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Measuring Academic Buoyancy Across Educational Contexts: A Systematic Review of Psychometric Evidence, Measurement Invariance, and Validity

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ABSTRACT

Academic buoyancy reflects a student's ability to navigate everyday academic setbacks. To measure this construct accurately across diverse educational and socio-cultural settings, psychometrically robust instruments are essential. This study systematic reviewed the psychometric properties and structural validity of academic buoyancy measurement, focusing on measurement invariance, convergent validity with external constructs, and socio-cultural adaptability. Following PRISMA guidelines, a systematic literature search was conducted across Scopus and Web of Science databases, identifying 12 eligible empirical studies. Data were extracted and synthesized based on measurement focus, invariant properties, motivational and academic correlates, and cross-cultural application. Synthesis revealed three core themes: First, measurement invariance testing remains underrepresented, with only two studies evaluating the equivalence of the Academic Buoyancy Scale (ABS) across gender and cultural groups. Second, academic buoyancy consistently correlated positively with adaptive constructs including grit, motivation, future time perspective, engagement, and achievement, while serving a protective function against academic anxiety and burn-out. Third, while studies span diverse geographic and educational contexts, contextual breadth failed to guarantee cross-cultural measurement equivalence. Furthermore, findings emphasize the critical necessity of conceptually and psychometrically distinguishing academic buoyancy from academic resilience. Future research must prioritize robust invariance testing, expand validity evidence, and ensure contextual adaptation to safeguard accurate interpretation and responsible application in educational research.

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1. INTRODUCTION

Academic buoyancy is the ability of students to face and overcome everyday academic difficulties, such as receiving unsatisfactory grades, tackling challenging

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assignments, experiencing academic pressure, and dealing with negative feedback (Collie et al., 2015; Datu & Yuen, 2018; Yun et al., 2018). Unlike the concept of academic resilience, which generally relates to the ability to cope with adversity or more severe academic circumstances, academic buoyancy emphasizes how learners respond to the routine challenges that arise during the learning process (Karimova & Tu, 2026; Liu, 2025; Martin & Marsh, 2008; Putwain et al., 2012). This construct is important in educational psychology because it helps explain how learners maintain engagement, adapt to academic demands, and persist in their efforts when facing learning obstacles (Martin et al., 2010; Martin et al., 2013). Previous research has examined the relationship between academic buoyancy and various aspects of academic and psychological experiences, including motivation, learning engagement, self-belief, and the ability to cope with academic pressure (Akbaba Eser et al., 2026; Collie et al., 2015). Thus, an understanding of academic buoyancy is relevant to the development of learning theories and the design of educational support tailored to learners' needs.

As research on academic buoyancy advances, the measurement of this construct has become an important aspect requiring attention (Collie et al., 2015; Datu & Yuen, 2018; Martin & Marsh, 2009). Conclusions regarding the level of academic buoyancy depend heavily on the accuracy with which the instrument represents the construct being measured (Martin, 2014). One instrument recognized in the literature is the Academic Buoyancy Scale (ABS), developed by Martin and Marsh to measure students' ability to cope with everyday academic setbacks and challenges (Datu & Yuen, 2018; Putwain & Daly, 2013). The use of this instrument in various studies enables researchers to examine the relationship between academic buoyancy and individual characteristics, learning experiences, and academic outcomes. However, the use of the same instrument does not automatically guarantee that measurement results hold equivalent meaning across different populations. Differences in language, participant characteristics, educational levels, and socio-cultural environments may necessitate instrument adaptation and further psychometric testing. Therefore, research on the measurement of academic buoyancy must consider not only the instrument employed but also the evidence supporting its validity, reliability, and the accuracy of score interpretations.

This need becomes increasingly important when academic buoyancy is studied within diverse sociocultural environments (Flett et al., 2014; Martin et al., 2017; Selvi et al., 2026). Students' experiences in facing academic challenges can be linked to values fostered within the family and society, expectations regarding educational success, patterns of interaction between teachers and students, and the characteristics of the education system (Al-Tameemi et al., 2023; Fong & Kim, 2021). Socio-economic factors, including access to learning resources and family support, can also be linked to the resources available to learners when facing academic difficulties (Lei et al., 2021). Furthermore, differences in learning experiences and environments may be related to how learners understand and respond to academic demands (Azadianbojnordi et al., 2022; Rusticus et al., 2023). This context provides a basis for examining academic buoyancy more broadly than merely as an individual characteristic, particularly when

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research seeks to compare measurements across different groups or countries (Colmar et al., 2019).

Although socio-cultural contexts can be related to academic experiences, differences in context do not necessarily indicate that the measurement instrument is biased (Colmar et al., 2019; Yun et al., 2018). A more fundamental issue is whether the instrument adequately measures the same construct across the groups being compared and whether the resulting scores can be interpreted equivalently (Martin & Marsh, 2009). For instance, research finding differences in academic buoyancy scores between male and female students or between two countries does not in itself prove that these differences reflect actual differences in the construct (Hirvonen et al., 2020; Hirvonen et al., 2019). That interpretation needs to take into account the quality of the instrument, the characteristics of the sample, and the available psychometric evidence (Collie, et al., 2017). In this context, measurement invariance is a crucial concept for evaluating whether the measurement structure and relevant parameters exhibit an adequate level of equivalence across groups. Such testing helps determine whether score comparisons can be meaningfully made, based on the level of invariance supported by the data.

