



# Situational Motivation in Academic Learning: A Systematic Review

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## Abstract

Recent academic motivation research has shifted towards understanding the situation-specific and process-sensitive nature of motivation. This shift has initiated discussions on methodological advancements to capture dynamic changes in motivation as they occur in authentic learning contexts. However, these studies have not been systematically documented. This systematic review aims to 1) describe how much and with which methods motivational constructs derived from the motivation theories (attributional theory, expectancy-value theory, social cognitive theory, achievement goal theory, and self-determination theory) have been measured situationally and 2) summarize the empirical results to get information on the situational variation of motivational constructs and the variables explaining this variation. Peer-reviewed articles were sourced from Scopus, ProQuest, and EBSCO databases, identifying 80 empirical studies from the last decade that measured situational motivation in academic contexts. As a result, two research waves were identified: 1) motivation measured as a situation-specific construct without focusing on dynamic changes ( $n=62$ ), and 2) motivation measured repeatedly during the learning process to capture momentary changes ( $n=18$ ). The findings show that situational motivation is influenced by the learning context, varies between and within individuals moment-to-moment, and that the interconnections between different motivational constructs and learning are complex and temporal. Future research should explore the potential of multimodal data and the more extensive use of time-sensitive analyses to capture the complexity and developmental aspects of motivational processes. This information is crucial for theoretical and methodological development and for designing advanced learning technologies that support students' motivation as part of self-regulated learning.

**Keywords** Motivation · Learning · Motivational state · Situational motivation · Momentary motivation · Dynamic motivation

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## Introduction

Motivation can be understood as an internal state of mind that directs, sustains, hinders, or inhibits behavior (Graham & Weiner, 2012). As such, it serves as the driving force that initiates and sustains the will to learn and pursue goal-directed behavior (Urduan & Kaplan, 2020). However, motivation is not a static characteristic but a dynamic construct that shifts across different contexts and develops over time (Turner & Patrick, 2008). Therefore, a learner's *situational motivation* is a temporary state influenced by specific features of the learning environment (Järvenoja et al., 2023).

During recent years, the field of motivation research has recognized the need to enhance the theoretical understanding of situational motivation in academic learning (Pekrun & Marsh, 2022). With situational motivation, we refer to the dynamic, temporal variation in motivation that fluctuates within and between individuals in response to specific triggers from the learning process, environments, tasks or the social setting. These triggers can include, for example, changes in efficacy beliefs or how the costs of a task are experienced differently in different phases of the process. It emerges within specific situations but is shaped by the broader learning context. Unlike stable, trait-like motivational tendencies, it captures changes in motivational states within a single learning task or session, throughout a study course, or over the academic year (Järvenoja et al., 2023; Nolen, 2020).

This growing focus on situational motivation aligns with a broader recognition of the dynamic nature of cognitive, affective, motivational, and metacognitive learning processes, which can fluctuate significantly during a learning process in response to various situational factors (Azevedo & Gašević, 2019). In response to this need, novel process-oriented methodologies, which can capture learning processes in real-time, have started to emerge (Azevedo, 2014; Sharma & Giannakos, 2020). Situation-specific measures, such as self-reports and interviews, assess motivation within a given context using prospective or retrospective timeframes, whereas momentary measures, such as experience sampling (ESM) and physiological data, capture real-time fluctuations with varying levels of granularity (Azevedo et al., 2010). These process-oriented approaches could also provide a more nuanced and accurate depiction of situational motivational processes, offering insights that static measures cannot provide (Järvenoja et al., 2020).

In the era of advanced technologies and artificial intelligence (AI), addressing situational motivation in learning has become increasingly important. AI technologies offer opportunities to personalize learning experiences and provide real-time feedback. However, to benefit from these advancements, a deeper understanding of learners' motivation in actual situations is needed, especially regarding how students' motivation fluctuates during learning activities (Molenaar et al., 2023). Methodological advancements offer novel ways to meet this need. For example, smartphones and wearable devices facilitate continuous tracking of physiological indicators that can be correlated with self-reported experiences, providing a multimodal measure of learning processes (Järvelä & Bannert, 2021). As situational motivation is inherently part of self-regulated learning (SRL), understanding and supporting motivation in real-time is fundamental in helping learners effectively plan, monitor, and control their learning processes (Winne & Hadwin, 1998; Zimmerman, 2000). To this day, however, motivation

has been an underemphasized aspect in SRL research, particularly in studies utilizing unobtrusive multimodal data (Molenaar et al., 2023).

Despite the needs presented above, recent empirical evidence or methodologies used to study situational motivation have not been systematically documented. Addressing this gap and synthesizing the available evidence is important not only for the further development of motivational theories and methodologies but also for the practical application of these insights. Specifically, a systematic understanding of situational motivation is vital for developing personalized AI-based support systems that can respond in the moment to students' motivational needs as part of SRL. Thus, this systematic review article brings together empirical articles studying situational motivation. It considers main motivational constructs derived from the five major motivation theories (attributional theory, expectancy-value theory, social cognitive theory, achievement goal theory, and self-determination theory) and investigates, first, how different constructs have been measured at a situational level. Second, it summarizes and describes empirical results from the included articles, providing insights into the situational variation of different motivational constructs.

## Rationale

### Theoretical Perspectives on Situational Motivation in Learning

The current field of academic motivation research employs various theoretical frameworks, each providing insights into different self-, social-, and cognitive-related factors underlying learners' motivation (Hattie et al., 2020). Thus, the empirical research related to situational motivation spans a wide range of different theories and concepts, which is why systematic reviewing of the research requires careful theoretical considerations. This systematic review employs the five major motivation theories that provide a comprehensive framework to understand the multifaceted nature of motivation (Wigfield & Koenka, 2020). First, these five theories collectively cover a broad spectrum of motivational constructs, such as intrinsic and extrinsic motivation, self-efficacy, goal orientations, and attributions. This ensures that various relevant aspects of situational motivation are addressed. Second, each theory explicitly considers the role of situational and contextual factors in shaping motivation, though in different ways (Nolen, 2020). This sensitivity is crucial for a review focused on situational motivation, as the way the theory addresses situatedness influences how the included studies approach it from a theoretical and methodological perspective. Accordingly, including different theories ensures a comprehensive exploration of how situational motivation is addressed in recent academic motivation research.

*Self-Determination Theory* (SDT), developed by Deci and Ryan (2012), posits that motivation is influenced by the needs for autonomy, competence, and relatedness. It distinguishes between intrinsic and extrinsic motivation and considers how different environments and contexts support or disturb learners' psychological needs, thereby influencing their motivation. From a situational motivation perspective, SDT particularly addresses the role of contextual factors in enhancing or undermining students' motivation.

*Expectancy-Value Theory* (EVT), proposed by Wigfield and Eccles (2000), suggests that motivation is determined by individuals' expectations for success, the value they place on success, and the costs associated with performing a learning task. EVT has been extended to Situated Expectancy-Value Theory (SEVT; Eccles & Wigfield, 2020), emphasizing the role of situational and contextual factors in shaping individuals' beliefs about their abilities and the importance they attach to tasks.

