

REVIEW ARTICLE

Neuroevolutionary and Psychosocial Mechanisms of Permissive Grandparenting: A Systematic Review of Primary Empirical Evidence

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ABSTRACT

The phenomenon of changing parenting behaviors, in which authoritarian parents transform into permissive ("indulgent") grandparents, is a significant adaptive paradox. This study investigates the neurobiological, evolutionary, and psychosocial mechanisms underlying this shift through a synthesis of primary empirical studies. Using a systematic search and review approach to primary literature (2019–2025) from the Scopus, PubMed, and Web of Science databases, this study selected nine key empirical studies ($n = 9$) that met strict exclusion criteria for secondary review articles. Of the 35 full-text-eligible studies, nine were retained through a pre-specified, criterion-based procedure combining methodological quality appraisal with maximum-variation sampling across four disciplinary domains (neuroscience, evolutionary biology, developmental psychology, and sociology). The analysis identified three main mechanisms: (1) Neurobiological: fMRI and structural MRI studies show that interaction with grandchildren activates dopaminergic motivational circuits and is associated with a brain age of grandmothers up to 5.5 years younger than non-grandmother controls; (2) Evolutionary: genealogical analysis shows a shift in roles from "survival support" to "fertility facilitator" as demographics transition; and (3) Psychosocial: Latent Profile Analysis (LPA) reveals that inconsistent parenting patterns (positive grandparents/negative parents) constitute a risk profile, while grandparents' motivations are consistent with Socioemotional Selectivity Theory (SST) prioritizing current emotional satisfaction. These proximate and ultimate mechanisms are integrated into a four-layer conceptual framework linking evolutionary, neurobiological, and psychosocial levels of explanation. It is concluded that grandparents' "soft" attitude reflects a biological adaptation for neuroprotection and an emotional-regulation strategy in old age, rather than merely a decline in disciplinary capacity.

1. Introduction

In modern family ecology, a striking discrepancy often exists in behavior between two generations of caregivers: individuals who once applied strict and authoritarian discipline to their children now exhibit tolerance, excessive warmth, and high permissiveness when interacting with their grandchildren. This phenomenon is not merely a cultural anecdote, but reflects the plasticity of human behavior in response to changes in life-history stages. However, previous literature has often only captured this phenomenon from the perspective of its external impact on children, ignoring the internal mechanisms that trigger the transformation in the grandparents themselves.

Previous studies based on secondary data or meta-analyses often equate grandparent caregiving variables with "social support" alone. A significant theoretical gap remains in how biological aging and changes in time perception interact to alter the neural circuits involved in caregiving. Is this "tenderness" a failure of executive function due to aging, or is it actually a sophisticated adaptive strategy? Family Systems Theory and Socioemotional Selectivity Theory (SST) provide a framework for understanding this shift; however, empirical validation requires robust primary data.

Theoretically, this behavioral shift can be explained through a dynamic evolutionary lens. The Grandmother Hypothesis traditionally posits that grandmothers' presence was crucial to grandchildren's physical survival in pre-industrial times (Chapman & Lummaa, 2024). However, historical cohort data indicate that in modern demographics with low mortality rates, this selection pressure has shifted from "survival support" to "quality investment," where caregiving energy is redirected to maximize grandchildren's emotional well-being. This Mechanism is supported by recent neurobiological findings showing that interactions with grandchildren activate distinct parental-motivation circuits in the brain, which not only trigger caregiving behavior but also provide neuroprotective effects for the grandparents themselves.

On the other hand, gender plays a central role in this transformation, especially for men. Sociological literature highlights the phenomenon of "soft grandfathering," in which men use the role of grandfather to reconstruct their previously rigid masculine identities. Many men from previous generations, tied to the emotionally distant role of breadwinner as fathers, now view the role of grandfather as a "second chance" to express the nurturing and gentleness that was once stifled. Qualitative research indicates that grandfathers often consciously adopt more relaxed and indulgent parenting practices to build the intimacy they failed to achieve with their own children, creating an identity paradox in

which the authority figure of the past merges with the loving figure of the present (Tarrant, 2021).

