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From family to classroom: mediating roles in promoting social and emotional learning among early adolescents

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ABSTRACT

This research aims to examine the influence of authoritative parenting (PAREN), cooperative learning (COOP), school environment (ENVI), positive classroom climate (CLASS), and extrovert personality (EXTRO) on social and emotional learning (SEL), as well as analyze the complexity of mediating variable roles linking these factors. The sample consisted of 684 lower secondary school students from the upper northern region of Thailand. Questionnaires were used for data collection, and analysis was conducted using partial least square structural equation modeling (PLS-SEM) technique. Research findings revealed complex structures among factors collectively explaining 67.37% of SEL variance. PAREN emerged as the most powerful driving force followed by school factors, namely COOP and CLASS, which demonstrated strong interconnection while ENVI showed only indirect influence through EXTRO. Furthermore, CLASS and EXTRO functioned as significant mediating variables between classroom factors and SEL. However, EXTRO did not play a mediating role in the relationship between parenting and SEL, reflecting that family influence remains the primary factor determining SEL development in Thai youth.

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1. INTRODUCTION

Social and emotional learning (SEL) plays a crucial role in developing quality youth to support rapidly changing, disruptive, and complex future scenarios. The function of schools can no longer be limited to academic knowledge development but must simultaneously foster emotional and social skills [1], [2]. These skills are increasingly demanded by the labor market to accommodate the rapid digital transformation of work processes [3]. Significant research supports that SEL not only helps students develop positive perspectives toward themselves, others, and school but also promotes positive social behaviors and serves as a protective factor against major risk behaviors such as aggression, bullying, depression, or substance use [4], [5]. These skills also help build psychological immunity, enhance resilience in facing problems, and improve adaptability when confronting difficulties [6], while also serving as important tools for academic achievement development [7].

Despite the critical importance of SEL, the development of these skills in youth faces complex challenges, particularly following the COVID-19 pandemic, which severely impacted the emotional and behavioral development of children and adolescents [8]. Simultaneously, the transition to the digital era, where social media platforms have become an integral part of adolescents' daily lives, has reduced face-to-face interactions, resulting in declining social skills [9]. Meanwhile, the education system, which

continues to prioritize academic achievement, has diminished the importance of SEL development, leading to its neglect and lack of serious integration into the curriculum. Additionally, there is a lack of systematic teacher training to promote SEL for students [10], [11]. These challenges highlight the necessity for educators to identify effective strategies for systematically promoting SEL among students.

According to scholarly concepts, SEL encompasses students' skills and abilities to express emotions and social behaviors appropriately by understanding and managing their own emotions, demonstrating understanding and empathy for others, building and maintaining positive relationships, and making responsible decisions with consideration of consequences [12]–[14]. These skills and abilities form a complex system for developing essential life skills. However, SEL development cannot overlook social and cultural contexts, which may reduce the effectiveness of developing these skills, especially in Eastern societies like Thailand, where values, beliefs, and social structures differ from those in the West. Adapting SEL programs to align with local contexts is therefore crucial [15], [16], enabling educators to design SEL development approaches that truly respond to the diverse needs of students.

SEL does not develop in a vacuum but is shaped by a complex social ecosystem including personal characteristics, family context, school, classroom, and teaching practices [1]. The family serves as the first incubator of SEL skills; parenting styles that provide attentive care within boundaries, offer freedom, and employ reasoning positively impact emotional skills and social behaviors [17]. Meanwhile, children's individual personalities play an important role, particularly extroverted personalities influenced by biological and environmental factors, which often facilitate SEL skill development [18], [19]. Nevertheless, SEL skills can flourish in all children with appropriate support, whether through cooperative learning that develops necessary social skills [20], creating positive classroom climates [21], or school environments that systematically promote SEL development through school-wide policies and activities [22], [23].

Although SEL research has been extensively studied, three critical gaps persist that fundamentally limit theoretical advancement and practical application, particularly in non-Western contexts first, mechanistic knowledge gaps. Most studies focus on evaluating the effectiveness of SEL promotion programs rather than understanding the deep mechanisms driving SEL [4], [7], particularly neglecting how personality characteristics or classroom climate may mediate environmental influences affecting SEL—mechanisms that may operate through entirely different pathways across diverse contexts. Second, cultural context limitations. Most research occurs in Western contexts, creating gaps in understanding how factors affect students in countries with different cultural contexts and social values, such as Thailand [15], [24], [25], generating theoretical blind spots regarding family parenting mechanisms, collectivist values, and authority respect that may significantly alter SEL developmental trajectories. Third, developmental stage complexity. Lower secondary school students are in a developmental stage with unique complexities that may require different SEL development approaches than those for younger children [26], [27], and existing theoretical models may inadequately capture the unique social-emotional challenges and opportunities specific to early adolescence.