To accurately understand the issue, it is necessary to distinguish between the core construct, variables related to the construct, group characteristics, instruments, and statistical indicators. In this review, academic buoyancy is the core construct serving as the focus of the study. Motivation, learning engagement, grit, social support, and other psychological factors are treated as related variables, the roles of which depend on the theoretical framework and design of each study (Hoferichter et al., 2021). These variables can function as predictors, correlates, mediators, or moderators, provided that such relationships are explicitly formulated and tested in primary research (Aydın & Michou, 2020). Academic buoyancy conditions vary in each country (Bakhshaee et al., 2017). Meanwhile, gender, country, level of education, and socioeconomic characteristics can be used to describe the study population or context and serve as a basis for group comparisons, provided the research design supports this (Voncova et al., 2026). Validity, reliability, factor structure, and measurement invariance are aspects of psychometric evidence used to evaluate the quality of an instrument and the comparability of measurement results (Collie et al., 2017).

This distinction is also needed in reading the results of psychometric analysis. The Academic Buoyancy Scale is a measurement instrument, while the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) are statistical indices for evaluating model suitability (Hirvonen et al., 2020). In confirmatory factor analysis and measurement invariance testing, these indices serve as part of the model evaluation process, contingent upon the chosen analytical method. The terms "constrained" and "unconstrained" refer to model specifications involving specific parameter restrictions or the absence thereof rather than the type of measurement instrument itself. Consequently, CFI and RMSEA cannot appropriately be categorized as tools for measuring academic buoyancy. In a systematic review, they should instead be classified under psychometric evidence or model fit evaluation to maintain a clear distinction between the instrument and the statistical procedure. Accurate categorization

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is essential to avoid conceptual errors and to produce a synthesis that is both comprehensible and replicable by other researchers.

The literature on academic buoyancy has expanded to encompass a wide range of learner characteristics, learning environments, and educational contexts. However, mapping publication characteristics such as year of publication, country, educational level, and research methods is insufficient to comprehensively explain the evolution of measurement quality for this construct. Descriptive information needs to be linked to analyses of the instruments employed, the reported dimensions or factor structures, evidence of validity and reliability, and the use of invariance testing in studies comparing groups. Similarly, identifying sociocultural factors must be accompanied by an explanation of how these factors are considered during instrument development, data analysis, or score interpretation. Without such a synthesis, mapping literature risks becoming a mere inventory of publications rather than yielding a deeper understanding of the relationship between research context and measurement quality.

Given this context, the need for a systematic literature review lies in the effort to integrate information scattered across prior research into a more structured analytical framework. Such a review must distinguish between studies that employ instruments to measure academic buoyancy, those that examine the psychometric properties of these instruments, and those that evaluate measurement comparability across groups. This distinction enables researchers to identify the types of evidence already available, measurement aspects that remain under-reported, and sociocultural contexts that are insufficiently represented. However, the extent to which such gaps exist must be determined through the search and analysis of articles meeting the selection criteria, rather than being assumed at the outset.

Based on these considerations, this study conducts a systematic literature review (SLR) of articles regarding the measurement of academic buoyancy, sourced from the Scopus and Web of Science databases. The review aims to map research characteristics, identify the measurement instruments employed, synthesize reported psychometric evidence, and analyze how group characteristics and sociocultural contexts are considered in the research. Furthermore, the study seeks to identify evidence gaps and opportunities for future research, particularly concerning the development, evaluation, and use of academic buoyancy instruments across diverse populations.

The expected contribution of this study extends beyond a mere descriptive profile of publications to include a structured synthesis linking instruments, evidence of psychometric quality, sample characteristics, and sociocultural contexts. Through this synthesis, the study aims to construct a conceptual map illustrating how the measurement of academic buoyancy has been researched and evaluated within the analyzed literature. This map is expected to reveal the relationships between instrument usage and the types of available psychometric evidence, while also helping to identify areas requiring further research. The novelty and substantive contribution of this map must be demonstrated through the findings of the systematic literature review (SLR) and explicit comparisons with relevant prior literature reviews. To ensure alignment among

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the objectives, methods, and analysis results, this study is guided by the following four research questions.

1. What are the characteristics of publications and research designs regarding the measurement of academic buoyancy, in terms of publication year, country, educational level, participant characteristics, and research methods?
2. What instruments are used to measure academic buoyancy, and how is psychometric evidence regarding validity, reliability, factor structure, and measurement invariance reported in the analyzed studies?
3. How are group characteristics and the sociocultural context including country, gender, educational level, and socioeconomic factors considered in the use, evaluation, and interpretation of the academic buoyancy instrument?
4. What is the evidence gaps and opportunities for future research regarding the measurement of academic buoyancy, particularly concerning psychometric quality, the comparability of measurement results across groups, and socio-cultural contextual relevance?

