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META-ANALYSIS

# Emotion Regulation and Academic Burnout Among Youth: a Quantitative Meta-analysis

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## Abstract

Emotion regulation (ER) represents an important factor in youth's academic wellbeing even in contexts that are not characterized by outstanding levels of academic stress. Effective ER not only enhances learning and, consequentially, improves youths' academic achievement, but can also serve as a protective factor against academic burnout. The relationship between ER and academic burnout is complex and varies across studies. This meta-analysis examines the connection between ER strategies and student burnout, considering a series of influencing factors. Data analysis involved a random effects meta-analytic approach, assessing heterogeneity and employing multiple methods to address publication bias, along with meta-regression for continuous moderating variables (quality, female percentage and mean age) and subgroup analyses for categorical moderating variables (sample grade level). According to our findings, adaptive ER strategies are negatively associated with overall burnout scores, whereas ER difficulties are positively associated with burnout and its dimensions, comprising emotional exhaustion, cynicism, and lack of efficacy. These results suggest the nuanced role of ER in psychopathology and wellbeing. We also identified moderating factors such as mean age, grade level and gender composition of the sample in shaping these associations. This study highlights the need for the expansion of the body of literature concerning ER and academic burnout, that would allow for particularized analyses, along with context-specific ER research and consistent measurement approaches in understanding academic burnout. Despite methodological limitations, our findings contribute to a deeper understanding of ER's intricate relationship with student burnout, guiding future research in this field.

**Keywords** Emotion regulation · Academic burnout · Youth · Meta-analysis

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## Introduction

The transitional stages of late adolescence and early adulthood are characterized by significant physiological and psychological changes, including increased stress (Matud et al., 2020). Academic stress among students has long been studied in various samples, most of them focusing on university students (Bedewy & Gabriel, 2015; Córdova Olivera et al., 2023; Hystad et al., 2009) and, more recently, high school (Deb et al., 2015) and middle school students (Luo et al., 2020). Further, studies report an exacerbation of academic stress and mental health difficulties in response to the COVID-19 pandemic (Guessoum et al., 2020), with children facing additional challenges that affect their academic well-being, such as increasing workloads, influences from the family, and the issue of decreasing financial income (Ibda et al., 2023; Yang et al., 2021). For youth to maintain their well-being in stressful academic settings, emotion regulation (ER) has been identified as an important factor (Santos Alves Peixoto et al., 2022; Yildiz, 2017; Zahniser & Conley, 2018).

Emotion regulation, referring to"the process by which individuals influence which emotions they have, when they have them, and how they experience and express their emotions" (Gross, 1998b), represents an important factor in youth's academic well-being even in contexts that are not characterized by outstanding levels of stress. Emotion regulation strategies promote more efficient learning and, consequentially, improve youth's academic achievement and motivation (Asareh et al., 2022; Davis & Levine, 2013), discourage academic procrastination (Mohammadi Bytamar et al., 2020), and decrease the chances of developing emotional problems such as burnout (Narimanj et al., 2021) and anxiety (Shahidi et al., 2017).

### Approaches to Emotion Regulation

Numerous theories have been proposed to elucidate the process underlying the emergence and progression of emotional regulation (Gross, 1998a, 1998b; Koole, 2009; Larsen, 2000; Parkinson & Totterdell, 1999). One prominent approach, developed by Gross (2015), refers to the process model of emotion regulation, which lays out the sequential actions people take to regulate their emotions during the emotion-generative process. These steps involve situation selection, situation modification, attentional deployment, cognitive change, and response modulation. The kind and timing of the emotion regulation strategies people use, according to this paradigm, influence the specific emotions people experience and express.

Recent theories of emotion regulation propose two separate, yet interconnected approaches: ER abilities and ER strategies. ER abilities are considered a higher-order process that guides the type of ER strategy an individual uses in the context of an emotion-generative circumstance. Further, ER strategies are considered factors that can also influence ER abilities, forming a bidirectional relationship (Tull & Aldao, 2015). Researchers use many definitions and classifications of emotion regulation, however, upon closer inspection, it becomes clear that there are notable similarities across these concepts. While there are many models of emotion regulation,

it's important to keep from seeing them as competing or incompatible since each one represents a unique and important aspect of the multifaceted concept of emotion regulation.

## Emotion Regulation and Emotional Problems

The connection between ER strategies and psychopathology is intricate and multifaceted. While some researchers propose that ER's effectiveness is context-dependent (Kobylińska & Kusev, 2019; Troy et al., 2013), several ER strategies have long been attested as adaptive or maladaptive. This body of work suggests that certain emotion regulation strategies (such as avoidance and expressive suppression) demonstrate, based on findings from experimental studies, inefficacy in altering affect and appear to be linked to higher levels of psychological symptoms. These strategies have been categorized as ER difficulties. In contrast, alternative emotion regulation strategies (such as reappraisal and acceptance) have demonstrated effectiveness in modifying affect within controlled laboratory environments, exhibiting a negative association with clinical symptoms. As a result, these strategies have been characterized as potentially adaptive (Aldao & Nolen-Hoeksema, 2012a, 2012b; Aldao et al., 2010; Gross, 2013; Webb et al., 2012).

A long line of research highlights the divergent impact of putatively maladaptive and adaptive ER strategies on psychopathology and overall well-being (Gross & Levenson, 1993; Gross, 1998a). Increased negative affect, increased physiological reactivity, memory problems (Richards et al., 2003), a decline in functional behavior (Dixon-Gordon et al., 2011), and a decline in social support (Séguin & MacDonald, 2018) are just a few of the negative effects that have consistently been linked to emotional regulation difficulties, which include but are not limited to the use of avoidance, suppression, rumination, and self-blame strategies. Additionally, a wide range of mental problems, such as depression (Nolen-Hoeksema et al., 2008), anxiety disorders (Campbell-Sills et al., 2006a, 2006b; Mennin et al., 2007), eating disorders (Prefit et al., 2019), and borderline personality disorder (Lynch et al., 2007; Neacsiu et al., 2010) are connected to self-reports of using these strategies.

Conversely, putatively adaptive strategies, including acceptance, problem-solving, and cognitive reappraisal, have consistently yielded beneficial outcomes in experimental studies. These outcomes encompass reductions in negative emotional responses, enhancements in interpersonal relationships, increased pain tolerance, reductions in physiological reactivity, and lower levels of psychopathological symptoms (Aldao et al., 2010; Goldin et al., 2008; Hayes et al., 1999; Richards & Gross, 2000).

Notably, despite the fact that therapeutic techniquest for enhancing the use of adaptive ER strategies are core elements of many therapeutic approaches, from traditional Cognitive Behavioral Therapy (CBT) to more recent third-wave interventions (Beck, 1976; Hofmann & Asmundson, 2008; Linehan, 1993; Roemer et al., 2008; Segal et al., 2002), the association between ER difficulties and psychopathology frequently show a stronger positive correlation compared to the inverse negative association with adaptive ER strategies, as highlighted by Aldao and Nolen-Hoeksema (2012a).

