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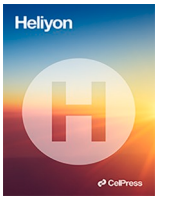

Review article

The relationship between school climate and students' non-cognitive skills: A systematic literature review

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ABSTRACT

The school climate plays a substantial part in student development. A positive and nurturing school climate encourages the growth of all-rounders and holistic individuals. Past literature has highlighted several domains related to the school climate, including academic performance, well-being, student engagement, attendance in school, delinquent behaviors, bullying, and school safety. However, little is known about the development of other related domains, like non-cognitive skills, in school. The purpose of the study is to review the linkages of school climate with the development of students' non-cognitive skills. The current study employs a systematic literature review that adheres to PRISMA to determine the association between school climate and students' non-cognitive skills. First, this study conducted three stages of rigorous and systematic searching: identification, screening, and eligibility. As a result of the search, this study identified 65 relevant articles from Scopus, Web of Science, and ScienceDirect as the leading databases and Google Scholar and Dimension. ai as supporting databases. Next, the current study highlights five clusters based on the analysis of network visualization by the VOSviewer software. These clusters are: the non-cognitive skills' intrapersonal and interpersonal key characteristics, a nurturing school climate and the presence of non-cognitive skills mitigate deviant behaviour in school settings, the non-cognitive skills as a predictor of academic outcomes, the multifaceted antecedents of school climate in promoting the development of student non-cognitive skills, the role of school domains and non-cognitive attributes towards students' cognitive development. This systematic literature review contributes a novel framework and an in-depth understanding of the relationship between school climate and students' non-cognitive skills. The current research serves as a starting point for future researchers to delve deeper into this subject matter to provide educational organisations with valuable guidance when navigating for better educational outcomes. In addition, the current review will shed light on the school climate and students' non-cognitive skills to further examine what has already been learnt and the missing links, contributing to the body of knowledge on this topic.

1. Introduction

The ultimate goal of education is to mould individuals with suitable behavioural, cognitive, emotional, spiritual, and skills for adulthood. In this volatile and fast-changing generation, it is pertinent for an education system to prepare students for their future,

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including the world of employment [1]. Hence, the school climate domain plays a central role in student outcomes. The concept of school climate has been highlighted in western literature and caught scholars' attention in the last half-century [2,3]. It seems that this concept appears distinct but may overlap with each other. Generally, the definition of school climate is twofold. The former, as highlighted by Refs. [4,5], mentioned that school climate comprises a set of interior features that vary amongst schools. While for the latter, scholars define school climate as the quality and character of schools in nurturing norms, values, and expectations that support individuals feeling socially, emotionally, and physically safe [6]. The current study will focus on the latter as it highlights the substantial role of instilling good values in our future generation.

Numerous studies have highlighted several precursors and antecedents that may link school climates, such as academic performance [7], well-being [8], student engagement and attendance in school [9,10], delinquent behaviour [11], bullying [12,13] and school safety [14]. In the same vein, previous work by Ref. [15] employed a traditional review approach to managing school climate issues. On the contrary, another study reviewed selected measures related to school climate to improve school monitoring and teacher quality [16,17]. However, Systematic Literature Review (SLR) studies discussed student social and emotional competencies [18], while discussions on non-cognitive skills remain scarce. This scarcity comes as a surprise as scholars have suggested that non-cognitive skills, which involve behaviours, attitudes, and skills, will affect an individual's success in the long term life [19,20].

Notably, non-cognitive skills are an intertwined concept based on the discussed field or setting. For example, seminal scholar, Ref. [3] suggested that non-cognitive skills are a measure or attributes that are not related to cognitive or academic performances, which refer to individual behavioural and emotional intelligence. Meanwhile, psychologists posit non-cognitive skills as the character that involve personality attributes [21]. In contrast, in a workforce or educational setting, non-cognitive skills refer to behaviour, employability skill, and soft-skill [22]. Nevertheless, it should be noted that the sustainability of these skills is longer and more dynamic throughout an individual's development [21,23]. Many studies investigate non-cognitive skills such as motivation, perseverance, social skills, and self-determination to shape long-term students' success in school and their long-term life [19,24]. However, what has been missing so far is the impact of schooling on the development of non-cognitive skills [25]. Although previous work by Ref. [26] discussed the importance of non-cognitive skills in schools with the compilation of several interventions, the present study is critical due to the limited studies available that were conducted using the SLR method and highlighted the association of school climate in developing student non-cognitive skills development. Even though both concepts of school climate and non-cognitive skills are considered mature, the linkages of these domains remain immature, necessitating SLR to provide a general overview and calling for a future empirical investigation [27]. Previous SLR publications on non-cognitive skills, to the best of the researcher's knowledge, failed to provide in-depth information on the various review techniques, such as keyword identification, article screening, eligibility, and databases employed. As a result, this failure has three outcomes. First, the previous SLR publications on non-cognitive skills are non-reproducible, obstructing future research. Second, there are challenges in examining and comprehending approval. Third, there is a lack of feedback on the topic's breadth and depth.

To bring light and provide input on school climate and student non-cognitive skills, the current systematic literature review is based on the following research question: Does the school climate have a relationship with students' non-cognitive skills development? To further expand the knowledge in this area of research, the current review will also specify several non-cognitive skills that need further investigation.

2. Materials and method

This section explains four subsections: resources, inclusion and exclusion criteria, and systematic review process, including data abstraction and analysis, employed in the current research.

2.1. The review protocol: PRISMA

The current study adheres to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method. It is a standard guideline for conducting a systematic literature review (SLR) and has been utilised in various fields of research [28]. Due to its comprehensiveness and capacity to increase the review's accuracy [29,30] and reduce researchers' biases, the guideline is highly regarded and widely utilised across various disciplines [31–33]. Moreover, to reduce researcher bias, one of the authors prepared the protocol, the others reviewed it, and the authors engaged in discussion, review, and iteration. The authors then reported the findings of their database searches. PRISMA provides a brief overview of the systematic review process, which comprises several stages. Thus, the present study utilised the PRISMA protocol to conduct a systematic literature review of pertinent, high-quality articles. Based on previous literature, there remains an inadequate number of studies related to school climate and non-cognitive skills that employed PRISMA as the review protocol [34].

2.2. Resources

The current study begins with a review of three leading scientific databases, Scopus, Web of Science, and ScienceDirect. These databases have advanced searching capabilities, which are comprehensive, have quality control, and are multidisciplinary [35]. For example, Scopus indexes 1531 journals, Web of Science (Social Science Citation Index) indexes 398 journals, and ScienceDirect indexes 39 journals related to education research. As one of the requirements for a quality SLR is rigorous searching, the current study also relies on two supporting databases, Google Scholar and Dimensian. ai, to enrich additional sources, such as missing articles from the leading databases. It is worth noting that Google Scholar was among the top 0.1% of academic paper publishers [35]. Google

Scholar provides a broad view when searching for academic sources [36]. Since the current SLR is a compilation of previously collected data, our institution did not require us to acquire approval for this technique from our local human research and ethical council.

2.3. The systematic literature review process for selecting the articles

2.3.1. Identification

The SLR method comprises three primary stages for identifying relevant publications for the current research. The initial stage is identifying keywords and searching for related and similar terms using a thesaurus, dictionaries, encyclopedias, and previous research. For example, the term "school climate" has been truncated to "school environment," "institution," "climate," or "school." Similarly, school climate is defined as the cognitive and non-cognitive components of social interactions, relationships, safety, values, and beliefs within the school community [17]. As a result, studies may use different terms for school climate while maintaining the same meaning. After determining all relevant terms, search strings for Scopus and Web of Science databases were constructed in February 2022 (see Table 1). Most crucially, the current work retrieved 4996 articles from both leading and supporting databases correctly. In addition, hand searching based on expert suggestions yielded an additional 29 articles. In the first stage of the systematic review procedure, 5025 articles were found.

2.3.2. Screening

The first stage of screening is to eliminate duplicate articles. The current study screened 5025 publications based on inclusion criteria retrieved from primary and secondary databases. Furthermore, the same inclusion criteria are applied in all databases to retain and minimize bias when scanning for papers in the screening process. However, the screening procedure is done manually for databases that do not have a sorting feature. It should be mentioned that reviewing all of the available articles is nearly impossible for a scholar. As a result, Ref. [37] noted that screening steps have become practically feasible within appropriate resources, namely, time, personal and financial limits. Meanwhile, Ref. [38] highlighted articles from peer-reviewed journals and how language will be chosen as an inclusion criterion.