Therefore, to fill existing research gaps, this study aims to examine the direct and indirect influences of factors affecting SEL among lower secondary school students. The primary novelty of this research lies in three distinct areas: first, this study investigates the complex mechanisms affecting SEL within the specific Thai context, moving beyond merely identifying influential factors to uncover "how" and "why" through mediating variables using partial least square structural equation modeling (PLS-SEM) analysis, particularly examining the roles of classroom climate and personality characteristics. Second, this research challenges the direct applicability of Western-derived theoretical frameworks by providing empirical evidence from an Asian collectivist context, expected to reveal unique developmental trajectories shaped by distinctive Thai sociocultural values. Third, by targeting the complex developmental period of early adolescence, this study delivers nuanced insights that can inform targeted, age-appropriate interventions. The empirical findings will contribute context-specific evidence benefiting effective SEL promotion policies and programs, while providing actionable guidelines for parents and schools to collaborate in supporting students' emotional and social competency development.

2. METHOD

This research aims to examine the structural relationships between factors influencing SEL with the following specific objectives: i) to study the influence of authoritative parenting (PAREN), cooperative learning (COOP), school environment (ENVI), positive classroom climate (CLASS), and extrovert personality (EXTRO) on SEL of lower secondary school students; and ii) to examine the mediating role of CLASS and EXTRO in the relationship between various factors and SEL through PLS-SEM analysis. The conceptual framework of this research is shown in Figure 1 with nine hypotheses as:

- H1: PAREN has a positive influence on students' SEL.
- H2: COOP has a positive influence on students' SEL.

- H3: ENVI has a positive influence on students' SEL.
- H4: CLASS has a positive influence on students' SEL.
- H5: EXTRO has a positive influence on students' SEL.
- H6: EXTRO mediates the relationship between PAREN and students' SEL.
- H7: EXTRO mediates the relationship between CLASS and students' SEL.
- H8: CLASS mediates the relationship between COOP and students' SEL.
- H9: CLASS and EXTRO serially mediate the relationship between COOP and students' SEL.

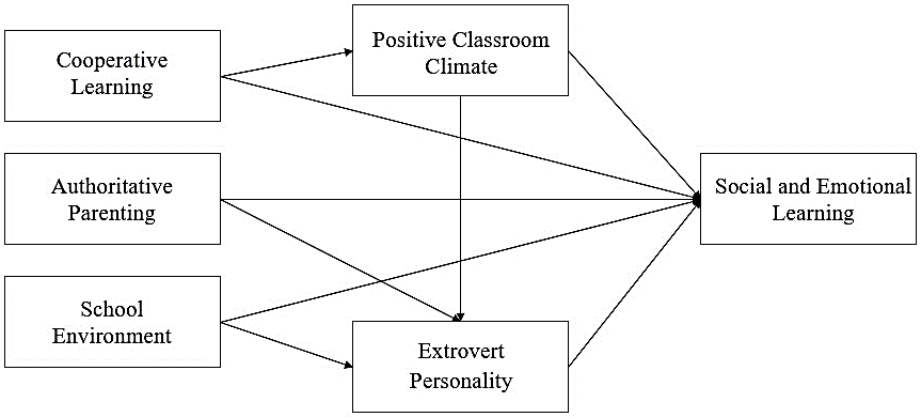

Figure 1. Conceptual framework

2.1. Participants

This research utilized a sample of 684 lower secondary school students from various schools in the upper northern region of Thailand, obtained through multi-stage sampling to ensure diversity and representativeness of the population. The researcher determined the sample size using calculations from the website https://www.danielsoper.com/statcalc, specifying an effect size (f^2) of 0.25, a statistical power of 0.80, a significance level (α) of 0.01, with 10 latent variables and 42 observed variables [28], [29]. The calculation indicated a minimum sample size of 355 participants. The actual data collection yielded a sample size exceeding this minimum threshold, consistent with recommendations that SEM analysis should utilize at least 300 participants for good results and over 500 for excellent results [30]. The sample consisted of 316 male students (46.20%) and 368 female students (53.80%), distributed across 7th grade (242 students, 35.38%), 8th grade (227 students, 33.19%), and 9th grade (215 students, 31.43%). Participants ranged in age from 12 to 16 years, with an average age of approximately 13.89 years, and represented a diverse range of academic achievement levels from 1.50 to 4.00 GPA.

2.2. Research instruments

This research employed a 5-point rating scale questionnaire (5=most accurate/most frequently practiced, 1=least accurate/never practiced) as the data collection instrument. The developed instrument underwent content validity assessment by four experts before being pilot-tested with 100 students. The collected data were analyzed for discriminative power using item-total correlation through Pearson correlation coefficient (r_{xy}) calculation and reliability analysis for each observed variable using Cronbach's alpha coefficient (α). The studied variables included:

PAREN refers to the parenting style in which parents or caregivers provide love, warmth, and attentive care within boundaries and with reasoning, as well as accepting students' opinions and abilities. This was classified into four observed variables: provision of love and warmth (PAREN1), attentive care within boundaries (PAREN2), acceptance of opinions and abilities (PAREN3), and reasoning (PAREN4). This was measured using 12 items, such as "My parents give me opportunities to think and make decisions on my own", "My parents encourage and support me to pursue my interests and abilities", and "communicating with family members makes me feel warm". The discriminant values ranged from 0.426-0.726, with a reliability of 0.881.