2. METHOD

This study employs a Systematic Literature Review (SLR) method to identify, select, and synthesize findings from prior research on the measurement of academic buoyancy within an educational context. The review focuses on the characteristics of academic buoyancy measurement instruments, the psychometric evidence reported in previous studies, and considerations regarding demographic, social, and cultural factors in the measurement and interpretation of the construct (Nicmanis, 2024). The review process was conducted systematically through several stages: literature search, application of inclusion and exclusion criteria, screening based on titles and abstracts, assessment of article eligibility, and content analysis of articles meeting the research criteria. The databases used were Scopus and Web of Science. All selection stages were documented in a flowchart to provide a transparent overview of the article identification and selection process. The reporting of the selection process is prepared with reference to the principles of transparency in Systematic Literature Review reporting and, where consistent with the procedures implemented, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

A systematic literature search was conducted using the Scopus and Web of Science databases to identify research addressing academic buoyancy within an educational context. The search strategy was developed using keywords related to the core construct, the educational context, and measurement aspects relevant to the research question. Boolean operators are used to combine keywords. The OR operator connects alternative terms within the same concept group, whereas the AND operator connects different concept groups. Parentheses are necessary to clarify the logical relationships between keywords and reduce the likelihood of retrieving irrelevant articles.

The construct of academic buoyancy is distinguished from related constructs such as resilience, engagement, and motivation. These terms are not treated as fully equivalent synonyms, as each may possess distinct definitions and theoretical functions. Terms

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related to the educational context and measurement are employed in accordance with the search strategies applied to each respective database.

The keywords used in the search were grouped according to core concepts, related terms, and research context, as presented in Table 1. The specific keyword combinations applied to each database must be fully reported in Table 2 to ensure the search process can be replicated by other researchers.

Table 1. Research Keyword Groups

Main Search Items	Keywords
Core construct	Academic buoyancy
Related constructs, if used in a search	Resilience, resiliency, engagement, motivation
Educational context, if used in a search	School, secondary school, higher education
Measurement aspect, if used in a search	Measurement, assessment, instrument, psychometric, validity, reliability

Source: (Linnenluecke et al., 2020)

Synonyms chosen for the main search term "Academic Buoyancy" are "buoyancy" and "academic". In addition to the term academic buoyancy, its three components, buoyancy, academic, and resiliency are also integrated into the search string. This is especially important referring to the seventh research question. Other related terms as academic difficulties are not considered, since existing studies focus exclusively on the concept of academic buoyancy. To determine the context of the study of interest, the item "school" has been added to the search string. The term high school was chosen to concretize this item. The main target group of this study is represented by students at various levels of education ranging from secondary education to higher education. In Table 2, the basic search string is divided by synonyms of the search term "Academic Buoyancy" to describe the various underlying search actions.

Table 2. Used Commands and Combinations of Search Items

Database	Combinations of Search Items
Scopus	[TITLE-ABS-KEY ("academic buoyancy" OR (academic AND (buoyancy OR resilience OR resiliency OR engagement OR motivation)) AND TITLE-ABS-KEY (school OR "secondary school" OR "higher education") AND TITLE-ABS-KEY (measurement OR assessment OR instrument OR psychometric OR validity OR reliability)]
Web of Science	TS= ("academic buoyancy" OR (academic AND (buoyancy OR resilience OR resiliency OR engagement OR motivation)) AND TS= (school OR "secondary school" OR "higher education") AND TS= (measurement OR assessment OR instrument OR psychometric OR validity OR reliability)

Source: (Linnenluecke et al., 2020)

Search syntax is recorded separately for each database because search formats and features may differ. Information regarding the search date, publication year range, and applied filters must also be included, reflecting the actual conduct of the research.

Inclusion and exclusion criteria were established to determine the suitability of articles regarding the research objectives and questions. These criteria encompassed publication year, language, database, research focus, publication type, and the article's relevance to the measurement of academic buoyancy. Articles were included in the

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selection process if they met the following criteria: (1) published in English; (2) published between 2017 and 2022; (3) indexed in Scopus or Web of Science according to the applied search procedures; (4) addressed academic buoyancy within an educational context; and (5) presented information relevant to the research questions, particularly regarding measurement instruments, psychometric evidence, or demographic and sociocultural factors related to the measurement of academic buoyancy.

Articles were excluded if they fell outside the specified publication year range or language criteria, were duplicates, belonged to publication types excluded under the research protocol, or did not address academic buoyancy substantively in alignment with the study's objectives. Articles that merely discussed related constructs without providing information relevant to the research questions were also omitted from the final synthesis. These criteria were applied in stages screening titles, abstracts, and full texts as required for the eligibility assessment. The availability of the full text was recorded separately from the article's scientific relevance. If an article's full text could not be obtained, this circumstance was documented transparently and was not automatically interpreted as evidence that the article lacked substantive relevance. The entire selection process is illustrated in the following flowchart.