The concepts of school climate and non-cognitive skills were featured in literature decades ago. Nevertheless, searches of selected databases have shown that the number of studies on students' non-cognitive skills has increased considerably since 2016. However, as the search began in November 2021, it has not yet been concluded. Thus, the inclusion criteria for the current study are threefold. First, the search period is between 2016 and 2022. The second criteria, only peer-reviewed publications published in a journal are to be included. The final inclusion criteria are that the articles must be in English (refer to Table 2). This stage resulted in 4622 articles being removed from the current study since they did not match the inclusion criteria, which yielded 403 articles to be used in the eligibility procedure.

2.3.3. Eligibility

The final stage of an SLR is eligibility. After the screening process, the remaining articles will be observed and manually retrieved. This stage ensures that all of the articles that have been chosen fit all of the requirements for inclusion. As a result, the researcher must review the paper titles and abstracts. However, if the researcher notices that the title and abstract are unclear, the article's content will be investigated. This stage of the screening yielded 65 articles and discarded 338 articles. The discarded articles were mainly due to the type of journal articles, duplicated information throughout databases, objectives not focusing on students, and papers published in a non-English language (See Fig. 1 for a summary of the review process). To ensure the scientific rigour of the review, the articles were subjected to a quality assessment to confirm that they contained a detailed methodology, empirical data, and key findings section [39]. Table 3 lists the elements of quality appraisal used to evaluate the strength of the selected articles.

2.4. Results and discussion

2.4.1. General findings and background of the studies

Generally, the analysis indicated that most research on this subject was employed within the western region, as shown in Fig. 2. On the one hand, several articles were written using a western lens, including the United States (24), followed by Europe (4), Germany (4), Ireland (1), Australia (2), Switzerland (1), Spain (3), Sweden (1), Austria (1), Croatia (1), and Russia (1). On the other hand, only a few studies were conducted in Asia, namely, China (7), Philippines (3), India (3), Japan (1), Indonesia (2), and Korea (2). Meanwhile, two comparative studies combined western and eastern lenses, Bhutan & England, India and Canada. Furthermore, there are also studies in

Table 1
The search strings

Database	Search String
Web of Science	TS= ((“non-cognitive skill*” OR “noncognitive skill*” OR “noncognitive” OR “non-cognitive” OR “softskill*” OR “soft-skill*” OR “socio-emotional learning” OR “character” OR “nonacademic” OR “non-academic”) AND (“school climate*” OR “school environment*” OR “institution* climate*” OR “school*”) AND (“student*” OR “pupil*” OR “adolescent*” OR “child*” OR “high school student*” OR “school child*”))
Scopus	TITLE-ABS-KEY ((“non-cognitive skill*” OR “noncognitive skill*” OR “noncognitive” OR “non-cognitive” OR “softskill*” OR “soft-skill*” OR “socio-emotional learning” OR “character” OR “nonacademic” OR “non-academic”) AND (“school climate*” OR “school environment*” OR “institution* climate*” OR “school*”) AND (“student*” OR “pupil*” OR “adolescent*” OR “child*” OR “high school student*” OR “school child*”))

Table 2
The inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Timeline	2016 to 2022	Before 2016
Publication Type	Journal article	Book, Chapters in the book, Conference proceeding, Newspaper, Review Paper
Language	English	Non-English

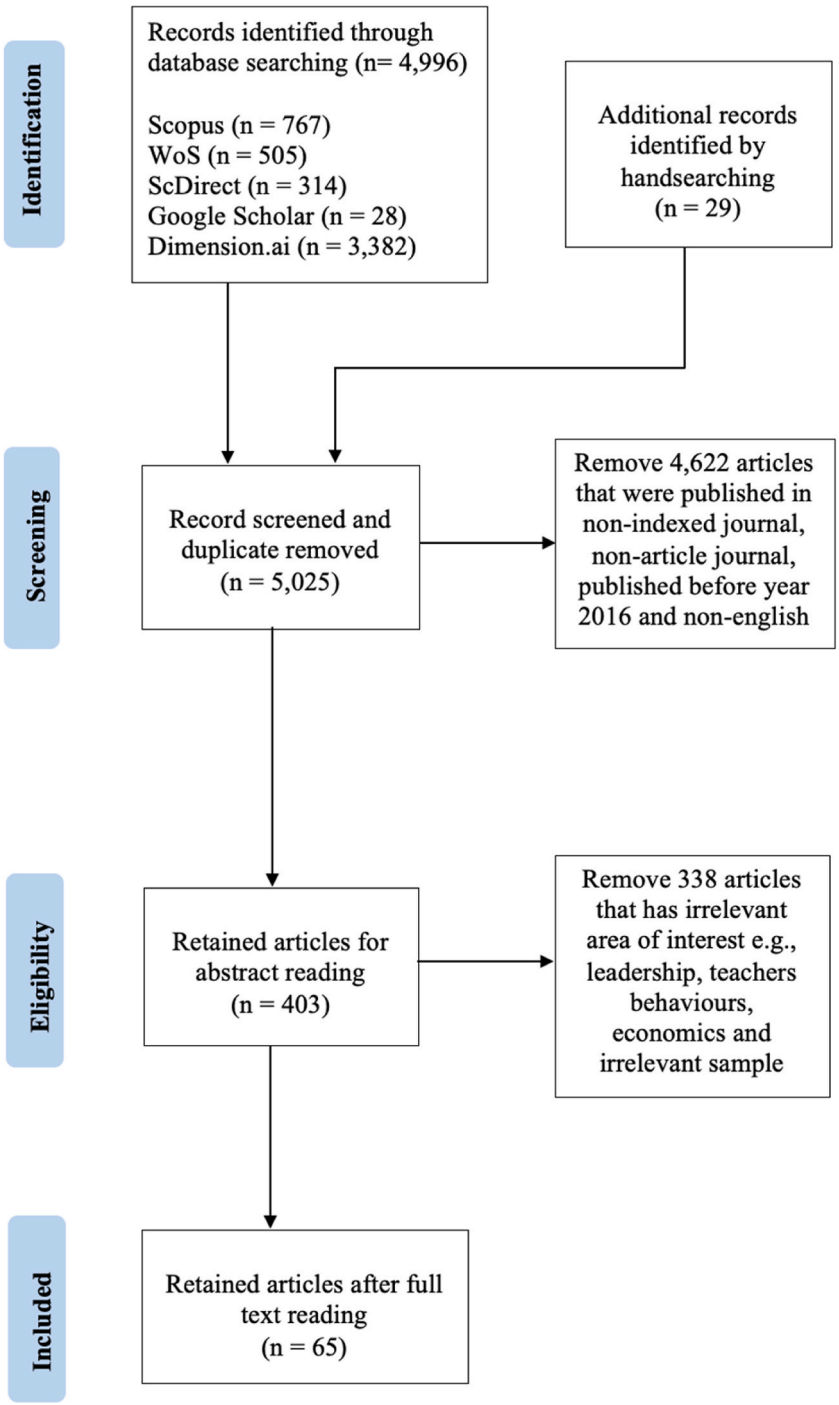

Fig. 1. The flow of publications through different stages of the systematic literature review.

Table 3
Summary of articles that met inclusion criteria

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
1	[40]	United States	811 third—eighth grade twins and triplets from the Texas Twin Project	Theories of childhood academic achievement	Mindsets, grit	Academic Achievement	Cross-sectional/ Correlations, regressions, factor models, and structural equations models/2 levels of analysis	The best way to conceptualise character assessments is as indices of personality dimensions essential to academic accomplishment.
2	[41]	United States	18 low-income racially and ethnically diverse high school graduates	Developmental systems theory	Self-control, self-regulation, self-awareness	Work-Based Learning 1 Year Post-Graduation	Open-ended questions interview	1. The potential of work-based learning (WBL) for developing academic and psychological/ noncognitive assets in low-income children. 2. Describe the influence of structural and contextual factors on post-secondary transitions and access to meaningful career and life choices.
3	[42]	Switzerland	186 students aged 15 and 1068 teachers in German-speaking schools in Switzerland	Career resources model	Soft skills	Career Preparedness	Item development/ CFA analysis	Researchers and practitioners can use the evaluation to evaluate several key career readiness variables accurately and affordably.
4	[43]	United States	Norwegian first-year high school students in Rogaland County	Incremental theory of intelligence	High perseverance, academic mindset	Perseverance in Mathematics	Experimental design	The low-cost intervention centred on the mindset of students can increase student engagement and performance.
5	[44]	12 European countries	Approximately 3000–4500 teenage students across these countries	Liberal, communitarian and cosmopolitan models	Active citizenship, positive attitudes	Equal rights among teenage students	Multi-source data collection/2 levels of analysis	1. Formal civic education, school democracy, and active community involvement are related to the perceptions and attitudes of pupils towards civic and citizenship concerns. 2. The function of each strategy varies significantly among the various civic attitudes and behaviours.
6	[45]	Philippines	380 Filipino high school students	Theory of character strengths	Fairness, teamwork, leadership, forgiveness, and kindness	Life satisfaction, teacher-reported academic engagement, Mathematics achievement, English achievement, and overall academic achievement	A longitudinal study with two-month interval/Objective measurement	1. There were stronger correlations between fairness and kindness and later life satisfaction, academic engagement, and accomplishment. 2. Teamwork and forgiveness were positively and somewhat associated with these outcomes. 3. The relationships between leadership and life satisfaction and accomplishment outcomes were weaker.

