%
5+	22	23,2%

5.3 The Total Load Model

The high prevalence of multiple sensitivities supports a "total load" or "bucket" model of environmental illness:

- Each individual has a finite capacity to process environmental stressors
- Multiple low-level exposures (EMF, chemicals, foods, seasonal changes) fill the "bucket"
- When capacity is exceeded, symptoms emerge
- Reducing ANY contributor can lower total load below the symptom threshold

This explains why:

- Some highly-exposed individuals remain asymptomatic (large bucket capacity)
- Some minimally-exposed individuals are severely affected (small bucket + other contributors)
- Symptom patterns vary widely despite similar EMF exposure levels

6. EHS Risk Categorization

We first classify respondents into 4 exposure-symptom patterns, then split each by sensitivity burden, producing 8 phenotypes.

6.1 Classification Methodology

Dimension 1: Exposure-Symptom Pattern Based on the relationship between EMF exposure habits (Survey A) and symptom burden (Survey B), participants fall into one of four base patterns:

Base Pattern	Definition	Characteristics
Healthy Baseline	Low exposure + Low symptoms	Good EMF hygiene, minimal symptom burden
Resilient	High exposure + Low symptoms	Poor EMF hygiene BUT protected from symptoms
Reactive	Low exposure + High symptoms	Good EMF hygiene BUT high symptom burden
Overexposed	High exposure + High symptoms	Poor EMF hygiene AND high symptom burden

Dimension 2: Sensitivity Burden

Each base pattern is then subdivided by environmental sensitivity status:

- **Without Sensitivities:** 0-2 environmental sensitivities (lower biological vulnerability)
- **With Sensitivities:** 3+ environmental sensitivities (higher biological vulnerability)

Result: 4 base patterns × 2 sensitivity levels = 8 distinct phenotypes

6.2 Four-Group View (Collapsed)

Phenotype Group	%	Primary Recommendation
Healthy Baseline	41%	Prevention and education
Resilient	16%	Study for protective factors
Reactive	20%	Functional medicine; biological support
Overexposed	35%	EMF reduction + multi-modal support

EMF EXPOSURE	SYMPTOM BURDEN: Low ↓	SYMPTOM BURDEN: High ↑
High ↑	**RESILIENT (16%)**	**OVEREXPOSED (35%)**
Low ↓	**HEALTHY BASELINE (41%)**	**REACTIVE (20%)**

Interpretation of Base Patterns:

- **Healthy Baseline (41%):** These individuals demonstrate that good EMF hygiene is associated with low symptom burden. They represent the "target state" for intervention—what we hope to achieve for symptomatic individuals. Their continued low exposure should be encouraged to prevent future sensitization.
- **Resilient (16%):** This is the most intriguing group. Despite poor EMF hygiene (high exposure scores), they report minimal symptoms. This suggests protective factors that buffer against EMF effects. Understanding what protects this group could unlock prevention strategies. Possible protective factors include: robust autonomic regulation, genetic variants, strong antioxidant capacity, or other environmental/lifestyle factors not captured in our surveys.
- **Reactive (20%):** These individuals have adopted good EMF hygiene (low exposure) yet still suffer high symptom burden. This pattern suggests that biological vulnerability trumps exposure levels in determining symptoms. For this group, EMF reduction alone is insufficient—they require interventions targeting the underlying biological dysfunction (autonomic regulation, inflammation, detoxification capacity, etc.).
- **Overexposed (35%):** The largest symptomatic group shows the expected pattern: high exposure correlates with high symptoms. These individuals have the most straightforward intervention path—EMF reduction should produce meaningful improvement. However, the presence of symptoms despite awareness suggests either inability to reduce exposure (environmental constraints) or incomplete understanding of EMF sources.

