LOG ID	BOOK REFERENCE	RCT FILTER	CONFIDENCE TIER
SEC A.1.1	DIRECTORY A: BACKEND SCHEMATIC (Multi-Agent Architecture)	**OFF**	**CONSENSUS**

AUDITED CLAIM

HARDWARE EXECUTION (DEFAULT MODE NETWORK)

SYSTEMS MODEL — AS STATED IN THE BOOK

> Clinically, elevated resting-state activity and dominance in the **Default Mode Network (DMN)** strongly correlate with maladaptive **rumination**, while broader DMN dysconnectivity and network imbalances track with clinical **anxiety**.

VALIDATION QUERY

Is high baseline activity in the Default Mode Network (DMN) during resting states positively correlated with rumination and anxiety?

EMPIRICAL FINDING

Current neuroimaging studies establish that the **Default Mode Network (DMN)** is the primary neural circuitry responsible for self-referential processing and mind-wandering. Elevated resting-state activity and prolonged dominance of the DMN are robustly correlated with maladaptive **rumination**, while broader DMN dysconnectivity and network imbalances are closely linked to clinical **anxiety**.

PRIMARY ANCHORS

- → **Zhu et al., 2012, Biological Psychiatry**
- → **Hamilton et al., 2011, Biological Psychiatry**

ABOUT THIS RECORD

Each claim in the book is decompiled from its IT metaphor into a naked, falsifiable scientific claim, then anchored to a **primary peer-reviewed source**. Claim and anchor are queried against the Consensus academic database (200M+ papers) under a fixed protocol — top-tier **Q1/Q2 journals only**, preprints excluded, human studies only. If a hypothesis fails the audit, the build is rejected: the AI generates the syntax; the peer-reviewed grid validates the physics.

CONFIDENCE TIERS

- **CONSENSUS ◀ this log** — broadly established, highly replicated mechanics.
- **EMERGING** — plausible, actively researched; no universal consensus yet.
- **EXPERIMENTAL** — contested, extrapolated, or purely theoretical.

RCT FILTER — Controlled Studies is ON for interventions (a forced action must beat a control) and OFF for mechanisms (so foundational neuroscience isn't blocked).

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Yes, **higher resting-state DMN activity/connectivity** is **often linked** to rumination and anxiety, but the pattern is not uniform.

1. Introduction

Across this corpus, high baseline activity or connectivity in the default mode network during rest is positively correlated with rumination more consistently than with anxiety. Resting-state studies in major depression, remitted depression, bipolar disorder, and non-clinical samples repeatedly link stronger DMN dominance, stronger anterior DMN connectivity, or stronger PCC–sgPFC coupling to brooding or maladaptive rumination (Hamilton et al., 2011; Zhu et al., 2012; Benschop et al., 2020). Meta-analytic and review papers reinforce that rumination is reliably associated with DMN involvement, especially in core and dorsomedial prefrontal subsystems, although the exact within-network pattern differs across studies and populations (Zhou et al., 2020; Riaz et al., 2025; Hamilton et al., 2015).

The anxiety side is more mixed. Several clinical and trait-anxiety studies report that anxiety severity tracks higher activity or hyperconnectivity in anterior or default-mode regions, particularly in generalized anxiety disorder and symptom-based samples (Li et al., 2023; Yuan et al., 2023; Coutinho et al., 2014). But other studies find the opposite pattern, including lower DMN connectivity with higher trait anxiety, lower connectivity within anxiety-related networks in adolescents, and broad meta-analytic evidence for hypo-connectivity or decoupling involving the DMN in anxiety disorders (Imperatori et al., 2019; Baggio et al., 2025; Xu et al., 2019).

Is high baseline activity in the Default Mode Network (DMN) during resting states positively correlated with rumination and anxiety?

N = 12

Yes 83% · Possibly 8% · Mixed 0% · No 8%

FIGURE 1 Consensus on resting-state DMN links to rumination and anxiety

The literature therefore supports a qualified yes: the positive correlation is fairly robust for rumination, but only partial and subtype-dependent for anxiety.

2. Methods

This Deep Search ran over more than 170 million research papers indexed in Consensus, drawing from Semantic Scholar, PubMed, and other scholarly sources. The workflow identified 217,513 papers in the primary query, expanded through targeted alternate searches and citation crawling, screened 240 papers with machine-learned relevance filtering, judged 139 as eligible after deduplication and thresholding, and included the top 50 most relevant human studies for synthesis.