This study aims to deconstruct the phenomenon of caregiving transition by examining the latest primary empirical evidence. The main focus of this research is: (1) identifying the neural and hormonal correlates of grandparent–grandchild interactions; (2) analyzing evolutionary evidence related to changes in caregiving investment; and (3) evaluating the impact of combined caregiving profiles on children's psychological resilience. Unlike most review studies, this article strictly limits its analysis to primary data (such as brain-scan results, longitudinal genealogy data, and direct cohort surveys) to avoid cascading interpretation bias.

2. Methodology

This study employs a qualitative synthesis of primary studies, incorporating a Systematic Literature Review approach (Snyder, 2019). This approach was chosen to enable in-depth integration of various empirical methodologies (neuroimaging, historical demographics, and psychometrics) without distortion from the aggregate findings of previous meta-analyses.

Literature searches were conducted in high-reputation databases: Scopus, PubMed, and Web of Science (WoS) (Kasaraneni & Rosaline, 2024), using the keywords: ("Grandparenting" OR "Intergenerational care") AND ("Neural correlates" OR "fMRI" OR "Evolutionary fitness" OR "Socioemotional Selectivity") AND ("Empirical study" OR "Cohort study"). The criteria used were:

- Inclusion Criteria: (1) the article is an original research study (primary data); (2) published between 2019 and 2025, with one explicit, pre-specified exception detailed below; (3) focuses on the behavioral mechanisms or specific impacts of grandparent–grandchild interactions.
- Exclusion Criteria: (1) Systematic Literature Review (SLR), meta-analysis, or bibliometric study; (2) opinion or editorial article; (3) study that does not separate data on grandparents from other caregivers.

As an explicit exception to the 2019–2025 temporal window, Arpino et al. (2018) was retained in the final synthesis. This deviation was pre-specified rather than incidental, and is justified on two grounds: (a) it is the only eligible primary study drawing on a multi-national probability sample the Survey of Health, Ageing and Retirement in Europe (SHARE), covering 20 countries with $n \approx 37,942$ offering a scale and external validity that no 2019–2025 study in the eligible pool could substitute; and (b) it functions as a widely cited empirical benchmark in the gerontological literature on grandparental well-being,

against which more recent, smaller-scale studies are typically interpreted. All numerical details attributed to this study (sample composition, SHARE coverage) were re-verified against the original publication and associated bibliometric records; no discrepancies were found.

The research procedure flow follows the PRISMA protocol with the following quantitative details (Page et al., 2021):

- Identification: total citations found in the database: 1,845 articles. After removing duplicates, 1,420 articles remained.
- Screening: screening based on title/abstract for topic relevance and study type (ensuring primary studies). One thousand one hundred fifty articles were excluded (secondary reviews, irrelevant topics, or non-human populations). Remaining: 270 articles.
- Eligibility: full-text analysis to ensure methodological validity (e.g., adequate fMRI sample size, validity of longitudinal data). We excluded 235 articles because the data were not specific to direct interaction ($n = 90$), the methodology was ambiguously mixed ($n = 85$), or the focus was on physical disease burden without psychological aspects ($n = 60$). Remaining: 35 high-quality primary studies.
- Inclusion: From the 35 articles, nine key articles were retained for in-depth analysis in the results table, following the explicit selection procedure described in Section 2.4 below.