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
7	[46]	United States	More than 90,000 high school students	Human Capital and Cultural Capital	Social-emotional skills, engagement	High school overall GPA	Secondary data/four waves longitudinal study/2 levels of analysis	1. Students who interact with teachers do better academically and professionally. 2. Their income is benefited from interaction with others. 3. Only in the classroom does one notice a significant class-based effect heterogeneity of student involvement with teachers: middle-class students gain more from it than lower-class students.
8	[47]	United States	248 undergraduates at a medium-sized Northeastern US university	Proactive personality	Proactive personality, conscientiousness	Academic citizenship and counterproductive behaviours	Cross-sectional/ correlations/single level	A proactive personality predicts both citizenship and unproductive behaviour in a classroom.
9	[48]	Germany	German ninth-grade students (N = 13.648)	Personality Psychology	The Big Five personality: extraversion, agreeableness, conscientiousness, emotional stability, openness	Intelligence and achievement	Secondary data/ longitudinal analysis/single level	Beyond intelligence, personality also explains some variation in achievement.
10	[49]	Australia	Kindergarten cohort of the Longitudinal Study of Australian Children	Social science theories	Persistence, introversion, reactivity	Student achievement	Secondary data/six waves longitudinal study/single level	The relationship between student achievement and family income or socioeconomic standing is not substantial.
11	[50]	United States	491 fifth through eighth-grade students were rated by all of their teachers	Social cognition/ character	Interpersonal self-control, gratitude, social intelligence, zest, curiosity, academic self-control, and grit	Taxonomy of character	Multi-source data collection/ longitudinal study/ single level	1. Intellectual, interpersonal, and intrapersonal characteristics associated to the Big Five. 2. Interpersonal personality was the most accurate predictor of positive peer interactions, followed by intellectual and intrapersonal personality for report card grades.
12	[51]	Switzerland	255 secondary school students	Trait activation theory	Creativity, curiosity, judgment, love of learning, perspective, bravery, perseverance, honesty, zest, love kindness, social intelligence, teamwork, fairness, leadership, forgiveness, humility, prudence, self-regulation, beauty, gratitude, hope, humour, spirituality	Students' Achievement, Flow Experiences, and Enjoyment in Teacher-Centred Learning, Individual, and Group Work Beyond Cognitive Ability	Multi-source data collection/ longitudinal study/ multilevel analysis	1. Some character qualities (love of learning and tenacity) consistently correlate with achievement and pleasant learning experiences (flow and enjoyment) beyond cognitive ability in all learning circumstances. 2. Some character qualities exhibit different trait-outcome associations (e.g., collaboration predicts achievement and favourable learning experiences in group work).

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
13	[52]	India and Canada	32 Indian adolescents from India (mean age = 16.78 years) and 20 Indian immigrant adolescents from Canada (mean age = 17.05 years)	Self-determination theory	Engagement	Performance in school	Focus group discussion/thematic analysis/single level	1. Indian and Indian immigrant youth had an intrinsic interest in education and academics. 2. Students viewed their teachers as authoritarian rather than autonomy supportive.
14	[25]	United States	12,686 young American men and women aged between 14 and 22 years when they were first surveyed in 1979	Human capital, signalling view	Self-esteem, locus of control	Non-cognitive skills	Secondary data/ longitudinal study/ single level	1. During the college education years, non-cognitive capabilities improve. 2. When antecedent levels of non-cognitive skills are controlled, the causal association between college education and non-cognitive skills is significantly diminished.
15	[53]	United States	Nearly 6000 third-grade students from more than 80 schools	Social-emotional learning (SEL) framework	Empathy, self-efficacy	Social-Emotional Development	Five waves longitudinal study/	1. Good parenting was linked with a lesser risk of children following a negative empathy trajectory. 2. The intergenerational closure of a neighbourhood fostered a consistent self-efficacy trajectory. 3. Living in a high-risk community was associated with more aggressive normative beliefs.
16	[54]	Japan	Three teachers of Miyauchi Elementary School of Hiroshima. (2) Six students of Miyauchi Elementary School of Hiroshima		Nationalism, independence, cooperation, integrity, self-reliance, mutual-cooperation	Character Values in Teaching-Learning Process	Class observations, interviews, focus group discussion	Incorporating character education into the curriculum of Japanese schools tends to perpetuate and sustain the traditions of character values that already exist in Japanese culture.
17	[55]	Lithuania, Europe	615 adolescents	Developmental system theory	Competence, confidence, connection, character, and caring	Positive youth development	Longitudinal quasi-experimental study design/multilevel analysis	1. The participants' competence, connection, and concern increased, while their confidence and character remained consistent. 2. Most nonparticipants demonstrated a decline in competence, confidence, and character while maintaining steady levels of connection and concern.
18	[56]	United States	155 College students	Theories of intelligence, attribution theory	Growth mindset	Passing the course and remaining in school	Experimental design/	1. The final grades of participants with a growth mentality scored higher than those with a fixed mindset. 2. Similar retention rates were seen for participants with high and low scores on the mindset scale.
19	[57]	India	Eight-year-old children (were born in 1994–1995	Self-concept	Self-concept, self-efficacy, self-esteem	Education/work status in the transition to adulthood	Secondary data/ Longitudinal study/ face-to-face	1. Youth with a positive self-concept are more likely to remain in school than seek employment.

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
							interviews/single-level analysis	2. Keeping young women in school rather than in education, employment, or training (NEET) has a comparable effect size to cognitive skills.
20	[58]	Germany	2177 students of PISA 2009	Not recorded	Self-concept, personality, conscientiousness, openness, agreeableness, neuroticism extra-version	Students' Academic Success	Secondary data, longitudinal study/ multilevel analysis	1. Over several school years, conscientiousness and openness were significantly connected to subject-specific grades in Mathematics, French, and German. 2. In addition to intelligence and academic self-concepts, there was evidence of incremental predictive validity.
21	[59]	Spain	133 primary education students (aged 6–9 years old)	Self-Determination Theory	Self-esteem, motivation, reasoning	Academic Achievement	Cross-sectional/ single-level analysis	1. Academic achievement is predicted by intrinsic drive and self-esteem, which are mediated by verbal fluency and reasoning. 2. These correlations changed according to the specific subject.
22	[60]	Sweden	320,182 Swedish boys	Not recorded	Calm, efficient response	Cognitive and emotional outcomes	Secondary data/ Quasi-experimental design/longitudinal study/single-level analysis	1. Expanding compulsory education increased intelligence but decreased emotional control and decreased socioeconomic background inequities. 2. Emotional control was the most accurate indicator of total mortality.
23	[61]	United States	21,260 kindergarteners	College Choice Model, Expectancy-value theory	Competence/liking	Child's expectation for educational attainment	Multi-sources/ Secondary data/ longitudinal study/ single-level analysis	Children with more effective learning approaches and higher school competence/liking were more likely to anticipate graduating from college.
24	[48]	Germany	13,648 ninth-grade students from general-education schools	PPIK theory (intelligence-as process, personality, interests, and knowledge)	Extraversion, agreeableness, conscientiousness, emotional stability, openness	Intelligence and achievement	Secondary data/ Longitudinal study/ single-level analysis	1. Compared to school grades, achievement tests are a somewhat accurate predictor of intellect. 2. Compared to school grades, achievement tests are a somewhat accurate predictor of intellect.
25	[62]	Austria	498 eighth-grade students from general secondary schools	Self-determination theory	Big Five, self-discipline, grit, self-efficacy, intrinsic-extrinsic motivation, and test anxiety	School Achievement	Objective measurement/cross-sectional study/ single-level analysis	Conscientiousness is the most crucial non-cognitive predictor of academic success and should be emphasised when assisting pupils to improve their performance.
26	[63]	United States	975 grade 5–6 elementary school students	Social cognitive theory	Self-efficacy, self-concept, anxiety	Mathematics achievement	Item development/ longitudinal study/ Multilevel analysis	1. Two-factor structure for self-concept, which represents positive math affect and perceived competence, and a single-factor