Pines & Aronson (1988) characterize burnout that arises in the workplace context as a state wherein individuals encounter emotional challenges, such as experiencing fatigue and physical exhaustion due to heightened task demands. Recently, driven by the rationale that schools are the environments where students engage in significant work, the concept of burnout has been extended to educational contexts (Salmela-Aro, 2017; Salmela-Aro & Tynkkynen, 2012; Walburg, 2014). Academic burnout is defined as a syndrome comprising three dimensions: exhaustion stemming from school demands, a cynical and detached attitude toward one's academic environment, and feelings of inadequacy as a student (Salmela-Aro et al., 2004; Schaufeli et al., 2002).

School burnout has quickly garnered international attention, despite its relatively recent emergence, underscoring its relevance across multiple nations (Herrmann et al., 2019; May et al., 2015; Meylan et al., 2015; Yang & Chen, 2016). Similar to other emotional difficulties, it has been observed among students from various educational systems and academic policies, suggesting that this phenomenon transcends cultural and geographical boundaries (Walburg, 2014).

The link between ER and school burnout can be understood through Gross's (1998a) process model of emotion regulation. This model suggests that an individual's emotional responses are influenced by their ER strategies, which are adaptive or maladaptive reactions to stressors like academic pressure. Given that academic stress greatly influences school burnout (Jiang et al., 2021; Nikdel et al., 2019), the ER strategies students use to manage this stress may impact their likelihood of experiencing burnout. In essence, whether a student employs efficient ER strategies or encounters ER difficulties could influence their susceptibility to school burnout.

The exploration of ER in relation to student burnout has garnered attention through various studies. However, the existing body of research is not yet robust enough, and its outcomes are not universally congruent. Suppression, defined as efforts to inhibit ongoing emotional expression (Balzarotti et al., 2010), has demonstrated a positive and significant correlation with both general and specific burnout dimensions (Chacón-Cuberos et al., 2019; Seibert et al., 2017), with the exception of the study conducted by Yu et al., (2022), where there is a negative, but not significant association between suppression and reduced accomplishment. Notably, research by Muchacka-Cymerman and Tomaszek (2018) indicates that ER strategies, encompassing both dispositional and situational approaches, exhibit a negative relationship with overall burnout. Situational ER, however, displays a negative impact on dimensions like inadequacy and declining interest, particularly concerning the school environment.

Cognitive ER strategies such as reappraisal, positive refocusing, and planning are, generally, negatively associated with burnout, while self-blame, other-blame, rumination, and catastrophizing present a positive association with burnout (Dominguez-Lara, 2018; Vinter et al., 2021). It's important to note that these relationships have not been consistently replicated across all investigations. Inconsistencies in the findings highlight the complexity of the interactions and the potential influence of various contextual factors. Consequently, there remains a critical need for further research to thoroughly examine these associations and identify the factors contributing to the variability in results.

## Existing Research

Although we were unable to identify any reviews or meta-analyses that synthesize the literature concerning emotion regulation strategies and student burnout, recent meta-analyses have identified the role of emotion regulation across pathologies. A recent network meta-analysis identified the role of rumination and non-acceptance of emotions to be closely related to eating disorders (Leppanen et al., 2022). Further, compared to healthy controls, people presenting bipolar disorder symptoms reported significantly higher difficulties in emotion regulation (Miola et al., 2022). Weiss et al. (2022) identified a small to medium association between emotion regulation and substance use, and a subsequent meta-analysis conducted by Stellern et al. (2023) confirmed that individuals with substance use disorders have significantly higher emotion regulation difficulties compared to controls. The study of Dawel et al. (2021) represents the many research papers asking the question"Cause or symptom" in the context of emotion regulation. The longitudinal study brings forward the bidirectional relationship between ER and depression and anxiety, particularly in the case of suppression, suggesting that suppressing emotions is indicative of and can predict psychological distress.

Despite the increasing research attention to academic burnout in recent years, the current body of literature primarily concentrates on specific groups such as medical students (Almutairi et al., 2022; Frajerman et al., 2019), educators (Aloe et al., 2014; Park & Shin, 2020), and students at the secondary and tertiary education levels (Madigan & Curran, 2021) in the context of meta-analyses and reviews. A limited number of recent reviews have expanded their focus to include a more diverse range of participants, encompassing middle school, graduate, and university students (Kim et al., 2018, 2021), with a particular emphasis on investigating social support and exploring the demand-control-support model in relation to student burnout.

The significance of managing burnout in educational settings is becoming more widely acknowledged, as seen by the rise in interventions designed to reduce the symptoms of burnout in students. Specific interventions for alleviating burnout symptoms among students continue to proliferate (Madigan et al., 2023), with a focus on stress reduction through mindfulness-based strategies (Lo et al., 2021; Modrego-Alarcón et al., 2021) and rational-emotive behavioral techniques (Ogbuanya et al., 2019) to enhance emotion-regulation skills (Charbonnier et al., 2022) and foster rational thinking (Bresó et al., 2011; Ezeudu et al., 2020). This underscores the significance of emotion regulation in addressing burnout.

Despite several randomized clinical trials addressing student burnout and an emerging body of research relating emotion regulation and academic burnout, there's a lack of a systematic examination of how emotion regulation strategies relate to various dimensions of student burnout. This highlights the necessity for a systematic review of existing evidence. The current meta-analysis addresses the association between emotion regulation strategies and student burnout.

A secondary objective is to test the moderating effect of school level and female percentage in the sample, as well as study quality, in order to identify possible sources of heterogeneity among effect sizes. By analyzing the moderating effect of school level and gender, we may determine if the strength of the association between

student burnout and emotion regulation is contingent upon the educational setting and participant characteristics. This offers information on the findings' generalizability to all included student demographics, including those in elementary, middle, and secondary education and of different genders. Additionally, the reliability and validity of meta-analytic results rely on the evaluation of research quality, and the inclusion of study quality rating allows us to determine if the observed association between emotion regulation and student burnout differs based on the methodological rigor of the included studies.

## Materials and Methods

### Study Protocol

The present meta-analysis has been carried out following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement (Moher et al., 2009). The protocol for the meta-analysis was pre-registered in PROSPERO (PROSPERO, 2022 CRD42022325570).

### Selection of Studies

A systematic search was performed using relevant databases (PubMed, Web of Science, PsychINFO, and Scopus). The search was carried out on 25 May of 2023 using 25 key terms related to the variables of interest, such as: (a) academic burnout, (b) school burnout, (c) student burnout (d) education burnout, (d) exhaustion, (e) cynicism, (f) inadequacy, (g) emotion regulation, (h) coping, (i) self-blame, (j) acceptance, and (h) problem solving.

Studies of any design published in peer-reviewed journals were eligible for inclusion, provided they used empirical data to assess the relationship between student burnout and emotion regulation strategies. Only studies that employed samples of children, adolescents, and youth were eligible for inclusion. For the purpose of the current paper, we define youth as people aged 18 to 25, based on how it is typically defined in the literature (Westhues & Cohen, 1997).