Bandura's *Social Cognitive Theory* (SCT) highlights the role of goals, self-evaluations of progress, self-efficacy, social comparisons, values, outcome expectations, attributions, and self-regulation (Schunk & DiBenedetto, 2020). These internal motivational factors interact with behavioral and environmental factors. SCT underlines how situational factors and social influences shape individuals' motivation and self-efficacy beliefs, which in turn influence their learning actions. SCT especially highlights the impact of social contexts and peer interactions on situational motivation, as well as the link between learners' beliefs and actions (Schunk & DiBenedetto, 2020).

*Achievement Goal Theory* (AGT; e.g., Nicholls, 1984) is based on the distinction between mastery and performance goals. While these two types of goals have remained fundamental, they have been extended and supplemented with additional motivational goal orientations over the years (Daumiller, 2023). For example, performance goals have been further divided into approach and avoidance orientations, reflecting whether an individual strives to demonstrate competence or avoid failure. Additionally, more socially driven goals, such as social approval goals (seeking validation from peers) and ego-protective goals (maintaining a positive self-image), have been recognized as influencing achievement motivation (Urduan & Kaplan, 2020). According to the theory, the purpose of engaging in academic behavior, as construed by the student, affects motivation. For example, when students are oriented towards mastery goals, their motive might be curiosity and enjoyment in learning new things, whereas when inclined towards performance orientation, the goal might be to accomplish a school task or get good grades. Furthermore, achievement goals influence students' perceptions of an achievement situation, their emotional and behavioral responses to success and failure, and how their identity and cultural background affect their perceptions of the context, task, self, and goals in the situation (Urduan & Kaplan, 2020).

Finally, *Attribution Theory* (ATT; Weiner, 1985) focuses on how individuals explain their successes and failures, attributing them to factors such as ability, effort, task difficulty, and luck. The situational perspective the theory provides is how different situational cues and feedback influence these attributions, thereby affecting motivation. ATT can shed light on how situational feedback and experiences shape students' motivational attributions and future effort (Graham, 2020).

To conclude, all five of the above-presented motivation theories acknowledge that motivation is not a static trait but rather a fluctuating construct that varies across contexts and evolves over time (Turner & Patrick, 2008). Contextual nuances and temporal fluctuations are central aspects of the research on situational motivation in learning and education, as they significantly influence the dynamic nature of students' motivational states. Students' motivations are deeply intertwined with the specific context of learning activities, such as classroom dynamics, teacher-student or student-student interactions, and the nature of the tasks at hand (Wigfield et al., 2021). Furthermore, motivation can

change rapidly over the course of a single learning session due to moment-to-moment variance (Järvenoja et al., 2023; Moeller et al., 2022).

### Time and Context in Empirical Studies

In this systematic review, we distinguish between situation and context to understand their roles in shaping situational motivation. The term *situation* refers to specific events or circumstances that occur at different timepoints; it is dynamic, momentary, and shaped by various types of immediate conditions or challenges. In contrast, *context* refers to the broader, more stable factors that frame and influence the situations, such as the environment or culture. These two dimensions—time and context—interact in complex ways to shape situational motivational processes over time (Pekrun & Marsh, 2022).

Pekrun and Marsh (2022) offer a categorization for considering the influence of time and context in empirical studies. They suggest that studies assessing a specific variable at one point in time within a single context (same time & same context) provide only limited insights into situational and contextual influences. Conversely, measuring a variable at one point in time across multiple contexts (same time & different context) reveals contextual variations but fails to capture situational changes. When the variable is measured multiple times within the same context (different times & same context), the focus shifts to temporal variation, shedding light on how motivation fluctuates over repeated exposures to the same situation. Furthermore, measuring the variable at multiple time points across multiple contexts (different times & different contexts) allows for the analysis of both temporal and contextual variations.

Since this systematic review focuses on the situational aspects of motivation, we are especially interested in studies that measure motivation at least twice, either within the same context over time or across different contexts at multiple time points. This includes studies that assess situational motivation at different times within the same context, as well as studies that examine motivation in different contexts, provided that multiple measurements are taken within each context.

### Offline and Online Measures of Situational Motivation

Traditionally, academic motivation research has relied heavily on well-tested and validated self-report trait-type measures (Fulmer & Frijters, 2009), which, however, often miss the sensitivity to situational changes. Along with the situative turn in academic motivation research (Nolen, 2024), a greater variation in methods capturing motivation in terms of granularity, frequency, and timeframe has become available. As this systematic review focuses on situational motivation, measures that capture more fine-grained, situation-specific motivational states are of particular interest.

Following Azevedo et al.'s (2010) suggestion, these measures can be divided into offline and online measures. Offline measures, including self-reports such as repeated questionnaires or learning diaries, are employed with prospective and retrospective timeframes to capture activities occurring before or after a learning task or to retrospectively describe the processes that took place during the task (Azevedo et al., 2010). These offline measures provide access to *situation-specific* information on motivation but do not capture more granular changes and learners' real-time

assessments and actions. For example, offline measures can be used to measure learners' situational motivational beliefs before and after an intervention (e.g., Gaspard et al., 2015; Totonchi et al., 2023) or in relation to different learning environments (e.g., Makransky et al., 2019) to assess their effects on learners' motivation.

In contrast, online measures capture activities and processes during the actual learning task, some in-the-moment with lower granularity (e.g., ESM) and some continuously with high granularity (e.g., facial expressions, physiological measures, observational methods, eye-tracking, log-data) (Azevedo et al., 2010), offering insights into *momentary* changes in motivation. Online measures allow for a more nuanced understanding of how motivation fluctuates moment-to-moment and in response to specific learning activities, instructional strategies, or environmental factors. For example, ESM could be used to gather information about students' motivational beliefs in the moment (e.g., Dietrich et al., 2019), while physiological measures could be used to track emotional costs, such as anxiety, continuously during learning (e.g., Graham et al., 2023).

Consequently, these advanced methodologies could enable novel ways to recognize and foster motivation in personalized AI-based learning technologies. The gained empirical evidence has the potential to provide research-based knowledge to create solutions that dynamically respond to the learner's motivational needs in varying situations, thereby optimizing the learning experience and outcomes. However, we still lack systematic information on how extensively motivation research has utilized situation-specific and momentary measures and what kind of empirical evidence exists to support the situative turn on one hand, and to provide directions for further refining traditional motivational theories on the other.

## Current Study

There is a need to advance theoretical understanding and integrate empirical evidence on situational motivation across a variety of motivation theories (Pekrun & Marsh, 2022). This systematic review aims to synthesize empirical studies on situational motivation by addressing the following research questions:

- 1) Which motivational constructs derived from the five major motivation theories have been measured situationally?
- 2) What methods have been used to measure these situational motivational constructs?
- 3) What do the selected studies reveal about the situational variation of different motivational constructs, and which variables explain or predict this variation?

## Methods

The PRISMA 2020 statement was followed when performing and reporting the systematic review procedure (Liberati et al., 2009; Page et al., 2021). The Covidence systematic review tool (<https://www.covidence.org/>) was used for the systematic

review management and for performing the screening and full-text reviews. The systematic review process included five main steps: 1) identifying, 2) screening, 3) reviewing full-text articles for eligibility, 4) including, and 5) synthesizing. The systematic review process is described in detail next.

