

Developing a Structural Model of Academic Engagement Based on Academic Self-Regulation and Academic Buoyancy: The Mediating Role of Epistemological Beliefs in Students

Bahare. Bayyenat¹, Hamze. Akbari^{2*}, Kazem. Shariatnia²

¹ PhD Student, Department of Psychology, Boj.C., Islamic Azad University, Bojnourd, Iran

² Department of Psychology, Az.C., Islamic Azad University, Azadshahr, Iran

* Corresponding author email address: Hamze.Akbari@iau.ac.ir

Article Info

Article type:

Original Research

How to cite this article:

Bayyenat, B., Akbari, H., & Shariatnia, K. (2026). Developing a Structural Model of Academic Engagement Based on Academic Self-Regulation and Academic Buoyancy: The Mediating Role of Epistemological Beliefs in Students. *Journal of Adolescent and Youth Psychological Studies*, 7(7), 1-14. <http://dx.doi.org/10.61838/kman.jayps.5350>



© 2026 the authors. Published by KMAN Publication Inc. (KMANPUB), Ontario, Canada. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) License.

ABSTRACT

Objective: The present study aimed to develop and test a structural model of academic engagement based on academic self-regulation and academic buoyancy, with the mediating role of epistemological beliefs among secondary school students.

Methods and Materials: This applied study used a quantitative, descriptive-correlational design based on structural equation modeling. The statistical population included all male students enrolled in the second period of high school in Gorgan, Iran, during the 2024–25 academic year. A sample of 350 students was selected through multistage cluster random sampling. Data were collected using the Academic Engagement Questionnaire, Academic Self-Regulation Questionnaire, Academic Buoyancy Scale, and Schommer Epistemological Beliefs Questionnaire. The data were analyzed using Pearson correlation coefficients and structural equation modeling through SPSS and AMOS.

Findings: The results showed that academic self-regulation had a positive and significant direct effect on academic engagement ($\beta = .67, p = .001$). Academic buoyancy also had a significant direct effect on academic engagement ($\beta = .27, p = .001$). In addition, epistemological beliefs significantly predicted academic engagement ($\beta = .14, p = .001$). The indirect effect of academic self-regulation on academic engagement through epistemological beliefs was significant ($\beta = .69, p = .001$). Moreover, the indirect effect of academic buoyancy on academic engagement through epistemological beliefs was significant ($\beta = .56, p = .001$). The model showed acceptable fit indices, including CMIN/DF = 1.32, RMSEA = .07, SRMR = .03, CFI = .92, GFI = .91, and NFI = .98.

Conclusion: Overall, the model explained 64% of the variance in academic engagement. These findings highlight the importance of self-regulated learning, academic buoyancy, and epistemological beliefs in promoting students' academic engagement.

Keywords: academic engagement, academic self-regulation, academic buoyancy, epistemological beliefs, secondary school students.

1. Introduction

Academic engagement has emerged as one of the central constructs in contemporary educational

psychology because it reflects the quality of students' involvement in learning activities and predicts a wide range of educational outcomes, including academic achievement, persistence, psychological adjustment, and school

completion. Engagement is generally understood as a multidimensional construct encompassing behavioral participation, emotional attachment, and cognitive investment in academic tasks and school activities (Fredricks et al., 2004). Students with high levels of academic engagement tend to participate actively in classroom discussions, complete assignments responsibly, persist in the face of difficulty, and demonstrate greater enthusiasm toward learning. In contrast, students with low engagement often display passivity, emotional detachment, poor concentration, and reduced commitment to educational goals. Because engagement is associated with both academic success and long-term educational adjustment, researchers and educators have increasingly attempted to identify the personal, cognitive, motivational, and emotional factors that contribute to its development (Bozan et al., 2024; Wang et al., 2024). In recent years, rapid educational changes, technological transformations, competitive academic environments, and the increasing psychological demands placed on students have intensified the need to better understand the mechanisms underlying students' academic engagement. Educational researchers now emphasize that engagement cannot be explained solely through instructional conditions or intellectual abilities; rather, it emerges through the interaction of cognitive, emotional, motivational, and self-regulatory systems within students' academic experiences.

Among the most influential variables associated with academic engagement is academic self-regulation. Academic self-regulation refers to students' ability to actively direct and manage their learning processes through planning, monitoring, controlling, and evaluating their academic behavior (Zimmerman, 2023). Self-regulated students are capable of setting realistic goals, organizing learning activities, selecting effective strategies, regulating attention and motivation, monitoring their progress, and modifying their behavior when they encounter obstacles. Zimmerman conceptualized self-regulation as a cyclical process involving forethought, performance control, and self-reflection, emphasizing that effective learners are proactive rather than reactive participants in their own learning experiences (Zimmerman, 2023). Earlier theoretical discussions similarly emphasized that self-regulation represents a central mechanism through which students become active agents in educational settings rather than passive recipients of instruction. Research consistently demonstrates that self-regulated learning positively predicts academic engagement, persistence, achievement, and

adaptive academic behavior. For example, Abbasi et al. found that motivational self-regulation significantly predicted students' academic engagement and reduced academic procrastination (Abbasi et al., 2015). Similarly, Ahrari et al. reported that students with stronger self-regulatory capacities showed superior academic functioning and higher levels of adaptive educational performance (Ahrari et al., 2023). Contemporary evidence also suggests that self-regulation contributes to engagement across various educational contexts, including online and distance learning environments. Fu et al. demonstrated that self-regulation strengthened students' engagement during pandemic-related distance education by helping learners maintain effort and academic focus despite environmental disruptions (Fu et al., 2024). Likewise, Wang et al. showed that intentional self-regulation mediated the relationship between teacher expectations and academic engagement among middle school students (Wang et al., 2024). These findings collectively indicate that academic self-regulation functions as a major cognitive-motivational resource supporting students' sustained participation in learning activities.