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
								structure for fear, which represents negative arithmetic affect. 2. It serves as an antecedent to a perceived confidence component of self-efficacy, which positively affects mathematical achievement levels, offsetting the detrimental impacts of anxiety.
27	[64]	United States	More than 50 of the world's leading social scientists	Not recorded	Self-control, humility	Moral Education	Qualitative study	Studies and leading scientists agree that more focus should be placed on "stealthy" methods and the mastery of values such as self-control and humility.
28	[65]	United States	10,317 individuals who graduated from Wisconsin high schools in 1957	Models of cognitive reserve	Conscientiousness, grit	Grit in adolescence	Secondary data/ longitudinal study	1. Similar contributions were made by Intelligence and tenacity to immediate memory. 2. Grit was a more accurate predictor of delayed memory.
29	[66]	Germany	648 apprentices and students	Five Factor Mode	Conscientiousness, openness to experiences, emotional stability, extraversion, agreeableness, self-efficacy	Professional Success in Apprenticeship	Multi-sources/cross-sectional, single-level analysis	1. The best predictors were intelligence, conscientiousness, and social-emotional competence and interests. 2. Other qualities contributed marginally.
30	[67]	India	507 employers from the information technology sector	Understanding of subject, Skilful practices, Efficacy beliefs, and Meta cognition (USEM) model	Self-efficacy, self-emotional	Employer satisfaction	Cross-sectional/ single-level analysis	Emotional intelligence mediate the association between employability skills and employer satisfaction.
31	[68]	Indonesia	480 parents of secondary school students	Not recorded	Self-awareness	Student talent	Cross-sectional/ supported by focus group discussion/ single-level analysis	The impact of guidance and counselling, the school atmosphere, parental involvement, and high-quality, competitive, and character-building learning activities on students' talent and competency development is significant.
32	[69]	Russia	196 students from regular schools (non-selected students) and 306 students from schools with the advanced mathematical curriculum (selected students)	Not recorded	Self-efficacy	Exam Performance	Cross-sectional/ single-level analysis	The impact of guidance and counselling, the school atmosphere, parental involvement, high-quality, competitive, and character-building learning activities on students' talent and competency development is significant.

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
33	[70]	Korea	724 students of 6th and 7th graders from 191 schools	Career self-efficacy	Creativity, resilience, self-concept, self-control	Non-cognitive skill development	Secondary data/ quasi-experimental methods/ longitudinal study	1. On non-cognitive skills, vocational and technical schools have significant positive influences. 2. It was concluded that the mediating role of the school curriculum (e.g., the number of hours spent on curriculum or career development) is negligible.
34	[71]	United States	30,071 students in grades 3 - 12	Social and Emotional Learning	Praise, rewards, social and emotional competencies	School climate	Cross-sectional/ multilevel analysis	1. Praise and encouragement for good behaviour and the instruction of social and emotional skills contribute positively to the school climate. 2. The school environment is inversely correlated with punitive outcomes. 3. Teaching social and emotional competencies was nearly twice as effective as praising and rewarding students. 4. Teaching social and emotional competence was nearly twice as effective as punitive consequences at the student level.
35	[12]	United States	23,532 students (4th to 12th grade) from 90 schools	Social-ecological theory	Responsible decision-making, social awareness, self-management, and relationship skills	Bullying victimisation	Cross-sectional study/Multilevel analysis	1. Students' bullying victimisation encounters were significantly associated with social awareness, relational skills, self-management, and student-level school climate perceptions. 2. There is a link between social awareness and bullying victimisation. 3. Negative relationships between self-management and bullying victimisation were reduced in schools with a more favourable school climate.
36	[72]	China	141 high school students in Study 1 and 132 high school students in Study 2	Theory of well-being	Connectedness, gratitude, academic self-efficacy	Higher gratitude and self-efficacy	Longitudinal study/ single-level analysis	1. Gratitude mediated the favourable relationship between connectedness to peers and parents and academic self-efficacy. 2. Relationships with parents and school gratitude positively predicted career development self-efficacy.

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
37	[73]	Philippines	One thousand seven hundred eighty-eight students from 21 classes participated; in Study 2, 404 students from 10 classes participated.	Emotional contagion theory	Life-satisfaction, well-being	Student well-being	Longitudinal study/ multilevel analysis	1. Life satisfaction and positive affect were more prevalent among students in classes with greater life satisfaction and positive affect levels. 2. The well-being of a student depends in part on that of their peers.
38	[74]	United States	8848 8th-grade students	Value added model	Absenteeism	Student achievement	Quasi-natural experiment	Early start schools had negative effects on absenteeism and tardiness rates, as well as higher rates of high school dropouts, but not on test results.
39	[75]	China	18,389 8th-grade students	Theory of resources substitution	Self-control, motivation, attention, interpersonal	Student achievement	Longitudinal study/ single-level analysis	1. Non-cognitive skills will moderate the effects of family socioeconomic status. 2. Greater non-cognitive skills will mitigate the effects of socioeconomic status on accomplishment.
40	[76]	Latvia, Europe	200 mathematics teachers and 3083 9th grade students	Ability-Motivation-Opportunity (AMO) theory	Self-beliefs, openness, conscientiousness, social attitudes, well-being	Mathematics achievement	Cross-sectional/ Multilevel analysis/	With personality traits like openness and conscientiousness, social attitudes like dominance and contentment, and values like universalism and stimulation, mathematics self-concepts were among the most accurate predictors of mathematical ability.
41	[77]	United States	2158 early adolescents	Stage-environment fit theory	School trust, social belonging, evaluation anxiety, self-complexity, locus of control, and identification	Academic attitudes	Cross-sectional/ single-level analysis	1. The Malleable Social-Psychological Academic Attitudes (MSPAA) survey accurately examined these constructs (N = 2158) among young adolescents. 2. Insightful patterns of variance by grade level, school context, gender, and race were discovered that have implications for social and psychological theory and practice in schools.
42	[11]	United States	8333 ethnically/racially diverse rural adolescents	SEL conceptual model	Aggression, depression, anxiety	Substance use, aggression, and psychological functioning	Longitudinal study	1. Positive Action (PA) participation was strongly related to fewer inconveniences, indicating an improved school atmosphere. 2. Significant correlations were found between lower school troubles and decreased alcohol

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
								usage, hostility, sadness, and anxiety.
43	[78]	Japan	All fourth to ninth graders in 1064 public schools	Maimonides' rule	Self-control, self-efficacy, conscientiousness	Cognitive and non-cognitive skills	Longitudinal study/ multilevel analysis	When school-fixed effects are controlled for, the impacts of class-size reduction on academic test results are statistically and economically inconsequential. There is no evidence that small class sizes increase non-cognitive skills.
44	[79]	United States	More than one million students in grades 4 till grade 8	Value-added model (VAM)	Growth mindset, self-efficacy, self-management, social awareness	Social–Emotional Learning (SEL)	Objective measurement/ secondary data/ multilevel analysis	1. Significant disparities in SEL growth between schools, with magnitudes comparable to those in academic success growth. 2. The variance in the average level of SEL measures between schools was proportionally considerably less than that of academic standards.
45	[80]	Bhutan and England	Five groups of teachers in each country	Classic economic-sociological-Marxist	Good character, good citizenship	Gross National Happiness, British Values, and non-cognitive skills	Focus group discussion/ observations	1. Convergence between the manifestation of stress to supply an "oversubscribed" curriculum and the shared nationalistic objectives of some values education. 2. Teachers' conceptions of their function and relationship to students and school culture varied.
46	[81]	China	493 Chinese adolescents	Ecological systems theory	Emotional intelligence, resilience	Adolescents' Emotional Intelligence, Perceived Social Support, and Resilience	Cross-sectional/ single-level analysis	1. In moderating the relationship between emotional intelligence and resiliency, social support from family was minor, whereas support from friends was significant. 2. The degree of the moderating effect of social support from friends depends on the type of school. 3. The association between characteristic EI and resilience was higher when students attended boarding school than when they attended day school.
47	[82]	United States	25,896 students across elementary, middle, and high schools	Social-ecological theory	Engagement, behaviour control, empathy, self-discipline	Student Engagement	Cross-sectional/ Multilevel analysis	1. These three criteria were strongly connected with cognitive behavioural engagement at the student level. However, only teaching social and emotional competencies was significantly connected with cognitive and behavioural involvement at the