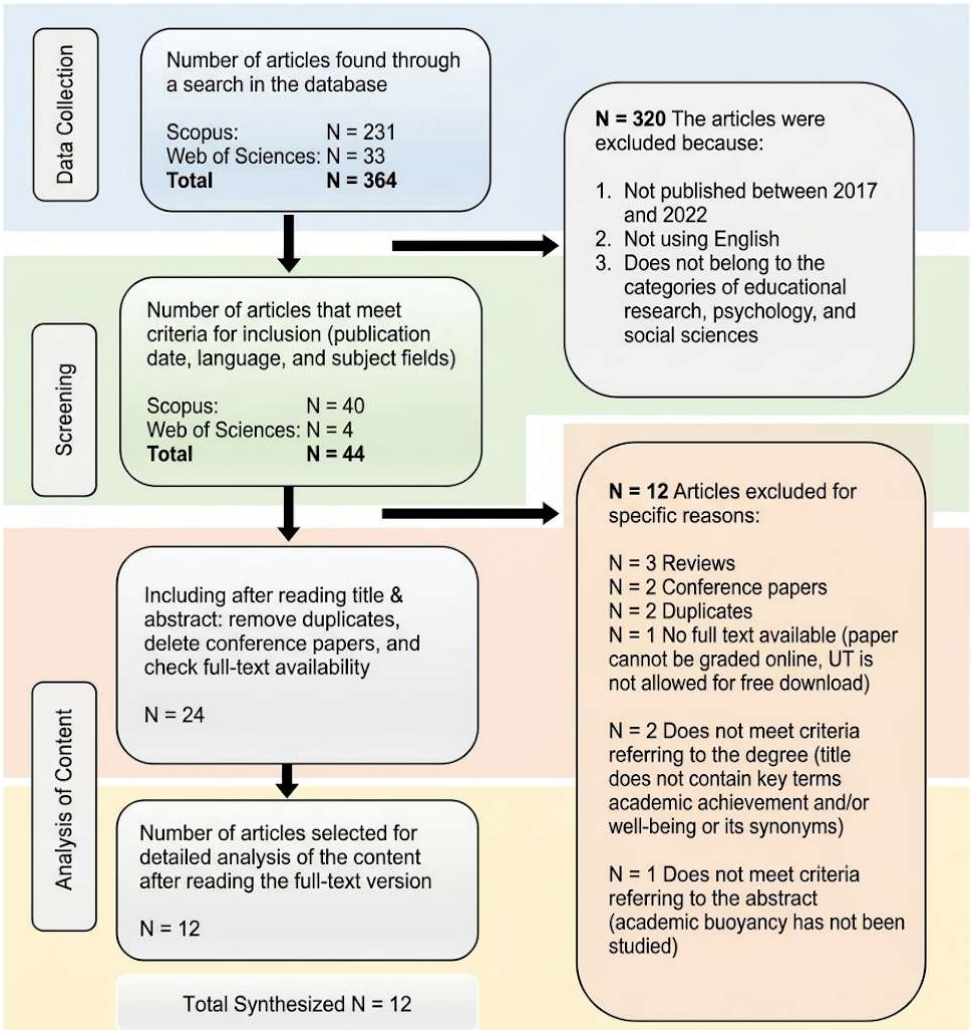


Figure 1. Study Selection Flowchart

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The article selection process was conducted systematically in stages, beginning with the identification of relevant literature through the Scopus and Web of Science databases, followed by preliminary screening, title and abstract evaluation, and full-text eligibility assessments. The initial database search yielded 364 article records. Applying the initial screening criteria reduced the collection to 44 articles, which were subsequently evaluated based on their titles and abstracts to select 29 articles for further examination. A subsequent screening step further narrowed the selection to 24 articles, which proceeded to the advanced eligibility assessment stage.

During the advanced eligibility phase, articles were rigorously evaluated based on the alignment of research focus, publication type, duplication, and explicit inclusion and exclusion criteria, with specific reasons recorded for every excluded article. The detailed distribution of records and exclusion metrics at each stage are illustrated in the study selection flowchart. Upon completing all selection stages, 12 articles met all predefined criteria and were included in the final synthesis. These 12 foundational articles provided the empirical basis for identifying research characteristics, academic buoyancy measurement instruments, reported psychometric evidence, and the integration of demographic and sociocultural factors across the reviewed literature.

Data from the 12 selected articles were extracted and analyzed using structured descriptive and content analysis approaches aligned with the core research questions and objectives. Information from each study was systematically recorded in a standardized data extraction matrix to facilitate cross-publication comparison. The extraction framework captured eight key categories: (1) publication details (authors and year); (2) research context (country and educational level); (3) sample characteristics and participant size; (4) research designs and methods; (5) academic buoyancy measurement instruments and dimensions; (6) reported psychometric evidence (validity, reliability, factor structure, and measurement invariance); (7) demographic, social, and cultural factors; and (8) key findings alongside study limitations relevant to the research questions.

Descriptive analysis was employed to outline publication profiles, contexts, methodologies, and measurement tools, whereas content analysis identified patterns, convergence, divergence, and sociocultural considerations across studies. Synthetically, conceptual distinctions were established between the primary construct (academic buoyancy), related constructs (e.g., engagement, motivation, social support), contextual factors (e.g., country, gender, socioeconomic status), and statistical indicators. Statistical parameters such as the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) were evaluated strictly as model fit indices rather than measurement tools. Furthermore, psychometric evidence was extracted strictly from explicitly reported data, where omitted parameters were classified as unavailable rather than as evidence of psychometric deficiency. The synthesized findings establish the evolutionary trajectory of academic buoyancy measurement, evaluate available psychometric properties, examine contextual nuances, and identify critical research gaps to guide future scholarship.

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3. RESULTS AND DISCUSSION

Results

Publication Characteristics

The systematic content analysis of the 12 selected articles was executed to rigorously address the predefined research questions, following a structured study selection process that systematically segregated eligible records based on explicit inclusion and exclusion criteria. Analysis of the finalized corpus reveals that scholarly literature on academic buoyancy is distributed across nine peer-reviewed journals spanning the disciplines of education, educational psychology, human development, and higher education. Based on the 2021 quartile classifications and SCImago Journal Rank (SJR) metrics documented in the source literature, these publications are situated across the Q1, Q2, and Q3 quartiles. This bibliographic distribution reflects both the multidisciplinary interest in academic buoyancy and its growing conceptual integration within mainstream educational and psychological research frameworks.