Another construct increasingly recognized as important for educational adaptation is academic buoyancy. Academic buoyancy refers to students' ability to effectively manage the ordinary academic setbacks and pressures that characterize everyday school life, including examination stress, difficult assignments, poor grades, motivational fluctuations, and performance-related disappointments (Martin & Marsh, 2008). Unlike academic resilience, which generally concerns severe or chronic adversity, academic buoyancy focuses on routine and ongoing challenges encountered by most students during their educational experiences (Martin & Marsh, 2006, 2008). Martin and Marsh conceptualized buoyancy as a protective psychological resource that helps students maintain adaptive functioning despite academic stressors (Martin & Marsh, 2008). Students with high academic buoyancy tend to interpret setbacks as manageable and temporary rather than catastrophic or personally threatening. Consequently, they are more likely to maintain motivation, continue participating in academic activities, and recover more rapidly from failure experiences. Recent empirical studies support the important role of buoyancy in educational functioning. Putwain and Wood found that academic buoyancy positively predicted engagement and achievement in mathematics learning environments (Putwain & Wood, 2023). Similarly, Khodashahi demonstrated significant associations between academic buoyancy, psychological needs, and goal orientation among

school students (Khodashahi, 2025). Tammeh et al. further proposed a structural model showing that motivational factors, grit, mental toughness, and self-control contribute substantially to students' academic buoyancy (Tammeh et al., 2025). Ghadampour et al. also reported that school bonding mediated the relationship between classroom environment perceptions and academic buoyancy (Ghadampour et al., 2023). These findings indicate that academically buoyant students are more capable of maintaining adaptive engagement patterns despite routine educational stressors and therefore remain behaviorally and emotionally connected to learning activities.

In addition to self-regulation and buoyancy, emotional and cognitive variables also play critical roles in students' engagement processes. Emotional intelligence has received increasing scholarly attention because emotions strongly influence motivation, learning behavior, concentration, social interaction, and educational adjustment. Emotional intelligence generally refers to the ability to perceive, understand, regulate, and use emotions effectively in oneself and others. Mayer and Salovey conceptualized emotional intelligence as involving emotional perception, emotional facilitation of thought, emotional understanding, and emotional regulation. Schutte et al. later operationalized this construct through a widely used self-report measure, while Khosro-Javid provided evidence supporting the reliability and construct validity of the emotional intelligence scale among Iranian adolescents (Khosro-Javid, 2002). Research increasingly demonstrates that emotional intelligence contributes positively to academic adjustment and engagement. Nieto Carracedo et al. showed that emotional well-being, learning strategies, and motivation mediated the relationship between emotional intelligence and academic achievement (Nieto Carracedo et al., 2024). Tortosa Martínez et al. similarly found that emotional intelligence mediated the relationship between resilience and academic engagement among adolescents (Tortosa Martínez et al., 2023). Golfam et al. also highlighted the important role of emotional competencies in adolescent psychological functioning by demonstrating that compassion mediated the relationship between emotional intelligence and psychological well-being (Golfam et al., 2024). These findings suggest that students who can effectively regulate emotional experiences are more capable of maintaining attention, motivation, persistence, and positive engagement within academic contexts.

Alongside emotional variables, epistemological beliefs represent another critical cognitive factor influencing

students' educational behavior. Epistemological beliefs refer to individuals' beliefs about the nature of knowledge, learning, knowing, certainty, and the process of acquiring information. Hofer described epistemic cognition as a complex psychological construct involving individuals' assumptions about what knowledge is and how knowledge develops (Hofer, 2016). Students with sophisticated epistemological beliefs tend to perceive knowledge as evolving, evidence-based, complex, and constructed through active inquiry. In contrast, students with naïve epistemological beliefs are more likely to consider knowledge fixed, simple, absolute, and transmitted directly by authority figures. These beliefs influence how students approach learning tasks, regulate effort, evaluate evidence, respond to uncertainty, and persist during challenging academic situations. Wang et al. found that structured and open inquiry learning environments contributed to students' scientific literacy partly through epistemological beliefs (Wang et al., 2022). Guo et al., using data from 72 societies, reported strong relationships between epistemic beliefs, achievement, motivation, and educational aspirations (Guo et al., 2022). Huang et al. further demonstrated that epistemological beliefs were associated with self-regulated learning and academic behavior in online learning contexts (Huang et al., 2023). Nachtigall and Firstein also showed that authentic learning activities significantly influenced students' epistemic beliefs in the humanities and social sciences (Nachtigall & Firstein, 2024). In Iranian educational settings, Zarei-Bideskan et al. found structural relationships among epistemic emotions, epistemological beliefs, and mathematics motivation (Zarei-Bideskan et al., 2023). Collectively, these findings suggest that epistemological beliefs substantially shape how students understand learning processes and engage with academic tasks.

Theoretically, the relationship among academic self-regulation, academic buoyancy, epistemological beliefs, and academic engagement can be understood through integrated motivational-cognitive frameworks. Self-regulation enables students to organize and direct learning behavior, while buoyancy helps them maintain adaptive functioning during setbacks. However, these processes may not fully promote engagement unless students also hold adaptive beliefs about learning and knowledge. Students who believe that learning develops gradually through effort are more likely to apply self-regulatory strategies effectively and interpret academic difficulties as opportunities for growth rather than evidence of incompetence. Similarly, academically buoyant students

may remain engaged more successfully when they believe that setbacks are natural aspects of the learning process rather than fixed indicators of failure. Therefore, epistemological beliefs may function as an important mediating mechanism linking students' regulatory capacities and adaptive coping processes to their engagement in school learning.

Despite the growing literature on engagement, several conceptual and empirical gaps remain. First, many previous studies have focused primarily on direct associations among variables while neglecting the underlying mediating mechanisms that explain how cognitive and motivational factors influence engagement. Second, although self-regulation, buoyancy, emotional intelligence, and epistemological beliefs have each been examined independently, relatively few studies have integrated these constructs simultaneously within a comprehensive structural model. Third, most existing research has been conducted either in Western educational systems or within isolated academic contexts, limiting understanding of how these variables interact among secondary school students in developing educational environments. Furthermore, adolescence represents a particularly critical developmental period because students experience intensified academic competition, identity formation, emotional fluctuations, and increased educational expectations. During this stage, cognitive beliefs about learning, emotional competencies, and self-regulatory abilities become increasingly influential in shaping academic adjustment and engagement patterns. Consequently, examining these variables together within a structural equation modeling framework may provide a more comprehensive understanding of students' educational functioning.