6.3 Eight-Phenotype View (Expanded by Sensitivity Burden)

Phenotype	n	%	Avg Symptoms	Avg Sleep	Risk Level
Healthy Baseline	32	34%	40,7	53,2	Low
Healthy + Sensitivities	7	7%	37,6	55,4	Low
Resilient	8	9%	42,7	57,3	Low
Resilient + Sensitivities	6	6%	59,1	57,8	Medium
Reactive	10	11%	110,1	84,2	High
Reactive + Sensitivities	9	10%	109,0	80,9	High
Overexposed	14	15%	114,2	83,4	High
Overexposed + Sensitivities	**19**	**20%**	**119,9**	**73,3**	**Highest**

6.4 What Sensitivity Burden Adds

Comparing phenotypes with and without sensitivities reveals how biological vulnerability modifies each base pattern:

Base Pattern	Without Sensitivities	With Sensitivities	Symptom Increase
Healthy Baseline	40,7	37,6	-8% (no effect)
Resilient	42,7	59,1	+38% (Significantly increased)
Reactive	110,1	109,0	-1% (no effect)
Overexposed	114,2	119,9	+5% (minimal)

Key Insight: Sensitivity burden has the greatest impact on the Resilient group (+38% symptom increase). This suggests that the "protection" observed in Resilient individuals may partially depend on having low sensitivity burden. When sensitivities are present, the resilience is compromised.

For Healthy Baseline and Reactive groups, sensitivity burden has minimal additional effect on symptoms. These groups are already at their floor or ceiling respectively.

6.5 Clinical Implications by Phenotype

Low-Risk Phenotypes (48% of population)

Phenotype 1: Healthy Baseline (34%)
- **Profile:** Low exposure, low symptoms, few sensitivities
- **Prognosis:** Excellent
- **Intervention:** Prevention education, maintain good EMF hygiene
- **Risk:** May develop sensitivities if exposure increases

Phenotype 2: Healthy + Sensitivities (7%)
- **Profile:** Low exposure, low symptoms, multiple sensitivities
- **Prognosis:** Good but vulnerable
- **Intervention:** Maintain EMF hygiene, address sensitivity triggers, monitor for progression
- **Risk:** Biological vulnerability present; may decompensate with increased stress

Phenotype 3: Resilient (9%)
- **Profile:** High exposure, low symptoms, few sensitivities
- **Prognosis:** Good short-term, uncertain long-term
- **Intervention:** Study for protective factors; encourage exposure reduction despite asymptomatic status
- **Risk:** May be accumulating subclinical damage; protective factors may wane with age

Medium-Risk Phenotype (6% of population)

Phenotype 4: Resilient + Sensitivities (6%)

- **Profile:** High exposure, moderate symptoms, multiple sensitivities
- **Prognosis:** Guarded—resilience compromised by sensitivity burden
- **Intervention:** Reduce exposure, address sensitivities, strengthen biological resilience
- **Risk:** May progress to Overexposed + Sensitivities without intervention

High-Risk Phenotypes (46% of population)

This represents patterns requiring intervention, distinct from the 23.2% with high-severity composite scores.

Phenotype 5: Reactive (11%)

- **Profile:** Low exposure, high symptoms, few sensitivities
- **Prognosis:** Poor without addressing underlying dysfunction
- **Intervention:** Functional medicine workup, autonomic support, sleep optimization
- **Risk:** EMF reduction alone will not resolve; requires biological intervention

Phenotype 6: Reactive + Sensitivities (10%)

- **Profile:** Low exposure, high symptoms, multiple sensitivities
- **Prognosis:** Poor—multiple system involvement
- **Intervention:** Comprehensive environmental medicine, total load reduction, intensive biological support
- **Risk:** Complex multi-system illness requiring specialist care