COOP refers to a classroom learning process that focuses on students with different abilities who helping, depending on, and working together within groups, with responsibility for both themselves and the group to achieve established goals. This was classified into five observed variables: positive interdependence

(COOP1), discussion and exchange of opinions (COOP2), individual and group accountability (COOP3), small group work skills (COOP4), and group process (COOP5). This was measured using 15 items, such as "I learn new or different concepts from group discussions with friends", "My friends and I in the group always have clear group work procedures", and "friends help improve my learning and work". The discriminant values ranged from 0.491-0.680, with a reliability of 0.895.

ENVI refers to the context surrounding the school beyond the classroom that promotes students' SEL. This was classified into four observed variables: shared spaces to promote interaction (ENVI1), extracurricular activities outside the classroom (ENVI2), support for students to engage in activities of interest (ENVI3), and acceptance and respect for students' opinions (ENVI4). This was measured using 12 items, such as "teachers and school personnel provide opportunities for students to express opinions on school matters", "I learn social coexistence skills and develop my emotional skills from extracurricular activities organized by the school", and "the school has places for shared leisure activities, such as activity areas, libraries, cafeterias, benches, football fields, and basketball courts". The discriminant values ranged from 0.534-0.725, with a reliability of 0.928.

CLASS refers to the psychological atmosphere in the classroom resulting from teacher behaviors, teacher-student interactions, and student-peer interactions. This was classified into five observed variables: warm atmosphere (CLASS1), free atmosphere (CLASS2), challenging atmosphere (CLASS3), respectful atmosphere (CLASS4), and atmosphere of success (CLASS5). This was measured using 15 items, such as "I feel that I receive as much attention from teachers as other friends", "teachers often have activities that make me feel challenged in my abilities", and "I feel that my classmates are friendly towards me". The discriminant values ranged from 0.291-0.663, with a reliability of 0.861.

EXTRO refers to student characteristics that favor building relationships with others, enjoying and learning from new experiences, being expressive and emotionally clear, and adapting well to various situations. This was classified into four observed variables: seeking and engaging in activities with others (EXTRO1), expressiveness (EXTRO2), clear emotional expression (EXTRO3), and adaptation to situations and environments (EXTRO4). This was measured using 12 items, such as "I feel excited and have fun when meeting and doing activities with large groups", "I dare to express my opinions even if they do not align with others", and "I find it easy to adapt to new groups of friends". The discriminant values ranged from 0.248-0.643, with a reliability of 0.852.

SEL consists of five components. First, self-awareness (SEA) measures the ability to recognize and manage one's emotions, recognize one's strengths and weaknesses, and have self-confidence. This was measured using 9 items, with discriminant values ranging from 0.381-0.590 and a reliability of 0.796. Second, self-management (SEM) measures the ability to control thoughts and behaviors, manage stress, have self-discipline, and be motivated to set goals. This was measured using 15 items, with discriminant values ranging from 0.213-0.692 and a reliability of 0.845. Third, social awareness (SOA) measures the ability to understand and empathize with others, value differences, listen to diverse opinions, and recognize social support resources. This was measured using 14 items, with discriminant values ranging from 0.374-0.639 and a reliability of 0.766. Fourth, relationship skills (RES) measure the ability to communicate, build relationships, manage conflicts, and provide assistance to others. This was measured using 15 items, with discriminant values ranging from 0.451-0.636 and a reliability of 0.908. Lastly, responsible decision-making (RDM) measures the ability to create options, make decisions based on ethics and safety, and accept consequences. This was measured using 10 items, with discriminant values ranging from 0.565-0.659 and a reliability of 0.873.

2.3. Data collection

Data collection was conducted after the research project received human research ethics approval from Chiang Mai University (COA No.053/66, CMUREC No. 66/085). The researcher strictly followed ethical guidelines by coordinating with school administrators to obtain permission to collect data from students, explaining the objectives, describing the questionnaire completion method, and informing students of their right to voluntary participation, as well as ensuring the confidentiality of personal information. The data collection resulted in 697 returned questionnaires out of 700 distributed, with students taking approximately 15-20 minutes to complete them. Upon verification of completeness, 3 questionnaires were found to be incomplete, and 10 showed unreliable response patterns (such as marking the same option throughout or making systematic diagonal markings) and were therefore excluded from the analysis. This resulted in a total of 684 complete questionnaires for data analysis, representing a complete response rate of 97.71%.

2.4. Data analysis

This study employed PLS-SEM analysis, a method capable of evaluating causal relationships between latent variables in highly complex models with numerous latent variables and indicators [31].