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
								school level. 2. All three criteria were strongly connected with emotional engagement at both the student and school levels, with the highest association being between teacher-student relationships and emotional engagement. 3. The degree of the correlation between student involvement and teacher-student relationships, student-student relationships, and the instruction of social-emotional competencies varied based on the forms of engagement and the grade levels of the students.
48	[83]	Australia	Six schools, three primary (students aged 5–12 years), and three secondary schools (students aged 12–18 years)	Restorative justice	Harmony, reflective thinking, respectful relationships, awareness and accountability, empathy for others	Student social skills	Interviews and focus groups/longitudinal study	Teachers and pupils noted five significant themes: improved harmony, increased empathy for others, self-awareness and accountability for one's actions, higher respect, and reflective thought. These factors enhance the social skills of students.
49	[84]	United States	14,147 students responded to all waves of the survey (representing 687 schools)	Not recorded	Persistence	College enrolment and persistence	Secondary data/ multilevel analysis/ longitudinal study	1. Certain aspects of the college-going culture are connected with college enrollment and persistence; school climate characteristics moderate this association. 2. It may be challenging to create a college-going culture if extracurricular options, school safety, and school climate issues are neglected.
50	[85]	United States	102 middle and high school students	Social interdependence theory	Grit, growth mindset	Grit, growth mindset and participation	Longitudinal study/ single-level analysis	1. When a growth mindset rose, grit decreased. 2. Civic engagement and sentiment remained unchanged. 3. The length of participation was correlated with a rise in grit but was unrelated to the other NCS.
51	[22]	United States	1368 eighth graders	Theory of intelligence	Conscientiousness, self-control, grit, and a growth mindset	Non-cognitive skills Conscientiousness, self-control, grit and growth mindset)	Objective measurement/ longitudinal study/ multilevel analysis	1. Conscientiousness, self-control, grit, and a growth mindset positively correlate with attendance, behaviour, and test-score gains. 2. At the school level, conscientiousness, self-control,

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
								and perseverance are unrelated to test score improvements. 3. On these scales, students attending oversubscribed charter schools score substantially lower than those attending district schools.
52	[86]	United States	315 youths in foster care	Not recorded	Resilience, engagement	Educational resilience	Secondary data/ multi-method/ longitudinal study/ single-level analysis	1. Depending on the confluence of their identities, youth's actual experiences of educational resilience vary. 2. Involvement in school and quality interactions between youth and foster carers also predicted specific educationally resilient outcomes.
53.	[87]	United States	1500 teachers from nearly 300 schools,	Human Capital	Conscientiousness, grit	Teacher non-cognitive skills	Secondary data/ multi-source/single-level study	Predictive student cognitive and non-cognitive results are small but substantial correlations between classroom observation measures and principal judgements of teacher quality.
54	[88]	South Africa	2383 learners distributed across 60 township and rural schools	Not recorded	Grit, perseverance	Reading achievement	Cross-sectional/ single-level	Non-cognitive skills interact with school features to produce learning results.
55	[89]	Croatia	193 participants, students from the fourth and eighth grades of primary schools	Five-factor personality model	Extraversion, agreeableness, conscientiousness-oriented	Learning strategies	Cross-sectional/ single-level analysis	1. Personality factors and goal orientations contributed considerably to the diversity in learning techniques. 2. Important indicators of the big five personality traits were conscientiousness and emotional stability.
56	[90]	China	2931 seventh-grade students in rural China	Not recorded	Grit	Academic achievement	Multi-source/cross-sectional/single-level analysis	IQ and perseverance predict success gains for the average student but have no beneficial association with low-IQ individuals.
57	[91]	China	45 Tibetan adolescents (17–19 years old), eight local teachers	Not recorded	Competence, confidence, connection, character, contribution, coping, control, self-esteem	Resilience	Interview/focus-group discussion/ experimental design	The intervention group demonstrated significant gains in mental health, learning competence, coping, and interpersonal competence, but not resilience or self-esteem.
58	[92]	Ireland	7165 students (9, 13, and 17 years old)	Bandura's theory	Competence, confidence and character	Being bullied	Longitudinal study/ multi-sources/ multilevel	Developing confidence, competence, and character in late adolescence was significantly associated with having fewer

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
								experiences of family trauma and transitions in childhood and greater levels of rapport with parents during early adolescence.
59	[93]	Spain	768 youth aged 17 to 29	Developmental systems theory	Competence, confidence, connection, caring, and character	Positive youth development (PYD)	Secondary data/ cross-sectional/ single-level analysis	1. Developmental assets were associated with PYD in a desirable way. 2. Female students scored higher on connection, caring, and character, while male students scored higher on confidence and competence.
60	[94]	Philippines	7233 15-year-old Filipino students	Ecological systems theory of human development	Motivation, growth mindset, reading self-concept	Reading proficiency in English	Secondary data/ single-level analysis	Students' home-related resources and socioeconomic restraints, learning motivation and mindsets, classroom reading experiences with teachers, reading self-beliefs, attitudes and experiences, and school-based social experiences were the variables with the most potent influences.
61	[95]	Indonesia	170 secondary school students	Not recorded	Critical thinking, curiosity	Critical Thinking and Curiosity	Quasi-experimental study	1. The problem-based learning-character emphasis (PBL-CE) improves the critical thinking and inquisitiveness of children. 2. The intelligence of naturalists has little effect on student's critical thinking and curiosity. 3. The connection between PBL-CE and naturalist intelligence did not affect the critical thinking and inquisitiveness of the students.
62	[96]	Turkey	148 learning outcomes (and explanations about these learning outcomes in Life Science Course Curriculum (LSCC)	Not recorded	Prudence, self-regulation, citizenship, kindness, social intelligence, bravery, persistence, leadership, forgiveness, modesty, hope, and humour	Character strengths	Secondary data/ document and content analysis	1. The top five character characteristics in the Life Science Course Curriculum were discretion, self-discipline, citizenship, and social intelligence (LSCC). 2. There was no evidence of courage, perseverance, leadership, forgiveness, modesty, optimism, or humour.
63	[97]	South Korea	5000 households and their family members	Not recorded	Agreeableness, conscientious-ness, extroversion, neuroticism, and openness	Soft skills	Quasi-experimental study/secondary data/longitudinal study	1. Some adult personalities are significantly affected by a combination of abilities. 2. Mixing treatments diminish agreeableness and

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Table 3 (*continued*)

No.	Author/s (Year)	Country	Samples	Theory	Non-cognitive skills domain	Consequences (DV)	Research Design/ Analysis strategy/ level of analysis	Key findings
								conscientiousness. The effects are more pronounced for women.
64	[98]	Spain	4000 fourth-grade students in each of 18 Europe countries	Not recorded	Resilience	Resilience	Secondary data/ longitudinal study/ single-level analysis	Socioeconomically disadvantaged students' academic achievement is influenced mainly by their preschool knowledge and the socioeconomic level of their peers.
65	[99]	India	5539 students	SEHER theory of change, social identification theory, and social categorization theory	Not recorded	Adolescent Mental Health	Longitudinal/ intervention study/ multilevel analysis	1. The school climate mediated the intervention's impacts on the three outcomes of interest. 2. A caring school environment, characterised by supportive and engaged interactions with instructors and students, a sense of belonging, and active participation in the school climate, was associated with decreased rates of depression symptoms, bullying incidents, and violent perpetration.

