METACOGNITION AS A PROTECTIVE PSYCHOLOGICAL FACTOR ACROSS DEVELOPMENT: A CRITICAL REVIEW OF ITS ROLE IN ACADEMIC ACHIEVEMENT AND SUBJECTIVE WELL-BEING

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Abstract: *Metacognition is widely recognized as a powerful driver of academic performance, yet this review argues that such a performance-centred framing overlooks a second, equally consequential dimension of the construct. Building on foundational work from Flavell, Brown, Schraw and Dennison, and Efklides' MASRL, the review advances the idea that metacognition may also function as a protective psychological factor, one that helps learners navigate stress, maintain emotional stability, and sustain well-being when academic demands intensify. By examining academic achievement and subjective well-being as parallel outcomes of the same regulatory-affective system, the analysis highlights a striking imbalance: achievement research rarely considers this protective role, while well-being research engages it only partially and with limited evidence for younger learners. As a result, metacognition's buffering function remains theoretically compelling but empirically under-tested. Closing this gap requires research that measures achievement and well-being together, within the same children, during the developmental period when metacognitive and affective regulation are still taking shape.*

Keywords: *Metacognition; Protective psychological factor; Subjective well-being; Academic achievement; Self-regulated learning; Developmental trajectory; Affective regulation; Primary and adolescent education*

Introduction

Metacognition, typically defined as the awareness and regulation of one's own thinking (Flavell, 1979; Thi-Nga et al., 2024), occupies a central position in contemporary learning theory. Its contribution to academic achievement is one of the most consistently replicated findings in educational psychology (Akpur, 2024; Ohtani & Hisasaka, 2018). What remains far less examined is whether metacognition also functions as a protective psychological factor, a developmental resource that helps children and adolescents withstand the stress, helplessness, and declines in well-being that often accompany academic difficulty.

The theoretical basis for this possibility is well established. Efklides' (2011) MASRL model rejects the idea that metacognition is a purely "cold" cognitive process. Instead, it argues that monitoring and regulating one's learning is inseparable from affective signals such as confidence, frustration, or curiosity. Under this view, a student who can identify why a strategy failed and adjust it has access to a psychological alternative that a less metacognitively skilled peer does not. Rather than interpreting difficulty as evidence of fixed inadequacy, the student can reframe it as a solvable problem. This is, in essence, a protective-mechanism hypothesis, and it warrants empirical evaluation rather than assumption.

Framing metacognition as a protective factor reshapes how its two most frequently studied outcomes, academic achievement and subjective well-being (SWB), should be understood. Under a performance-focused view, achievement and SWB function as separate dependent variables that metacognition happens to predict. Under a protective-factor framing, however, they become two expressions of the same underlying regulatory mechanism; a child who can monitor and adjust their thinking is shielded not only from academic failure but also from the emotional toll that failure typically produces. Because metacognitive skills allow students to reinterpret difficulty as a solvable problem rather than a personal deficiency, the same mechanism should support both stronger academic performance and greater emotional resilience.

To evaluate this possibility, the review examines evidence across childhood and adolescence, with particular attention to primary-school students, a group for whom both achievement and well-being remain highly malleable and closely tied to concrete experiences of competence (Rosso et al., 2004). Achievement and SWB are therefore not reviewed as separate literatures. Instead, each section considers whether metacognition functions as a psychological buffer within its respective outcome domain, and not merely as a performance-enhancing skill.

1. From Cognitive Skill to Psychological Buffer

Flavell's (1979) foundational model remains the anchor for most contemporary theorizing on metacognition. He distinguished three interconnected components. First, metacognitive knowledge represents awareness of oneself as a learner, of task demands, and of available strategies. Second, metacognitive regulation represents planning, monitoring, and evaluating one's cognitive activity. Third, metacognitive experiences are the cognitive and affective sensations, confusion, insight, uncertainty, that prompt strategic adjustment. This last

component is especially important. It reveals that affect has been embedded in metacognition from the beginning; a feeling of confusion or a sense of emerging clarity is not a neutral cognitive event but an emotional signal. How a child interprets that signal, either as a cue to adapt or as evidence of personal inadequacy, marks the developmental point at which metacognition begins to function as a psychological buffer rather than merely a cognitive tool.