Parameters were estimated using the PLS algorithm, and statistical significance was tested using bootstrapping simulation with 5,000 iterations via ADANCO version 2.3.2 software [32], which is software specifically designed for data analysis using PLS-SEM technique. The model had a formative-formative structure and employed the disjoint 2-stage approach for analysis, which can reduce the impact of complex relationships in the model and prevent multicollinearity problems between indicators in various variables, resulting in more accurate analysis [31], [33]. The first step began with analyzing the lower-order construct model without considering the second-order latent variables, to obtain standardized construct scores of the lower-order latent variables. These standardized scores from the first step were then used as indicators in analyzing the newly created higher-order latent variables, and the model was analyzed again [33].

For model evaluation, three key approaches were employed: i) assessment of overall model fit by examining the standardized root mean square residual (SRMR), which should be below 0.080; ii) evaluation of the measurement model through confirmatory composite analysis (CCA) by examining T-weight values that must exceed 1.96 (or if not significant, checking for loadings greater than 0.50), and testing for multicollinearity using the variance inflation factor (VIF), which should not exceed 5; and iii) assessment of the structural model by evaluating path coefficients and their statistical significance, assessing the coefficient of determination (R^2), where values of 0.25, 0.50, and 0.75 are considered low, moderate, and high predictive accuracy, respectively, and evaluating effect size (f^2), where values of 0.02, 0.15, and 0.35 indicate that the independent variable has a low, moderate, and high influence on the dependent variable, respectively [31].

For the mediation effect analysis, which examined the in-depth mechanisms of relationships between variables in the PLS-SEM model to provide a more complete understanding of variable relationships [34], the researcher proceeded by introducing mediating variables into the relationship pathway and determining whether these mediating variables altered the relationship between factor variables and SEL. The analysis began by examining the total effect (C) from the factor variable pathway to SEL, then sequentially adding mediating variables according to the hypotheses (H6 to H9) and examining the following results: i) direct effect after adding the mediating variable (C') and ii) indirect effect (IE). In cases where IE≠0 and C' is not significant, this indicates a full mediator; in cases where IE≠0 but C' is significant, this indicates a partial mediator, suggesting that other latent connecting variables remain; and in cases where IE=0, this indicates no mediation [35]. Additionally, the researcher considered the variance accounted for (VAF), which is the ratio of IE to total effect, to provide clearer conclusions about the nature of mediation effects. If VAF<0.20, this indicates no mediation; if VAF is between 0.20-0.80, this indicates partial mediation; and if VAF>0.80, this indicates full mediation [36].

3. RESULTS AND DISCUSSION

3.1. Overall model assessment

The assessment of overall model validity, analogous to examining the big picture of how well the constructed model aligns with empirical data, revealed that the SRMR values from the first and second analyses were 0.0373 and 0.0312, respectively. These values are substantially below the 0.0800 threshold, indicating that the covariance matrix of the estimated model and the empirical covariance matrix exhibit good fit. This excellent model fit establishes confidence in the reliability of subsequent structural model analyses and interpretation of relationships between variables.

3.2. Measurement model properties

A good measurement model is comparable to a precise instrument for measuring the subject under study. The evaluation of the measurement structure in the first analysis revealed that the weight values of each indicator were statistically significant at the 0.05 level, with the exception of EXTRO 3. However, when considering the loading value, it was found to be higher than 0.5, thus meeting the evaluation criteria. Additionally, none of the indicators exhibited multicollinearity issues, allowing the researcher to proceed with the second analysis. In this subsequent analysis, the weight values of all indicators were found to be statistically significant at the 0.05 level, and no multicollinearity was detected. This demonstrates that the measurement model is of good quality and suitable for further structural model analysis, the details are presented in Table 1.

3.3. Structural model result

When delving deeper into the structure of relationships between variables, the structural model analysis revealed interesting insights. The five factors collectively explained 67.37% of the variance in SEL, which is considered a high level. This reflects that the selected factors have substantial power in comprehensively explaining the phenomenon.

When considering the total effects, all factors were found to have positive influences on SEL, as hypothesized. However, when examining direct effects separately, interesting findings emerged. PAREN remained the most influential factor on SEL (DE=0.4278, p<0.01), followed by COOP (DE=0.2545, p<0.01) and CLASS (DE=0.1498, p<0.01), respectively. Meanwhile, the ENVI did not have a statistically significant direct effect on students' SEL, but an IE was observed (IE=0.0366, p<0.01) through EXTRO.

The relationships between various factors revealed interesting dynamics, particularly COOP, which strongly influenced CLASS (DE=0.6472, p<0.01). This reflects that encouraging student to work together is a key mechanism in creating a classroom atmosphere conducive to SEL development. Additionally, it was found that the ENVI had a greater impact on students' EXTRO than family parenting (DE=0.3097, p<0.01 compared to DE=0.1699, p<0.01), which may indicate that the school context plays a significant role in providing opportunities for students to express their personalities.