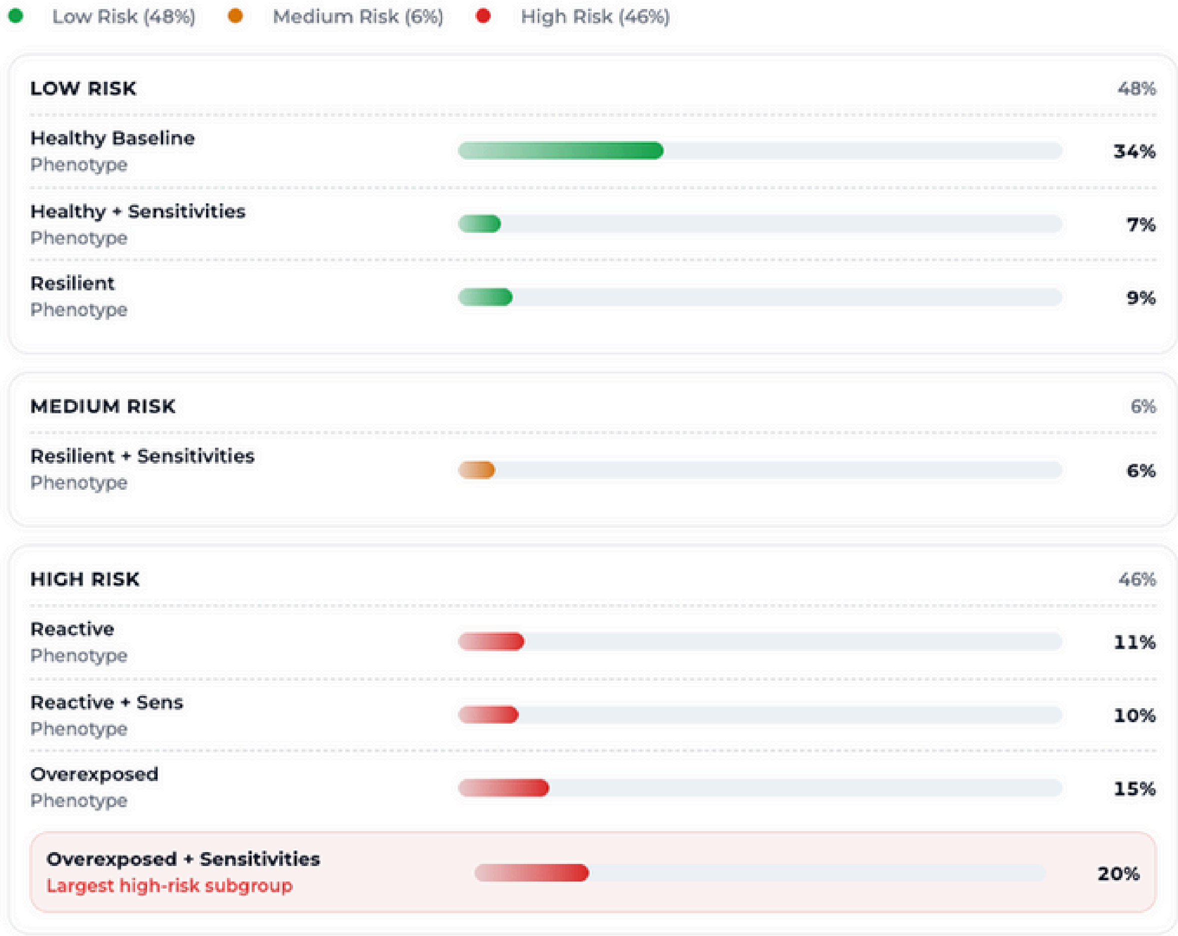
Phenotype 7: Overexposed (15%)

- **Profile:** High exposure, high symptoms, few sensitivities
- **Prognosis:** Good if exposure reduced
- **Intervention:** Aggressive EMF reduction, sleep hygiene, lifestyle modification
- **Risk:** Most treatable high-risk group; respond well to EMF interventions

Phenotype 8: Overexposed + Sensitivities (20%)

- **Profile:** High exposure, high symptoms, multiple sensitivities
- **Prognosis:** Guarded—requires comprehensive approach
- Intervention: EMF reduction + sensitivity management + sleep optimization + biological support
- **Risk:** Largest high-risk group; incomplete response to single interventions.