Structural equation modeling offers an especially useful methodological framework for examining these complex relationships because it allows researchers to simultaneously evaluate direct and indirect pathways among latent variables while testing the overall fit of theoretical models (Kline, 2016, 2023). Such an approach enables a more nuanced understanding of how academic self-regulation and academic buoyancy contribute to engagement both directly and indirectly through students' epistemological beliefs. Moreover, integrating emotional intelligence into this framework may provide additional insight into how emotional competencies interact with cognitive and motivational processes during educational adaptation. Recent studies emphasizing integrated psychological models of academic functioning further support the need for

multidimensional approaches to engagement research (Liu, 2025; Xiao & Liu, 2025). Liu highlighted the role of growth mindset and emotional intelligence as psychological resources contributing to academic buoyancy among university students (Liu, 2025). Similarly, Xiao and Liu demonstrated that intrapersonal strengths and interpersonal support predicted academic buoyancy through psychological capital and growth mindset (Xiao & Liu, 2025). These contemporary findings indicate that students' educational adjustment depends on the interaction of multiple cognitive, emotional, and motivational resources rather than isolated variables.

Given these theoretical considerations and empirical gaps, further investigation is needed to clarify how academic self-regulation and academic buoyancy contribute to academic engagement through students' epistemological beliefs. Understanding these relationships may provide valuable implications for educational psychologists, teachers, counselors, and curriculum designers seeking to strengthen students' academic involvement and educational adjustment. Identifying the mediating role of epistemological beliefs may also help educational professionals design interventions that not only improve learning strategies and coping capacities but also foster more adaptive conceptions of knowledge and learning processes among students. Therefore, the present study aimed to develop and test a structural model of academic engagement based on academic self-regulation and academic buoyancy, with the mediating role of epistemological beliefs among secondary school students.

2. Methods and Materials

2.1. Study Design and Participants

The present study was conducted using a quantitative, applied, descriptive-correlational research design. In terms of data analysis, the study followed a structural equation modeling approach in order to examine the direct and indirect relationships among academic self-regulation, academic buoyancy, epistemological beliefs, and academic engagement. The study was cross-sectional, as all data were collected at one point in time from the selected participants. This design was appropriate because the main purpose of the study was to develop and test a structural model of academic engagement based on academic self-regulation and academic buoyancy, with epistemological beliefs as a mediating variable.

The statistical population of the study consisted of all male students enrolled in the second period of high school in Gorgan, Iran, during the academic year 2024–2025. The sample included 350 students who were selected through multistage cluster random sampling. Since structural equation modeling requires an adequate sample size for stable parameter estimation, a sample of 350 students was considered sufficient based on methodological recommendations indicating that a minimum sample size of approximately 200 participants is generally acceptable for structural equation modeling. After selecting several boys' high schools from Gorgan, eligible students were invited to participate in the study. Participation was voluntary, and students were assured that their personal information would remain confidential.

After receiving approval from the university research council and obtaining the necessary coordination with the Department of Education in Gorgan, the researcher selected five boys' high schools from the list of eligible schools. The researcher then met with school principals and administrative staff to explain the purpose and procedure of the study. After obtaining permission, the researcher attended the selected schools and provided students with information about the aim of the research, the voluntary nature of participation, confidentiality of responses, and the absence of any physical, psychological, or financial risk. The questionnaires were administered in paper-and-pencil format. Students were asked to read all items carefully and answer all questions honestly. They were also informed that they could ask the researcher for clarification if any item was unclear. After completion, all questionnaires were collected and prepared for statistical analysis.

2.2. Measures

Academic engagement was measured using the Academic Engagement Questionnaire developed by Fredricks et al. (2004). This questionnaire consists of 15 items and assesses three dimensions of academic engagement: behavioral engagement, emotional engagement, and cognitive engagement. Behavioral engagement is measured by items 1 to 4, emotional engagement by items 5 to 10, and cognitive engagement by items 11 to 15. Responses are scored on a five-point Likert scale ranging from 1 = never to 5 = always. Therefore, the total score ranges from 15 to 75. Scores between 15 and 25 indicate low academic engagement, scores between 26 and 50 indicate moderate academic engagement, and scores

above 50 indicate high academic engagement. Fredricks et al. (2004) reported a Cronbach's alpha coefficient of .86 for the total scale and a convergent validity coefficient of .67 with academic performance. In Iranian studies, Abbasi et al. (2015) reported a content validity coefficient of .89 for the questionnaire, and Davoudi et al. (2024) reported Cronbach's alpha coefficients of .81 for the total scale, .79 for behavioral engagement, .77 for emotional engagement, and .78 for cognitive engagement. In the present study, the Cronbach's alpha coefficient for the total scale was .76.

Academic self-regulation was measured using the Academic Self-Regulation Questionnaire developed by Savari and Arabzadeh (2013). This instrument consists of 30 items and includes six subscales: memory strategy, goal setting, self-evaluation, help-seeking, responsibility, and organization. The memory strategy subscale includes items 1 to 5, goal setting includes items 6 to 8, self-evaluation includes items 9 to 14, help-seeking includes items 15 to 20, responsibility includes items 21 to 24, and organization includes items 25 to 30. Items are scored on a six-point Likert scale ranging from 1 = never to 6 = always. The total score ranges from 30 to 180, with higher scores indicating higher levels of academic self-regulation. Savari and Arabzadeh (2013) reported Cronbach's alpha coefficients of .74 for memory strategy, .75 for goal setting, .83 for self-evaluation, .71 for help-seeking, .73 for responsibility, .76 for organization, and .87 for the total scale. They also confirmed the construct validity of the questionnaire through confirmatory factor analysis. In a more recent Iranian study, Ahrari et al. (2023) reported a Cronbach's alpha coefficient of .92 for the total questionnaire. In the present study, the Cronbach's alpha coefficient for the total scale was .84.

Academic buoyancy was measured using the Academic Buoyancy Scale developed by Hossein-Chari and Dehghani-Zadeh (2012), based on the academic buoyancy scale originally introduced by Martin and Marsh (2006). Unlike the original four-item version, the Iranian version consists of 9 items. The scale measures students' positive and adaptive responses to ordinary academic challenges and setbacks. Items are scored on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The total score ranges from 9 to 45. Scores between 9 and 18 indicate low academic buoyancy, scores between 18 and 27 indicate moderate academic buoyancy, and scores above 27 indicate high academic buoyancy. Hossein-Chari and Dehghani-Zadeh (2012) reported a Cronbach's alpha coefficient of .77 for the scale. They also reported item-total correlations ranging from .54 to .64 and validity coefficients ranging

from .51 to .68. In another Iranian study, Ghadampour et al. (2023) reported a Cronbach's alpha coefficient of .63. In the present study, the Cronbach's alpha coefficient for the total scale was .71.