Brown (1987) sharpened this distinction by separating cognitive processes, which execute a task, from metacognitive processes, which supervise that execution. She identified four core regulatory skills, prediction, planning, monitoring, and evaluation, and classified metacognitive knowledge into declarative ("knowing what"), procedural ("knowing how"), and conditional ("knowing when and why") categories (Brown, 1987; Schraw, 1998). Conditional knowledge is central to the protective-factor argument: it enables a child to interpret a failed strategy as a mismatch between approach and task rather than as a reflection of ability. Longitudinal evidence supports the developmental significance of these skills. Regulatory competencies measured in early elementary school predict achievement three years later, even after controlling for executive function and general cognitive ability (Bryce, Whitebread, & Szűcs, 2015), suggesting that any protective function metacognition provides is established early rather than emerging only as an academic skill.

Schraw and Dennison's (1994) Metacognitive Awareness Inventory (MAI) translated this theoretical structure into an empirical instrument, distinguishing knowledge of cognition (declarative, procedural, conditional) from regulation of cognition (planning, information management, monitoring, debugging, evaluation). The MAI's contribution is methodological: it made metacognition measurable at scale, enabling the accumulation of achievement-focused evidence reviewed in later sections. A persistent debate concerns whether the regulatory processes it captures are domain-general or domain-specific. Veenman, Van Hout-Wolters, and Afflerbach (2006) found a hybrid pattern: broad regulatory skills such as planning and monitoring transfer across subjects, while other aspects remain tied to domain-specific knowledge. This matters directly for the protective-factor hypothesis. If the buffering function of metacognition depends partly on domain-general regulatory habits, it should be observable across a child's academic life rather than confined to a single subject.

Metacognition operates within the broader system of self-regulated learning (SRL). It includes not only thinking skills but also the regulation of motivation, emotion, and behavior. In Zimmerman's (2000) cyclical model, metacognitive monitoring links forethought,

performance, and self-reflection, but SRL extends beyond this by helping learners manage frustration, sustain effort, and stay motivated (Panadero, 2017; Zheng et al., 2023). This distinction is crucial for understanding metacognition as a protective factor. A child may notice a misunderstanding or recognize that a strategy is failing, this is metacognitive awareness, but still struggle to continue without the emotional and motivational regulation needed to act on that awareness. Awareness alone does not guarantee constructive action. For metacognition to buffer students against stress or discouragement, it must work in tandem with the broader SRL capacities that allow learners to persist, adapt, and regulate their emotional responses.

Efklides' (2011) MASRL model provides the clearest articulation of metacognition as a psychological buffer and serves as the conceptual anchor for this review. Efklides argues that learners respond simultaneously to cognitive information and affective signals, making metacognition a continuous negotiation between intellectual progress and emotional state. Under this model, the buffering mechanism is specific: a child who can recognize frustration as a signal about strategy fit rather than as a verdict on competence is protected from the downward spiral in which academic difficulty triggers emotional distress, which then impairs performance and deepens the distress.

This mechanism also generates a developmental prediction. Metacognitive monitoring and control develop throughout childhood, while emotional awareness and emotion-regulation processes undergo further age-related changes during adolescence (Rueth et al., 2023; Wan et al., 2025). However, these trajectories are not uniformly linear; therefore, the prediction should be framed in terms of developmental change rather than simple age-related improvement. The strength of the buffering effect should change over time, becoming more robust as children's capacity for reflective reappraisal matures. The following analysis examines whether the empirical literature on achievement and subjective well-being has genuinely tested the buffering mechanism proposed in metacognitive theory, or whether these outcomes have been measured separately in ways that leave the protective-factor claim more assumed than demonstrated.

2. Metacognition and Academic Achievement

Numerous studies confirm that metacognition enhances academic performance; most of them measure only outcomes or grades, not whether it supports or protects the learner's psychological experience while pursuing those outcomes. In other words, the literature demonstrates that metacognition makes students perform better while largely ignoring whether

it also makes the experience of achieving that success psychologically easier or more stable. This leaves a critical gap: the protective, well-being-related function of metacognition remains largely untested alongside its well-documented academic benefits.