Studies were excluded from the meta-analysis if they: (a) were not a quantitative study, (b) did not explore the relationship between academic burnout and emotion regulation strategies, (c) did not have a sample that can be defined as consisting of children and youth (Scales et al., 2016), (e) did not utilize Pearson's correlation or measures that could be converted to a Pearson's correlation, (f) include medical school or associated disciplines samples.

### Statistical Analysis

For the data analysis, we employed Comprehensive Meta-Analysis 4 software. Anticipating significant heterogeneity in the included studies, we opted for a random effects meta-analytic approach instead of a fixed-effects model, a choice that

acknowledges and accounts for potential variations in effect sizes across studies, contributing to a more robust and generalizable synthesis of the results. Heterogeneity among the studies was assessed using the $I^2$ and $Q$ statistics, adhering to the interpretation thresholds outlined in the Cochrane Handbook (Deeks et al., 2023).

Publication bias was assessed through a multi-faceted approach. We first examined the funnel plot for the primary outcome measures, a graphical representation revealing potential asymmetry that might indicate publication bias. Furthermore, we utilized Duval and Tweedie's trim and fill procedure (Duval & Tweedie, 2000), as implemented in CMA, to estimate the effect size after accounting for potential publication bias. Additionally, Egger's test of the intercept was conducted to quantify the bias detected by the funnel plot and to determine its statistical significance.

When dealing with continuous moderating variables, we employed meta-regression to evaluate the significance of their effects. For categorical moderating variables, we conducted subgroup analyses to test for significance. To ensure the validity of these analyses, it was essential that there was a minimum of three effect sizes within each subgroup under the same moderating variable, following the guidelines outlined by Junyan and Minqiang (2020). In accordance with the guidance provided in the Cochrane Handbook (Schmid et al., 2020), our application of meta-regression analyses was limited to cases where a minimum of 10 studies were available for each examined covariate. This approach ensures that there is a sufficient number of studies to support meaningful statistical analysis and reliable conclusions when exploring the influence of various covariates on the observed relationships.

### Data Extraction and Quality Assessment

In addition to the identification information (i.e., authors, publication year), we extracted data required for the effect size calculation for the variables relevant to burnout and emotion regulation strategies. Where data was unavailable, the authors were contacted via email in order to provide the necessary information. Potential moderator variables were coded in order to examine the sources of variation in study findings. The potential moderators included: (a) participants' gender, (b), grade level (c) study quality, and (d) mean age.

The full-text articles were independently assessed using the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields tool (Kmet et al., 2004) by a pair of coders (II and SM), to ensure the reliability of the data, resulting in a substantial level of agreement (Cohen's $k = 0.89$). The disagreements and discrepancies between the two coders were resolved through discussion and consensus. If consensus could not be reached, a third researcher (OD) was consulted to resolve the disagreement.

The checklist items focused on evaluating the alignment of the study's design with its stated objectives, the methodology employed, the level of precision in presenting the results, and the accuracy of the drawn conclusions. The assessment criteria were composed of 14 items, which were evaluated using a 3-point Likert scale (with responses of 2 for "yes," 1 for "partly," and 0 for "no"). A cumulative score was computed for each study based on these items. For studies where certain

checklist items were not relevant due to their design, those items were marked as "n/a" and were excluded from the cumulative score calculation.

## Results

### Study Selection

The combined search terms yielded a total of 15,179 results. The duplicate studies were removed using Zotero, and a total of 8,022 studies remained. The initial screening focused on the titles and abstracts of all remaining studies, removing all documents that target irrelevant predictors or outcomes, as well as qualitative studies and reviews. Two assessors (II and SA) independently screened the papers against the inclusion and exclusion criteria. A number of 7,934 records were removed, while the remaining 88 were sought for retrieval. Out of the 88 articles, we were unable to find one, while another has been retracted by the journal. Finally, 86 articles were assessed for eligibility. A total of 20 articles met the inclusion criteria (see Fig. 1). Although a specific cutoff criterion for reliability coefficients was not imposed during study selection, the majority of the included studies had alpha Cronbach values for the instruments assessing emotion regulation and school burnout greater than 0.70.

### Data Overview

Among the included studies, four focused on middle school students, two encompassed high school student samples, and the remaining 14 articles involved samples of university students. The majority of the included studies had cross-sectional designs (17), while the rest consisted of 2 longitudinal studies and one non-randomized controlled pilot study. The percentage of females within the samples ranged from 46% to 88.3%, averaging 65%, while the mean age of participants ranged from 10.39 to 25. The investigated emotional regulation strategies within the included studies exhibit variation, encompassing other-blame, self-blame, acceptance, rumination, catastrophizing, putting into perspective, reappraisal, planning, behavioral and mental disengagement, expressive suppression, and others (see Table 1 for a detailed study presentation).

### Study Quality

Every study surpasses a quality threshold of 0.60, and 75% of the studies achieve a score above the more conservative threshold indicated by Kmet et al. (2004). This indicates a minimal risk of bias in these studies. Moreover, 80% of the studies adequately describe their objectives, while the appropriateness of the study design is recognized in 50% of the cases, mostly utilizing cross-sectional designs. While 95% of the studies provide sufficient descriptions of their samples, only 10% employ appropriate sampling methods, with the majority relying on convenience sampling. Notably, there is

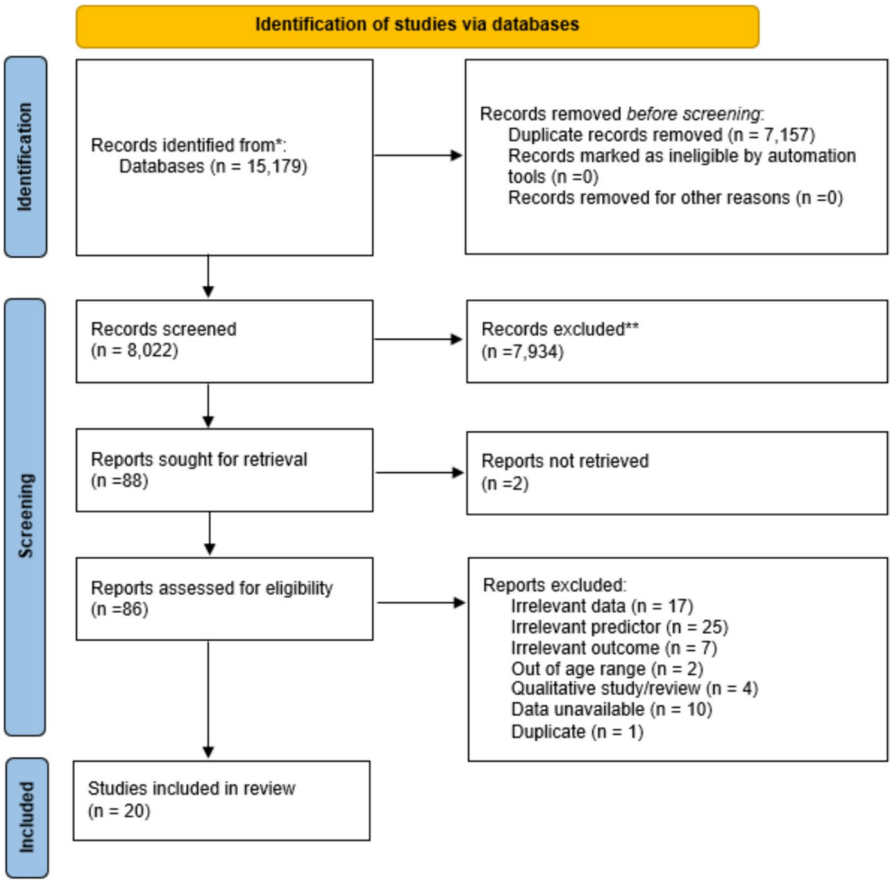


**Fig. 1** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart of the study selection process

just one interventional study that lacks random allocation and blinding of investigators or subjects.