Table 1. CCA results for first-order and second-order measurement models

Construct	Indicator	First-order				Second-order			
		Weight	t-weight	Loading	VIF	Weight	t-weight	Loading	VIF
SEA	SEA 1	0.5710	11.2752	0.7880	1.1323	0.2346	5.9368	0.7607	1.7196
	SEA 2	0.3392	5.9022	0.6215	1.1302				
	SEA 3	0.4812	8.9478	0.7049	1.1029				
SEM	SEM 1	0.2694	5.0386	0.5842	1.1691	0.2264	5.5008	0.8069	1.9966
	SEM 2	0.3971	8.2360	0.6747	1.1426				
	SEM 3	0.2292	4.2367	0.5892	1.2076				
	SEM 4	0.3319	6.3263	0.6872	1.2887				
	SEM 5	0.3065	6.0257	0.6902	1.3231				
SOA	SOA 1	0.2035	3.6282	0.3541	1.0277	0.1650	3.8021	0.7307	1.7306
	SOA 2	0.4052	7.5458	0.6660	1.1241				
	SOA 3	0.4436	8.0590	0.6745	1.1038				
	SOA 4	0.5063	8.9551	0.7089	1.0846				
RES	RES 1	0.3264	7.3845	0.7663	1.4811	0.4244	8.3796	0.9607	2.4241
	RES 2	0.2935	6.5736	0.7720	1.5768				
	RES 3	0.3509	6.4272	0.8205	1.7007				
	RES 4	0.2143	2.4694	0.6268	1.4540				
	RES 5	0.2212	4.6823	0.7401	1.6431				
RDM	RDM 1	0.4888	9.7147	0.7978	1.3393	0.1675	3.6581	0.7972	2.1022
	RDM 2	0.3321	5.4576	0.7933	1.5741				
	RDM 3	0.4507	8.1843	0.7691	1.3250				
PAREN	PAREN 1	0.4131	7.9510	0.9113	2.4730	0.3846	6.4178	0.9037	2.4730
	PAREN 2	0.2646	5.4445	0.8386	2.1192	0.2611	4.8583	0.8379	2.1192
	PAREN 3	0.2343	4.1973	0.8503	2.3777	0.2641	4.3154	0.8607	2.3777
	PAREN 4	0.2440	4.5422	0.8300	2.1250	0.2479	4.1608	0.8325	2.1250
COOP	COOP 1	0.2118	4.3980	0.7849	1.8591	0.2121	6.5262	0.7850	1.8591
	COOP 2	0.3400	6.9932	0.8580	2.0901	0.3704	8.6801	0.8680	2.0901
	COOP 3	0.2076	4.4130	0.8061	2.0611	0.1634	3.6811	0.7872	2.0611
	COOP 4	0.2012	3.9370	0.8077	2.0940	0.2094	6.6727	0.8084	2.0940
	COOP 5	0.2692	5.6317	0.7882	1.7528	0.2720	7.6830	0.7874	1.7528
ENVI	ENVI 1	0.3508	4.9720	0.7869	1.5217	0.3581	5.2035	0.7902	1.5217
	ENVI 2	0.3583	5.3486	0.8231	1.7235	0.3509	5.9334	0.8190	1.7235
	ENVI 3	0.1520	2.0539	0.7320	1.7304	0.1446	2.0510	0.7278	1.7304
	ENVI 4	0.3846	5.1858	0.8262	1.6693	0.3915	5.2984	0.8286	1.6693
CLASS	CLASS 1	0.3631	7.3671	0.6960	1.2170	0.3632	7.6445	0.6959	1.2170
	CLASS 2	0.2319	4.3347	0.6711	1.5447	0.1934	3.7582	0.6345	1.5447
	CLASS 3	0.2839	4.8407	0.7144	1.5913	0.2507	4.5088	0.6819	1.5913
	CLASS 4	0.3514	6.4392	0.7159	1.2893	0.3998	7.6364	0.7485	1.2893
	CLASS 5	0.2260	4.8045	0.6070	1.2379	0.2469	5.5933	0.6251	1.2379
EXTRO	EXTRO 1	0.6426	11.3570	0.8865	1.3097	0.6331	11.7158	0.8855	1.3097
	EXTRO 2	0.4182	7.0991	0.7528	1.2883	0.3892	6.5742	0.7387	1.2883
	EXTRO 3	0.1247	1.9175	0.5938	1.3270	0.1817	2.9420	0.6038	1.3270
	EXTRO 4	0.1185	2.2624	0.3813	1.1332	0.1102	2.2610	0.3829	1.1332

VIF=variance inflation factor

When examining the effect size (f^2), PAREN was found to have the highest influence on SEL (f^2=0.317), which is considered a moderate effect, while other variables had low effect sizes. This reflects that even in early adolescence, when young people are beginning to seek independence, family influence remains more important than other factors in shaping SEL. The details are presented in Table 2 and Figure 2.