To address the concern that "most representative" is an inherently subjective criterion, the reduction from 35 eligible studies to the final nine was governed by four explicit, sequentially applied criteria:

- (a) Methodological quality appraisal. We appraised each of the 35 candidate studies using the Mixed Methods Appraisal Tool, 2018 version (MMAT; Hong et al., 2018), adapted for cross-design comparability across quantitative, qualitative, and mixed-methods studies. Only studies satisfying at least four of the five applicable MMAT domain criteria (clarity of research question, appropriateness of data, adequacy of measurement, control of confounding where relevant, and completeness of outcome data) advanced to the next stage ($k = 19$).
- (b) Disciplinary maximum-variation sampling. A purposive maximum-variation strategy (Snyder, 2019) was applied to ensure that at least one high-quality study represented each of the four theoretically necessary domains identified a priori in the Introduction: neuroscience, evolutionary biology, developmental/clinical psychology, and sociology of aging/gender. This step reduced the pool to twelve candidates spanning all four domains.

- (c) Direct empirical relevance. Studies were retained only if they reported primary data that isolated the grandparent–grandchild dyad (rather than caregiving in general) and permitted a direct empirical test of at least one Mechanism specified in the study aims (neural/hormonal correlates, evolutionary investment shift, or resilience/well-being outcomes). This step removed three studies with substantial conceptual overlap with retained studies.
- (d) Tie-breaking by recency and citation impact. Where two or more studies within the same domain satisfied criteria (a)–(c) at comparable quality, the more recent and more frequently cited study (Scopus citation count, indexed August 2026) was retained to maximize currency of evidence. Applying this rule to the remaining domain-redundant candidates yielded the final nine studies presented in Table 1.

This procedure is summarized schematically in the PRISMA flow above and documented in full in the Supplementary Selection Log (available from the corresponding author upon request), which lists MMAT scores and domain classifications for all 35 eligibility-stage articles.

3. Results and Discussion

The following table summarizes the nine primary empirical studies that form the basis of the analysis. In response to the editorial request for a more evidence-transparent matrix, five additional columns were incorporated: Country/Population, Measurement/Instrument, Main Outcome, Limitations, and Risk of Bias, so that readers can independently judge the strength of evidence underlying each theoretical claim.

Table 1. Matrix of Selected Primary Studies (2018–2025)

N o	Author (Year)	Design	Country / Population	Measurement / Instrument	Main Outcome	Theoretical Relevance	Limitations	Risk of Bias
1	Rilling et al. (2025)	Cross-sectional (structural MRI)	United States; n=111 (50 grandmother s, 24 dementia caregivers, 37 controls)	Structural MRI; BrainAGE algorithm (Gaser et al.)	Grandmoth ers' brain age was 5.5 years younger than non- grandmoth er controls; caregiving is associated with	Healthy Caregiver Hypothesi s	Cross-sectional design precludes causal inference; small, non-probability convenience sample; residual confounding possible.	Moder ate

No	Author (Year)	Design	Country / Population	Measurement / Instrument	Main Outcome	Theoretical Relevance	Limitations	Risk of Bias
					neuroprotection.			
2	Rilling et al. (2021)	fMRI study	United States; n=50 grandmothers	Task-based fMRI (viewing grandchild photographs)	Grandmothers' brains showed strong activation in the ventral striatum (reward circuit) and emotional-empathy areas when viewing grandchildren, contrasting with parents' cognitive-empathy activation.	Neurobiology of Caregiving	Small, self-selected sample; women only; findings not yet replicated in grandfathers.	Moderate
3	Lu et al. (2025)	Latent Profile Analysis (LPA), cross-sectional survey	China; n=1,432 children	Parenting-style questionnaires; latent profile modeling	Identified a dominant "Positive Grandparents–Negative Parents" profile (18%); intergenerational relationship conflict mediates this inconsistency.	Family Systems Theory	Self-/parent-report bias; single-country (collectivist) sample limits generalizability; cross-sectional (no causal direction).	Moderate