Search Strategy

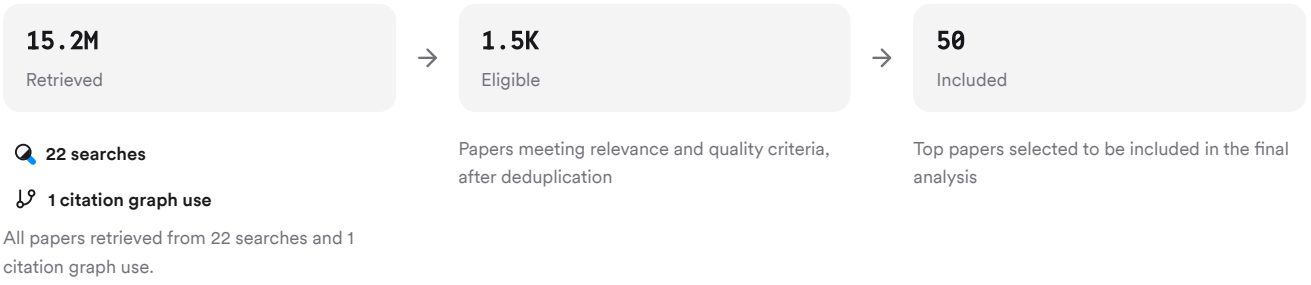

FIGURE 2 Deep search screening and inclusion workflow

Searches combined resting-state DMN terms with rumination, worry, anxiety, trait anxiety, repetitive negative thinking, and contrasting null-result phrasing.

3. Results

3.1 Key Papers

Several papers anchor this literature because they directly test resting-state DMN measures against rumination or anxiety symptoms and are repeatedly referenced by later work. Foundational depression studies established positive links between anterior DMN hyperconnectivity and rumination, while later anxiety studies clarified that anxiety is associated with DMN dysconnectivity but not always simple hyperactivity (Zhu et al., 2012; Berman et al., 2011; Li et al., 2023).

Paper	Summary
(Kaiser et al., 2019)	DMN dominance tracks maladaptive rumination (Hamilton et al., 2011)
(Coutinho et al., 2014)	Anterior DMN hyperconnectivity correlates with rumination (Zhu et al., 2012)
(Katayama et al., 2025)	Psychological anxiety linked to DMN hyperconnectivity (Li et al., 2023)

FIGURE 3 Foundational papers anchoring this DMN literature

3.2 Rumination Findings

Rumination shows the clearest positive association with elevated resting DMN measures. In first-episode untreated depression, stronger anterior medial DMN connectivity correlated positively with rumination, while posterior DMN reductions tracked a different construct, overgeneral memory, indicating regional dissociation rather than uniform whole-network elevation (Zhu et al., 2012).

That pattern extends beyond acute depression. Rest-period PCC–subgenual cingulate connectivity correlated with rumination and brooding in MDD (Berman et al., 2011). In remitted depression, PCC–sgPFC EEG connectivity also correlated positively with rumination even after controlling for anxiety and depression (Benschop et al., 2020). In healthy participants, greater MPFC, PCC, and IPL connectivity correlated with stronger rumination tendencies (Luo et al., 2016). More recent work links brooding to increased DMN–CEN beta connectivity (Imperatori et al., 2025)and higher DMN-state frequency or entries to higher rumination in MDD and adolescents (Katayama et al., 2025; Liu et al., 2023).

3.3 Anxiety Findings

Dimension	Evidence for Positive Association	Evidence for Negative or Mixed Association	Citations
Generalized anxiety disorder	Psychological anxiety dominated by **within-DMN hyperconnectivity**	SN–DMN hypo-connectivity also related to anxiety	(Li et al., 2023)
Symptom severity	Anxiety severity correlated with **AG activity** and **AG-mPFC connectivity**	—	(Yuan et al., 2023)
Healthy trait anxiety	Anterior DMN scores rose with anxiety symptoms in one study	Higher trait anxiety linked to **lower DMN connectivity** in another	(Coutinho et al., 2014; Imperatori et al., 2019)

Dimension	Evidence for Positive Association	Evidence for Negative or Mixed Association	Citations
Adolescents	—	Higher trait anxiety associated with **lower connectivity** in networks overlapping DMN	(Baggio et al., 2025)
Meta-analytic anxiety literature	—	Anxiety characterized by DMN decoupling with affective and executive networks	(Xu et al., 2019)

FIGURE 4 Contrasting resting-state DMN associations in anxiety

The main difference from rumination is that anxiety studies often describe dysconnectivity, imbalance, or failed switching rather than straightforward DMN hyperactivity.

3.4 Network Dynamics and Subsystems

The DMN signal is not unitary. Rumination is especially tied to anterior/core or dorsomedial subsystems rather than global elevation everywhere. Reviews and subsystem studies converge on the DMPFC-related DMN as particularly relevant to rumination (Zhou et al., 2020; Zhu et al., 2017; Jia et al., 2025).