Across 18 studies spanning preschool through university, students with stronger metacognitive skills are reliably associated with higher academic achievement, even after controlling for general intelligence (Chen & McDunn, 2022; Jain, Tiwari, & Awasthi, 2018). Akpur's (2024) meta-analysis further confirms a robust link between metacognitive awareness and academic success across educational levels. In mathematics, the association is particularly strong, though moderated by age, domain, and cultural context, with younger students often showing the largest effects and benefits (Xie et al., 2024).

This apparent consistency should not be read as evidence of a uniform or context-independent effect. Gender-based variation in the metacognition-achievement relationship illustrates why important questions remain unanswered. Metacognitive strategy instruction has produced stronger gains in mathematics achievement for girls, possibly because these strategies help counter a documented tendency toward procrastination (Xue et al., 2021). In reading comprehension, girls' more frequent spontaneous use of reflective techniques appears to strengthen the metacognition–achievement link (Kolić-Vehovec & Bajšanski, 2019). Rather than treating these findings as incidental demographic footnotes, they should be read as evidence against a universal-skill framing of metacognition: the construct's practical value appears to be conditional on population, domain, and even the specific deficit it is compensating for, which complicates any straightforward claim that metacognitive instruction will produce uniform benefits across a primary-school classroom.

A second limitation concerns what these studies actually measure. Much of the literature reports correlations between metacognitive awareness or accuracy and achievement; recent meta-analytic and longitudinal evidence indicates that metacognitive awareness is positively associated with academic achievement and that initial metacognitive ability modestly predicts subsequent achievement (Baars, 2023; Jang et al., 2020; He et al., 2024). Correlational designs cannot determine whether metacognition itself is doing causal work, independent of the underlying ability or motivation that metacognitively skilled students often possess. Intervention studies offer somewhat stronger evidence: in their meta-analysis, Aydın and Öztürk (2024) found a significant positive effect of metacognitive training on students' mathematical problem-solving performance. However, because the included studies focused

on Turkish students and the effects were larger among primary-school students than among middle-school students, these findings should be generalized cautiously.

Overall, the literature provides more consistent support for a positive association between metacognition and academic achievement than for the claim that metacognition constitutes an independently manipulable causal mechanism. This distinction matters for any claim that metacognitive instruction provides genuine psychological benefit rather than simply correlating with students who were already coping well. Equally important is what this achievement-focused literature does not address. Nearly all studies treat metacognition as a performance mechanism, something that improves problem-solving, comprehension, or strategy selection, and evaluate it solely through academic outcomes. None examine whether the same regulatory processes that raise a test score also protect the learner's emotional experience of reaching that score, whether by reducing frustration, sustaining motivation after failure, or stabilizing a sense of competence. In other words, the buffering function at the center of this review is not tested, contradicted, or even considered within the achievement literature; it lies outside the scope of these studies, creating a structural gap rather than a set of null findings. This gap is precisely why the subsequent analysis turns to a much thinner body of research on subjective well-being to evaluate the protective-factor claim directly.

3. Metacognition and Subjective Well-Being: The Critical Gap

Subjective well-being (SWB) is not a single, easily defined construct. Diener's (1984, 1999) tripartite model, still the field's most widely used framework, distinguishes life satisfaction, positive affect, and negative affect as separate components rather than facets of one global score. Seligman's (2011) PERMA model extends this approach by organizing flourishing around five elements: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment. These frameworks matter for the present review because they imply a specific, testable pathway: if metacognitive instruction influences SWB, it is most likely through Engagement and Accomplishment, the dimensions most closely tied to students' awareness of progress and mastery. Although theoretically coherent, this pathway is rarely examined directly; it appears more often as an intuitive narrative linking two literatures than as an empirically estimated mechanism.

Where direct evidence does exist, it is supportive but modest. Sadati et al. (2022) found that positive metacognitive beliefs predicted psychological well-being in adolescents, and Weight and Bond (2021) argued that metacognitive strategies can buffer academic anxiety.