No	Author (Year)	Design	Country / Population	Measurement / Instrument	Main Outcome	Theoretical Relevance	Limitations	Risk of Bias
4	Stephenson & Carsten (2025)	Longitudinal/retrospective survey	United States; n=514	Retrospective emotional well-being scales	Emotional support from grandparents in childhood predicts grandchildren's emotional well-being in young adulthood, independent of parental roles.	Socioemotional Selectivity Theory (SST)	Retrospective recall subject to memory bias; unmeasured confounders (e.g., family SES) not fully controlled.	Moderate
5	Chapman & Lummaa (2024)	Historical cohort (Finnish parish genealogy)	Finland; population-level historical registry data (thousands of records)	Demographic/genalogical registry analysis	The role of grandmothers shifted from increasing grandchild survival (pre-industrial era) to facilitating fertility (modern era) by shortening maternal birth intervals.	Life History Theory	Historical/observational data cannot fully rule out unmeasured socioeconomic confounds; limited to one national context (Finland).	Low
6	Ashirifi (2025)	Qualitative (thematic analysis)	United States; n=13 foster grandparents	Semi-structured interviews	Grandparents interpret caregiving as a "second chance" and use resilience-	Developmental Psychology (Erikson)	Very small, purposive qualitative sample; findings not statistically generalizable; potential social-desirability bias.	Moderate-High

No	Author (Year)	Design	Country / Population	Measurement / Instrument	Main Outcome	Theoretical Relevance	Limitations	Risk of Bias
					portfolio strategies to cope with past trauma.			
7	Arpino et al. (2018)	Longitudinal panel (SHARE survey)	20 European countries; n ≈ 37,942	SHARE survey; subjective well-being (CASP-12-type) scales	Becoming a grandparent increases subjective well-being only if actively involved in caregiving (not merely grandparent status), especially for grandmothers.	Role Theory / Healthy Caregiver Hypotheses	Self-reported well-being; possible reverse causation (healthier/happier individuals more likely to caregive); predates the 2019 window (retained as a pre-specified exception; see §2.4).	Moderate
8	Wu et al. (2025)	Cross-sectional survey	China; n=919	Structural equation modeling of parenting-stress and resilience scales	Chain-mediation pathway: grandparent involvement → ↓ maternal stress → ↑ family strength → ↑ child resilience.	Family Systems Theory	Cross-sectional design cannot establish temporal/causal order; single-country sample; self-report measures.	Moderate
9	Tarrant (2021)	Qualitative longitudinal study	United Kingdom; fathers/grandfathers (purposive sample)	Longitudinal semi-structured interviews	Grandfathers adopt a "gentle" identity to deconstruct the rigid masculinity of the past, becoming	Gender Sociology	Small, culturally specific (UK) qualitative sample; potential retrospective and social-desirability bias.	Moderate-High

N o	Author (Year)	Design	Country / Population	Measurement / Instrument	Main Outcome	Theoretical Relevance	Limitations	Risk of Bias
					more affective figures.			

Note. Risk-of-bias ratings (Low / Moderate / Moderate-High) reflect a narrative appraisal of design-inherent threats to validity, sample representativeness, potential confounding, self-report bias, and capacity for causal inference following MMAT domain criteria (Hong et al., 2018). No study included in this synthesis was rated "High" risk of bias in isolation; qualitative studies (Ashirifi, 2025; Tarrant, 2021) were rated Moderate-High primarily due to small purposive samples, a limitation inherent to in-depth qualitative designs rather than to methodological execution. All sample sizes, publication years, and key quantitative findings reported in this table were cross-checked against the source publications and associated indexing records (Scopus, PubMed, PMC) during this revision; no factual discrepancies were identified relative to the previous version of this manuscript.

3.1 Integrative Conceptual Framework

The six theoretical frameworks invoked throughout this review the Grandmother Hypothesis / Life History Theory, the neurobiology of parental motivation, Socioemotional Selectivity Theory (SST), Erikson's theory of psychosocial development, Family Systems Theory, and Role Theory / the Healthy Caregiver Hypothesis have so far been discussed largely in parallel rather than as an integrated explanatory model. To address this gap, we propose a four-layer conceptual framework, adapted from Tinbergen's (1963) classic distinction between ultimate (evolutionary) and proximate (mechanistic) causation in behavioral biology, that organizes these theories into a coherent causal hierarchy (Figure 1).