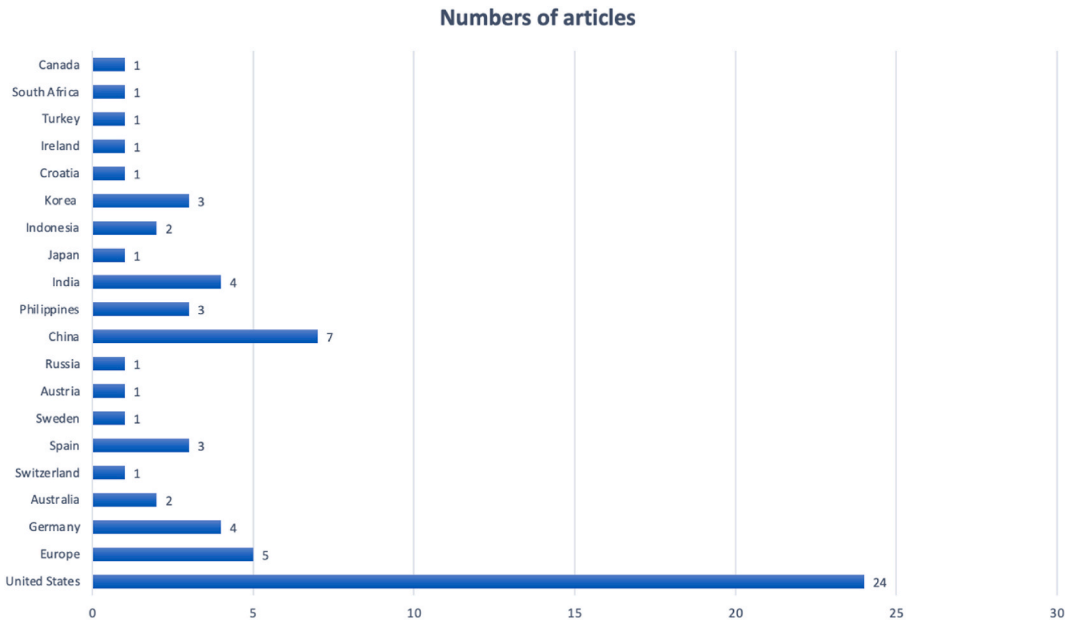

Fig. 2. Countries where studies were conducted. Note: The number of countries outweighs the total number of studies due to the addition of comparative studies.

other regions, including Turkey (1) and South Africa (1).

Based on Fig. 3, there is an increasing trend regarding publications on this topic. Seven articles were published in 2016, followed by 11 articles in 2017. The highest number of publications was in 2018, with 13 articles. However, the publication rate declined to ten articles in 2019 and escalated to 12 in 2020 and 2021.

The current study summarises all articles that met the inclusion criteria in a Table 3. The 65 articles were analysed using VOSviewer to perform network visualisations and delve into the linkages between school climate and non-cognitive skills.

2.4.2. Analysis of bibliometric mapping

The current study uses the VOSviewer software to perform a network visualization on all 65 articles to determine the relationships between the studies and the major research themes linking school climate and non-cognitive skills. The researcher refers to Ref. [100] in analysing the network visualization. Regardless of the number of citations, the articles were analysed, ensuring that all recently published publications could be included in the analysis. As a result of the thematic analysis (Fig. 4), 128 items were grouped into five clusters. "Non-cognitive skills' intrapersonal and interpersonal key characteristics," identified in red; "A nurturing school climate and the presence of non-cognitive skills mitigate deviant behaviour in school settings," identified in dark green; "Non-cognitive skills as a

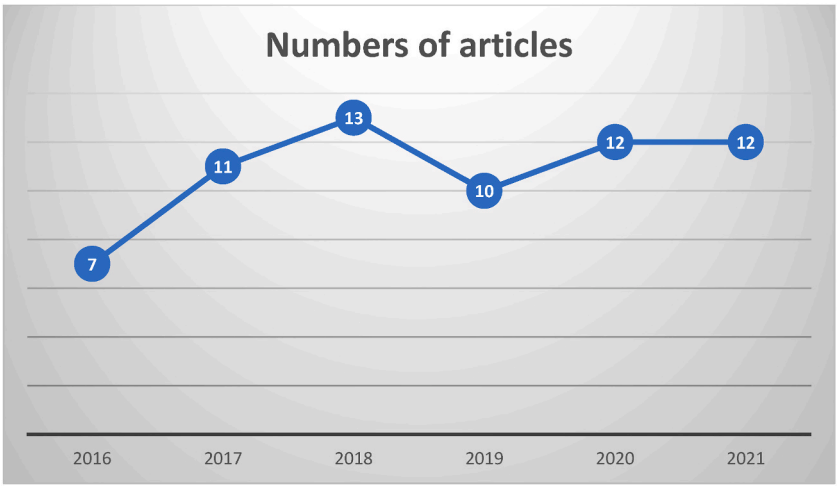

Fig. 3. Year of publication.

predictor of academic outcomes," identified in blue; "Multifaceted antecedents of school climate in promoting the development of student non-cognitive skills," identified in light green; "The role of school domains and non-cognitive attributes towards students' cognitive development," identified in purple.

2.4.2.1. Cluster one: non-cognitive skills' intrapersonal and interpersonal key characteristics (23 items). The majority of studies in this cluster focus on the non-cognitive characteristics of school climate-related non-cognitive skills. The essential characteristics generally consist of two domains: intrapersonal and interpersonal. The analysis thus far indicates that researchers have extensively discussed intrapersonal characteristics. For example, Ref. [58] correlated the big five personality traits, openness, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN), with educational outcomes in longitudinal settings. Recent research indicates that the interpersonal domain, specifically ability mixing, decreases agreeableness and conscientiousness [97]. The data analysis identifies conscientiousness as the most prevalent predictor of the five factors significantly influencing behavioural and educational outcomes [40,58,62,66].

In addition to the big five personality traits, the Five Cs mentioned by Ref. [55] are a group of non-cognitive skills that include competence, confidence, connection, character, and caring, which can promote positive youth development. Previous work by Ref. [92] indicated that the Five Cs of Child Development are pertinent because they can help reduce family trauma and build rapport with parents. Furthermore, character strengths vary significantly across school settings but are positively associated with student achievement, well-being, flow experience, and enjoyment of learning [45,51].

In school settings, the importance of student development and positive education helps to equip the next generation with future-proof skills. Growth mindset, grit, self-concept, deep processing, and virtues are some of the most frequently discussed intrapersonal skills in this field. These concepts appear to overlap and have the same effect on student development. For instance, while growth mindset, grit, and self-concept have positive associations with behavioural and academic outcomes [63,85,101], self-concept helps students remain in school longer [57]. Consequently, more studies [43,56] have focused on the type of intervention that improves these skills.

Most research in this field focuses on developing interpersonal skills, including cooperative learning, for positive educational outcomes. For instance, cooperative learning enhances students' social and emotional skills throughout their everyday lives [71]. Until now, these non-cognitive skills were one of the tools the younger generation needed to deal with rapid change and uncertainty in their professional and personal success.

2.4.2.2. Cluster two: a nurturing school climate and the presence of non-cognitive skills mitigate delinquent behaviour in school settings (30 items). The majority of adolescents' time is spent in school, even though adolescence is a crucial developmental stage with long-lasting consequences. Generally, a nurturing school environment will support and improve relationships between teachers, peers, and staff, reducing delinquent behaviour such as bullying and violence [5,13,99]. Many studies have revealed that the school environment can

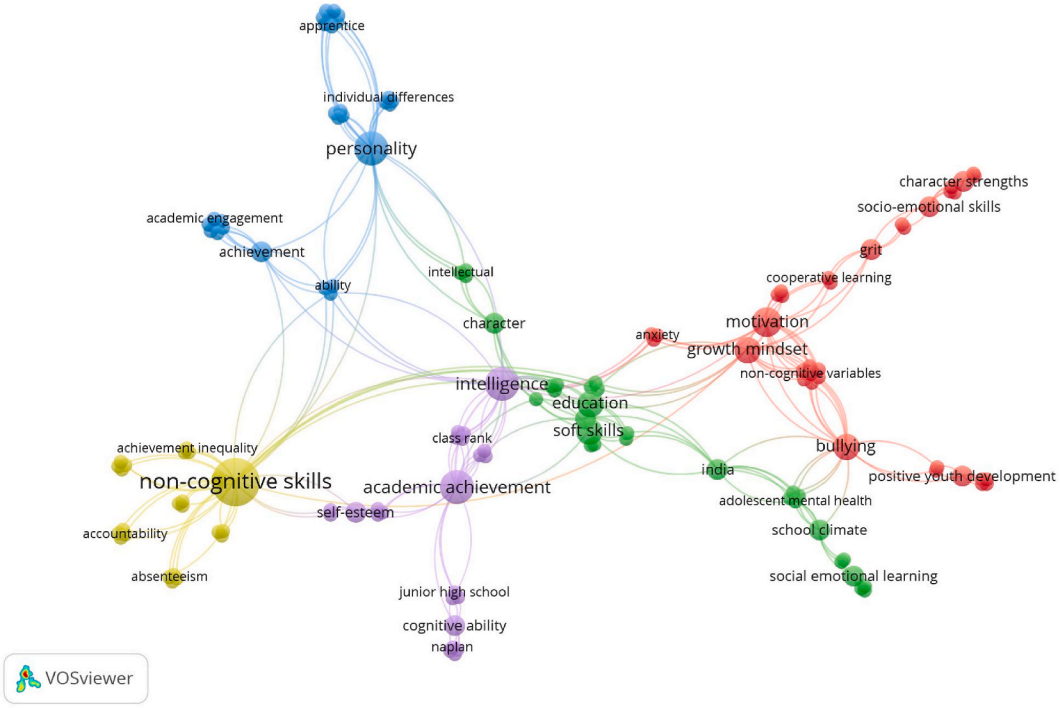

Fig. 4. Summary of themes.