Table 3. Characteristics of articles used as literature references

Journal Name	Best Quartile	Rank SJR 2021	Publisher	Frequency
European Journal of Educational Research	Q3	0,31	Eurasian Society of Educational Research	1
Current Psychology	Q2	0,51	Springer New York	2
Journal of Applied Research in Higher Education	Q3	0,32	Emerald Group Publishing Ltd.	1
Learning and Individual Differences	Q1	1,55	Elsevier BV	2
Journal of Further and Higher Education	Q1	0,79	Routledge	1
Educational Studies	Q2	0,53	Routledge	1
Educational Psychology	Q1	1,08	Routledge	1
Studies in Higher Education	Q1	1,57	Routledge	1
International Journal of Behavioral Development	Q1	1	SAGE Publications Ltd	2

Source: data analysis

Regarding journal quality indicators, seven articles originated from Q1-ranked journals, three from Q2, and two from Q3 publications. *Learning and Individual Differences*, *Current Psychology*, and the *International Journal of Behavioral Development* were the most prominent venues, each contributing two articles, whereas *Studies in Higher Education* recorded the highest SCImago Journal Rank (SJR) index at 1.57. Although this journal distribution highlights the widespread scholarly interest and high impact of academic buoyancy research across reputable peer-reviewed outlets, high quartile rankings and SJR metrics do not intrinsically guarantee the psychometric rigor or methodological validity of the individual empirical studies.

The final sample of selected articles, published between 2017 and 2021, exhibited diverse research designs encompassing quantitative, qualitative, mixed-methods, and advanced psychometric approaches. Notably, specialized psychometric methodologies were applied to validate the interpretation and utility of the Academic Buoyancy Scale

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(ABS), alongside qualitative investigations designed to delineate the conceptual boundaries between academic buoyancy and resilience. Geographically, the reviewed studies reflect a broad international footprint across various national contexts and educational settings, as comprehensively summarized in the geographical distribution table below.

Country Characteristics and Levels of Education

Table 4. Distribution of Research Locations on Academic Buoyancy

Countries	Researcher	Frequency	Frequency
Egypt	(Khalaf & Abulela, 2021)	1	1
USA	(Fong & Kim, 2021; Skinner et al., 2020)	2	2
Iran	(Jahedizadeh et al., 2019)	1	1
England	(Putwain et al., 2020)	1	1
Philippine	(Datu & Yang, 2021)	1	1
Southwestern United States	(Thomas & Allen, 2021)	1	1
Tallinn	(Vinter, 2021)	1	1
Australia	(Colmar et al., 2019; Martin & Marsh, 2020)	2	2
United Kingdom	(Breslin, 2021)	1	1
Finland	(Hirvonen et al., 2019)	1	1

Source: data analysis

The extracted data demonstrate that empirical research on academic buoyancy spans diverse educational contexts and geographical locations, with the United States and Australia contributing two studies each, alongside single-study representations from other regions; notably, these spatial classifications reflect a mix of national, regional, sub-national, and municipal units—such as the Southwestern United States, the overlapping designations of England and the United Kingdom, and the municipal context of Tallinn. Across these geographical settings, literature encompasses three distinct academic levels, including lower secondary, upper secondary, and higher education. Within higher education settings, studies explicitly examine both STEM (Science, Technology, Engineering, and Mathematics) and non-STEM disciplines, illustrating that academic buoyancy research transcends specific institutional tiers and student cohorts, as graphically mapped in the global distribution layout below.

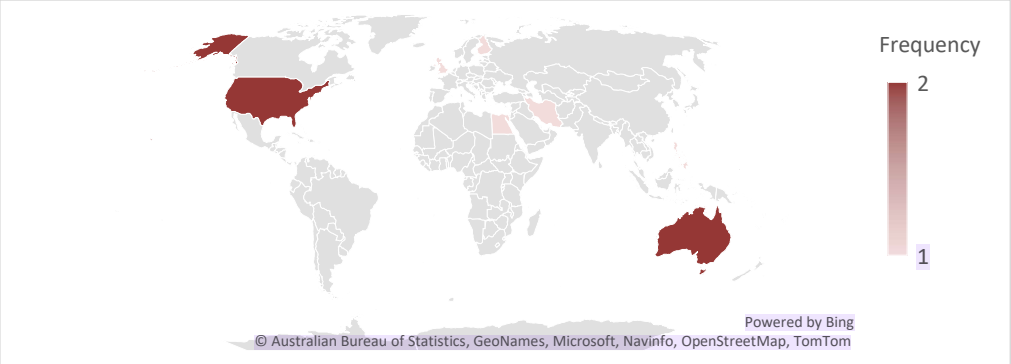


Figure 2. Illustration of a Country conducting Academic Buoyancy Research

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Measurement Instruments and Psychometric Evidence of Academic Buoyancy

The mapping of instruments in the initial draft indicates that the Academic Buoyancy Scale (ABS), developed by Martin and Marsh, is the most frequently cited instrument. Eleven articles report using this instrument, while one article discusses measurement evaluation using CFI and RMSEA indicators. However, CFI and RMSEA are not measurement instruments but rather statistical indices for evaluating model fit. Therefore, they should be classified under psychometric evidence rather than measurement tools.

