

Temporal Discovery Framework: Traditional vs Novel Extended Effects

Revolutionary Extension of Climate-Health Lag Windows from 0-7 Days to 0-21 Days
System-Specific Response Patterns • Clinical Monitoring Protocol Implications

TRADITIONAL LITERATURE FRAMEWORK

Limited 0-7 Day Temporal Windows

TEMPORAL LAG WINDOW: 0-7 DAYS



LITERATURE LIMITATIONS

Knowledge Gaps

- Limited lag exploration
- Short-term focus only
- Missed extended effects
- Incomplete understanding

Research Constraints

- Small sample sizes
- Limited follow-up periods
- Cross-sectional designs
- Methodological limitations

Clinical Impact

- Incomplete monitoring
- Reactive protocols
- Missed interventions
- Suboptimal care timing

EXTENDED EFFECTS UNDETECTED - CRITICAL KNOWLEDGE GAP

Traditional approaches miss clinically significant extended cardiovascular effects

NOVEL XAI DISCOVERY FRAMEWORK

Extended 0-21 Day Temporal Windows

EXTENDED LAG WINDOW: 0-21 DAYS



XAI DISCOVERY ADVANTAGES

Revolutionary Discovery

- Extended lag detection
- Novel 21-day effects
- Complete temporal profile

First in literature

Methodological Innovation

- Large sample: n=18,205
- 6-year longitudinal design
- Rigorous validation

91% hypothesis success

Clinical Revolution

- Extended monitoring
- Predictive protocols
- Proactive interventions

Optimal care timing

BREAKTHROUGH: 21-DAY CARDIOVASCULAR EFFECTS DISCOVERED

XAI methodology reveals previously undetected extended health impacts

SYSTEM-SPECIFIC TEMPORAL RESPONSE PATTERNS

CARDIOVASCULAR SYSTEM

EXTENDED ADAPTATION PATTERN

Peak effects at 21-day lag ($r = -0.114$, $p < 10^{-15}$)
Vascular adaptation to chronic heat exposure
Sample size: n = 4,957 • Effect size: 2-3 mmHg
Novel finding: First literature report

METABOLIC SYSTEM

IMMEDIATE STRESS RESPONSE

Peak effects at 0-3 day lag ($r = 0.118$ - 0.131 , $p < 10^{-6}$)
Acute thermoregulatory stress response
Sample size: n = 2,731 • Effect size: 10-20 mg/dL
Immediate glucose elevation pattern

IMMUNE SYSTEM

THRESHOLD ACTIVATION

Extreme heat threshold effects (Cohen's d = 0.261)
CD4+ cell count elevation in high temperature
Sample size: n = 1,283 • African population specific
Heat-induced immune activation

TEMPORAL SUMMARY

Response Types:

Extended (21d)
Immediate (0-3d)
Threshold-based

Key Discovery:

*Different systems
show distinct
temporal patterns*

CLINICAL MONITORING PROTOCOL IMPLICATIONS

Misses critical 21-day effects

TRADITIONAL: 0-7 Day Monitoring Window

EXPAND

NOVEL: 0-21 Day Extended Monitoring Framework

Captures complete temporal profile

TRANSFORMING CLIMATE-HEALTH MONITORING: FROM REACTIVE TO PREDICTIVE HEALTHCARE