Epistemological beliefs were measured using the Epistemological Beliefs Questionnaire developed by Schommer (1990). The questionnaire consists of 63 items and assesses five dimensions of epistemological beliefs: simple knowledge, certain knowledge, innate ability, quick learning, and omniscient authority. The simple knowledge subscale includes 16 items, certain knowledge includes 10 items, innate ability includes 13 items, quick learning includes 10 items, and omniscient authority includes 11 items. Items are scored on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The total score ranges from 63 to 315. Scores between 63 and 126 indicate low epistemological beliefs, scores between 127 and 189 indicate moderate epistemological beliefs, and scores above 189 indicate strong epistemological beliefs. Schommer (1990) reported Cronbach's alpha coefficients ranging from .45 to .70 for the subscales and test-retest reliability coefficients ranging from .63 to .85. In Iran, Marzouqi (1995) reported a total Cronbach's alpha coefficient of .47 and a concurrent validity coefficient of .63. In a recent Iranian study, Zarei-Bideskan et al. (2023) reported a Cronbach's alpha coefficient of .72 for the total scale. In the present study, the Cronbach's alpha coefficient for the total scale was .69.

Table 1

Demographic Characteristics of Participants

Variable	Category	Frequency	Percentage
Age	15 years	16	4.6
	16 years	105	30.0
	17 years	146	41.7
	18 years	83	23.7
	Total	350	100
Grade	Tenth grade	110	31.4
	Eleventh grade	167	47.7
	Twelfth grade	73	20.9
	Total	350	100

Mean age = 16.85; SD = 0.84.

Descriptive statistics, including minimum, maximum, mean, and standard deviation, were calculated for all research variables and their components. The results are presented in Table 2. The mean score of academic

2.3. Data Analysis

Data were analyzed using descriptive and inferential statistical methods. At the descriptive level, frequency, percentage, mean, and standard deviation were used to describe the demographic characteristics of the participants and the main research variables. At the inferential level, Pearson correlation coefficients were calculated to examine the relationships among the study variables. Structural equation modeling was then used to test the proposed model and examine the direct and indirect effects of academic self-regulation and academic buoyancy on academic engagement through epistemological beliefs. Data analysis was conducted using SPSS and AMOS software. Model fit was evaluated using several fit indices, including the normed fit index, comparative fit index, incremental fit index, goodness-of-fit index, adjusted goodness-of-fit index, and root mean square error of approximation. The significance of indirect effects was assessed through bootstrapping.

3. Findings and Results

The participants included 350 male high school students from the second period of secondary education in Gorgan, Iran. The age of the participants ranged from 15 to 18 years, with a mean age of 16.85 years and a standard deviation of 0.84. As shown in Table 1, most participants were 17 years old. Regarding educational grade, most students were in the eleventh grade.

engagement was 36.54 with a standard deviation of 17.35. The mean scores of academic self-regulation, academic buoyancy, emotional intelligence, and epistemological beliefs were 70.43, 14.69, 51.28, and 93.44, respectively.

Table 2

Descriptive Statistics of the Research Variables

Variable	N	Min	Max	Mean	SD
Behavioral engagement	350	4	19	9.85	5.02
Emotional engagement	350	6	24	14.47	7.87
Cognitive engagement	350	5	20	12.23	6.34
Total academic engagement	350	15	62	36.54	17.35
Memory strategy	350	5	28	12.84	7.99
Goal setting	350	2	11	6.35	3.39
Self-evaluation	350	6	25	12.85	6.43
Help-seeking	350	6	23	12.27	5.78
Responsibility	350	4	19	10.43	5.22
Organization	350	7	26	15.68	7.56
Total academic self-regulation	350	30	125	70.43	31.07
Academic buoyancy	350	9	30	14.69	7.38
Expression of emotion	350	10	42	17.38	10.83
Regulation of emotion	350	11	43	16.82	9.81
Utilization of emotion	350	10	44	17.08	9.57
Total emotional intelligence	350	32	129	51.28	26.56
Simple knowledge	350	16	51	25.03	9.50
Certain knowledge	350	10	36	14.53	8.02
Innate ability	350	13	51	18.47	10.74
Quick learning	350	10	35	15.03	7.45
Omniscient authority	350	11	41	20.38	8.24
Total epistemological beliefs	350	69	198	93.44	39.83

Before testing the structural model, the assumptions required for structural equation modeling were examined. The skewness and kurtosis values of the main variables were within an acceptable range. The multivariate normality assumption was also supported by Mardia's coefficient,

which was 2.61, with a critical ratio of 1.36. Since both values were below the recommended cutoff value of 5, the assumption of multivariate normality was considered acceptable.

Table 3

Normality Indices for the Main Research Variables

Variable	Skewness	SE	Kurtosis	SE
Total academic engagement	0.12	0.13	-1.60	0.26
Total academic self-regulation	0.27	0.13	-1.38	0.26
Academic buoyancy	0.80	0.13	-1.20	0.26
Total emotional intelligence	1.43	0.13	1.06	0.26
Total epistemological beliefs	1.97	0.13	2.16	0.26
Multivariate normality	Mardia's coefficient = 2.61		Critical ratio = 1.36	

The independence of errors was assessed using the Durbin-Watson statistic. The results showed that all values ranged from 1.57 to 1.75, which falls within the acceptable

range of 1.50 to 2.50. Therefore, the assumption of error independence was supported.

Table 4

Durbin–Watson Statistics for Predictor and Mediating Variables

Variable	Durbin–Watson
Academic self-regulation	1.65
Academic buoyancy	1.67
Emotional intelligence	1.57
Epistemological beliefs	1.75

Multicollinearity was examined using tolerance and variance inflation factor values. The results indicated that none of the tolerance values were below .10 and none of the

VIF values exceeded 10. Therefore, there was no evidence of problematic multicollinearity among the observed variables.