These findings align with the protective-factor hypothesis introduced earlier, but both studies focus on adolescents rather than primary-school children, and neither uses a validated multidimensional SWB instrument of the type recommended by Diener's model. This pattern recurs across the literature: evidence for a metacognition–well-being link is present, but it clusters in older populations and often relies on global or single-item measures rather than child-appropriate multidimensional scales such as the MSLSS (Huebner, 1991, 2004) or the Elementary School Students' Subjective Well-Being in School Scale (Liu et al., 2015). Methodological reviews consistently recommend these instruments for younger samples (Tabueva et al., 2024; OECD, 2025 update), yet they remain underused in metacognition research.

This measurement gap is not a minor technical issue. The OECD's (2025) updated guidelines explicitly advise treating life evaluation, affect, and eudaimonic well-being as distinct, non-interchangeable dimensions, especially in educational contexts where cognitive and emotional experiences may diverge (Eckert, Steinmayr, & Wirthwein, 2025). A study reporting that metacognition improves well-being without specifying which dimension, and measured with which instrument, cannot be meaningfully compared to another study using a different operationalization. This heterogeneity is one reason the metacognition–SWB literature has been slow to accumulate into a coherent evidence base.

A developmental gap compounds the measurement gap. Eudaimonic aspects of well-being, such as meaning and psychological functioning, require abstract reasoning capacities that begin emerging around age eight and continue developing through adolescence (Rosso et al., 2004). For primary-school children, a hedonic-leaning framework emphasizing positive affect and school satisfaction may therefore be more developmentally appropriate than the full PERMA model typically applied to older students. Very few studies adjust their well-being measures to reflect this developmental reality when examining metacognition, which means that even the modest positive findings available may not generalize cleanly to 10- to 12-year-olds.

Taken together, the evidence reviewed here does not contradict the protective-factor hypothesis, but it also does not confirm it with the level of confidence seen in the achievement literature. This asymmetry, rich evidence for performance, thin and methodologically uneven evidence for well-being, is the central finding of this review. It is precisely the gap that a study

measuring both outcomes directly, using age-appropriate multidimensional instruments, in a primary-school population is positioned to address.

4. The Developmental Trajectory of Metacognition as a Psychological Buffer

If metacognition operates as a psychological buffer, its protective strength should not be treated as fixed across childhood and adolescence. Instead, it should develop alongside the regulatory and affective capacities on which the buffering mechanism depends. Although the existing literature addresses this developmental question only indirectly, the available evidence allows several important observations.

Metacognitive knowledge and regulation are already detectable in early and middle childhood, even among five- to seven-year-olds, and both continue to develop throughout the elementary years (Bryce, Whitebread, & Szűcs, 2015; Chen et al., 2024). This early emergence suggests that the foundations of any buffering mechanism are laid well before adolescence rather than appearing suddenly in the teenage years. At the same time, developmental research shows that metacognitive regulation and eudaimonic self-understanding do not mature at the same pace. Primary-school children can monitor their thinking and adjust ineffective strategies, but the ability to use this information to form broader self-evaluations develops more slowly. During adolescence, young people begin to build a coherent self-concept and a clearer sense of purpose, and these capacities continue to strengthen across this period (Schneider & Löffler, 2016; Chen & Cheng, 2020; Crone et al., 2022; van der Cruijsen et al., 2023). As a result, children may reinterpret a failed strategy constructively at the task level without yet translating that experience into a stable sense of meaning, identity, or well-being. If this asymmetry holds, it implies that metacognition's protective effect on achievement-related distress should emerge earlier than its influence on more abstract measures of subjective well-being, a pattern consistent with the combined findings of the achievement and well-being literature.

Adolescence adds further complexity rather than simply extending childhood trends. The two studies offering the clearest evidence for metacognition's protective role (Sadati et al., 2022; Weight & Bond, 2021) were conducted with adolescents, a period marked by heightened academic pressure and more socially comparative, identity-linked forms of self-evaluation. It is plausible that metacognition's buffering function becomes more visible, and more necessary, precisely because adolescence introduces psychological demands that younger children have not yet encountered. Under this interpretation, the concentration of protective-factor evidence in adolescent samples reflects not only research design but also developmental reality: the

buffer becomes empirically detectable only once the level of psychological pressure is high enough for its effects to surface.