Table 2. Path analysis results of direct, indirect and total effects in the structural model

Path	Effect			Cohen's f²	Conclusion
	DE	IE	TE		
Variances explained in SEL (R^2_{adj}=0.6737)					
PAREN→SEL	0.4278**	0.0201**	0.4478**	0.3173	Support H1
COOP→SEL	0.2545**	0.1158**	0.3703**	0.0789	Support H2
ENVI→SEL	0.0371	0.0366**	0.0737*	0.0023	Support H3
CLASS→SEL	0.1498**	0.0291**	0.1789**	0.0351	Support H4
EXTRO→SEL	0.1181**	-	0.1181**	0.0260	Support H5
Variances explained in CLASS (R^2_{adj}=0.4180)					
COOP→CLASS	0.6472**	-	0.6472**	0.7208	
Variances explained in EXTRO (R^2_{adj}=0.3623)					
ENVI→EXTRO	0.3097**	-	0.3097**	0.0970	
PAREN→EXTRO	0.1699**	-	0.1699**	0.0309	
CLASS→EXTRO	0.2464**	-	0.2464**	0.0566	
COOP→EXTRO	-	0.1595**	0.1595**	-	

Note: *p<0.05, ** p<0.01; DE=direct effect, IE=indirect effect, TE=total effect

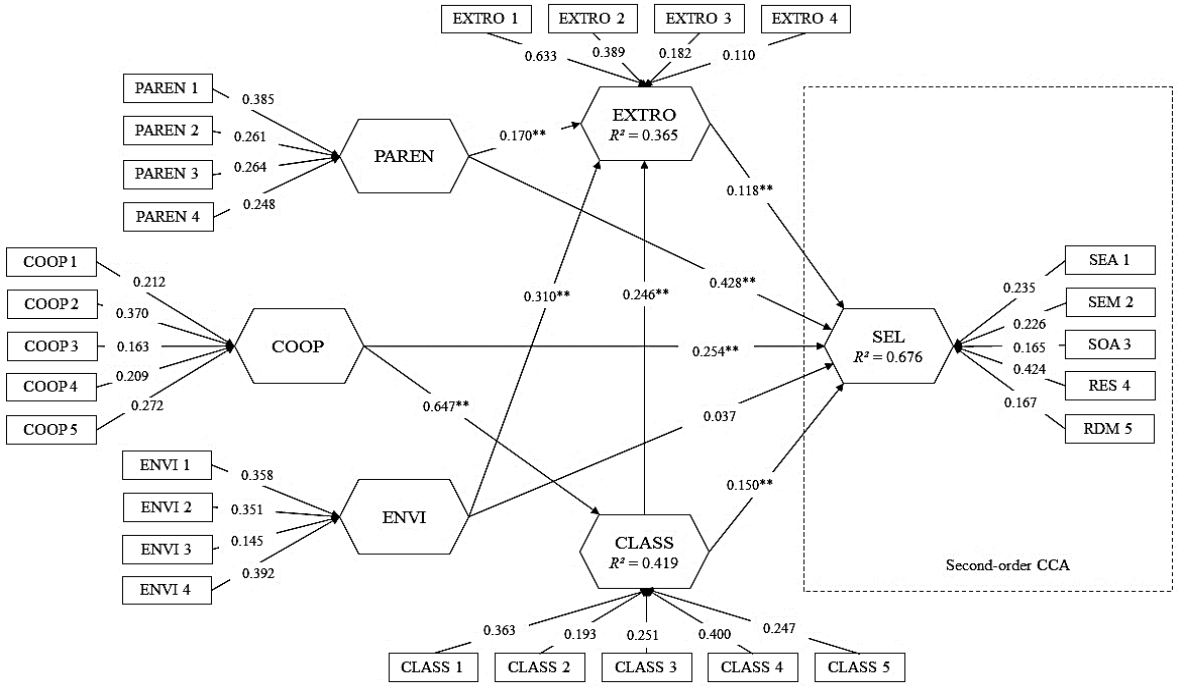

Figure 2. Path model of PAREN, COOP, ENVI, CLASS, and EXTRO on SEL with second-order CCA results

3.4. Mediation effects analysis

The analysis of mediating variables helped reveal the underlying mechanisms of how various factors influence SEL through different pathways. When examining the single mediation in the COOP→CLASS→SEL pathway, the direct effect coefficient decreased slightly from 0.2457 to 0.2444 while remaining statistically significant, with a VAF value of 0.4306, p<0.01. This indicates that CLASS functions as a partial mediator between COOP and SEL, meaning that COOP affects SEL both directly and through creating a CLASS.