## Eligibility Criteria

The inclusion and exclusion criteria are presented in Table 1. We included empirical studies done in an academic learning context. No restrictions in terms of the participants' age, education level, or study subject were imposed to allow for consideration of how well the studies covered different educational levels and subjects. Additionally, at least one construct from the five selected motivation theories or other situational motivational constructs (as defined by the authors, e.g., interest or unspecified situational motivation) needed to be included as a variable (see Table 2). Motivation needed to be measured at least two times in the same learning context using situation-specific or momentary instruments. However, if there were more than two measurement points in the same learning context, the context could also change between the remaining measures. The study was excluded if it was done in a non-academic learning context (e.g., informal learning, workplace learning). We also excluded review articles, methodological articles, and theoretical articles. If the study used traditional trait-type measurements of motivation, it was excluded even if motivation was measured several times or longitudinally.

## Information Sources

Studies were identified by searching peer-reviewed academic journal articles written in English from three different electronic databases relevant for educational psychology (Scopus, ProQuest [Education collection], EBSCO [APA PsycArticles]). The search was limited to articles published between 2013 and 2023. In Scopus, the search was also limited to social science and psychology journals. The initial search was conducted in Scopus on March 21, 2023. A similar search was repeated

**Table 1** Inclusion and exclusion criteria for the review

Eligibility criteria	Include	Exclude
Context	Academic learning All subjects	Informal learning Workplace learning
Participants	All ages and educational levels	-
Type of study	Empirical	Review Methodological Theoretical
Type of measures	Relevant motivational constructs as variables Motivation measured at least two times in the same context Situation-specific or momentary instruments used	Trait-type instruments Motivation measured multiple times but every time in different contexts

**Table 2** Search terms used for the electronic database search

Motivation	Search terms
Attribution theory	attribution theory, attributional theory, attribution*, outcome-dependent affect, outcome dependent emotion*, causal antecedent*, attributional antecedent*, causal ascription*, causal dimension*, attributional consequence*
Expectancy-value theory	expectancy value theory, expectancy-value theory, expectancy for success, expectancies for success, academic self-concept*, self-concept of ability, task value*, utility value*, attainment value*, intrinsic value, emotional cost*, opportunity cost*, effort cost*
Social cognitive theory	self-efficacy, self-evaluation of progress, self-evaluations of progress, social comparison*, outcome expectation*
Achievement goal theory	achievement goal*, goal orientation*, mastery goal*, learning goal*, task goal*, performance goal*, ego goal*, ability goal*
Self-determination theory	self-determination theory, extrinsic motivation*, intrinsic motivation*, amotivation
Situational motivation	situational motivation*, motivational state*, situated motivation*, situation-specific motivation*, dynamic motivation*, momentary motivation*
<b>Academic learning context</b>	learn*, academic, achievement, student*, school, education*
<b>Situation</b>	situat*, dynamic*, moment*, motivational state*

in ProQuest and EBSCO on March 29, 2023. During April–May 2024, the reference lists of included articles were manually screened to identify additional studies. We also conducted citation tracking of included studies in Scopus.

## Search Strategy

We searched articles from the different databases using the search terms related to a) motivation, b) academic learning context, and c) situation, and combined them with AND operator. Based on the options available in the database, the search terms were searched from title, abstract, and keywords (Scopus), anywhere but full text (ProQuest), or from all fields (EBSCO). First, we did separate searches for the key constructs of each of the five motivation theories. Second, we did a separate search using the search terms related to situational motivation. Table 2 presents all the search terms used. The full replicable search strings for each search and number of studies found as a result are available in Supplementary file in Table 4. In total, we identified 3885 studies of which 1231 were duplicates. The remaining 2654 studies were moved to the screening phase.

## Selection & Data Collection Process

In the screening phase, the team included four members, and titles and abstracts of each study were screened by two reviewers. The proportionate agreement between the reviewers was 88% and Cohen's kappa was moderate, indicating a sufficient agreement (Landis & Koch, 1977; McHugh, 2012). For the 327 studies where the

reviewers' votes conflicted, the first author screened them again to make the final decision. Studies were included in the full-text review if the title and abstract did not provide sufficient details (e.g., about methodology) for a proper decision. After screening, 2274 studies were identified as irrelevant and removed. The remaining 380 studies proceeded to the full-text review.

In the full-text review, each study was reviewed by one reviewer. If it was unclear from the title and abstract whether the study met the inclusion criteria, the relevant information was checked first. A total of 310 studies were found irrelevant (see Fig. 1 for reasons). After the full-text review, 70 studies were included in the synthesis. An additional 10 studies were included in the synthesis based on checking reference lists and citations from the included studies (Greenhalgh & Peacock, 2005).

## Synthesis Methods

During the full-text review, information relevant to answering the research questions (see Table 3) was collected in Excel from each included study (a total of 80 studies). After this, the first author reviewed the collected information to ensure that the selected articles met the inclusion criteria. The collected information was then used for the synthesis.

To get an overall picture of the included studies, the synthesis process began with coding the studies for their context and type. Next, information about participants, focus and aims, and data collection methods were gathered. This information addressed the first and second research question, for which the studies were then grouped based on the

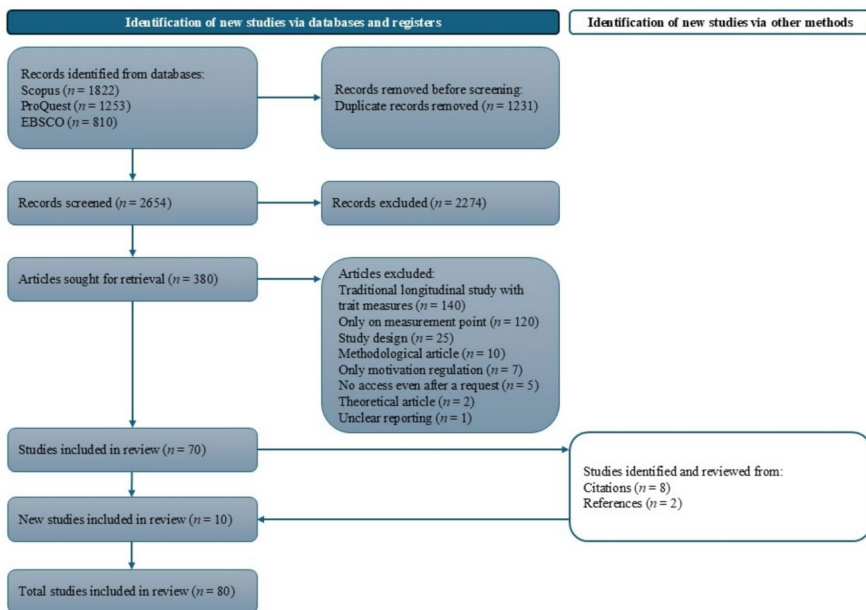


Fig. 1 PRISMA flow diagram of the systematic review process

timeframe of measurement (situation-specific/momentary). Finally, the motivation theories, measured constructs, and instruments used were summarized for both timeframes.