6.6 Risk Distribution by Phenotype



6.6 Key Observations

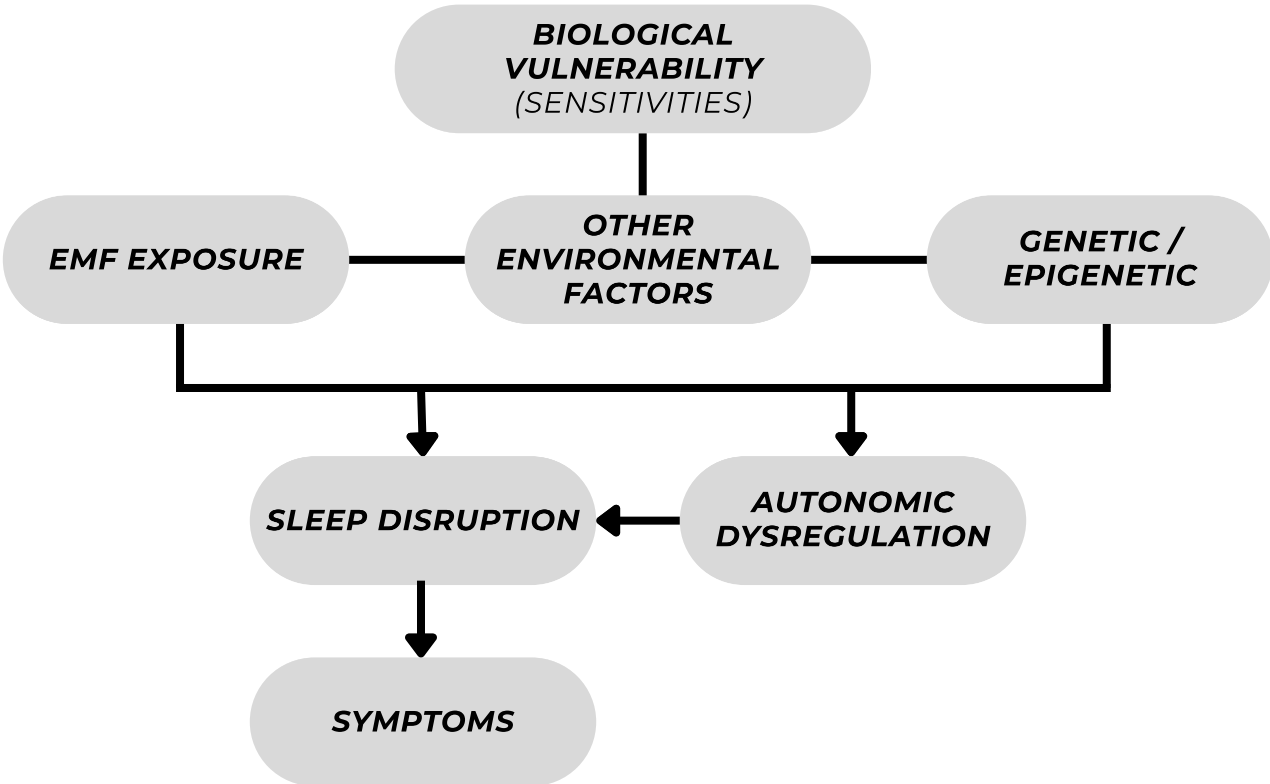
- **The Overexposed + Sensitivities phenotype (20%) is the largest high-risk group.** These individuals face a "double burden"—both high EMF exposure AND multiple environmental sensitivities. They require the most comprehensive intervention approach combining EMF reduction, sensitivity management, and biological support.
- Based on composite scores, 23.2% fall into high-severity categories (Moderate/Severe/Catastrophic). However, **phenotype analysis reveals that 46% exhibit patterns that warrant professional intervention** regardless of absolute score severity.
- **Sensitivity burden transforms the Resilient phenotype from low-risk to medium-risk, increasing symptoms by 38%.** This suggests that "resilience" to EMF is partly dependent on low overall biological vulnerability.
- **Reactive phenotypes (20% combined) will not improve with EMF reduction alone.** Their low exposure scores indicate they've already minimized EMF—their symptoms arise from biological dysfunction that requires targeted intervention.
- **The Resilient group (16% combined) represents an untapped research opportunity**. Understanding what protects these high-exposure, low-symptom individuals could reveal prevention strategies applicable to the broader population.

Discussion

The traditional model of electromagnetic hypersensitivity positions EMF exposure as the primary driver of symptoms:

EMF Exposure → Symptoms

Our integrated correlation analysis reveals a more complex reality requiring a paradigm shift:



This revised model accounts for several observations:

- **Why identical exposures produce different outcomes:** Biological vulnerability (sensitivity burden) modulates the exposure-symptom relationship.
- **Why sleep is the strongest predictor:** Sleep disruption serves as a final common pathway through which multiple factors converge to produce symptoms.
- **Why EMF reduction alone is often insufficient:** The 83% unexplained variance in the lifestyle-symptoms correlation indicates that EMF is one contributor among many.
- **Why some individuals improve dramatically while others don't:** Treatment response depends on which pathways dominate in each individual's unique presentation.