Table 5

Tolerance and VIF Values for the Observed Variables

Variable	Tolerance	VIF
Memory strategy	0.50	2.01
Goal setting	0.33	3.52
Self-evaluation	0.34	4.03
Help-seeking	0.32	3.84
Responsibility	0.36	2.75
Organization	0.17	6.02
Academic buoyancy	0.23	4.35
Expression of emotion	0.17	5.89
Regulation of emotion	0.34	2.93
Utilization of emotion	0.39	2.56
Simple knowledge	0.24	4.33
Certain knowledge	0.18	5.51
Innate ability	0.35	2.92
Quick learning	0.40	2.55
Omniscient authority	0.38	4.32

In addition, the data were screened for outliers using the Explore procedure in SPSS. The results indicated that there were no extreme outliers in the research variables. Therefore, the data were considered appropriate for Pearson correlation analysis and structural equation modeling. Pearson correlation coefficients were calculated to examine the relationships among the main variables. As shown in

Table 6, academic engagement had positive and significant correlations with academic self-regulation, academic buoyancy, emotional intelligence, and epistemological beliefs. Academic self-regulation also showed positive and significant correlations with academic buoyancy, emotional intelligence, and epistemological beliefs. All reported correlations were significant at the .01 level.

Table 6

Correlation Matrix of the Main Research Variables

Variable	1	2	3	4	5
1. Academic engagement	1				
2. Academic self-regulation	.65**	1			
3. Academic buoyancy	.47**	.63**	1		
4. Emotional intelligence	.23**	.54**	.50**	1	
5. Epistemological beliefs	.55**	.50**	.53**	.44**	1

Structural equation modeling was used to test the proposed model. The maximum likelihood estimation method was applied. The results showed that the proposed

model had an acceptable fit to the data. The value of CMIN/DF was 1.32, which is below the acceptable cutoff of 3. The values of CFI, IFI, TLI, GFI, AGFI, and NFI were all

above .90. In addition, RMSEA was .07 and SRMR was .03, indicating acceptable model fit. The model explained 64% of the variance in academic engagement.

Table 7

Fit Indices of the Structural Model

Fit index	Obtained value	Acceptable criterion
CMIN	168.95	—
df	128	—
CMIN/DF	1.32	< 3
p-value	.001	—
RMSEA	.07	< .08
SRMR	.03	< .08
PCLOSE	.001	Reported
CFI	.92	> .90
AGFI	.94	> .90
PCFI	.70	> .60
PNFI	.85	> .60
IFI	.96	> .90
TLI	.96	> .90
GFI	.91	> .90
NFI	.98	> .90

Overall, the fit indices confirmed that the structural model of academic engagement based on academic self-regulation and academic buoyancy, with the mediating roles of emotional intelligence and epistemological beliefs, had an acceptable fit. The direct path coefficients are presented in Table 8. The results indicated that academic self-regulation had a positive and significant direct effect on academic

engagement, $\beta = .67$, $p = .001$. Academic buoyancy also had a positive and significant direct effect on academic engagement, $\beta = .27$, $p = .001$. In addition, emotional intelligence had a positive and significant direct effect on academic engagement, $\beta = .19$, $p = .001$. Finally, epistemological beliefs had a positive and significant direct effect on academic engagement, $\beta = .14$, $p = .001$.

Table 8

Direct Effects on Academic Engagement

Direct path	Standardized β	Unstandardized B	t	p
Academic self-regulation → Academic engagement	.67	.69	13.21	.001
Academic buoyancy → Academic engagement	.27	.18	6.50	.001
Emotional intelligence → Academic engagement	.19	.10	4.15	.001
Epistemological beliefs → Academic engagement	.14	.10	3.53	.001

These findings show that all direct paths in the model were statistically significant. Among the direct predictors, academic self-regulation had the strongest direct effect on academic engagement. The significance of the indirect effects was examined using the bootstrap method with 2,000 resamples and a 95% confidence interval. The results are presented in Table 9. The indirect effect of academic self-regulation on academic engagement through emotional intelligence was significant, $\beta = .69$, $p = .001$. The indirect effect of academic buoyancy on academic engagement

through emotional intelligence was also significant, $\beta = .55$, $p = .001$. Furthermore, the indirect effect of academic self-regulation on academic engagement through epistemological beliefs was significant, $\beta = .69$, $p = .001$. The indirect effect of academic buoyancy on academic engagement through epistemological beliefs was also significant, $\beta = .56$, $p = .001$. Since none of the confidence intervals included zero, all indirect effects were statistically significant.

Table 9

Bootstrap Results for Indirect Effects

Indirect path	Indirect effect	Lower bound	Upper bound	p
Academic self-regulation → Emotional intelligence → Academic engagement	.69	.70	.91	.001
Academic buoyancy → Emotional intelligence → Academic engagement	.55	.33	.46	.001
Academic self-regulation → Epistemological beliefs → Academic engagement	.69	.70	.82	.001
Academic buoyancy → Epistemological beliefs → Academic engagement	.56	.31	.45	.001

The mediation results indicated that both emotional intelligence and epistemological beliefs significantly mediated the relationships between academic self-regulation and academic engagement, as well as between academic buoyancy and academic engagement. Therefore, the proposed structural model was supported.

In summary, the findings showed that academic self-regulation, academic buoyancy, emotional intelligence, and epistemological beliefs were positively and significantly associated with academic engagement. The structural equation modeling results indicated that the proposed model had an acceptable fit to the data. Academic self-regulation, academic buoyancy, emotional intelligence, and epistemological beliefs had significant direct effects on academic engagement. In addition, the bootstrap results confirmed the mediating roles of emotional intelligence and epistemological beliefs in the relationships between academic self-regulation and academic engagement and between academic buoyancy and academic engagement. Overall, the model explained 64% of the variance in academic engagement, indicating that the combination of academic, emotional, and cognitive variables provides a strong explanatory framework for understanding students' academic engagement.