For the third research question, the results of the included studies were reviewed and summarized in terms of measured constructs, data analysis methods, and main findings and conclusions. The results were then synthesized from the perspectives of context (contextual variation) and time (temporal variation). This led to the identification of studies that provided evidence on 1) contextual and 2) temporal variation in situational motivation. Next, studies that provided evidence on 3) variables potentially explaining or predicting variation in situational motivation were identified, and their results were synthesized. This led to the identification of complex interconnections between different motivational constructs and learning. Finally, examples of the studies and their results were qualitatively synthesized.

## Results

In the results section, an overview of the context and participants of the included studies is first provided. Then, the results related to the first and second research questions are described in the light of two timeframes: situation-specific and

**Table 3** Information derived from each study in the full-text review

Category	Explanation
Context	1) Country 2) Subject 3) Learning environment (f2f, online, hybrid, exam) 4) Individual/collaborative
Type of study	a) Empirical research study b) Intervention study
Participants	Age
Focus and aims	Summary of the focus and aims
Data collection	1) Measurement instruments used 2) Number of measurement points, interval between the measurements 3) Summary of the data collection design
Timeframe	a) Situation-specific b) Momentary
Theory of motivation	Motivation theory used a) SDT b) EVT c) SCT d) AGT e) ATT f) Other
Motivational constructs	Motivational constructs studied
Data analysis	Analysis methods used
Main findings & conclusions	Summary of the main findings and conclusions

momentary. Finally, for the third research question, the results of the identified studies are qualitatively synthesized, with examples illustrating three key findings.

## Overview of Study Contexts and Participants

Altogether, 80 studies were included in the synthesis (see the flow diagram in Fig. 1). From the included studies, 49 were empirical and 30 were intervention studies, and one article included both an empirical and intervention sub-study. Most of the studies were done in Europe ( $n = 33$ ) and North America ( $n = 22$ ), followed by Asia ( $n = 15$ ), Australia ( $n = 3$ ), Africa ( $n = 2$ ), and South America ( $n = 1$ ). Two studies were conducted in multiple continents and two studies did not report the country where the study was conducted. In terms of the age of the participants, most studies considered adults (age  $\geq 19$ ,  $n = 42$ ), followed by adolescents ( $10 < \text{age} < 19$ ,  $n = 29$ ), and only seven studies focused on children (age  $\leq 10$ ). One study included children and adolescents, and one study adolescents and adults.

Most of the studies ( $n = 44$ ) were related to learning of STEM and related subjects (science, technology, engineering, mathematics, medicine, nursing sciences), seven were related to physical education, seven to psychology studies, and five to language studies. Nine studies were related to other subjects (e.g., arts, music, design thinking; see Table 5 and Table 6 in the Supplementary file) and eight studies included multiple subjects. Regarding the learning environment, 67 of the studies utilized face-to-face learning, seven online learning and three both online and face-to-face learning, while three studies did not report the learning environment. Additionally, 23 studies focused on individual learning, 11 on collaborative learning, 31 incorporated both individual and collaborative learning, and 15 studies did not clearly specify the learning methods used.

## Measurement of Motivational Constructs – The Two Waves of Situational Motivation Research

In the synthesis, two waves of situational motivation research were identified: 1) motivation measured with offline measures as a situation-specific construct, but without focus on the dynamic changes (*situation-specific wave*,  $n = 62$ ) and 2) motivation measured repeatedly during the learning process capturing the continuous changes in the situational motivation with online measures (*momentary wave*,  $n = 18$ ). In terms of the year of publication, most studies in both of the waves were published between 2021 – 2022 ( $n = 29$ , see Fig. 2). Based on the year of publication, the situation-specific wave began to emerge more strongly after 2015 and increased significantly after 2019, while the momentary wave peaked in 2021. However, it should be noted that the initial search was performed in March 2023, and thus, some of the studies published in 2023 might have been missed.

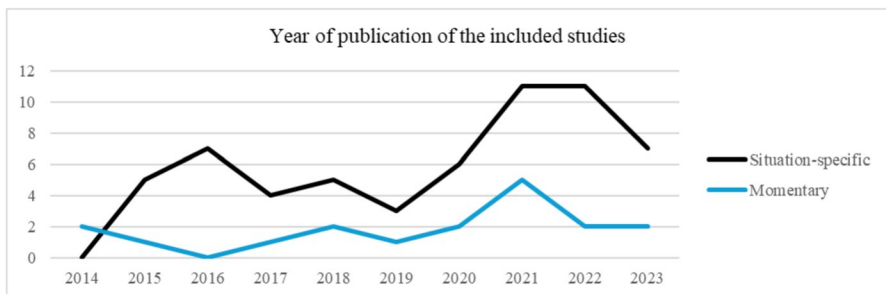
The studies in the *situation-specific wave* (see Table 5, Supplementary file) were theoretically based mostly on SDT ( $n = 16$ ) or EVT and its situated extension SEVT ( $n = 14$ ). Five studies were based on SCT, one study on AGT, and one study on

ATT. Four studies integrated multiple of the five motivation theories. Nine studies used other theories (e.g., self-regulated learning, engagement) and 12 studies did not report explicitly the motivation theory they used as a theoretical background.

*Self-efficacy* ( $n = 25$ ) was the most measured construct in the situation-specific studies. *Intrinsic motivation* ( $n = 19$ ) was the second most measured construct. Related to the other constructs derived from SDT, *extrinsic motivation* ( $n = 16$ ) and *amotivation* ( $n = 10$ ) were also measured. In terms of EVT, *task values* ( $n = 21$ ) were measured the most, followed by *costs* ( $n = 5$ ), *expectancies for success* ( $n = 3$ ), and *self-concept* ( $n = 2$ ). *Achievement goals* and *goal orientations* were measured in four studies, while *attributions* were measured in three studies and *affect* in 10 studies. Thirty studies also considered other motivation-related constructs (as defined by the authors of the study) that were not directly related to the five motivation theories. The most measured construct in these studies was *interest* ( $n = 9$ ). Four studies measured *situation-specific motivation* without further specifying the constructs. Regarding the measurement instruments, all the studies used self-reports, mainly in the form of questionnaires. As complementary data channels, interviews ( $n = 4$ ), video or classroom observations ( $n = 3$ ), learners' written reflections ( $n = 2$ ), log-data ( $n = 1$ ), and EEG ( $n = 1$ ) were used.

The studies in the *momentary wave* (see Table 6., Supplementary file) covered all motivation theories (EVT ( $n = 6$ ), SDT ( $n = 2$ ), AGT ( $n = 2$ ), SCT ( $n = 1$ )), except for ATT ( $n = 0$ ). Two studies integrated multiple of the five motivation theories and four studies used other theories (e.g., control-value theory, momentary engagement). One study did not report the theory they used as a theoretical background. In the momentary studies, *task values* appeared as the most measured constructs ( $n = 6$ ), followed by *self-efficacy* ( $n = 5$ ), *expectancies for success* ( $n = 5$ ), *affect* ( $n = 4$ ), *costs* ( $n = 3$ ), *intrinsic motivation* ( $n = 3$ ), *achievement goals* and *goal orientations* ( $n = 3$ ), *self-concept* ( $n = 2$ ), and *extrinsic motivation* ( $n = 1$ ). Fifteen studies measured also other motivational constructs (e.g., motivation regulation, motivational conflict) and one study measured momentary motivation without specifying the exact constructs used.