predict students' mental health, Ref. [11] noted that enhancing the school climate will reduce alcohol use, aggression, depression, and anxiety, all impacting student mental health. Similarly [73] indicated that a student's mental health could be predicted by how well their classroom environment supports their development.

According to the results, there are significant ties between mental health and depression. Previous research has highlighted the concepts of depression and school connectedness [72] and the concept of resilience [86,91]. In addition to other factors, self-complexity has been linked to depression, as [77] found that a higher level of self-complexity reduces depression. For instance, a student with self-complexity traits will be able to overcome depression by understanding their multiple roles in school, such as student, friend, athlete, and family member, and will be able to transition to a non-threatened state easily and buffer their negative emotions. In addition, Ref. [81] noted that the type of school, namely boarding school or day school, will influence the level of depression among students.

The role of school climates in preventing bullying has been highlighted by Ref. [12], whereby a positive school climate will reduce bullying victimisation. In addition, the study revealed that bullying victimisation varies by gender and grade level, highlighting the need for additional efforts to prevent bullying among students. Students' ability to get over depression depends on the type of school they go to and on factors like self-esteem, resilience, and how much social support they feel they have.

2.4.2.3. Cluster three: non-cognitive skills as a predictor of academic outcomes (28 items). This cluster of evidence supporting the concept of non-cognitive skills has garnered increasing attention in the literature in various contexts, including academic achievement. According to empirical studies, non-cognitive factors of students are sources of individual differences in academic achievement that go hand in hand with the school environment. These findings include the non-cognitive skills that relate to multiple academic outcome domains. A longitudinal study with a 2-month gap demonstrated that in both western and eastern contexts, fairness and kindness are positively associated with academic performance [45]. This finding is in line with [51], that revealed the consistent relationship between a love of learning and perseverance with student achievement.

Consequently, students with higher grades in specific subjects, such as mathematics, French, and German, were also associated with conscientiousness and openness [58]. Intelligence and academic self-report were found to predict stable grades but only have minor effects on later grades when striving for grade stability. In the same vein, it is interesting to note that academic self-control and perseverance were predictors of report card grades [50]. On the other hand, Ref. [47] stated that a proactive personality is a better predictor of success than grades and that institutions should focus more on that and less on academic ability testing.

In the realm of predicting academic achievement by an individual's intelligence, findings by a prominent representative of German students indicated that the non-cognitive skills comprised of the big five personalities provide substantial effects on achievement [48]. Thus, it is recommended to control non-cognitive domains while measuring academic achievement. These intertwined findings are interesting as they may further expand the knowledge of the importance of non-cognitive skills for life outcomes.

2.4.2.4. Cluster four: multifaceted antecedents of school climate in promoting the development of students' non-cognitive skills (24 items). Most of the articles in this cluster highlight the multifaceted mechanisms of school climate that will employ positive and negative outcomes for student non-cognitive skills. It is intriguing to conclude that multiple domains surrounding student outcomes are rooted in upper-level education policy and reform associated with lower-level domains, namely, schools, teachers, students, parents, and social environments. A policy-driven approach to education will then be implemented in schools. For instance, a positive school climate affects students' mental health and well-being due to fewer school-related stresses, improving student achievement [11,84]. Additionally, school start times have benefited students positively and negatively [74]. On the one hand, an early school start time improves high school and college performance. On the other hand, the earlier school start time has resulted in several adverse outcomes, including increased absenteeism and dropout rates.

It should be noted that teachers and students at school are interdependent domains that have proximal effects on one another. In particular, Ref. [80] discovered a curriculum-integrated overlapping understanding of non-cognitive skills. Teachers argued for the necessity of an evaluation of their learning approaches, relationships with students, and school culture with the objective of fostering the development of non-cognitive skills in students. Concerning the student domain, it should be noted that class size [78] and emotional control [86,98] have also played a role in determining student outcomes.

This study's findings indicate that parental involvement and expectations affect their children's educational attainment levels [61]. Therefore, parents who expect their children to obtain a Bachelor's degree or higher are more likely to have college-completed children. Other research [68,72,92] supports the notion that parental involvement and connectedness influence the development of their children's non-cognitive skills. Additionally, interesting findings by Ref. [81] revealed that peers play a significant role in promoting non-cognitive skills while family social support is insignificant depending on the type of school, while [75] confirms that non-cognitive skills will mitigate the effect of disadvantages on academic performance for students from disadvantaged backgrounds.

2.4.2.5. Cluster five: the role of school domains and non-cognitive attributes towards students' cognitive development (23 items). Most of the articles in this cluster highlight the interconnected school domains, including school environment, teachers, and students, and are associated with non-cognitive skill attributes that contribute to students' cognitive development. A qualitative study by Ref. [52] revealed that the majority of classroom teachers are more control-oriented than autonomy-supportive. The findings also demonstrated that an autonomy-supportive classroom has a strong correlation with extrinsic motivation, which typically occurs in a collectivist culture. Individualistic culture, meanwhile, tends to perceive students' intrinsic motivation, which is also influenced by parenting style and socio-economic resources. Similarly, Ref. [59] found that motivation and self-esteem improved cognitive factors, namely verbal

fluency and reasoning, which improved student academic performance in language and mathematics.

In contrast, Ref. [40] discovered intriguing findings that shed light on the genetic role as a predictor of non-cognitive skills and academic outcomes, rather than environmental factors such as school, parents, and home conditions. This result is attributable to the idea that non-cognitive domains provide stable trends in cognitive ability that are also influenced by genetic factors. However, the research on the concept of grit is inconsistent. On the one hand, the significance of cognitive reserve fostered by non-cognitive domains such as grit had a lasting impact on memory loss. This notion is supported by the findings of a longitudinal study which indicated that, after controlling for IQ, adolescent grit would reduce the negative effects of late-life cognitive conditions [65].

On the other hand, a recent study by Ref. [90] indicates that grit is insignificant among students with low IQs. It should be noted that the presence of grit does not improve academic performance for students with delayed cognitive ability. Thus, the intervention for this group of students cannot focus on grit. Instead, it should focus on other non-cognitive skills that will help them improve in school and life.

2.4.2.6. Summary of bibliometric mapping. A conceptual framework that illustrates the state-of-the-art relationship between school climate and non-cognitive skills. The framework depicted in Fig. 5 represents the state-of-the-art studies examining the relationship between school climate and students' non-cognitive skills resulting from bibliometric network visualization. As described in the section, the analysis identified the primary research themes by grouping the prior studies into five categories.

According to Cluster 1, the composition of non-cognitive attributes is twofold—first, intrapersonal attributes. The majority of non-cognitive skills within the scope of this review are intrapersonal. These malleable characteristics are nurtured by the individual and shaped by the environment. A positive environment will facilitate the maturation of these qualities, which will eventually become part of their character. In contrast, interpersonal relationships are those between individuals. For example, individuals in a team require cooperation among the team members to achieve a goal. If a person has the right non-cognitive skills, they can work well with others and finish the assigned task.

Secondly, Cluster 2 explains that the interrelationship between a positive school climate and the presence of non-cognitive skills will aid in reducing deviant student behaviour. The findings indicated that policymakers, school leaders, teachers, and researchers need to pay more attention to several negative emotional outcomes, including anxiety, depression and other mental health issues, bullying victimisation, and violence. In the long term, these issues can be resolved by fostering a positive school environment and encouraging the development of non-cognitive skills such as self-complexity, self-esteem, and resilience to cope with unanticipated challenges in school and adulthood.