In terms of measurement, 85% of the studies employ validated and reliable tools. Adequacy in sample size and well-justified and appropriate analytic methods are observed across all included studies. While approximately 50% of the studies present estimates of variance, a mere 30% of them acknowledge the control of confounding variables. Lastly, 95% of the studies provide results in comprehensive detail, with 60% effectively grounding their discussions in the obtained results. The quality assessment criteria and results can be consulted in Supplementary Material 4.

## Pooled Effects

A sensitivity analysis using standardized residuals was conducted. Provided that the residuals are normally distributed, 95% of them would fall within the range of -2 to

**Table 1** Study Characteristics

| Study | Country | Study design | Sample type | Sample size | Mean age | %female | Emotion regulation measure | Types of emotion regulation | Burnout measure | Burnout dimensions |
|---|---|---|---|---|---|---|---|---|---|---|
| Alarcon et al. (2011) | USA | Cross-sectional | University | 454 | n/a | 69.8 | COPE (Carver et al., 1989) | Active coping; Planning; Denial; Behavioral disengagement; Mental disengagement | MBI-SS (Schaufeli et al., 2002) | Exhaustion, Cynicism |
| Arias-Gundín & Vizoso Gómez (2018) | Columbia | Cross-sectional | University | 775 | 21 | 88.1 | CSI (Tobin et al. 1989) | Problem solving; Cognitive restructuring; Emotional expression; Seeking social support | MBI-SS (Schaufeli et al., 2002) | Exhaustion, Cynicism, Lack of Efficacy |
| Chacon-Cuberos et al. (2019) | Spain | Cross-sectional | University | 569 | 10.39 | 47.7 | ERQ (Gross & John, 2003) | Cognitive reassessment, Expressive suppression | SBI (Salmela-Aro et al., 2009) | Burnout, Exhaustion, Cynicism, Lack of efficacy |
| Charbonnier et al., (2022) | France | Non-randomized controlled pilot study | University | 265 | n/a | n/a | Brief COPE (Carver, 1997) | Active Coping; Planning; Using instrumental support; Using emotional support; Venting; Positive reframing; Acceptance; Denial; Self-blame; Humor; Religion; Self-distraction; Behavioral disengagement | MBI-SS (Schaufeli et al., 2002) | Exhaustion, Academic efficacy, Cynicism |
| Dominguez-Lara (2018) | Peru | Cross-sectional | University | 219 | 21.39 | 68 | CERQ (Garnefskiet et al., 2001) | Other-blame; Self-blame; Acceptance; Rumination; Catastrophizing; Putting into perspective; Positive Reappraisal; Focus on planning; Positive refocusing | ECE (Ramírez & Hernández, 2007) | Emotional exhaustion |
| Fong & Loi (2016) | Australia | Cross-sectional | University | 306 | 25.17 | 78.10 | SCS (Neff, 2003) | Self-compassion | MBI-SS (Schaufeli et al., 2002) | Burnout |

**Table 1** (continued)

| Study | Country | Study design | Sample type | Sample size | Mean age | %female | Emotion regulation measure | Types of emotion regulation | Burnout measure | Burnout dimensions |
|---|---|---|---|---|---|---|---|---|---|---|
| Lau et al. (2020) | Malaysia | Cross-sectional | University | 251 | n/a | 68.5 | Brief COPE (Carver, 1997) | Active coping strategies | MBI-SS (Schaufeli et al., 2002) | Burnout |
| Libert et al., (2019) | France | Cross-sectional | University | 320 | 23.2 | 88 | Brief COPE (Carver, 1997) | Adaptive coping; Maladaptive coping | MBI-SS (Schaufeli et al., 2002) | Burnout |
| Luo et al., (2016) | China | Cross-sectional | Middle school | 1230 | 13.2 | 47.31 | PFSC (Chen et al., 2000) | Task-oriented coping; Emotion-oriented coping | MBI-SS (Schaufeli et al., 2002) | Burnout |
| Merino-Tejedor et al. (2016) | Spain | Cross-sectional | University | 577 | 21.66 | 64.8 | The Self-Regulation Scale (Luszczynska et al., 2004) | Self-regulation | SBI-U (Boada-Grau et al., 2015) | Burnout |
| Noh et al. (2016) | Korea | Longitudinal | Highschool | 210 | 15 | 54.4 | Brief COPE (Carver, 1997) | Positive religious coping; Negative religious coping | MBI-SS (Schaufeli et al., 2002) | Burnout |
| Seibert et al., (2017) | USA | Cross-sectional | University | 550 | 19.63 | 88.4 | ERQ (Gross & John, 2003) | Expressive suppression; Cognitive reappraisal | SBI (Salmela-Aro et al., 2009) | Burnout, Exhaustion, Cynicism, Lack of Efficacy |
| Shih (2013) | China | Cross-sectional | Highschool | 435 | 14.5 | 46 | PALS (Midgley et al., 2000) | Help avoidance; Self-handicapping | MBI-SS (Schaufeli et al., 2002) | Exhaustion, Cynicism, Lack of Efficacy |
| Shih (2015a) | Taiwan | Cross-sectional | Middle school | 396 | 13.5 | 50.5 | Academic coping strategies. adapted from Brief COPE (Carver, 1997) | Disengagement coping; Engagement coping | MBI-SS (Schaufeli et al., 2002) | Emotional exhaustion, Cynicism, Lack of efficacy |
| Shih (2015b) | Taiwan | Cross-sectional | Middle school | 374 | 13.92 | 49.5 | Scale adapted from Brief COPE (Carver, 1997) | Engagement coping; Support seeking coping; Disengagement coping | Scale adapted from MBI-SS (Schaufeli et al., 2002) | Emotional exhaustion, Cynicism, Lack of efficacy |
| Vinter et al. (2021) | Estonia | Longitudinal | Middle school | 326 | 14.6 | 51 | CERQ (Garnefskiet et al., 2001) | Refocus on planning; Positive refocusing; Rumination | SBI (Salmela-Aro et al., 2009) | Burnout |
| Vizoso et al. (2019) | Spain | Cross-sectional | University | 532 | 22.10 | 82.3 | CSI (Tobin et al., 1989) | Adaptive coping; Maladaptive coping | MBI-SS (Schaufeli et al., 2002) | Exhaustion, Cynicism, Lack of Efficacy |