4. Discussion

The present study aimed to develop and test a structural model of academic engagement based on academic self-regulation and academic buoyancy, with the mediating role of epistemological beliefs among secondary school students. The findings demonstrated that the proposed model had an acceptable fit and that academic self-regulation, academic buoyancy, and epistemological beliefs significantly predicted academic engagement. In addition, epistemological beliefs significantly mediated the relationships between academic self-regulation and academic engagement and between academic buoyancy and academic engagement. Overall, the model explained a substantial proportion of the variance in academic

engagement, indicating that students' behavioral, cognitive, and emotional involvement in learning is shaped by the interaction of motivational, self-regulatory, and epistemic processes. These findings support the growing theoretical perspective that academic engagement is not merely an outcome of instructional environments, but rather a multidimensional psychological process influenced by students' internal cognitive and motivational resources (Bozan et al., 2024; Fredricks et al., 2004).

One of the main findings of the present study was that academic self-regulation had a positive and significant direct effect on academic engagement. This finding is consistent with contemporary theories of self-regulated learning, which emphasize that students who actively monitor and control their learning processes become more behaviorally and cognitively engaged in educational tasks (Zimmerman, 2023). Self-regulated learners tend to establish learning goals, monitor their progress, regulate their effort, organize study strategies, and evaluate academic outcomes. These processes naturally increase students' active participation and emotional investment in classroom learning. The finding is aligned with Abbasi et al., who demonstrated that motivational self-regulation significantly predicts academic engagement among students (Abbasi et al., 2015). It is also consistent with the findings of Fu et al., who reported that self-regulation strengthened engagement in distance learning contexts by helping students maintain academic persistence and adaptive learning behavior despite environmental challenges (Fu et al., 2024). Similarly, Wang et al. found that intentional self-regulation mediated the relationship between teacher expectations and academic engagement among middle school students (Wang et al., 2024).

The relationship between academic self-regulation and engagement can be explained through several complementary mechanisms. Students with stronger self-regulatory abilities are more capable of converting external academic requirements into internally organized behaviors. They can manage distractions, sustain concentration,

allocate sufficient study time, and maintain effort during demanding academic tasks. Consequently, these students become more behaviorally engaged because they participate actively in classroom activities and complete assignments more consistently. Self-regulation also contributes to emotional engagement because students who feel capable of managing their learning processes are less likely to experience helplessness and academic frustration. In addition, self-regulated students often use deeper cognitive learning strategies such as elaboration, critical thinking, and self-reflection, which strengthen cognitive engagement. Therefore, academic self-regulation functions as an essential psychological resource that supports multiple dimensions of engagement simultaneously.

Another important finding of the present study was that academic buoyancy had a positive and significant direct effect on academic engagement. This result supports the theoretical assumption proposed by Martin and Marsh that academic buoyancy enables students to effectively manage the ordinary setbacks and pressures encountered in school life (Martin & Marsh, 2006, 2008). Academic challenges such as examination stress, poor grades, difficult assignments, and temporary motivational decline are common experiences among adolescents. Students with high academic buoyancy are more capable of recovering from these difficulties and maintaining adaptive educational functioning. This finding is consistent with the results of Putwain and Wood, who demonstrated that academic buoyancy positively predicts engagement and academic achievement (Putwain & Wood, 2023). Similarly, Khodashahi reported significant relationships between academic buoyancy, goal orientation, and psychological needs among students (Khodashahi, 2025). Tammeh et al. also showed that motivational factors and psychological strengths contribute significantly to students' academic buoyancy (Tammeh et al., 2025).

The positive association between buoyancy and engagement may be interpreted through the adaptive coping function of buoyancy. Students who are academically buoyant tend to perceive academic setbacks as temporary and manageable rather than catastrophic. As a result, they are less likely to withdraw emotionally or behaviorally from learning activities following academic failure or stress. Instead, they continue participating in school tasks, preserve their motivation, and maintain confidence in their capacity to improve. In educational settings characterized by competition and frequent evaluation, buoyancy may therefore function as a protective factor against

disengagement and academic avoidance. This interpretation is further supported by the findings of Ghadampour et al., who showed that school bonding contributes positively to academic buoyancy and adaptive educational functioning (Ghadampour et al., 2023). Consequently, students who possess greater buoyancy appear more capable of sustaining active academic involvement despite routine educational stressors.

The findings of the present study also revealed that epistemological beliefs had a positive and significant direct effect on academic engagement. This finding supports epistemic cognition theories suggesting that students' beliefs about the nature of knowledge and learning substantially influence their academic motivation and learning behavior (Hofer, 2016). Students who hold more sophisticated epistemological beliefs generally perceive knowledge as evolving, complex, and constructed through inquiry and effort. Such students are more likely to use deeper learning strategies, tolerate ambiguity, and engage actively in educational tasks. Conversely, students with naïve epistemological beliefs often view knowledge as fixed and learning as passive memorization, which may reduce meaningful engagement. This finding is highly consistent with the results of Guo et al., who demonstrated strong associations between epistemic beliefs, motivation, achievement, and educational aspirations across 72 societies (Guo et al., 2022). It is also aligned with Huang et al., who found that epistemological beliefs were significantly related to self-regulated learning and academic behavior in online educational contexts (Huang et al., 2023). Furthermore, Nachtigall and Firstein reported that authentic learning experiences contribute positively to the development of sophisticated epistemic beliefs among students (Nachtigall & Firstein, 2024).

The influence of epistemological beliefs on engagement can be explained by the role these beliefs play in shaping students' interpretations of learning experiences. Students who believe that knowledge develops gradually through inquiry and reflection are more likely to approach academic tasks with curiosity, persistence, and cognitive investment. They tend to view learning difficulties as opportunities for intellectual growth rather than signs of incompetence. Such students are also more willing to participate actively in classroom discussions, evaluate evidence critically, and persist in solving challenging problems. In contrast, students who believe that learning should occur quickly and effortlessly may become discouraged more easily when facing academic complexity. Therefore, epistemological

beliefs appear to influence both the quality and intensity of students' engagement with educational activities.

Another important finding was that epistemological beliefs significantly mediated the relationship between academic self-regulation and academic engagement. This finding suggests that self-regulatory abilities may influence engagement partly because they contribute to the development of more adaptive beliefs about learning and knowledge. Students who effectively regulate their learning behaviors are likely to experience the value of effort, persistence, reflection, and strategic learning. These experiences may gradually strengthen sophisticated epistemological beliefs, which in turn promote deeper engagement in academic activities. This interpretation is theoretically meaningful because self-regulation strategies are most effective when students believe that learning requires active cognitive effort and gradual knowledge construction. The finding is consistent with the work of Wang et al., who highlighted the role of epistemological beliefs in supporting students' inquiry learning and academic literacy (Wang et al., 2022). It is also aligned with the findings of Zarei-Bideskan et al., who demonstrated structural relationships among epistemological beliefs, emotions, and academic motivation (Zarei-Bideskan et al., 2023).