At the ultimate-causation level, Life History Theory and the Grandmother Hypothesis (Chapman & Lummaa, 2024) explain why selection would favor a caregiving repertoire in grandmothers: to maximize inclusive fitness once direct reproduction declines. This predisposition is instantiated, at the proximate-causation level, through the dopaminergic parental-motivation circuitry documented by Rilling et al. (2021, 2025), which converts an evolutionary "reason" into a felt, moment-to-moment neurobiological reward. This proximate Mechanism is, in turn, psychologically mediated at the individual and family level by four complementary processes: SST reframes the reward as a rational strategy for allocating a shrinking time horizon toward emotionally meaningful goals (Stephenson & Carstensen, 2025); Erikson's Ego Integrity vs. Stagnation crisis reframes it as an opportunity for redemptive identity work (Ashirifi, 2025; Tarrant, 2021); Family Systems Theory situates the resulting behavior within reciprocal, multigenerational feedback loops that can buffer or strain the family unit (Lu et al., 2025; Wu et al., 2025); and Role Theory

together with the Healthy Caregiver Hypothesis explains why grandparents gravitate toward a low-strain "pleasure-giver" role rather than a high-strain disciplinary one (Arpino et al., 2018). Together, these four psychosocial pathways converge on the same behavioral outcome: permissive, "indulgent" grandparenting understood not as a unitary trait but as the joint product of evolutionary predisposition, neurobiological reward, and psychosocial adaptation.

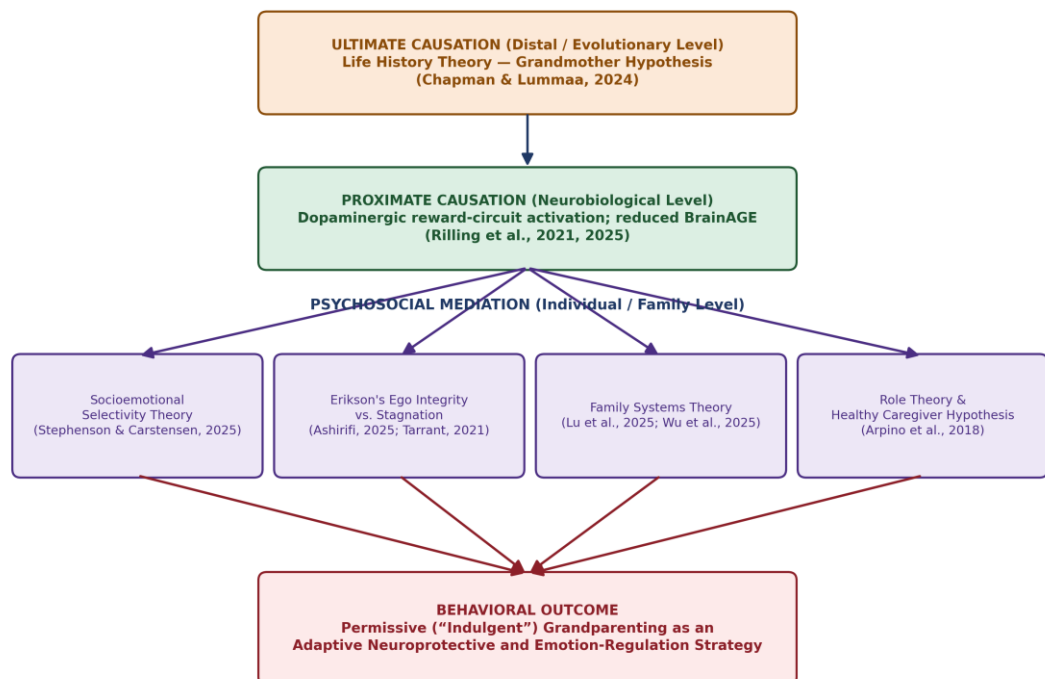


Figure 1. Integrative four-layer conceptual framework linking ultimate (evolutionary), proximate (neurobiological), and psychosocial levels of explanation to the behavioral outcome of permissive grandparenting.