The Lifestyle-Sensitivity Connection

The correlation between EMF hygiene habits and environmental sensitivity burden ($r=0.556$, $R^2=30.9\%$) represents a previously unreported finding that demands explanation.

Hypothesis 1: Shared Underlying Dysfunction

Autonomic nervous system dysregulation could simultaneously impair:

- Adaptation to EMF exposure (manifesting as worse EHS scores when protective behaviors are counted)
- Adaptation to other environmental stimuli (manifesting as multiple sensitivities)

Under this hypothesis, both EHS and multiple sensitivities are symptoms of a deeper regulatory dysfunction rather than causally related to each other.

Hypothesis 2: Cumulative Damage

Chronic EMF exposure may progressively deplete biological resilience, eventually triggering sensitivity cascade:

- Initial EMF sensitivity develops
- Continued exposure depletes adaptive reserves
- System becomes sensitized to additional triggers
- Multiple chemical sensitivity, food intolerances, and seasonal sensitivity emerge

This "kindling" model suggests early intervention could prevent progression to multiple sensitivity syndrome.

Hypothesis 3: Behavioral Confounding

Individuals with multiple sensitivities may interact with technology differently:

- More frequent phone checking due to anxiety
- Longer screen time due to social isolation
- Paradoxically higher "exposure scores" despite attempts at avoidance

Survey A may not adequately distinguish between harmful exposure and compensatory behaviors in sensitized individuals.

Research implications: Longitudinal studies tracking the temporal relationship between EMF habits and sensitivity development could distinguish between these hypotheses.

Sleep as the Critical Intervention Target

The dominance of the sleep-symptom correlation (r=0.638, explaining 40.7% of variance) has profound clinical implications.

Why sleep may be the master regulator:

- **Cellular repair:** Deep sleep enables glymphatic clearance of metabolic waste and cellular repair processes that are impaired by EMF exposure.

- **Autonomic reset:** Sleep allows parasympathetic recovery from daytime sympathetic activation.
- **Immune regulation:** Sleep deprivation promotes inflammatory states that amplify sensitivity responses.
- **Cognitive function:** Sleep disruption directly produces many symptoms attributed to EHS (brain fog, concentration difficulties, memory problems).
- **Pain amplification:** Poor sleep lowers pain thresholds, intensifying somatic symptoms.

The vicious cycle:

- **Night 1:** EMF exposure disrupts sleep architecture → inadequate cellular repair.
- **Day 2:** Fatigue, cognitive fog, pain sensitivity increase → symptoms worsen.
- **Night 2:** Symptoms create difficulty falling asleep → sleep further deteriorates.
- **Day 3:** Even worse symptoms emerge → functional capacity declines ...and the cycle continues.

Breaking the cycle: Aggressive sleep optimization may be the highest-yield intervention, potentially producing improvements across all symptom domains even before EMF exposure is fully addressed.

Clinical Implications

For Assessment:

1. **Comprehensive evaluation is essential:** Single-domain assessment misses critical interactions.
2. **Environmental sensitivity screening should be standard:** The 76.8% prevalence and strong symptom correlation make this non-optional.
3. **Sleep assessment deserves priority:** Given its dominant predictive value.
4. **Incomplete assessments contain information:** The completion paradox suggests inability to complete may itself be diagnostic.

For Intervention:

1. **Prioritize sleep optimization:** The r=0.638 correlation suggests this produces the largest symptom improvements.
2. **Address total environmental load:** EMF reduction alone is insufficient for most patients.
3. **Personalize based on sensitivity profile:** High-sensitivity individuals need comprehensive environmental medicine approaches.
4. **Consider autonomic regulation:** The pattern of correlations points toward autonomic dysfunction as a unifying mechanism.