Cluster 3 highlights the importance of non-cognitive skills in predicting students' academic outcomes. In an effort to shed light on which factors have the most significant impact on student achievement, this cluster sheds light on the importance of non-cognitive skills that go beyond intelligence and provide solid evidence for student academic achievement. Non-cognitive skills also have a confounding effect on academic performance, making these findings crucial for developing appropriate student interventions.

Next, Cluster 4 describes the multifaceted domains that contribute significantly to student development, particularly non-cognitive skills. For instance, the education policy outlined the need for holistic student development, and the school has become the venue for implementing and pursuing this objective. Similarly, additional resources, such as a positive and nurturing school climate, teachers,

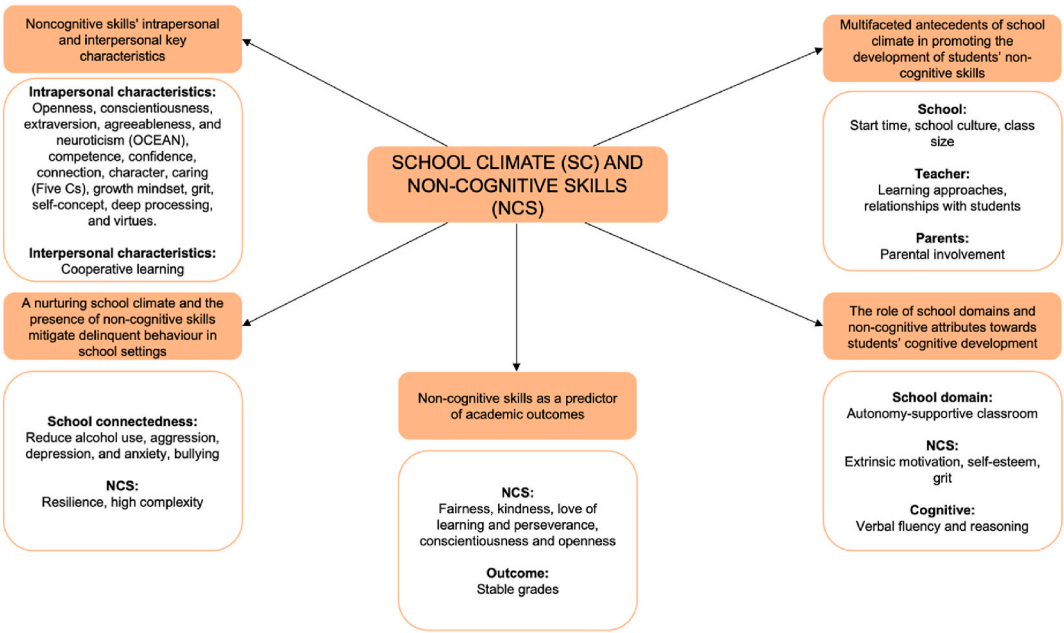

Fig. 5. The framework of themes and trends in school climate and non-cognitive skills interlink.

and students who share the same mission, are required. In addition, parents and the community play an essential role in supporting the school system and providing students with the resources they need to succeed academically, behaviourally, and emotionally. This study provides useful insights into the proximal and distal relationships between the domains that influence students' non-cognitive skills in school settings.

The final cluster emphasises the influence of school domains, namely school environment, teachers, and students with non-cognitive skills, on students' cognitive development. According to the findings, teachers can help improve students' cognitive ability by nurturing their intrinsic motivation to mitigate the impact of differences in parenting style and socio-economic status. In contrast, the findings also revealed that genetics, not environmental factors, affected students' cognitive ability. In an effort to shed light on which aspect of non-cognitive has been highlighted within this cluster, it is important to note that motivation, self-esteem, and perseverance play a significant role in students' cognitive development.

2.4.3. Research design, level of analysis, and future recommendations

In relation to research design, 17 articles (25%) employed cross-sectional studies, ten articles (12%) used an experimental design, eight articles (12%) applied qualitative studies, and another two articles (4%) utilised scale development (See Table 4 for a summary). So far, longitudinal design was the most frequent method employed with 23 articles (37%). Furthermore, for multi-source/multi-method/mixed method, one article employed multilevel analysis, while two other studies used individual analysis.

The current review summarised that 90% of the study was employed at the individual level. It should be noted that multilevel analyses provide a remedy for studies related to the organisational context. For example, the lower level (i.e., individual level) was affected by the upper level (i.e., school or department), and suitable statistical tools and analysis are needed to provide cross-level effects and empirical evidence on this phenomenon [102–104]. In the same vein, we encourage future research to explore multiple climates simultaneously to provide better evidence of which climates have better linkages to the variables being studied. The reason is that suitable intervention can be delivered to overcome issues related to the phenomena.

Furthermore, although 32% of the studies reviewed used a longitudinal approach, limited research examines using a shorter time gap which has been highlighted in the previous literature. It is suggested to conduct multiple time gaps to examine the optimal effect for the variables studied [105]. It should be noted that more studies employing longitudinal and multilevel approaches are needed to examine the nested and shared perception of school climate and provide causality for the studied domains. In addition, while most of the studies in this area have been using a longitudinal approach by exploiting secondary data, limited studies employ primary data based on the current scenario.

Besides a longitudinal approach, we would recommend more research make use of multiple sources to reduce bias amongst responses. For example, teachers will rate students' engagement instead of a self-reported survey. Furthermore, it should be noted that this review revealed that more qualitative and mixed-method designs should be conducted in the future. A qualitative study research design that involves a dyadic approach [106], diary study [107], content analysis [108], experience sampling method [109] and momentary ecological assessment [110] should be conducted. Moreover, the role of item response theory and the Rasch model should be undertaken in this area of study to obtain more precise and robust empirical evidence to expand further the body of knowledge in this area [111].

2.5. Research contribution, limitations, and conclusion

The current study highlights themes and frameworks of the interlink between school climate and non-cognitive skills. This framework provides a holistic ideas that school climate have substantial association with students' non-cognitive skills outcomes [22]. In the same vein, this framework contributes theoretically and conceptually and would guide future work to further expand the existing theories by involving multiple domains related to school climate and non-cognitive skills. For instance, Bronfenbrenner's Bioecological Theory of Human Development [12,81,94] highlighted the multifaceted domains which need further investigation of other constructs in other contexts of study to provide distinct etic and emic perspectives. Similarly, the Human Capital theory [25,46,87] involves several non-cognitive skills, namely conscientiousness, grit, self-esteem, locus of control, social-emotional skills and engagement influence on educational years and achievement, occupational status, and income. Another practical contribution of this work is it enables educational policymakers, school administrators, teachers, researchers, and the community to comprehend the changing trends in school management to maximise student outcomes holistically. It also points out the gaps in the existing literature so that future researchers will have a good set of directions for reference.

The SLR and mapping given in this work are susceptible to the same constraints as any other research method. To mitigate the risk of bias and assess quality, the researcher reviews previous SLRs to confirm the need to conduct the presented study and follows systematised and documented phases marked by inclusion and exclusion criteria. Although a search protocol has been developed, this does not guarantee that all relevant papers are included. This study used three of the most important databases, Scopus, Web of Science, and ScienceDirect, as well as two supporting databases, Google Scholar and Dimensian. ai, to assuage this risk.

This systematic literature review contributed a novel framework and an in-depth understanding of the relationship between school climate and students' non-cognitive skills development to the research community and practitioners with the application of PRISMA protocols [28] and bibliometric mapping analysis utilising VOSviewer software [100]. It provides a general overview as a starting point for future researchers to delve into the relationship between school climate and students' non-cognitive skills to provide educational organisations with valuable insight for navigating better educational outcomes. Moreover, future studies might use the current study as a starting point to investigate the association between school climate and domains of students' non-cognitive skills to give educational organisations vital data for navigating improved educational results.

Table 4
Research design analysis

Research design	Level of Analysis		Total (N = 65)*
	Multilevel	Individual-level	
Cross-sectional		19	19
Experiment	–	10	10
Longitudinal	5	18	23
Objective measurement	1	7	8
Multisource/multimethod/Mixed method	1	2	3
Qualitative	–	8	8
Scale development		2	2
Total	7	66	73

Note: *Some studies fit into more than one analysis because the number of studies in Table 4 outweighs the total number of studies.

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The authors declare no competing interests.

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