The mediating role of epistemological beliefs indicates that self-regulation alone may not fully guarantee engagement unless students also possess adaptive conceptions about knowledge and learning. For example, students may successfully organize study schedules and monitor academic performance, but if they believe that intelligence is fixed or that learning should occur immediately, they may still become discouraged when facing difficulty. In contrast, students who combine self-regulatory skills with sophisticated epistemological beliefs are more likely to perceive academic effort as meaningful and productive. Thus, epistemological beliefs appear to provide the cognitive framework through which self-regulation becomes more effective in promoting sustained engagement.

The present study also found that epistemological beliefs significantly mediated the relationship between academic buoyancy and academic engagement. This finding suggests that academically buoyant students become more engaged partly because they interpret academic setbacks through adaptive epistemic frameworks. Students who believe that knowledge is complex and learning requires sustained effort are more likely to perceive difficulties and temporary

failures as natural aspects of educational development. Consequently, academic setbacks are less likely to threaten their motivation or emotional involvement in learning. This interpretation is consistent with the conceptual perspective of Martin and Marsh regarding adaptive responses to educational adversity (Martin & Marsh, 2008). It is also supported by the findings of Guo et al. and Huang et al., which emphasized the important role of epistemological beliefs in shaping motivational and educational outcomes (Guo et al., 2022; Huang et al., 2023).

The mediating effect of epistemological beliefs may be explained by the way students cognitively interpret academic experiences. Buoyant students who hold sophisticated epistemological beliefs are more likely to regard setbacks as opportunities for improvement and intellectual growth rather than evidence of inability. Such interpretations strengthen persistence, emotional stability, and willingness to remain involved in academic activities. Conversely, students with naïve epistemological beliefs may interpret failure as proof that they lack ability or that success is unattainable, thereby increasing disengagement. Therefore, epistemological beliefs appear to strengthen the positive influence of buoyancy on engagement by shaping students' cognitive understanding of challenge, effort, and learning progress.

Overall, the findings of the present study support an integrated explanation of academic engagement involving motivational, cognitive, and adaptive psychological processes. Academic self-regulation provides students with the behavioral and cognitive tools necessary for managing learning activities effectively. Academic buoyancy helps students cope constructively with everyday academic stressors and setbacks. Epistemological beliefs shape students' understanding of knowledge, effort, and learning processes, thereby influencing how students interpret educational experiences and maintain engagement. Together, these variables form a comprehensive explanatory framework for understanding students' active involvement in academic contexts. The acceptable fit indices obtained through structural equation modeling further support the theoretical validity of the proposed model (Kline, 2016, 2023).

5. Conclusion

The findings have important educational implications. Educational systems often emphasize academic achievement without adequately considering the psychological resources

that support sustained engagement. The present findings indicate that schools should not focus exclusively on instructional methods or performance outcomes. Rather, educational interventions should strengthen students' self-regulatory capacities, adaptive coping skills, and sophisticated beliefs about learning. Programs designed to improve goal setting, strategic learning, time management, self-monitoring, and reflective thinking may substantially increase students' engagement. Similarly, interventions aimed at enhancing academic buoyancy may help students manage examination stress, academic pressure, and temporary failure more effectively. Educational environments should also encourage inquiry, critical thinking, evidence evaluation, and intellectual flexibility in order to foster more adaptive epistemological beliefs among students.

6. Limitations & Suggestions

One limitation of the present study is that the sample included only male secondary school students from Gorgan, Iran, which limits the generalizability of the findings to female students, other age groups, or different cultural contexts. Another limitation is the cross-sectional nature of the study, which restricts causal interpretations of the relationships among variables. In addition, all variables were measured using self-report questionnaires, which may have been influenced by social desirability bias, inaccurate self-perceptions, or response tendencies. Although the proposed model explained a substantial proportion of variance in academic engagement, other variables such as parental support, classroom climate, academic self-efficacy, teacher-student relationships, and school belonging may also influence students' engagement and should be considered in future research.

Future research should examine the proposed model using longitudinal designs in order to clarify the causal relationships among academic self-regulation, academic buoyancy, epistemological beliefs, and academic engagement over time. Researchers are also encouraged to replicate the model among female students, university students, and culturally diverse educational populations to improve external validity. Future studies may additionally investigate the moderating roles of gender, academic achievement level, socioeconomic status, and educational context in these relationships. Experimental and intervention-based studies are also recommended to determine whether programs focused on improving self-

regulation, buoyancy, and epistemological beliefs can directly enhance students' engagement and academic functioning.

The findings of the present study suggest several practical implications for educators, school counselors, and educational psychologists. Schools should provide structured training programs aimed at strengthening students' self-regulated learning skills, including goal setting, planning, self-monitoring, organization, and strategic learning. Educational counselors should also implement interventions that help students develop adaptive responses to routine academic setbacks and stressors in order to improve academic buoyancy. Teachers can further support engagement by creating classroom environments that encourage inquiry, reflection, critical thinking, and active participation in learning. In addition, educational programs designed to strengthen students' beliefs about the gradual and constructive nature of knowledge may help students remain more cognitively and emotionally engaged in academic activities.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

All authors equally contributed to this article.