Methodologically, all the studies in the momentary wave used self-reports (mainly ESM and repeated questionnaires). Four studies used an additional, either online or offline data collection method. Schlafer et al., (2021) recorded in-class



**Fig. 2** The year of publication of the included studies in the situation-specific and momentary waves

discussions to analyze instructor-student discussions in two teaching formats, Symonds et al. (2021) used video recordings to observe students' momentary behavioral engagement, and Katz-Buonincontro and Hektner (2014) used interview data to get further insights into survey responses. Graham et al. (2023) used self-reports together with physiological data, namely salivary cortisol, to investigate the connection between shifts in students' expectancies for success and changes in this physiological indicator of anxiety during an exam. Galla et al. (2018) reported three sub-studies including both situation-specific and momentary measurements. In the first sub-study, ESM was used, while the second and third study utilized situation-specific measurements with self-reports and daily diary measures. Figure 3 summarizes the information of the included studies in terms of the type of study, context, timeframe, motivation theory, and measured constructs.

To sum up, most of the studies measured motivation as a situation-specific construct providing accumulating empirical evidence particularly related to SCT (self-efficacy), SDT, and EVT. Thus, empirical evidence on the dynamic changes in situational motivation remains scarce as only 18 studies were measuring motivation repeatedly with online measures on a momentary level. *Self-efficacy and task values* were the most measured constructs in relation to situational motivation. Methodologically, all the included studies used self-reports and only 19% ( $n = 15$ ) of the studies used an additional complementary data channel.

### Empirical Evidence on the Situational Variation of the Different Motivational Constructs

When the results of the included studies of both waves were reviewed and summarized, the findings revolved around three main points: 1) situational motivation can be influenced by the learning context, 2) situational motivation can vary between

Type of the study	Context	Timeframe	Motivation theory	Motivational constructs
Empirical ( $n = 49$ ) Intervention ( $n = 30$ ) Both ( $n = 1$ )	Europe ( $n = 33$ ) North America ( $n = 22$ ) Asia ( $n = 15$ ) Australia ( $n = 3$ ) Africa ( $n = 2$ ) South America ( $n = 1$ ) Multiple continents ( $n = 2$ ) No country reported ( $n = 2$ )	Situation-specific ( $n = 62$ )	Self-determination theory ( $n = 16$ ) Expectancy-value theory ( $n = 14$ ) Social cognitive theory ( $n = 5$ ) Achievement goal theory ( $n = 1$ ) Attributional theory ( $n = 1$ ) Multiple theories ( $n = 4$ ) Other theories ( $n = 9$ ) Theory not reported ( $n = 12$ )	Self-efficacy ( $n = 25$ ) Task values ( $n = 21$ ) Intrinsic motivation ( $n = 19$ ) Extrinsic motivation ( $n = 16$ ) Amotivation ( $n = 10$ ) Affect ( $n = 10$ ) Costs ( $n = 5$ ) Achievement goals and goal orientations ( $n = 4$ ) Expectancies for success ( $n = 3$ ) Self-concept ( $n = 2$ ) Attributions ( $n = 3$ ) Other constructs ( $n = 30$ ) Situation-specific motivation ( $n = 4$ )
	Adults ( $n = 42$ ) Adolescents ( $n = 29$ ) Children ( $n = 7$ ) Multiple age groups ( $n = 2$ )			
	STEM and related subjects ( $n = 44$ ) Physical education ( $n = 7$ ) Psychology ( $n = 7$ ) Language ( $n = 5$ ) Other subjects ( $n = 9$ ) Multiple subjects ( $n = 8$ )			
	Face-to-face ( $n = 67$ ) Online ( $n = 7$ ) Both ( $n = 3$ ) Not reported ( $n = 3$ )			
	Individual ( $n = 23$ ) Collaborative ( $n = 11$ ) Both ( $n = 31$ ) Not reported ( $n = 15$ )			

Fig. 3 The summary of the included studies in terms of the type of study, context, timeframe, motivation theory, and measured constructs

individuals and within individuals from moment to moment, and 3) the interconnections between the different motivational constructs and learning are complex and temporal. Figure 4 summarizes how the constructs measured in the two waves provided evidence for these three claims.

### Situational Motivation can be Influenced by the Learning Context

Among the studies in the situation-specific wave, 65% ( $n = 40$ ) provided empirical evidence for this claim. In contrast, only 28% ( $n = 5$ ) of the studies in the momentary wave offered evidence on the contextual variation of situational motivation. These studies examined situational motivation in different contexts with multiple measurements taken within each context. The research in both the situation-specific and momentary wave showed how situational motivation changed depending on the various features of the learning context, including educational context, subject, learning environment and task, and social interaction. Moreover, the studies showed that interventions targeting specific motivational aspects can effectively enhance situational motivation across diverse settings.

Many studies measured situational motivation at least twice to examine how specific learning environments or instructional designs influenced situational motivation, particularly in terms of self-efficacy and intrinsic motivation. For example, Makransky et al. (2019) compared three different learning environments for laboratory safety training: an immersive VR simulation, a desktop VR simulation, and a conventional safety manual. They found that the immersive VR simulation increased self-efficacy and intrinsic motivation more than the conventional safety manual. Likewise, Peechapol (2021) reported that a virtual laboratory simulation in chemistry improved undergraduate students' self-efficacy, learning achievement, and learning experience. In a collaborative learning context, Cho et al. (2022) explored whether the "digital game virtual environment" and the "real environment of acrylic paint" would influence elementary school students' group self-efficacy, learning effectiveness, motivation, and cognitive load. The results showed that the students

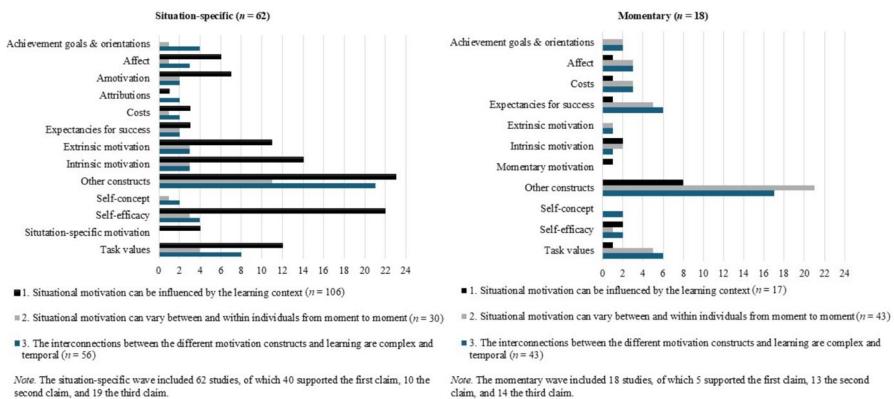


Fig. 4 Summary of measured constructs in relation to evidence for the three claims

who studied in the virtual environment had higher group self-efficacy than those who studied in the real environment.