This developmental reading has direct implications for research with primary-school students. If the buffering mechanism is present but not yet heavily taxed at ages 10–12, studies of subjective well-being in this group may be assessing the mechanism at a stage where its protective function is real but not yet maximally expressed. A modest or null well-being effect in such samples should therefore be interpreted as evidence of developmental timing rather than evidence against the existence of the mechanism.

5. Discussion

Three critical observations emerge from this review. First, the achievement and well-being literatures on metacognition are asymmetrically developed, and this asymmetry runs deeper than measurement inconsistency; it reflects a difference in the questions each literature actually asks. Recent achievement research provides evidence that metacognition is positively associated with academic performance. A meta-analysis of longitudinal studies found that students' initial metacognitive ability positively predicted their subsequent academic achievement, although the relationship was modest and reciprocal rather than strictly causal (Akpur, 2024; He et al., 2024). In contrast, the well-being literature considers metacognition's psychological benefits only indirectly and offers limited, mostly adolescent-based evidence for its protective role (Sadati et al., 2022; Weight & Bond, 2021). Neither literature, notably, asks both questions of the same sample, which means the central claim of this review, that achievement and SWB are joint expressions of a single protective mechanism, has essentially never been tested as a joint claim.

Second, the developmental specificity of this mechanism is under-addressed. The argument developed earlier suggests that metacognition's protective role follows a developmental trajectory: it appears in basic form during childhood but becomes more visible and more rigorously tested as academic and social pressures intensify in adolescence. If this is correct, then studying the protective-factor hypothesis exclusively in adolescents, as much of the existing direct evidence does, may be studying the mechanism only after it has already been shaped by years of prior, unmeasured developmental history. A primary-school population offers the opportunity to observe the mechanism nearer to its point of origin, before that history has accumulated.

Third, and most fundamentally, the literature's tendency to treat achievement and SWB as separate research programs, each with its own measures, samples, and theoretical framing, is itself evidence against, or at least evidence untested for, the integrated protective-factor claim this review has evaluated. A theory that predicts a single mechanism producing two correlated outcomes should, in principle, be tested with designs that measure both outcomes in the same children at the same time. The near-total absence of such designs in the literature reviewed here is not a minor methodological footnote; it is the central reason the protective-factor hypothesis remains a theoretically coherent but empirically unconfirmed claim.

6. Implications for Future Research

Future research should assess academic achievement and subjective well-being as joint outcomes within the same sample, rather than treating them as separate questions addressed by different studies. Measures of subjective well-being should rely on validated, age-appropriate, multidimensional instruments such as the MSLSS or the Elementary School Students' Subjective Well-Being in School Scale rather than global or single-item indicators, in line with OECD (2025) guidance that cognitive and affective components must be analyzed separately. Given the developmental asymmetry outlined earlier, studies with primary-school children should interpret modest or null SWB effects cautiously. Such findings may indicate that the buffering mechanism is present but not yet under sufficient academic or emotional pressure to be fully observable, a possibility best examined through longitudinal or follow-up designs rather than single-timepoint studies. Finally, future work should test the buffering mechanism directly. This includes examining whether children's metacognitive reappraisal of a specific academic setback predicts both their subsequent performance and their emotional response, rather than inferring the mechanism indirectly from separate correlations with achievement and well-being.

7. Conclusion

Metacognition's role as a protective psychological factor is not yet an established empirical finding; it remains a theoretically well-supported hypothesis that has been tested extensively for academic achievement but only thinly, indirectly, and unevenly across development for subjective well-being. Research on achievement and well-being has proceeded largely in isolation, despite clear theoretical justification, most directly articulated in Efklides' MASRL model, for treating both outcomes as expressions of a single regulatory-affective mechanism. Addressing this gap requires studies that assess both achievement and

well-being within the same children and during the developmental period in which metacognitive and affective self-regulation are still forming, particularly the primary-school years, where the buffering mechanism may exist but not yet be fully visible. Until such work is conducted, the claim that metacognition protects children psychologically as well as academically remains a compelling theoretical proposition awaiting the direct empirical test its logic demands.

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