Dynamic studies add that rumination also reflects how often the brain enters or remains in DMN-like states. Adolescents with higher rumination spent more time in frontoinsular-DMN states and transitioned more often between those states and canonical DMN states (Kaiser et al., 2019). Current MDD showed greater dominance of a primarily DMN state, and state entries correlated positively with trait rumination (Liu et al., 2023). A review of dynamic methods concludes that increased time in DMN+ states is consistently related to higher rumination in depressed samples (Peterson et al., 2025).

Results Timeline

DMN research progressed from broad disorder-level abnormalities to symptom-specific and dynamic network models.

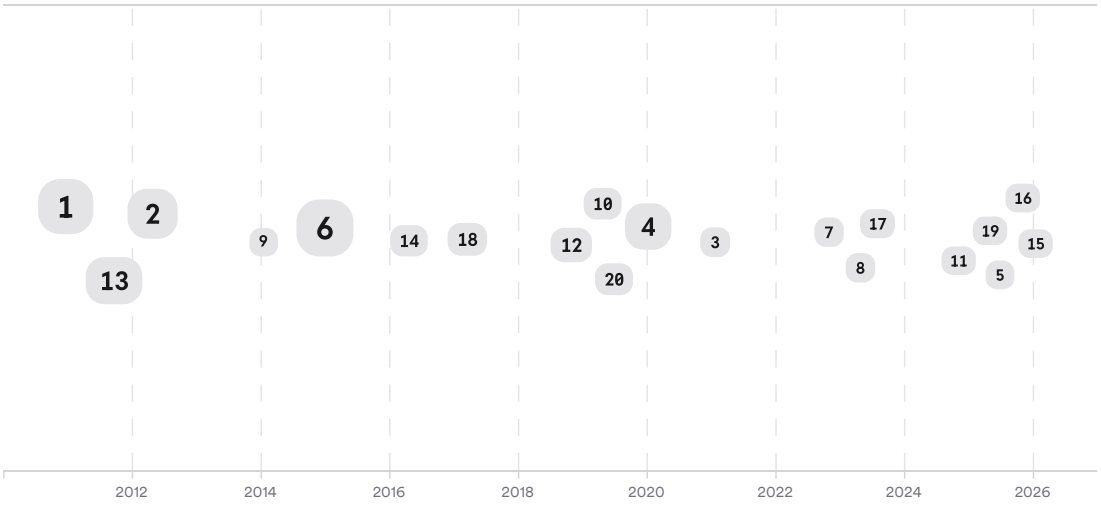

FIGURE 5 Timeline of DMN rumination and anxiety studies, larger markers indicate more citations

Early work emphasized abnormal DMN modulation in social anxiety and depression (Gentili et al., 2009; Berman et al., 2011). Mid-period studies established anterior–posterior DMN dissociations and resting-state links to rumination (Zhu et al., 2012; Coutinho et al., 2015). Recent work has shifted toward subsystems, dynamic states, and transdiagnostic models that separate rumination from worry and distinguish psychological from somatic anxiety (Li et al., 2023; Marchitelli et al., 2024; Katayama et al., 2025).

Top Contributors

Based on appearance frequency in this corpus, **Xueling Zhu**, **Chaogan Yan**, and **Roselinde H. Kaiser** are among the most visible contributors, and **Journal of Affective Disorders**, **Biological Psychiatry**, and **NeuroImage** appear repeatedly.

Type	Name	Papers
Author	Xueling Zhu	[9b13caaf948a50919c63b827b813f9de][7a128b9678955763991eb8027844c23b]
Author	Chaogan Yan	[1f3d92225813534aa2b2877f13722e5b][737c08f912f656fb809dd59a0a1207ee] [1f47784f0f115dc4ad42add4e8db672c]
Author	Roselinde H. Kaiser	[451597d7f43a53b3af71aa974e4e6f59][7cadf71ad06b5d7198e475e8de80dc13] [6b76e667f23d580db66544a20983f8a7]
Journal	*Journal of Affective Disorders*	[13f23076128d5f828fa3e832073da438][359d0ae244f45031b405b04551132cc1] [ae6f7fbbadab57b7a3e95417694715dc][12f08b95202e55eeab5c9d8aa043a4b1] [0a6ee411cd6850d8b29757617284f703]
Journal	*Biological Psychiatry*	[9b13caaf948a50919c63b827b813f9de][38468690b23b5eb6a73d6de321db760f] [927182df67e951c68a9b52477144630e]
Journal	*NeuroImage*	[1f3d92225813534aa2b2877f13722e5b][737c08f912f656fb809dd59a0a1207ee] [9560d897bf1f5982a56d889590d38fa4]

FIGURE 6 Authors and journals appearing most in included papers

4. Discussion

The strongest part of the evidence is the rumination link. It appears across imaging modalities, across current and remitted depression, and even in non-clinical samples, with replication in static connectivity, dominance metrics, and dynamic state analyses (Hamilton et al., 2011; Benschop et al., 2020; Luo et al., 2016). That breadth supports a real association, but it is still correlational and region-specific. Multiple papers show anterior or DMPFC-related effects rather than uniform global DMN elevation, and some rumination studies report decreased connectivity in selected subsystem pairs instead of increases everywhere (Chen et al., 2020; Zhu et al., 2017).