Two studies (Katz-Buonincontro & Hektner, 2014; Schlafer et al., 2021) examined how different learning contexts influenced momentary self-efficacy based on the instructional design or learning activity, showing again that situational self-efficacy is affected by the learning context. Katz-Buonincontro and Hektner (2014) analyzed students' self-efficacy, emotional states, intrinsic motivation, cognitive engagement, and positive work attitudes in leadership activities that involved problem solving over five days. They found that participants reported lower self-efficacy when they were solving problems than when they were not, and higher intrinsic motivation when they faced new problems than old problems. Interestingly, being with other students increased their self-efficacy compared to being alone. Schlafer et al. (2021), in turn, compared two teaching formats (hands-on vs. procedural video) in a dental teaching context and found that both teaching formats improved participants' self-efficacy, without significant differences between them. Finally, Hinnerman et al. (2020), studied how an autonomy-supportive or a controlling instructional style affected adolescents' autonomous motivation in a musical learning activity. They found that students who received autonomy-supportive instruction were more autonomously motivated at all measurement points.

Grounding on EVT, several studies focused on how interventions and contextual factors shape students' situational value beliefs. Gaspard et al. (2015) and Totonchi et al. (2023) designed interventions including learning activities focused on improving students' value beliefs in math. In both studies, the intervention boosted positive value and relevance beliefs compared to the control conditions (Gaspard et al., 2015; Totonchi et al. (2023). Salmela-aro et al. (2021) examined the influence of country context on secondary school students' momentary task-values, expectations, and costs by comparing a high-performing educational context (Finland) and a low-performing educational context (Chile). Their results suggested that Chilean students' variation in the observed variables was more often related to individual characteristics than momentary changes, providing some preliminary evidence on the differences between the high- and low-performing contexts. However, some of the results, especially the relationship between task values, expectancies, flow, and grid, were similar in both countries, suggesting that certain findings may be applicable across different contexts (Salmela-aro et al., 2021).

Finally, Kim et al. (2023) provided insight into how different cost-related motivational constructs vary in their sensitivity to contextual factors. They examined how undergraduate students' general and momentary cost perceptions were related and how motivation regulation moderated this relationship. They found that task effort costs and loss of valued alternatives costs were not significantly associated with general costs perceptions, indicating a high sensitivity to contextual and situational factors (Kim et al., 2023).

### **Situational Motivation can Vary Between and Within Individuals from Moment to Moment**

In the situation-specific wave, only 16% of the ( $n = 10$ ) studies provided evidence for within- and between-individual differences in learners' situation-specific motivation.

In contrast, most of the studies (72%,  $n = 13$ ) in the momentary wave provided evidence for this claim. Theoretically, the studies were predominantly based on EVT. Dietrich et al. (2019) analyzed university students' in-the-moment profiles of expectancies, task values, and costs within learning situations during a weekly lecture. They found four different profiles of expectancies, values, and costs: three profiles had symmetric levels (high, medium, low) of expectancies, values, and costs, and one profile reflected motivating but costly situations. Integrating EVT with academic emotions framework, Umarji et al. (2021) studied situational profiles of task values and anticipated emotions and found six distinct profiles.

The studies reported that in addition to between-student differences, situational motivation varied significantly within persons from moment to moment. These findings covered task value beliefs (Parrisius et al., 2022; Salmela-aro et al., 2021; Umarji et al., 2021), expectancies for success and competence beliefs (Graham et al., 2023; Parrisius et al., 2022; Salmela-aro et al., 2021), and costs (Kim et al., 2023; Salmela-aro et al., 2021). As an exception, Dietrich et al. (2019) reported that students' motivational profiles were relatively stable from one situation to another. Also, Rach (2023) found that in an undergraduate mathematics course, students' task values fluctuated only slightly in different situations and were strongly predicted by individual characteristics such as interest.

Regarding the other theoretical perspectives, based on SDT, Stolk et al. (2021) studied situation-specific motivation of undergraduate students participating in STEM courses using Situational Motivation Scale (SIMS). Their results revealed seven different motivational response types from a highly control-oriented to a highly autonomous and individual differences in how the students transitioned between the different motivational response types across the academic term (Stolk et al., (2021).

From an AGT perspective, Tapola et al. (2014) found evidence on individual differences in elementary school students' situational goal orientations by identifying three goal orientation profiles: success-, mastery-, and avoidance-orientation. Moreover, the students with different profiles showed different patterns in changes in situational interest (Tapola et al., 2014). Also, Lee and Bong (2022) provided evidence of the situational variation of achievement goals by studying adolescents' achievement goals during exam preparation and demonstrating how achievement goals fluctuated momentarily.

Combining multiple theoretical frameworks, Martin et al. (2015) investigated intra- and interindividual variation in high school students' motivation and engagement. They collected self-report data on adaptive motivation, adaptive engagement, maladaptive motivation, and maladaptive engagement with mobile devices three times each day of the school week for four weeks. The results showed substantial variability in motivation and engagement both within days and between students, but not so much variation between days and weeks.

Interestingly, Kim et al. (2023) and Paumier and Chanal (2022) found evidence that some constructs might be more sensitive to situational variation than others. Within EVT, Kim et al. and's (2023) results indicated that outside effort costs (i.e., negative appraisals of time and effort needed to complete tasks from other life domains) and emotional costs were positively associated with students' general cost

perceptions, while task effort costs and loss of valued alternatives costs were not, which might indicate that these cost dimensions are more sensitive to situational variations. In relation to SDT, Paumier and Chanal (2022) discovered that the autonomous motivation types of university students varied more by situation than the controlled motivation types.

### The Interconnections Between the Different Motivational Constructs and Learning are Complex and Temporal

The situation-specific wave had 29% ( $n = 19$ ) of the studies and the momentary wave had most of the studies (78%,  $n = 14$ ) that showed evidence on how different motivational constructs relate to each other over time and in different situations. For example, from an EVT point of view, Kiuru et al. (2020) examined how sixth grade students' motivation, emotions, and performance in a task were connected in a situation-specific way. Their results showed that students who valued the task more, expected to succeed more, and felt more positive before the task also put more effort into the task. Also, Rach (2023) reported that undergraduate students' values for the task influenced their effort slightly. Salmela-aro et al. (2021) then reported that students' motivation in different situations was linked to their academic engagement and Galla et al. (2018) reported that middle and high school students' intrinsic value perceptions in the moment were strongly related to motivational conflict. Additionally, Benden and Lauer mann (2022) reported that university students' situational expectancies, intrinsic value, and utility value went down while costs went up during the first half of the semester. These changes in situational motivation then affected students' study program satisfaction, exam performance, and course dropout (Benden & Lauer mann, 2022).

Regarding the connection between more general motivational beliefs and situational motivation, Dietrich et al. (2019) showed that students' motivational profiles in the moment were linked to their motivational dispositions at the start and finish of the semester, and partially related to the change in these dispositions during the semester. Similarly, Kim et al. (2023) showed that while general cost perceptions were connected to some of the situational costs, motivation regulation moderated this connection (Kim et al., 2023).