**Table 1** (continued)

| Study | Country | Study design | Sample type | Sample size | Mean age | %female | Emotion regulation measure | Types of emotion regulation | Burnout measure | Burnout dimensions |
|---|---|---|---|---|---|---|---|---|---|---|
| Yu et al. (2022) | China | Cross-sectional | University | 890 | 19.57 | 66.96 | AERQ (Burić et al., 2016) | Avoiding/situation selection; Suppression; Venting | MBI-SS (Schaufeli et al., 2002) | Exhaustion, Cynicism, Lack of Efficacy |
| Popescu et al., (2023) | Romania | Cross-sectional | University | 399 | 20.76 | 60.7 | Brief COPE (Carver, 1997) | Emotion focused; Problem focused; Social support; Avoidant coping | BAT (Schaufeli et al., 2020) | Exhaustion |
| Marques et al. (2023) | Portugal | Cross-sectional | University | 205 | 21.72 | 80 | CERQ (Garnefskiet et al., 2001); ERQ (Gross & John, 2003); SESES (Nyklícek & Temoshok, 2004) | Rumination; Putting into perspective; Expressive suppression; Emotion communication | CBI (Kristensen et al., 2005) | Academic-related burnout |

2. Residuals outside this range were considered unusual. We applied this cutoff in our meta-analysis to identify any outliers. The results of the analysis revealed that several relationships had standardized residuals falling outside the specified range. Re-analysis excluding these outliers demonstrated that our initial results were robust and did not significantly change in magnitude or significance. As a result, we have moved on with the analysis for the entire sample.

The calculated overall effects can be consulted in Table 2. The correlation between ER difficulties and student burnout is a significant one, with significant positive associations between ER difficulties and overall burnout (k = 13), $r = 0.25$ (95% CI = 0.182; 0.311), $p < 0.001$, as well as individual burnout dimensions: cynicism (k = 9), $r = 0.28$ (95% CI = 0.195; 0.353) $p < 0.001$, lack of efficacy (k = 8), $r = 0.17$ (95% CI = 0.023; 0.303), $p < 0.05$ and emotional exhaustion (k = 11), $r = 0.27$ (95% CI = 0.207; 0.335) $p < 0.001$. Regarding the relationship between adaptive ER strategies and student burnout, a statistically significant result is observed solely between overall student burnout and adaptive ER (k = 17), $r = -14$ (95% CI = -0.239; 0.046) $p < 0.005$. The forest plots can be consulted in Supplementary Material 1.

## Heterogeneity and Publication Bias

Table 3 shows that all $Q$ tests were significant, indicating that there is significant variation among the effect sizes of the individual studies included in the meta-analysis. Further, all $I^2$ indices are over 75%, ranging from 83.67% to 99.32%, which also indicates high heterogeneity (Borenstein et al., 2017). This consistently high level of heterogeneity indicates substantial variation in effect sizes, pointing to influential factors that significantly shape the outcomes of the included studies. Consequentially, subgroup and meta-regression analyses are to be carried out in order to unravel the underlying factors driving this pronounced heterogeneity. The results of the publication bias analysis are presented individually below and, additionally, you can consult the funnel plots included in Supplementary Material 2.

**Table 2** Overall associations between adaptive ER / ER difficulties and school burnout

| | | | 95% CI | | | |
|---|---|---|---|---|---|---|
| | k | *r* | LL | UL | *Z* | *p* |
| Adaptive ER—School burnout | 17 | -0.14 | -0.239 | 0.046 | -2.872 | 0.004** |
| ER Difficulties—School burnout | 13 | 0.25 | 0.182 | 0.311 | 7.173 | 0.000*** |
| Adaptive ER—Cynicism | 9 | -0.14 | -0.290 | 0.016 | -1.760 | 0.078 |
| ER difficulties—Cynicism | 9 | 0.28 | 0.195 | 0.353 | 6.460 | 0.000*** |
| Adaptive ER—Lack of efficacy | 8 | -0.12 | -0.404 | 0.185 | -0.770 | 0.441 |
| ER difficulties—Lack of efficacy | 8 | 0.17 | 0.023 | 0.303 | 2.265 | 0.024* |
| Adaptive ER—Emotional exhaustion | 10 | -0.05 | -0.159 | 0.065 | -0.837 | 0.403 |
| ER difficulties—Emotional exhaustion | 11 | 0.27 | 0.207 | 0.335 | 7.993 | 0.000*** |

CI = confidence interval; k = number of studies included in the analysis; *r* = correlation coefficient; LL = Lower Limit; UL = Upper Limit; *z* = Z-Score, *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$

**Table 3** Heterogeneity and publication bias indices

| | Heterogeneity | | | Egger's | | | |
|---|---|---|---|---|---|---|---|
| | *Q* | *p* | $I^2$ | *B* | 95% CI | | *p* |
| | | | | | LL | UL | |
| Adaptive ER—School burnout | 412.298 | **0.0**00 | 96.119 | -5.34 | -11.85 | 1.16 | 0.10 |
| ER difficulties—School burnout | 107.169 | 0.000 | 88.803 | 2.20 | -3.46 | 7.86 | 0.41 |
| Adaptive ER—Cynicism | 241.462 | 0.000 | 96.687 | -2.187 | -8.57 | 4.19 | 0.43 |
| ER difficulties—Cynicism | 66.702 | 0.000 | 88.006 | 2.092 | -12.92 | 17.10 | 0.75 |
| Adaptive ER—Lack of efficacy | 731.056 | 0.000 | 99.042 | -30.27 | -73.89 | 13.35 | 0.14 |
| ER difficulties—Lack of efficacy | 149.447 | 0.000 | 95.316 | 7.76 | -16.53 | 32.05 | 0.46 |
| Adaptive ER—Emotional exhaustion | 148.967 | 0.000 | 93.958 | 7.02 | -23.05 | 9.02 | 0.34 |
| ER difficulties—Emotional exhaustion | 60.485 | 0.000 | 83.467 | 0.33, 95 | -9.36 | 10.03 | 0.93 |

CI = confidence interval; LL = Lower Limit; UL = Upper Limit, $Q$ = Q statistic; $I^2 = I^2$ index; $B$ = between-study coefficient of variation; $^*p < 0.05$. $^{**}p < 0.01$. $^{***}p < 0.001$

### Adaptive ER and School Burnout

Upon visual examination of the funnel plot, asymmetry to the right of the mean was observed. To validate this observation, a trim-and-fill analysis using Duval and Tweedie's method was conducted, revealing the absence of three studies on the left side of the mean. The adjusted effect size ($r$ = -0.17, 95% CI [0.27; 0.68]) resulting from this analysis was found to be higher than the initially observed effect size. Nevertheless, the application of Egger's test did not yield a significant indication of publication bias ($B$ = -5.34, 95% CI [-11.85; 1.16], $p$ = 0.10).

### Adaptive ER and Cynicism

Following a visual examination of the funnel plot, a symmetrical arrangement of effect sizes around the mean was apparent. This finding was contradicted by the application of Duval and Tweedie's trim-and-fill method, which revealed two missing studies to the right of the mean. The adjusted effect size ($r$ = 0.04, 95% CI [-0.21; 0.13]) is smaller than the initially observed effect size. The application of Egger's test did not yield a significant indication of publication bias ($B$ = -2.187, 95% CI [-8.57; 4.19], $p$ = 0.43).