Table 5. Mapping Psychometric Instruments and Indicators

Category	Information recorded in the manuscript	Interpretation
Measurement instrument	Academic Buoyancy Scale (ABS), developed by Martin and Marsh	The primary instrument used in most of the selected articles
Model fit evaluation	Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA)	Statistical indicators for assessing model fit, not measurement instruments.
Measurement invariance	This is discussed in the studies by Khalaf and Abulela (2021) and Jahedizadeh et al. (2019) regarding the mapping of research objectives	Indicates attention to measurement invariance; detailed test results should be examined in the original article.
Validity based on relationships with other variables	Disebut dalam pembahasan Khalaf dan Abulela (2021)	Regarding the evaluation of validity evidence through construct relationships with other variables.

Source: Data Analysis

This mapping reveals that the use of the ABS constitutes a major part of the literature reviewed. Beyond the use of the instrument itself, several studies focus on psychometric evaluation specifically measurement invariance and validity evidence based on relationships with other variables. Khalaf and Abulela (2021), for instance, are cited in the initial manuscript as a study examining the measurement invariance of the ABS for cross-cultural and gender comparisons.

In the context of measurement, testing for invariance is crucial because score differences between groups do not necessarily reflect actual differences in the underlying construct if the instrument does not measure that construct comparably across those groups. Therefore, research concerning the use of the ABS across different populations or cultural contexts needs to be distinguished from research that directly tests for measurement equivalence between groups.

Research Objectives and Factors Related to Academic Buoyancy

An analysis of the research objectives reveals several study orientations. Some studies focus on evaluating measurement invariance, while others examine the

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relationship of academic buoyancy with academic and psychological variables, its protective role regarding academi

Table 6. Categorization of Research Objectives in Selected Articles

No.	Research target group	Included articles	Number of articles
1	Testing the measurement invariance of the Academic Buoyancy Scale	Jahedizadeh et al. (2019); Khalaf dan Abulela (2021)	2
2	Examining the relationship between academic buoyancy and other variables, including grit, motivation, future time perspective, academic engagement, academic performance, and academic difficulties.	Colmar et al. (2019); Datu dan Yang (2021); Fong dan Kim (2021); Martin dan Marsh (2020); Thomas dan Allen (2021); Vinter (2021)	6
3	Examining the protective role of academic buoyancy in academic achievement.	Putwain et al. (2020)	1
4	Distinguishing academic buoyancy from resilience	Breslin (2021); Skinner et al. (2020)	2
5	Specific objectives have not yet been mapped separately in the initial objectives table.	Hirvonen et al. (2019)	1

Source: Data Analysis

Based on this thematic taxonomy, the structural relationship between academic buoyancy and related psychological or educational variables represents the primary research stream, addressed by six studies examining constructs such as grit, motivation, Future Time Perspective (both Valence and Connectedness), academic engagement, academic performance, and academic adversity. Another prominent research focus addresses measurement invariance testing for the Academic Buoyancy Scale (ABS)—a crucial psychometric prerequisite for valid cross-group comparisons—as exemplified by Khalaf and Abulela (2021) across cultural (Egypt and Oman) and gender groupings, underscoring the necessity of evaluating cultural and demographic equivalence against empirical fit indices. Complementing these measurement-focused inquiries, Putwain et al. (2020) demonstrated the protective role of academic buoyancy in preserving academic achievement under stress, while Breslin (2021) and Skinner et al. (2020) focused on delineating the conceptual and operational boundaries between academic buoyancy and resilience to prevent construct contamination and ensure precise measurement in future scholarship.

Sociocultural Context and Research Gap

Synthesis of the mapped literature indicates that sociocultural contexts primarily manifest through geographical variations, gender demographics, educational tiers, and target cohorts evaluated during measurement invariance testing. While cross-cultural and cross-demographic investigations emphasize the imperative of ensuring structural equivalence when administering instruments across heterogeneous populations, the execution of research across diverse settings does not inherently imply that score comparability has been empirically validated through rigorous psychometric testing.

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Furthermore, existing literature highlights critical avenues for future inquiry, including the validation of academic buoyancy measures across broader demographic matrices, cross-setting comparative designs, and the examination of pre-tertiary achievement indicators. Future scholarship must also delineate the protective mechanisms of academic buoyancy by identifying underlying sources of academic adversity and uncovering potential mediating pathways that Link buoyancy to subsequent academic success.

Based on these findings, three pivotal directions are established for future research. First, scholars must provide comprehensive and transparent reporting of psychometric evidence—such as construct validity, internal consistency, and structural stability—to facilitate rigorous, evidence-based evaluations of measurement quality. Second, empirical inquiries must explicitly distinguish true psychometric measurement equivalence across demographic and cultural cohorts from the mere application of a standardized instrument within a diverse sample. Third, future studies need to clarify the conceptual and operational boundaries separating academic buoyancy from its antecedent, concurrent, and outcome variables, thereby preventing construct proliferation and ensuring that measurement interpretations accurately differentiate the core construct from its contextual correlates.