Unlike all other studies that used self-reports to study momentary variations in motivation, Graham et al. (2023) used physiological data as well, specifically salivary cortisol, to examine the relation between changes in undergraduate students' expectancies for success and changes in the physiological component of anxiety during an exam. The results revealed that students' expectancy for success decreased during the exam and the change in expectancy for success was negatively associated with the change in cortisol (Graham et al., 2023).

Malmberg et al. (2015) investigated the situation-specific experiences of autonomous and controlled motivation of primary school students over one week. They found that controlled motivation had a positive effect on autonomous motivation at the situation-level. However, there were differences in these effects at the student level: only the students with lower performance reported higher autonomous motivation when controlled motivation was also high (Malmberg et al., 2015). Ketonen

et al. (2018) explored how daily autonomous and controlled-motivated educational goals influenced university students' academic emotions and found that setting autonomous educational goals was linked to positive emotions, while setting controlled goals was associated with negative emotions. Lee and Bong (2022), on the other hand, demonstrated how the changes in students' momentary achievement goals affected different learning outcomes. However, the explanatory power of achievement goals was greater at the person level than at the within-person level (Lee & Bong, 2022).

Huang and Gao (2013) examined how previous mastery experiences, situational interest, and physical activity were related in the context of a dance game from the SCT perspective. They found that students who had prior mastery experiences showed higher situational interest than those who did not have such experiences (Huang & Gao, 2013). Vongkulluksn et al. (2018) explored the motivational factors of elementary school students in makerspaces and discovered that self-efficacy was linked to situational interest. Nuutila et al. (2021; 2020) also analyzed how self-efficacy, situational interest, and performance interacted during a dynamic problem-solving task. Both studies emphasized the dynamic interplay of situational self-efficacy, interest, and performance. Nuutila et al. (2021) study showed that self-efficacy decreased over time, and that higher initial self-efficacy and a smaller decline in self-efficacy were positively related to task performance. In another study, Nuutila et al. (2020) found that self-efficacy was more influential at the start of a task, while situational interest became more important for later task engagement. In the study by Symonds et al. (2021), self-efficacy was a significant predictor of the momentary engagement, along with gender, ethnicity, peer support, and classmate cognitive engagement.

The study by Bernacki et al. (2015) also supported the temporality of the associations between the different motivational constructs. They investigated motivational beliefs during learning and how changes in self-efficacy relate to both past and future learning events. They embedded self-efficacy prompts into an intelligent tutoring system for adolescents' algebra learning and found that learners experienced changes in their self-efficacy during a learning task. At first, their self-efficacy derived from prior performance but over time, the students began to use other performance indicators, such as the fluency of their problem solving, to judge their self-efficacy. Also, increased self-efficacy led to less frequent help-seeking, greater accuracy in problem-solving, and further improvements in subsequent tasks.

## Discussion

This systematic review aimed to bring together empirical studies concerning learners' situational motivation in academic learning contexts. First, it reviewed how much and by which methods motivational constructs derived from the five big motivation theories have been measured situationally. Altogether, only 80 studies published between 2013 and 2023 were found to measure situational motivation in an academic learning context, with more than half of the studies involving adults from Western countries. While the discussion over motivation theories has taken a

situative turn according to theoretical literature (Nolen, 2024), based on the results of this review, it seems that empirically we still lack cumulative, systematic evidence on situational motivation. Thus, we argue that there is a need for more explorative investigations that examine how different process-oriented data sources can inform about motivation as a situated and fluctuating phenomenon. Additionally, studies replicating the findings from different settings are needed to reveal and validate the methods that appear most prominent. This is particularly meaningful for the methodological development aiming to produce systematic and generalizable evidence of situational motivation.

### **Theoretical Foundations: Prevalence of SDT, EVT, and Self-Efficacy**

In terms of the five major motivation theories, SDT and EVT were most often represented, as well as self-efficacy construct related to SCT. In terms of other motivation theories and constructs, the evidence on a situational level is still limited. This is consistent with the recent conceptual development of these theories. Especially EVT framework has been developed in a systematic way to recognize the situation- and context-specificity of its constructs resulting in its situated extension SEVT (Eccles & Wigfield, 2020). Self-efficacy, on the other hand, is based on Bandura's SCT that views motivation in relation to cognition and emotions as well as other personal factors and sociocultural environment making it contextualized and thus, giving a logical way for researchers to study self-efficacy also with a situation-specific or momentary approach. Moreover, it can be debated that some of the theories, such as SDT, currently offer more validated and widely used methods to measure the constructs on a situation-specific level (e.g., SIMS; Guay et al., 2000). This could partly account for why some of the theories were more common than others among the empirical studies on situational motivation.

### **Methodological Approaches: Dominance of Offline Measures over Online Measures**

In terms of methods, most studies used situation-specific (offline) measures rather than momentary (online) measures. This makes sense as the situational motivation studies seem to usually use subjective self-reports to examine motivation: all the included studies used self-reports, while only a few studies used some complementary data channel, some even a bit more exploratory ones like EEG and cortisol (Graham et al., 2023; Wimmer et al., 2019). The findings of the review showed how online measures of motivation that provide high-granularity information on a momentary basis are still rare and only emerging. There is a need to investigate the potential of these more granular online process measures, such as physiological and log data, in studying learners' situational motivation. Such data would also enable tracking the 'real' continuous processes on the analysis-level (Järvelä et al., 2021).

For example, Graham et al. (2023) showed that students' expectancy for success declined during the exam and the change in expectancy for success was negatively related to anxiety measured with a change in cortisol (Graham et al., 2023),

providing promising indications that changes in motivational beliefs might be reflected in learners' physiological responses. We want to emphasize though, that as motivation is based on the learner's subjective beliefs (Graham & Weiner, 2012), there is no need to underestimate the high importance of self-reported subjective interpretations of situational motivation. Instead, the wider variety in methods and multimodal approaches could increase the possibilities to capture motivation with a higher granularity and more unobtrusively without interrupting the natural flow of the learning process (Järvenoja et al., 2018).

### **Empirical Insights: Three Key Findings on Situational Motivation**

The synthesis of the included studies revealed three main insights on the situational variation of different motivational constructs. First, the situation-specific wave studies, in particular, provided evidence that situational motivation can be influenced by the learning context. Although these studies varied in their theoretical frameworks, motivational constructs, and interventions with specific features, they strongly suggested that the learning context is shaping students' situational motivation, consistent with prior literature (Dietrich et al., 2022). Yet, this variation of the contextual features hinders the provision of systematic evidence on how the specific constructs are related to the specific features of the context. Therefore, there is still a lot to learn about how the context affects the emergence and development of situational motivation in learning (Hagenauer et al., 2023). On a broader scale, most of the studies that fulfilled the inclusion criteria were carried out in Western countries and with adult learners, and the evidence on how the context affects situational motivation and its development was especially limited for children. Furthermore, cultural differences inherent in different contexts need to be more thoroughly examined in the future. In general, more studies are required that gather data from multiple contexts and enable a systematic analysis of contextual differences and the generalizability of the findings to fully comprehend the role of social and cultural context for the functioning of motivation in situations (Wang et al., 2020).