### ER difficulties and Lack of Efficacy

The visual examination of the funnel plot revealed asymmetry to the right of the mean. This finding was validated by the application of Duval and Tweedie's trim-and-fill method, which revealed two missing studies to the left of the mean and a

lower adjusted effect size ($r = 0.08$, 95% CI [-0.07; 0.23]), the effect becoming statistically non-significant. The application of Egger's test did not yield a significant indication of publication bias ($B = 7.76$, 95% CI [-16.53; 32.05], $p = 0.46$).

### Adaptive ER and Emotional Exhaustion

The visual examination of the funnel plot revealed asymmetry to the left of the mean. The trim-and-fill method also revealed one missing study to the right of the mean and a lower adjusted effect size ($r = 0.00$, 95% CI [-0.13; 0.12]). The application of Egger's test did not yield a significant indication of publication bias ($B = 7.02$, 95% CI [-23.05; 9.02], $p = 0.46$).

### Adaptive ER and Lack of Efficacy; ER difficulties and School Burnout, Cynicism, and Exhaustion

Upon visually assessing the funnel plot, a balanced distribution of effect sizes centered around the mean was observed. This observation is corroborated by the application of Duval and Tweedie's trim-and-fill method, which also revealed no indication of missing studies. The adjusted effect size remained consistent, and the intercept signifying publication bias was found to be statistically insignificant.

### Moderator Analysis

We performed moderator analyses for the categorical variables, in the case of significant relationships that were uncovered in the initial analysis. These analyses were carried out specifically for cases where there were more than three effect sizes available within each subgroup that fell under the same moderating variable.

Students' grade level was used as a categorical moderator. Pre-university students included students enrolled in primary and secondary education, while the university student category included tertiary education students. The results, presented in Table 4, show that the moderating effect of grade level is not significant for the relationship between adaptive ER and overall school burnout $Q(1) = 0.20$, $p = 0.66$. At a specific level, the moderating effect is significant for the relationship between ER difficulties and overall burnout $Q(1) = 9.81$, $p = 0.002$, cynicism $Q(1) = 16.27$, $p < 0.001$, lack of efficacy $Q(1) = 15.47$ ($p < 0.001$), and emotional exhaustion $Q(1) = 13.85$, $p < 0.001$. A particularity of the moderator analysis in the relationship between ER difficulties and lack of efficacy is that, once the effect of the moderator is accounted for, the relationship is not statistically significant anymore for the university level, $r = -0.01$ (95% CI = -0.132; 0.138), but significant for the pre-university level, $r = 0.33$ (95% CI = 0.217; 0.439).

### Meta-regressions

Meta-regression analyses were employed to examine how the effect size or relationship between variables changes based on continuous moderator variables. We

**Table 4** Moderator analysis of sample grade level in the relationship between ER and school burnout

| Variables | *Q(df)* | *p* | Type | k | *r* | 95% CI | |
|---|---|---|---|---|---|---|---|
| | | | | | | LL | UL |
| Adaptive ER—School burnout | 0.196(1) | 0.66 | Pre-university | 5 | 0.08 | -0.245 | 0.084 |
| | | | University | 11 | 0.13 | -0.235 | 0.017 |
| ER difficulties—School burnout | 9.813(1) | 0.002** | Pre-university | 6 | 0.34 | 0.263 | 0.408 |
| | | | University | 7 | 0.18 | 0.109 | 0.244 |
| ER difficulties—Cynicism | 16.27(1) | 0.000** | Pre-university | 4 | 0.39 | 0.46 | 0.46 |
| | | | University | 5 | 0.18 | 0.25 | 0.25 |
| ER difficulties—Lack of efficacy | 15.465(1) | 0.000*** | Pre-university | 4 | 0.33 | 0.217 | 0.439 |
| | | | University | 4 | -0.01 | -0.132 | 0.138 |
| ER difficulties—Emotional exhaustion | 13.85(1) | 0.000*** | Pre-university | 4 | 0.37 | 0.318 | 0.424 |
| | | | University | 6 | 0.24 | 0.190 | 0.283 |

*Q* = goodness of fit measure; k = number of studies included in the analysis, *r* = effect size; *LL* = Lower Limit; *UL* = Upper Limit; *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$

included as moderators the female percentage (the proportion of female participants in each study's sample) and the study quality assessed based on the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields tool (Kmet et al., 2004).

Results, presented in Table 5**,** show that study quality does not significantly influence the relationship between ER and school burnout. The proportion of female participants in the study sample significantly influences the relationship between ER difficulties and overall burnout ($\beta$, -0.0055, SE = 0.001, $p < 0.001$), as well as the emotional exhaustion dimension ($\beta$, -0.0049, SE = 0.002, $p < 0.01$). Mean age significantly influences the relationship between ER difficulties and overall burnout ($\beta$, -0.0184, SE = 0.006, $p < 0.01$). Meta-regression plots can be consulted in detail in Supplementary Material 3.

**Table 5** Meta-regression analyses for study quality, female percentage, and mean age of participants

| Variables | Moderator | k | $\beta$ | *SE* | 95% *CI* | | *p* |
|---|---|---|---|---|---|---|---|
| | | | | | *LL* | *UL* | |
| Adaptive ER—School burnout | Study quality | 16 | 0.3638 | 0.671 | -0.952 | 1.68 | 0.59 |
| | % females | 13 | -0.0012 | 0.004 | -0.010 | -0.007 | 0.79 |
| | Mean age | 13 | 0.0139 | 0.014 | -0.042 | 0.013 | 0.30 |
| ER difficulties—School burnout | Study quality | 13 | 0.8380 | 0.480 | -0.104 | 1.78 | 0.08 |
| | % females | 10 | -0.0055 | 0.001 | -0.008 | -0.003 | 0.000*** |
| | Mean age | 11 | -0.0184 | 0.006 | -0.029 | -0.007 | 0.001*** |
| ER difficulties—Emotional exhaustion | Study quality | 10 | 0.4576 | 0.437 | 0.588 | 1.610 | 0.43 |
| | % females | 10 | -0.0049 | 0.002 | -0.002 | -0.002 | 0.009*** |

k = number of studies included in the analysis, $\beta$ = regression coefficient; *SE* = Standard Error; *CI* = Confidence Interval; *LL* = Lower Limit; *UL* = Upper Limit; *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$

A post hoc power analysis was conducted using the metapower package in R. For the pooled effects analysis of the relationship between ER difficulties and overall school burnout, as well as with cynicism and emotional exhaustion, the statistical power was adequate, surpassing the recommended 0.80 cutoff. The analysis of the association between ER difficulties and lack of efficacy, along with the relationship between adaptive ER and school burnout, cynicism, lack of efficacy, and emotional exhaustion were greatly underpowered. In the case of the moderator analysis, the post-hoc power analysis indicates insufficient power. Please consult the coefficients in Table 6.