Discussion

Measurement Invariance of the Academic Buoyancy Scale Across Gender and Culture

A critical empirical finding of this systematic review emphasizes the necessity of rigorously evaluating the psychometric properties of the Academic Buoyancy Scale (ABS)—particularly regarding measurement invariance—prior to conducting cross-group comparisons of academic buoyancy levels. Within the synthesized corpus of 12 articles, only the studies by Jahedizadeh et al. (2019) and Khalaf and Abulela (2021) explicitly prioritized ABS measurement invariance as a primary research focus. This emphasis underscores that the utility and robustness of an assessment instrument depend not only on its baseline capacity to measure academic buoyancy, but also on the psychometric degree to which the resulting observed scores remain meaningfully equivalent and comparable across heterogeneous populations.

Establishing measurement invariance is an indispensable prerequisite when comparing academic buoyancy scores across gender, cultural, or educational cohorts. In the absence of confirmed invariance, observed score discrepancies cannot be definitively attributed to true underlying psychological variations; instead, they may artifactually reflect differential item functioning or group-specific interpretations of the scale items. This methodological vulnerability directly accounts for the mixed findings reported in gender-difference literature, where Azadianbojnordi et al. (2022) suggested that inconsistent empirical outcomes frequently stem from unverified measurement invariance prior to inter-group testing. This perspective aligns with assertions by Bakhshaee et al. (2017), who independently emphasized that meaningful group

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comparisons remain fundamentally unconvincing unless structural and metric equivalence across groups is explicitly established.

The psychometric examination of ABS measurement invariance has been integral to the instrument's developmental trajectory since its inception. Early foundational work by Martin and Marsh (2008) utilized multigroup confirmatory factor analysis (MGCFA) to demonstrate measurement equivalence across gender and age cohorts, which was subsequently extended by Martin and Marsh (2009) to confirm cross-cultural invariance among samples from the United States, Canada, the United Kingdom, and China. Subsequent investigations further substantiated the temporal stability and gender invariance of the construct (Datu & Yuen, 2018; Putwain & Daly, 2013). Within the present review, Khalaf and Abulela (2021) advanced this lineage by validating cross-cultural and gender invariance between Egyptian and Omani university students, while Jahedizadeh et al. (2019) similarly demonstrated a targeted commitment to establishing measurement equivalence in diverse educational contexts.

Despite its critical importance, only two of the 12 reviewed studies explicitly framed measurement invariance as their primary research objective within the classification framework of this study. While this does not imply a lack of basic psychometric reporting among the remaining ten studies, it indicates that invariance testing remains underrepresented as a primary analytical focus in current academic buoyancy literature. Consequently, future research must systematically prioritize testing ABS invariance across gender, cultural contexts, academic levels, and other salient demographic parameters to ensure a psychometrically sound foundation for comparative educational and psychological research.

Evidence of the Validity of Academic Buoyancy Based on Its Relationship with Other Variables

A second prominent theme emerging from this systematic review concerns the structural relationships linking academic buoyancy with a broad spectrum of motivational and academic constructs. Within the taxonomy of research objectives, six reviewed articles explicitly investigated how academic buoyancy correlates with variables such as grit, motivation, future time perspective, academic engagement, academic achievement, and academic adversity (Colmar et al., 2019; Datu & Yang, 2021; Fong & Kim, 2021; Martin & Marsh, 2020; Thomas & Allen, 2021; Vinter, 2021). This empirical trend demonstrates that academic buoyancy is conceptualized not merely as an isolated psychological trait, but rather as an active mechanism inextricably tied to students' motivational dynamics and their capacity to adaptively navigate routine academic stressors.

These empirical patterns corroborate seminal literature documenting positive associations between academic buoyancy and academic performance (Martin et al., 2010), adaptive motivational orientations (Collie et al., 2015), and sustained learning engagement (Martin & Marsh, 2008), alongside longitudinal evidence demonstrating its capacity to predict grade point average (GPA) trajectory (Putwain & Daly, 2013; Yun et al., 2018). From a psychometric standpoint, evaluating these convergent relationships

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provides critical criterion-related and construct validity evidence for the Academic Buoyancy Scale (ABS). Demonstrating that ABS scores align theoretically with key indicators of motivation, engagement, and achievement strengthens the interpretive validity of the instrument; however, establishing validity requires going beyond simple positive correlations to rigorously evaluate construct definitions, sample characteristics, reference measures, and methodological designs.

Expanding on these relational dynamics, the review incorporates investigations into the protective function of academic buoyancy against academic decline, as highlighted by Putwain et al. (2020). This inquiry broadens the conceptual framework by explaining how students buffer the impacts of recurring academic setbacks through sustained effort and behavioral persistence. Nevertheless, empirical associations between academic buoyancy and achievement metrics must not be conflated with direct causality. Drawing robust causal inferences regarding the protective mechanisms of buoyancy necessitates advanced longitudinal or experimental designs capable of establishing temporal precedence and controlling for confounding socio-demographic and psychological covariates.

Ultimately, the synthesis provides a compelling rationale for positioning the empirical interplay between academic buoyancy, motivation, and achievement as a core pillar in the ongoing psychometric evaluation of the ABS. To advance this line of inquiry, future research must implement sharper operational distinctions between motivational antecedents, behavioral engagement, academic achievement outputs, and specific responses to academic adversity. Refining these operational boundaries will clarify the theoretical standing of academic buoyancy within wider educational psychology models and enhance the diagnostic precision of ABS score interpretation across diverse educational contexts.