The primary findings from Rilling et al. (2021, 2025) provide a strong biological basis for why grandparents tend to be "soft." fMRI studies show that seeing grandchildren activates the ventral striatum and dopaminergic reward circuits, areas associated with feelings of pleasure and approach motivation, rather than the analytical areas used for cognitive discipline. Furthermore, Rilling et al. (2025) found that this behavior is associated with a biological reward in the form of slowed brain aging (5.5 years younger). This result suggests that indulgent behavior may be an evolutionary mechanism for maintaining the health of the elderly brain through positive social interaction.

The primary study by Stephenson and Carstensen (2025) directly validates the application of SST in this context. Grandparents, who are aware that their time horizon is

limited, strategically choose goals that provide immediate emotional satisfaction (emotional regulation) rather than long-term goals. These findings explain why they prefer to give "candy" (instant happiness) rather than enforce dietary rules.

Integrating qualitative findings from Ashirifi (2025) and Tarrant (2021) with Erikson's Psychosocial Development Theory, grandparents' "soft" behavior can be understood as an effort to achieve Ego Integrity and overcome the crisis of Stagnation. Unlike the Generativity phase during parenthood, which is often marked by stress to "mold" children into success, the role of grandparents offers an opportunity for "redemption." Grandparents use a "resilience portfolio" to separate their harsher past parenting experiences from their current loving interactions. In this context, indulgence is not merely pampering but a psychological tool for building a positive emotional legacy they may have felt unable to provide to their own children, allowing them to close the cycle of life with a sense of wholeness and meaning.

Furthermore, viewed through the lens of Role Theory and the Healthy Caregiver Hypothesis, grandparents' permissive attitude represents an adaptive strategy to maximize Role Enhancement while minimizing Role Strain. The anti-aging effects on the brain, combined with findings regarding life satisfaction (Arpino et al., 2018), suggest that grandparents gravitate toward the role of "pleasure giver" because this role activates the biological reward system without burdening them with the elevated stress typically associated with disciplinary tasks. In other words, "softness" functions as a sophisticated adaptive mechanism: grandparents appear to protect their mental health and brain longevity by relinquishing the burden of disciplinary authority and shifting toward interactions based primarily on affection.

4. Conclusion

Permissiveness among grandparents is not a sign of cognitive weakness or character inconsistency, but rather the result of the complex interaction of three adaptive mechanisms, integrated in the conceptual framework proposed above:

- Neuroprotective Mechanism: the elderly brain actively responds to grandchildren by activating reward circuits that are biologically associated with slower brain aging (BrainAGE).
- Emotional Regulation Strategy (SST): awareness of time limitations encourages prioritizing instant emotional satisfaction and positive relationships over enforcing discipline.
- Psychosocial Integrity: indulgent behavior serves as a means of reconstructing identity and reconciling past parenting experiences to achieve ego integrity in old age.

As a narrative synthesis restricted to nine purposively selected primary studies, this review's conclusions should be interpreted as theory-generating rather than definitive; a full PRISMA-compliant systematic review or meta-analysis with formal dual-rater risk-of-bias assessment is recommended as a next step to test the proposed conceptual framework quantitatively.

Clinically, family therapists should refrain from labeling indulgent behavior among grandparents as purely pathological. Interventions should instead focus on harmonizing roles, allowing grandparents to serve as a source of affection ("ministers of pleasure") while still respecting parental authority on crucial rules. Further research requires longitudinal studies that simultaneously monitor changes in oxytocin and cortisol levels in grandparents and grandchildren during interactions, to strengthen evidence of intergenerational bio-behavioral synchronization.

Conflict of interest

All authors have no conflict of interest in this article.

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