## Discussion

The central goal of this meta-analysis was to examine the relationship between emotion-regulation strategies and student burnout dimensions. Additionally, we focused on the possible effects of sample distribution, in particular on participants' age, education levels they are enrolled in, and the percentage of female participants included in the sample. The study also aimed to determine how research quality influences the overall findings. Taking into consideration the possible moderating effects of sample characteristics and research quality, the study aimed to offer a thorough assessment of the literature concerning the association between emotion regulation strategies and student burnout dimensions. A correlation approach was used as the current literature predominantly consists of cross-sectional studies, with insufficient longitudinal studies or other designs that would allow for causal interpretation of the results.

The study's main findings indicate that adaptive ER strategies are associated with overall burnout, whereas ER difficulties are associated with both overall burnout and all its dimensions encompassing emotional exhaustion, cynicism, and lack of efficacy.

Prior meta-analyses have similarly observed that adaptive ER strategies tend to exhibit modest negative associations with psychopathology, while ER difficulties generally presented more robust positive associations with psychopathology (Aldao et al., 2010; Miu et al., 2022). These findings could suggest that the observed

**Table 6** Post hoc power analysis for the pooled analyses

| | Pooled Analysis | Moderator Analysis (grade level) |
|---|---|---|
| Adaptive ER—School burnout | 0.02 | 0.68 |
| ER difficulties—School burnout | 0.78 | 0.32 |
| Adaptive ER—Cynicism | 0.02 | |
| ER difficulties—Cynicism | 0.82 | 0.42 |
| Adaptive ER—Lack of efficacy | 0.02 | |
| ER difficulties—Lack of efficacy | 0.06 | 0.40 |
| Adaptive ER—Emotional exhaustion | 0.01 | |
| ER difficulties—Emotional exhaustion | 0.92 | 0.51 |

variation in the effect of ER strategies on psychopathology, as previously indicated in the literature, can also be considered in the context of academic burnout.

However, it would be an oversimplification to conclude that adaptive ER strategies are less effective in preventing psychopathology than ER difficulties are in creating vulnerability to it. Alternatively, as previously underlined, researchers should consider the frequency, flexibility, and variability in the way ER strategies are applied and how they relate to well-being and psychopathology. Further, it's important to also address the possible directionality of the relationship. While the few studies that assume a prediction model for academic burnout and ER treat ER as a predictor for burnout and its dimensions (see Seibert et al., 2017; Vizoso et al., 2019), we were unable to identify studies that assume the role of burnout in the development of ER difficulties. Additionally, the studies identified that relate to academic burnout have a cross-sectional design that makes it even more difficult to pinpoint the ecological directionality of the relationship.

While the focus on the causal role of ER strategies in psychopathology and psychological difficulties is of great importance for psychological interventions, addressing a factor that merely reflects an effect or consequence of psychopathology will not lead to an effective solution. According to Gross (2015), emotion regulation strategies are employed when there is a discrepancy between a person's current emotional state and their desired emotional state. Consequently, individuals could be likely to also utilize emotion regulation strategies in response to academic burnout. Additionally, studies that have utilized a longitudinal approach have demonstrated that, in the case of spontaneous ER, people with a history of psychopathology attempt to regulate their emotions more when presented with negative stimuli (Campbell-Sills et al., 2006a, 2006b; Ehring et al., 2010; Gruber et al., 2012). The results of Dawel et al. (2021) further solidify a bidirectional model that could and should be also applied to academic burnout research.

Following the moderator analysis, the results indicate that the moderating effect of grade level did not have a substantial impact on the relationship between adaptive ER and school burnout. In the context of this discussion, it is important to note that regarding the relationship between adaptive ER and overall burnout, there is an imbalance in the distribution of studies between the university and pre-university levels, which could potentially present a source of bias or error.

When it comes to the relationship between ER difficulties and burnout, the inclusion of the moderator exhibited notable significance, overall and at the dimensions' level. Particularly noteworthy is the finding that, within the relationship involving ER difficulties and lack of efficacy, the inclusion of the moderator rendered the association statistically insignificant for university-level students, while maintaining significance for pre-university-level students. The outcomes consistently demonstrate larger effect sizes for the relationship between ER difficulties and burnout at the pre-university level in comparison to the university level. Additionally, the mean age significantly influences the relationship between ER difficulties and overall burnout.

These findings may imply the presence of additional variables that exert a varying influence at the two educational levels and as a function of age. There are several contextual factors that could be framing the current findings, such as parental education anxiety (Wu et al., 2022), parenting behaviors, classroom atmosphere (Lin

& Yang, 2021), and self-efficacy (Naderi et al., 2018). As the level of independence drastically increases from pre-university to university, the influence of negative parental behaviors and attitudes can become limited. Furthermore, the university-level learning environment often provides a satisfying and challenging educational experience, with greater opportunities for students to engage in decision-making and take an active role in their learning (Belaineh, 2017), which can serve as a protective factor against student's academic burnout (Grech, 2021). At an individual level, many years of experience in navigating the educational environment can increase youths' self-efficacy in the educational context and offer proper learning tools and techniques, which can further influence various aspects of self-regulated learning, such as monitoring of working time and task persistence (Bouffard-Bouchard et al., 1991; Cattelino et al., 2019).

The findings of the meta-regression analysis suggest that the association between ER and school burnout is not significantly impacted by study quality. It's important to interpret these findings in the context of rather homogenous study quality ratings that can limit the detection of significant impacts.

The current results underline that the correlation between ER difficulties and both overall burnout and the emotional exhaustion dimension is significantly influenced by the percentage of female participants in the study sample. Previous research has shown that girls experience higher levels of stress, as well as higher expectations concerning their school performance, which can originate not only intrinsically, but also from external sources such as parents, peers, and educators (Östberg et al., 2015). These heightened expectations and stress levels may contribute to the gender differences in how emotion regulation difficulties are associated with school burnout.

The results of this meta-analysis suggest that most of the included studies present an increased level of methodological quality, reaching or surpassing the quality thresholds previously established. These encouraging results indicate a minimal risk of bias in the selected research. Moreover, it's notable that a sizable proportion of the included studies clearly articulate their research objectives and employ well-established measurement tools, that would accurately capture the constructs of interest. There are still several areas of improvement, especially with regard to variable conceptualization and sampling methods, highlighting the importance of maintaining methodological rigor in this area of research.

Significant $Q$ tests and $I^2$ identified in the case of several analyses indicate a strong heterogeneity among the effect sizes of individual studies in the meta-analysis's findings. This variability suggests that there is a significant level of diversity and variation among the effects observed in the studies, and it is improbable that this diversity is solely attributable to random chance. Even with as few as 10 studies, with 30 participants in the primary studies, the Q test has been demonstrated to have good power for identifying heterogeneity (Maeda & Harwell, 2016). Recent research (Mickenautsch et al., 2024), suggests that the $I^2$ statistic is not influenced by the number of studies and sample sizes included in a meta-analysis. While the relationships between Adaptive ER—cynicism, ER difficulties—cynicism, Adaptive ER—lack of efficacy, and ER difficulties—lack of efficacy are based on a limited number of studies (8–9 studies), it's noteworthy that the primary study sample sizes for these

relationships are relatively large, averaging above 300. This suggests that despite the small number of studies, the robustness of the findings may be supported by the substantial sample sizes, which can contribute to the statistical power of the analysis.