A similar pattern was observed in the CLASS→EXTRO→SEL pathway, where EXTRO served as a partial mediator between CLASS and SEL. The direct effect coefficient decreased from 0.1783 to 0.1538 while maintaining statistical significance. These results showed a VAF value of 0.3477, p<0.01, confirming the partial mediation effect.

An interesting finding appeared in the PAREN→EXTRO→SEL pathway, where EXTRO did not function as a mediator in the relationship between PAREN and SEL. Although the direct effect coefficient decreased slightly, when considering the VAF value of 0.1327, p<0.01, which is below 0.20, it can be

concluded that EXTRO does not play a mediating role. This reflects that PAREN directly affects SEL without necessarily requiring changes in the child's personality.

When analyzing serial mediation in the COOP→CLASS→EXTRO→SEL pathway, even more interesting results emerged. The VAF value of 0.6846, $p<0.01$, demonstrates the robust efficiency of the collaboration between CLASS and EXTRO as serial mediators. COOP continued to affect SEL even with both mediating variables included in the analysis. This finding reflects that COOP helps create a CLASS, which encourages students to express their EXTRO, ultimately leading to SEL development, the details are presented in Table 3.

Table 3. Results of simple and serial mediation analysis for CLASS and EXTRO

Effect	Path	β	t-value	VAF (IE/TE)	Conclusion	Hypothesis test
PAREN→SEL	TE	0.4189	10.9590**	0.1327	No mediation	Not support H6
PAREN→SEL	DE (C)	0.4189	10.9590**			
PAREN→SEL	DE (C')	0.4176	10.9516**			
PAREN→EXTRO→SEL	IE	0.0556	3.6757**			
CLASS→SEL	TE	0.1783	5.0771**	0.3477	Partial mediation	Support H7
CLASS→SEL	DE (C)	0.1783	5.0771**			
CLASS→SEL	DE (C')	0.1538	4.1528**			
CLASS→EXTRO→SEL	IE	0.0620	3.5868**			
COOP→SEL	TE	0.2457	5.0751**	0.4306	Partial mediation	Support H8
COOP→SEL	DE (C)	0.2457	5.0751**			
COOP→SEL	DE (C')	0.2444	5.1478**			
COOP→CLASS→SEL	IE	0.1058	4.3609**			
COOP→SEL	TE	0.2457	5.0751**	0.6846	Partial mediation	Support H9
COOP→SEL	DE (C)	0.2457	5.0751**			
COOP→SEL	DE (C')	0.2415	5.3226**			
COOP→CLASS→EXTRO→SEL	IE	0.1682	5.6473**			

Note: **$p<0.01$, VAF=variance accounted for, C=DE before mediator added, C'=DE after mediator added

3.5. Discussion

3.5.1. Influence of factors on social and emotional learning

The research findings clearly indicate that PAREN remains the most crucial driving force for adolescents' SEL development (β=0.428**, f^2=0.317). This aligns with Bandura [37] social cognitive learning theory, which emphasizes that most learning occurs through observing models, with parents being the first models who profoundly influence emotional and social development [38]. Previous studies confirm this mechanism, finding that parents' emotional and social skills affect parenting approaches and family atmosphere, which directly impact children's SEL development [39]. Surprisingly, this family dominance persists even in our digital age, where social media and peer interactions might be expected to diminish parental influence among adolescents. This finding reveals a phenomenon that fundamentally challenges Western developmental theories, reflecting the foundation of Thai collectivist culture, which values interpersonal relationships more strongly than individualistic societies where peer influence typically becomes dominant during adolescence. These results suggest that Thai cultural values create what might be termed "sustained family influence" despite contemporary digital pressures.

The strong influence of PAREN also has significant implications for educational inequality. Specifically, students from families lacking PAREN may be disadvantaged in SEL development compared to peers from more nurturing family environments. This issue highlights the necessity to develop specific support mechanisms for vulnerable students in the Thai educational context, such as more intensive SEL skill enhancement programs or mentoring systems that help compensate for missing behavioral models from the family. Therefore, emphasizing family factors in developing policies to promote SEL is an issue that cannot be overlooked in the Thai educational context.

In the educational domain, COOP emerges as the second most influential direct factor, which aligns with Johnson [40] social interdependence theory, explaining that COOP simulates social situations that help develop necessary social and emotional skills. Research confirms that this learning approach develops both personal and interpersonal skills, such as self-efficacy, communication, problem-solving, and empathy development [41], [42]. For lower secondary school students in early adolescence, COOP holds special importance as they are in a developmental period of cognitive, emotional, and social growth. Research has found that COOP helps socially isolated adolescents form new friendships and reduces bullying and victimization problems [43], which are common issues at this age. Additionally, the strong relationship between COOP and CLASS (β=0.647**) reflects that these characteristics foster a CLASS that contributes to

SEL development. It is therefore not surprising that educators advocate for integrating COOP into teaching practices and extracurricular activities [14], [22], [44].