Social and Cultural Contexts in the Measurement of Academic Buoyancy

The geographical scope and academic tiers represented across the 12 reviewed articles demonstrate that empirical research on academic buoyancy encompasses highly diverse educational contexts, spanning multiple national jurisdictions and institutional levels from secondary to higher education. While this wide-ranging distribution reflects a growing global interest in academic buoyancy across varied learning environments, the mere presence of research across multiple countries does not inherently prove that the Academic Buoyancy Scale (ABS) possesses equivalent construct validity or measurement invariance across these heterogeneous cultural and educational frameworks. Scholars must rigorously distinguish between geographical scope—defined simply as the physical or institutional setting where data collection occurs—and empirical cross-cultural measurement invariance, which necessitates explicit statistical evaluation to verify whether the scale assesses the targeted construct equivalently across disparate population cohorts.

Understanding how participants process and respond to ABS items requires careful consideration of contextual variations, including localized educational expectations, instructional environments, social support structures, and the specific nature of daily

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academic stressors. Consequently, cross-group or cross-setting administrations of the ABS demand comprehensive validation regarding linguistic equivalence, contextual item relevance, factor structure stability, internal consistency, and formal measurement invariance—considerations that are particularly crucial when empirical scores are drawn upon for inter-group comparisons or to guide educational policy formulation. Beyond sociocultural parameters, the review underscores the necessity of maintaining clear conceptual boundaries between academic buoyancy and resilience, as highlighted in the objective-focused inquiries by Breslin (2021) and Skinner et al. (2020). Although both frameworks address adaptive responses to difficulty, academic buoyancy specifically operationalizes a student's capacity to navigate routine, everyday academic setbacks, whereas resilience conceptualizes adaptation in response to acute, severe, or chronic adversity; establishing this distinction is vital for preventing construct contamination, selecting fit-for-purpose instruments, and interpreting structural relationships accurately.

Synthesizing these empirical and conceptual insights yields three critical imperatives for future scholarship in this domain. First, psychometric evaluations of the ABS must be systematically fortified, prioritizing multigroup invariance testing across salient demographic, cultural, and educational strata. Second, criterion and construct validity evidence derived from relationships with external variables must be reported with greater analytical precision, clearly differentiating motivational antecedents, behavioral engagement, specific academic adversities, and objective achievement metrics. Third, future investigations must expand their contextual reach while maintaining a sharp analytical distinction between merely sampling from diverse research settings and providing rigorous empirical proof of measurement equivalence across those populations.

Ultimately, advancing the academic buoyancy literature requires going beyond simply proliferating study sites or sample sizes; it demands heightened conceptual precision and superior standards of psychometric reporting. Implementing these recommendations will provide a substantially more robust foundation for interpreting ABS scores, executing responsible cross-group comparisons, and establishing the nuanced relevance of academic buoyancy across global educational landscapes.

4. CONCLUSION

This systematic review of 12 empirical studies synthesizes the current state of academic buoyancy literature across three core dimensions: the psychometric measurement invariance of the Academic Buoyancy Scale (ABS), validity evidence derived from relationships with external variables, and the methodological implications of social and cultural contexts. The findings demonstrate that evaluating academic buoyancy requires going beyond raw instrument scores to systematically account for psychometric quality, relational validity, and sample-specific characteristics. Although measurement invariance across gender and cultural cohorts was explicitly prioritized in only two of the reviewed studies, its central role in ensuring metric equivalence highlights a critical need for future scholarship to expand invariance testing across

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diverse demographic strata and educational tiers before executing cross-group comparisons. Furthermore, six studies established construct and criterion-related validity evidence by linking academic buoyancy to grit, motivation, future time perspective, academic engagement, daily setbacks, and academic achievement, alongside evidence supporting its protective role. However, these associations must be interpreted with analytical rigor, distinguishing relational dynamics from direct causal mechanisms.

While the geographic and institutional diversity represented across the reviewed literature reflects the broad global interest in academic buoyancy, sampling from heterogeneous national and educational settings does not inherently guarantee cross-cultural measurement equivalence or structural stability. Responsible utilization of the ABS across novel sociocultural contexts necessitates empirical verification of linguistic appropriateness, item functioning, factor structure robustness, internal consistency, and group-level invariance, while maintaining a clear conceptual boundary between academic buoyancy and broader psychological resilience. Ultimately, advancing the measurement of academic buoyancy demands balanced progress in psychometric rigor, precise relational mapping, and context-sensitive application. Future research must prioritize multigroup invariance testing, refine the operational boundaries separating buoyancy from its motivational correlates and outcomes, and extend empirical inquiries into underrepresented educational settings. While these conclusions are bounded by the specific corpus of 12 analyzed articles, they provide a robust foundation for enhancing the diagnostic accuracy and scientific defensibility of ABS score interpretations in global educational research.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The authors state that the data supporting the findings of this study will be made available by the corresponding author, W, upon reasonable request.

AUTHOR CONTRIBUTIONS

W: Conceptualization, Methodology, Literature search, Data extraction and curation, Formal analysis, Writing – original draft, Writing – review & editing, Project administration. The author has read and agreed to the published version of the manuscript.

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