However, it's essential to consider potential limitations such as range restriction or measurement error, which could impact the validity of the findings. Despite these considerations, the combination of substantial primary study sample sizes and the robustness of the Q test provides a basis for confidence in the results.

The results obtained when publication bias was examined using funnel plots, trim-and-fill analyses, and Egger's tests were varying across different outcomes. In the case of adaptive emotion regulation (ER) and school burnout, no evidence of publication bias was found, suggesting that the observed effects are likely robust. The trim-and-fill analysis, however, indicated the existence of missing studies for adaptive ER and cynicism, potentially influencing the initial effect size estimate. For ER difficulties and lack of efficacy, the adjustment for missing studies in the trim-and-fill analysis led to a non-significant effect. Additionally, adaptive ER and emotional exhaustion displayed a similar pattern with the trim-and-fill method leading to a lower, non-significant effect size. This indicates the need for additional studies to be included in future meta-analyses. According to the Cochrane Handbook (Higgins et al., 2011), the results of Egger's test and funnel plot asymmetry should be interpreted with caution, when conducted on fewer than 10 studies.

The results of the post-hoc power analysis reveal that the relationship between ER difficulties and cynicism, as well as emotional exhaustion, meets the threshold of 0.80 for statistical power, as suggested by Harrer et al. (2022). This implies that our study had a high likelihood of detecting significant associations between ER difficulties and these specific outcomes, providing robust evidence for the observed relationships. However, for the relationship between ER difficulties and overall burnout, the power coefficient falls just below the indicated threshold. While our study still demonstrated considerable power to detect effects, the slightly lower coefficient suggests a marginally reduced probability of detecting significant associations between ER difficulties and overall burnout.

The power coefficients for the remaining post-hoc analyses are fairly small, which suggests that there is not enough statistical power to find meaningful relationships. This shows that there might not have been enough power in our investigation to find significant correlations between the variables we sought to investigate. Even if these analyses' power coefficients are lower than ideal, it's important to consider the study's limitations and implications when interpreting the results.

## Limitations and Future Directions

One important limitation of our meta-analysis is represented by the small number of studies included in the analysis. Smaller meta-analyses could result in less reliable findings, with estimates that could be significantly influenced by outliers and inclusion of studies with extreme results. The small number of studies also interferes with the interpretation of both $Q$ and $I^2$ heterogeneity indices (von Hippel, 2015). In small sample

sizes, it may be challenging to detect true heterogeneity, and the $I^2$ value may be imprecise or underestimate the actual heterogeneity.

The studies included in the current meta-analysis focused on investigating how individuals generally respond to stressors. However, it's crucial to remember that people commonly use various ER strategies based on particular contexts, or they could even combine ER strategies within a single context. This adaptability in ER strategies reflects the dynamic and context-dependent nature of emotional regulation, where people draw upon various tools and approaches to effectively manage their emotions in different circumstances.

Given the heterogeneity of studies that investigate ER as a context-dependent phenomenon in the context of academic burnout, as well as the diverse nature of these existing studies, it becomes imperative for future research to consider a number of key aspects. First and foremost, future studies should aim to expand the body of literature on this topic by conducting more research specifically focusing on the context-dependent and flexible nature of ER in the context of academic burnout and other psychopathologies. Taking into account the diversity of educational environments, curricula, and student demographics, these research initiatives should also include a wide range of academic contexts.

Furthermore, it is advisable for researchers to implement a uniform methodology for assessing and documenting ER strategies. This consistency in measurement will simplify the process of comparing results among different studies, bolster the reliability of the data, and pave the way for more extensive and comprehensive meta-analyses.

Insufficient research that delves into the connection between burnout and particular emotional regulation (ER) strategies, such as reappraisal or suppression, has made it unfeasible to conduct a meaningful analysis within the scope of the current meta-analysis, that could further bring specificity as to which ER strategies could influence or be affected in the context of academic burnout. Consequentially, the expansion of the inclusion criteria for future meta-analyses should be considered, along with the replication of the current meta-analysis in the context of future publications on this topic.

Future interventions aimed at addressing academic burnout should adopt a tailored approach that takes into consideration age or school-level influences, as well as gender differences. Implementing prevention programs in pre-university educational settings can play a pivotal role in equipping children and adolescents with vital emotion regulation skills and stress management strategies. Additionally, it is essential to provide additional support to girls, recognizing their unique stressors and increased academic expectations.

## Implications

Our meta-analysis has several implications, both theoretical and practical. Firstly, the meta-analysis extends the understanding of the relationship between emotion regulation (ER) strategies and student burnout dimensions. Although the correlational and cross-sectional nature of the included studies does not allow for drawing causal implications, the results represent a great stepping stone for future research. Secondly, the results highlight the intricacy of ER strategies and their applicability

in educational contexts. Along with the identified differences between preuniversity and university students, this emphasizes the importance of developmental and contextual factors in ER research and the necessity of having an elaborate understanding of the ways in which these strategies are used in various situations and according to individual particularities. The significant impact of the percentage of female participants on the relationship between ER strategies and academic burnout points to the need for gender-sensitive approaches in ER research. On a practical level, our results suggest the need for targeted interventions aimed at the specific needs of different educational levels and age groups, as well as gender-specific strategies to address ER difficulties.

## Conclusion

In conclusion, the findings of the current meta-analysis reveal that adaptive ER strategies are associated with overall burnout, while ER difficulties are linked to both overall burnout and its constituent dimensions, including emotional exhaustion, cynicism, and lack of efficacy. These results align with prior research in the domain of psychopathology, suggesting that adaptive ER strategies may be more efficient in preventing psychopathology than ER difficulties are in creating vulnerability to it, or that academic burnout negatively influences the use of adaptive ER strategies in the youth population. As an alternative explanation, it might also be that the association between ER strategies, well-being, and burnout can vary based on the context, frequency, flexibility, and variability of their application. Furthermore, our study identified the moderating role of grade level and the sample's gender composition in shaping these associations. The academic environment, parental influences, and self-efficacy may contribute to the observed differences between pre-university and university levels and age differences.

Despite some methodological limitations, the current meta-analysis underscores the need for context-dependent ER research and consistent measurement approaches in future investigations of academic burnout and psychopathology. The heterogeneity among studies may suggest variability in the relationship between emotion regulation and student burnout across different contexts. This variability could be explained through methodological differences, assessment methods, and other contextual factors that were not uniformly accounted for in the included studies. The included studies do not provide insights into changes over time as most studies were cross-sectional. Future research should aim to better understand the underlying reasons for the observed differences and to reach more conclusive insights through longitudinal research designs.

Overall, this meta-analysis contributes to a deeper understanding of the intricate relationship between ER strategies and student burnout and serves as a good reference point for future research within the academic burnout field.

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**Data Availability** The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Declarations

**Competing Interests** The authors declare that they have no known competing financial interests or personal relationships that influence the work reported in this paper.

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