A surprising finding is that ENVI does not have a significant direct effect on SEL, which contradicts previous studies [22], [45] and Western theoretical models that emphasize the importance of ENVI. This inconsistency reveals that SEL development models developed in Western contexts may not fully explain phenomena in the Thai cultural context, providing evidence supporting the need to develop theories more aligned with Asian cultural contexts. However, ENVI still plays an important role as a supporting factor that helps students express their personalities and develop social skills through its indirect pathway (IE=0.0366**, p<0.01). This indirect mechanism aligns with research finding that biological and environmental factors influence students' personality characteristics [46], and environments that promote interaction and participation in extracurricular activities help develop self-regulation and SOA [45]. This finding suggests that effective SEL promotion in Thai schools requires understanding how environmental factors work through personality expression rather than direct intervention approaches.

3.5.2. Mediating role of factors

The mediation analysis has revealed fascinating underlying mechanisms, finding that CLASS and EXTRO function as partial mediators in the COOP→CLASS→SEL and CLASS→EXTRO→SEL pathways, respectively. Particularly interesting is the discovery of the "classroom as mediator" phenomenon. The mechanism explaining this phenomenon stems from CLASS helping students to express themselves, interact openly with others, and fully develop their social and emotional skills [22]. This aligns with research finding that CLASS results in students showing more prosocial tendencies, exhibiting less disruptive behavior, and daring to explore new ideas [21]. Furthermore, the serial mediation analysis revealed a significant pathway of COOP→CLASS→EXTRO→SEL with an exceptionally high VAF value of 0.6846, uncovering a special mechanism in the Thai educational context where CLASS not only serves as a result of COOP but also functions as a "catalyst" that encourages students to express more extroverted personality traits, leading to SEL development. Consequently, COOP creates a cascading effect throughout the entire SEL development system, indicating to educators that personality-based SEL interventions may be less effective than creating process-oriented environments that facilitate personality expression through CLASS.

Another intriguing finding is that EXTRO does not function as a mediating variable in the relationship between PAREN and SEL. Although the direct effect coefficient decreased slightly, when considering the VAF value of 0.1327, p<0.01, which is below 0.20, it can be concluded that it does not play a mediating role. This phenomenon may reflect the importance of a "critical period" in personality development, suggesting that family influence on personality may have occurred during earlier childhood, and in early adolescence, personality influenced by family tends to be relatively stable. Meanwhile, classroom climate and ENVI have more influence on the expression of personality. This reflects that PAREN directly affects SEL without necessarily requiring changes in the child's personality. A notable point is that EXTRO plays a mediating role only in pathways related to school-level factors, but not in family-level pathways. This indicates that parents can promote SEL in their children without having to change personality traits, but by focusing on enhancing existing strengths and adding necessary skills, they can help make children's SEL development more concrete. Therefore, SEL development should be a continuous process adapted to family contexts and children's specific characteristics, and must have diverse forms that match real contexts to address individual differences [1]. Understanding that both family and school factors affect SEL through different mechanisms will help parents and teachers establish appropriate and effective SEL development approaches.

4. CONCLUSION

This empirical study has unveiled the complex interrelationships between family, school, classroom, and personal characteristic factors that collectively shape SEL in lower secondary school students in northern Thailand. The findings demonstrate that authoritative parenting remains the strongest predictor of SEL development, followed by cooperative learning, positive classroom climate, and extrovert personality, which together explain 67.37% of SEL variance. Importantly, the serial mediation analysis revealed a "sequential activation model" where cooperative learning not only directly affects SEL but also creates positive classroom climate and encourages students to express extrovert personality, establishing a cascading effect throughout the SEL development system. Meanwhile, school environment shows no direct influence on SEL but operates indirectly through extrovert personality expression, providing evidence that Western SEL development models may not fully explain phenomena in Asian cultural contexts. These findings challenge Western-derived approaches and highlight the necessity for developing context-specific SEL promotion theories that reflect Thai collectivist culture.

The findings reveal significant implications for effective SEL promotion through integrated family-school collaboration. Teachers can establish "family-school SEL partnership frameworks" through parental classroom participation and bidirectional communication, emphasizing parenting strategy exchange rather than personality modification. For students lacking SEL-supportive parenting, compensatory programs utilizing cooperative learning and positive classroom climates can provide universal benefits while offering enhanced support for those requiring additional assistance. School administrators play crucial roles in cultivating systematic and sustainable school-wide SEL culture throughout the entire school. Future research should employ longitudinal mixed-methods approaches to understand how SEL-influencing factors evolve across developmental stages. Implementing these evidence-based insights requires thoughtful adaptation to each school's specific context and sociocultural conditions, recognizing that effective SEL promotion is not "one-size-fits-all" but achieves maximum impact when contextualized to help all children develop SEL to their full potential.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

No conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author [SD], upon reasonable request. The data are not publicly available due to privacy and ethical restrictions, as they contain information that could compromise the privacy of research participants, including personal information of student and individuals involved.

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