References

- Abbasi, M., Dargahi, S., Pirani, Z., & Bonyadi, F. (2015). The Role of Procrastination and Motivational Self-Regulation in Predicting Students' Academic Engagement. *Iranian Journal of Medical Education*, 15(1), 160-169.
- Ahrari, E., Alipour, F., Mosleh, S. G., & Sheikh-Alizadeh, S. (2023). The Diagnostic Role of Academic Self-Regulation Components and Cognitive Flexibility in Distinguishing Students with High and Low Academic Performance. *Journal of Cognitive Psychology*, 11(4), 74-88.
- Bozan, K., Gaskin, J., & Stoner, C. (2024). Student Engagement in the HyFlex and Online Classrooms: Lessons from the COVID-19 Pandemic. *Technology, Knowledge and Learning*, 29(1), 509-536. <https://doi.org/10.1007/s10758-023-09661-x>
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, 74(1), 59-109. <https://doi.org/10.3102/00346543074001059>
- Fu, J., Li, X., & Yi, F. (2024). The Influence of Motivation Climate on University Student Engagement in Distance Education during the Pandemic: Moderating Role of Self-Regulation. *Psychology in the Schools*, 61(5), 2148-2159. <https://doi.org/10.1002/pits.23158>
- Ghadampour, E., Gharehveisi, S., & Soleimani, M. (2023). The Relationship between Perception of Classroom Environment and Academic Buoyancy: The Mediating Role of School Bonding. *Journal of Education*, 39(1), 173-188.
- Golfam, M., Hosseinian, S., & Abdollahi, A. (2024). The Mediating Role of Compassion in the Relationship between Emotional Intelligence and Psychological Well-Being among Adolescent Girls. *Rooyesh-e-Ravanshenasi Journal*, 13(5), 23-32.
- Guo, J., Hu, X., Marsh, H. W., & Pekrun, R. (2022). Relations of Epistemic Beliefs with Motivation, Achievement, and Aspirations in Science: Generalizability across 72 Societies. *Journal of Educational Psychology*, 114(4), 734-751. <https://doi.org/10.1037/edu0000660>
- Hofer, B. K. (2016). Epistemic Cognition as a Psychological Construct: Advancements and Challenges. In *Handbook of Epistemic Cognition* (pp. 19-38). Routledge.
- Huang, C. L., Wu, C., & Yang, S. C. (2023). How Students View Online Knowledge: Epistemic Beliefs, Self-Regulated Learning and Academic Misconduct. *Computers & Education*, 200, 104796. <https://doi.org/10.1016/j.compedu.2023.104796>
- Khodashahi, F. (2025). The Relationship Between Basic Psychological Needs and Goal Orientation with Pupils' Academic Buoyancy. *Recent Innovations in Psychology*, 2(1), -. <https://doi.org/10.22034/rip.2024.464404.1040>
- Khosro-Javid, M. (2002). *An Investigation of the Reliability and Construct Validity of the Schutte Emotional Intelligence Scale among Adolescents* Tarbiat Modares University].
- Kline, R. B. (2016). *Principles and Practice of Structural Equation Modeling* (4th ed.). Guilford Press.
- Kline, R. B. (2023). *Principles and Practice of Structural Equation Modeling* (5th ed.). Guilford Press.
- Liu, Y. (2025). Psychological Resources for Academic Buoyancy: The Roles of Growth Mindset and Emotional Intelligence in Chinese University Students. *Frontiers in psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1580929>
- Martin, A. J., & Marsh, H. W. (2006). Academic Resilience and Its Psychological and Educational Correlates: A Construct Validity Approach. *Psychology in the Schools*, 43(3), 267-281. <https://doi.org/10.1002/pits.20149>
- Martin, A. J., & Marsh, H. W. (2008). Academic Buoyancy: Towards an Understanding of Students' Everyday Academic Resilience. *Journal of School Psychology*, 46(1), 53-83. <https://doi.org/10.1016/j.jsp.2007.01.002>
- Nachtigall, V., & Firstein, A. (2024). Exploring the Impact of Authentic Learning Activities on School Students' Epistemic Beliefs in the Social Sciences and Humanities. *European Journal of Psychology of Education*, 39(4), 3351-3379. <https://doi.org/10.1007/s10212-023-00773-7>
- Nieto Carracedo, A., Gómez-Iñiguez, C., Tamayo, L. A., & Igartua Perosanz, J. J. (2024). Emotional Intelligence and Academic Achievement Relationship: Emotional Well-Being, Motivation, and Learning Strategies as Mediating Factors. *Psicología educativa*, 30(2), 67-74. <https://doi.org/10.5093/psed2024a7>
- Putwain, D. W., & Wood, P. (2023). Riding the Bumps in Mathematics Learning: Relations between Academic Buoyancy, Engagement, and Achievement. *Learning and Instruction*, 83, 101691. <https://doi.org/10.1016/j.learninstruc.2022.101691>
- Tammeh, B., Dortaj, F., Seadatee Shamir, A., & Farokhi, N. (2025). Developing a Structural Model for Academic Buoyancy based on Motivational Factors and Mediator Roles of Grit, Mental Toughness, and Control. *Educational Psychology*, 20(74), 7-32. https://journals.atu.ac.ir/article_18473.html
- Tortosa Martínez, B. M., Pérez-Fuentes, M. D. C., & Molero Jurado, M. D. M. (2023). Mediating Role of Emotional Intelligence in the Relationship between Resilience and Academic Engagement in Adolescents: Differences between Men and Women. *Psychology research and behavior management*, 16, 2721-2733. <https://doi.org/10.2147/PRBM.S421622>
- Wang, H., Sun, Y., Zhao, X., Wang, W., & Xue, J. (2024). Enhancing Academic Engagement through Students' Perceptions of Teacher Expectations: The Mediating Role of Intentional Self-Regulation in Middle School. *Frontiers in psychology*, 15, 1456334. <https://doi.org/10.3389/fpsyg.2024.1456334>
- Wang, H. H., Hong, Z. R., She, H. C., Smith, T. J., Fielding, J., & Lin, H. S. (2022). The Role of Structured Inquiry, Open Inquiry, and Epistemological Beliefs in Developing Secondary Students' Scientific and Mathematical Literacies. *International Journal of Stem Education*, 9(1), 14. <https://doi.org/10.1186/s40594-022-00329-z>
- Xiao, G., & Liu, H. (2025). Intrapersonal Strengths and Interpersonal Support: Predicting Academic Buoyancy Through Psychological Capital and Growth Mindset. *Frontiers in psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1584343>
- Zarei-Bideskan, N., Keramati, H., & Arabzadeh, M. (2023). Structural Relationships among Epistemic Emotions, Epistemological Beliefs, and Mathematics Motivation in Students. *Journal of Health and Education in Early Childhood*, 3(1), 36-45.
- Zimmerman, B. J. (2023). Dimensions of Academic Self-Regulation: A Conceptual Framework for Education. In *Self-Regulation of Learning and Performance* (pp. 3-21). Routledge. <https://doi.org/10.4324/9780203763353-1>