Second, situational motivation seems to vary between individuals, but even more within individuals from one moment to another. Students' motivational states can shift in response to a learning task or specific classroom events, such as feedback from teachers or interactions with peers as well as learning progress and experience of success (Ahola et al., 2023; Järvenoja et al., 2025; Skinner et al., 2022). This highlights the dynamic nature of situational motivation, which can be influenced by various temporal factors (Järvenoja et al., 2018). The studies included in this review demonstrated this temporal variation, for example, in expectancies, values, costs, achievement goals and goal orientations. There was also evidence showing that some constructs within the theoretical frameworks might be more sensitive to temporal impact than others (Kim et al., 2023; Paumier & Chanal, 2022). This may be because some constructs are more closely tied to momentary task experiences, such as effort and expectancies for success related to task progress (Järvenoja et al., 2025; Kim et al., 2023), while others reflect more stable, trait-like beliefs. For instance, controlled motivation for studies tends to remain stable across different topics and

tasks, whereas autonomous motivation may fluctuate depending on students' preferences and the specific context (Paumier & Chanal, 2022). Additionally, more stable, trait-like beliefs—such as a general interest in the subject—may have a stronger influence on situational motivation at the start of a task, but their impact may diminish as the task progresses and situational factors become more prominent (Shubina et al., 2021).

Third, the included studies clearly demonstrated the complexity of situational motivation and its temporal relations to other constructs and learning processes. The included studies evidenced the relations between situational motivation and for example effort, engagement, emotions, and learning outcomes (e.g., Ketonen et al., 2018; Kiuru et al., 2020; Lee & Bong, 2022; Symonds et al., 2021). However, the synthesis of the empirical findings showed clearly that the existing body of research on this topic is somewhat fragmented with heterogeneous findings. There is a need for further empirical investigation to better understand the mechanisms driving learners' situational motivation and to identify patterns that can be generalized between individuals and across different educational settings (Pekrun & Marsh, 2022). More research is needed also to clarify the causal mechanisms and temporal dynamics of these relations, as well as the individual and social conditions and moderators that might influence them (Bürger & Schmitt, 2017). Finally, engaging in a dialogue between empirical findings and theoretical frameworks is essential to refine our understanding of situational motivational dynamics (Hilpert et al., 2023).

## Limitations

This systematic review has limitations that need to be acknowledged. First, as the field of academic motivation research encompasses various theories and concepts, it was difficult to conduct systematic searches that would cover all the relevant studies. Second, the search for relevant studies was conducted on March 29, 2023, and as such, studies published after this date may have been excluded. These shortcomings were reduced by systematically checking the references and citations of the included studies to possibly locate the studies that were not found in the initial searches. Furthermore, while this review focused on how situational motivation has been studied within five big motivational theories, broader integrative frameworks, such as the Basic Model of Motivation (Urhahne & Wijnia, 2023) and the Unified Model of Task-specific Motivation (De Brabander & Martens, 2014), can provide valuable perspectives for future research on how different motivational constructs interact on situational level.

The synthesis of the results was done in a descriptive way, and no meta-analysis was performed. That is, there were few studies that would examine the same construct in a similar way, and thus, a more descriptive approach was deemed to be suitable. Since qualitative synthesis involves interpretative analysis, it may introduce some degree of subjectivity despite efforts to maintain rigor and transparency. Additionally, variation in the research designs and reporting of the included studies may have affected the overall reliability of the synthesized findings. Finally, the possibility of publication bias should be acknowledged, as studies with significant

or positive results are more likely to be published, potentially limiting the scope of available evidence. Nevertheless, the review provided important information on the status of the current situational motivation research with implications to theory, methodological progress, and development of AI-driven advanced technologies for academic motivation and SRL support.

## Conclusions

This systematic review highlights the role of context and time in studying situational motivation within educational settings. Based on the synthesized empirical evidence, situational motivation demonstrates significant contextual and temporal variability, not only between individuals but also within individuals from moment to moment. This variability highlights the importance of methodologies that can capture these shifts in motivational states (Järvenoja et al., 2018; Goetz et al., 2016). Therefore, we propose that the situation-specific and momentary waves of motivation research, which have been widely dominated by self-report measures, could be followed by a new *process-oriented wave* exploring the possibilities that the novel, unobtrusive online process measures could bring. These high-granularity, continuous data collection methods could provide a more comprehensive picture of situational motivation, complementing traditional self-report methods and offering nuanced insights into the dynamics of motivation (Molenaar et al., 2023).

Moreover, this review demonstrates that studies on situational motivation do not consider motivational constructs in isolation, but in complex and temporal interplay with other learning related processes. This provides implications also for the development of advanced AI-based learning technologies. On one hand, the complex structure and situation-specificity of motivation can make it challenging to predict and support with advanced technologies that might make too simplistic assumptions on learning motivation. The challenge the motivation poses for the personalized and automated learning support is not only about variation between individuals in how they react in certain situations, but there is also variation in motivation within persons (Murayama et al., 2017). The traditional methods implemented in motivation research and reflected in motivation theories have often failed to capture the dynamic and temporal nature of motivation, necessitating the adoption of process-oriented and context-sensitive approaches the advancements in technology can provide (Azevedo & Gašević, 2019; Järvelä & Bannert, 2021).

Although studies in the momentary wave have already employed some online process measures, our proposed process-oriented wave aims to build on these approaches by aiming for a more systematic integration of multimodal data. While capturing situational motivation using these methods, particularly physiological measures, may be more challenging compared to other constructs like emotions or stress (Horvers et al., 2021), we believe that such integration could offer richer insights into the situation-specific nature of motivation. While self-reports remain crucial for measuring motivation, combining it with other process data sources, such as continuous measurement methods or log data, would provide a more comprehensive understanding.

For example, while self-reports could be used to assess learners' motivational beliefs at the beginning and end of the task, log data could offer insights into their momentary engagement and situational interest by tracking the time spent on the task and the information sources they read or selected. This combination would help capture both learners' perceived motivation and their actual, real-time engagement, providing a more nuanced understanding of their situational motivation.

By integrating multimodal data and advanced learning technologies, researchers can gain deeper insights into the real-time fluctuations of learners' situational motivation. As the knowledge of the situational motivation cumulates, the integration of AI and advanced learning technologies can become more prominent in offering new avenues for supporting situational motivation as a part of SRL, enabling more effective and personalized support for example, by providing timely feedback that enhances learners' ability to self-regulate (Järvelä et al., 2023; Molenaar et al., 2023).

In conclusion, advancing situational motivation research is essential for both refining motivation theories and developing sophisticated AI-driven learning technologies supporting motivated SRL. Future research is encouraged to focus on integrating process-oriented approaches with multimodal data to capture the complexity of motivational processes, leading to more effective educational interventions and personalized learning environments. This integration is key to supporting SRL and ensuring that learners receive the tailored motivational support they need to succeed.

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**Data Availability** The articles included in this systematic review, along with the coded information, are available in the Supplementary File.

## Declarations

**Conflict of interests** The authors have no competing interests to declare that are relevant to the content of this article.

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