For Research:

1. **Longitudinal designs needed:** Cross-sectional data cannot establish causality.
2. **Include partial responders:** Excluding incomplete data systematically biases findings.
3. **Measure sensitivities routinely:** The lifestyle-sensitivity correlation needs replication and explanation.
4. **Investigate autonomic function:** This may be the key to understanding individual susceptibility.

Limitations

- **Cross-sectional design: C**orrelations do not establish causation; the directionality of relationships cannot be determined.
- **Self-selection bias:** Participants who sought out the census may differ from the broader EHS population.
- **Self-report measures:** All data relies on participant self-assessment without objective verification.
- **Completion bias:** Despite identifying the completion paradox, our integrated analysis necessarily excludes the most severely affected individuals.
- **Cultural/linguistic factors:** The 85% Spanish-speaking majority may limit generalizability.
- **Sensitivity measurement:** The sensitivity count is a crude measure; greater precision instruments may be needed.

Conclusion

The EHS Global Census 2025 provides the most comprehensive characterization of electromagnetic hypersensitivity to date, revealing a condition far more complex than simple exposure-response relationships suggest.

Principal Findings:

1. **Sleep disruption is the dominant factor in EHS symptom burden**, explaining 40.7% of symptom variance—more than double any other single factor.
2. **Environmental sensitivities are nearly universal (76.8%) and predict symptoms more strongly** (R^2=21.6%) than EMF exposure habits (R^2=17.0%).
3. **The correlation between EMF habits and sensitivity burden** (r=0.556, R^2=30.9%) suggests shared underlying mechanisms or progressive sensitization processes.
4. While 23.2% show high-severity composite scores, **46% fall into phenotypes requiring professional-level intervention**, nearly half the assessed population.
5. **The completion paradox reveals that traditional research methodologies systematically underestimate disease burden** by excluding the most severely affected individuals.

The Emerging Picture

EHS is not simply "sensitivity to electromagnetic fields." It is better understood as a complex environmental sensitivity characterized by:

- **Biological vulnerability** manifesting as multiple environmental sensitivities
- **Sleep disruption** as both consequence and amplifier of symptoms
- **Autonomic dysregulation** as a likely unifying mechanism
- **Progressive sensitization potential,** where initial triggers expand to multiple systems
- **High individual variability** in presentation, severity, and treatment response

The correlation structure we observed—with sleep dominating, sensitivities strongly predictive, and EMF exposure playing a significant but not overwhelming role—demands a corresponding shift in clinical approach.

A Call for Paradigm Shift

The data compel us to move beyond the reductive "EMF causes symptoms" model toward an integrative framework that:

1. Recognizes biological terrain as the primary determinant of susceptibility
2. Prioritizes sleep restoration as the highest-yield intervention
3. Addresses total environmental load rather than EMF in isolation
4. Acknowledges individual heterogeneity in pathophysiology and treatment response
5. Investigates autonomic function as the potential key to understanding and treating EHS

Future Directions

This census establishes a foundation for more targeted research:

- Longitudinal studies to establish temporal relationships and causality
- Autonomic function assessment to test the dysregulation hypothesis

- Intervention trials prioritizing sleep optimization
- Biomarker identification to move beyond self-report
- Phenotype refinement to enable personalized treatment approaches

Final Statement

The EHS Global Census 2025 reveals electromagnetic hypersensitivity as a multifactorial condition where biological vulnerability, sleep disruption, and environmental load interact in complex ways. The discovery that sleep explains 40.7% of symptom variance—and that a previously unreported lifestyle-sensitivity correlation (r=0.556) represents the second strongest relationship in the dataset—fundamentally reframes our understanding of this condition.

- **For practitioners:** Prioritize sleep, assess sensitivities, address total load.
- **For researchers:** Investigate autonomic mechanisms, include incomplete responders, study the lifestyle-sensitivity link.
- **For patients:** Understand that EMF sensitivity often exists within a broader pattern of environmental vulnerability—and that sleep optimization may be your most powerful intervention.
- **For policymakers:** Recognize EHS as a legitimate environmental health condition requiring comprehensive approaches that extend beyond EMF exposure limits alone.

The path forward requires moving beyond simplistic models toward the integrative understanding that this data demands. The 292 individuals who contributed to this census have provided a roadmap. It is now our responsibility to follow it.

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