The anxiety evidence is less consistent because “anxiety” covers heterogeneous constructs. GAD studies tend to show within-DMN hyperconnectivity for psychological anxiety and higher angular gyrus or mPFC-linked DMN measures with symptom severity (Li et al., 2023; Yuan et al., 2023). But trait anxiety, adolescent anxiety, late-life worry, and meta-analytic anxiety samples often show lower connectivity or mixed positive and negative DMN associations (Imperatori et al., 2019; Gerlach et al., 2021; Xu et al., 2019). That makes a blanket claim about “high baseline DMN activity” and anxiety too simple.

The construct being measured also matters. Several studies assess connectivity, coherence, ALFF, microstate transitions, or DMN dominance rather than absolute activity, and these metrics are not interchangeable (Ho et al., 2024; Yuan et al., 2023; Hao et al., 2024). Sample composition further limits generalization because many results come from depression or internalizing-disorder cohorts where anxiety and rumination co-occur.

Claim	Evidence Strength	Reasoning	Papers
Resting-state DMN abnormalities are **positively associated with rumination**	Strong	Replicated across many studies, modalities, and reviews	(Zhu et al., 2012; Hamilton et al., 2011; Zhou et al., 2020)

Claim	Evidence Strength	Reasoning	Papers
The association is strongest in **anterior/core or DMPFC-related DMN subsystems**	Strong	Multiple subsystem studies converge on anterior midline contributions	(Zhu et al., 2017; Jia et al., 2025; Gruzman et al., 2024)
Anxiety is associated with **DMN dysconnectivity**, but not uniformly with higher baseline DMN activity	Moderate	Several GAD studies support hyperconnectivity, but others show lower connectivity or decoupling	(Li et al., 2023; Imperatori et al., 2019; Xu et al., 2019)
In GAD, **psychological anxiety** appears more linked to DMN hyperconnectivity than somatic anxiety	Moderate	Supported mainly by one strong disorder-specific study	(Li et al., 2023)
Absolute **DMN hyperactivity** itself is the causal driver of anxiety	Weak	Evidence is correlational, heterogeneous, and often based on connectivity rather than activity	(Hamilton et al., 2011; Xu et al., 2019)

FIGURE 7 Key claims and supporting evidence in this corpus

5. Conclusion

Taken together, the answer is yes for rumination and only partly yes for anxiety. Higher resting-state DMN activity, dominance, or connectivity is repeatedly associated with brooding and maladaptive self-focus, especially in anterior and dorsomedial DMN regions (Berman et al., 2011; Luo et al., 2016; Guo & Wei, 2025). For anxiety, the more defensible conclusion is that DMN organization is altered, but the direction differs by subtype, age group, and measurement approach (Saviola et al., 2020; Baggio et al., 2025; Gerlach et al., 2021).

Research Gaps

The clearest gaps are direct head-to-head comparisons of rumination versus worry, standardized DMN metrics, and longitudinal studies that test whether DMN changes precede symptoms rather than simply accompany them.

Topic/Outcome	Longitudinal data	Mechanistic specificity	Anxiety subtype coverage	Multimodal replication
Rumination in MDD	4	9	2	6
Trait anxiety	2	3	5	3
GAD worry	3	5	6	2
Adolescent internalizing symptoms	2	3	3	1

Open Research Questions

Future work should separate symptom dimensions more cleanly and test whether DMN abnormalities are causes, consequences, or maintenance factors.

Question	Why
Do resting-state anterior DMN changes predict future brooding rumination better than future anxiety symptoms?	This would test whether the strongest signal in current studies is specific to rumination rather than shared internalizing distress.
Which DMN metrics most reproducibly map onto worry across generalized, social, and trait anxiety?	Current anxiety findings vary by disorder and method, suggesting the field lacks a standardized neural signature.
Can shifts from DMN-dominant to executive-control states mediate treatment-related reductions in rumination and worry?	Dynamic studies and treatment work suggest state transitions may be a more actionable target than static connectivity alone.

In short, high resting-state DMN activity is positively correlated with rumination much more consistently than it is with anxiety.

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