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What are the most essential social-emotional skills?: Relationships between adolescents' social-emotional skills and psychosocial health variables: an explorative cross-sectional study of a sample of students in preparatory vocational secondary education

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Introduction: Universal school-based social-emotional learning (SEL) programs target several social-emotional skills assuming a relationship between the skills and psychosocial health outcomes. However, greater insight into the relationship is required to clarify the skills that are most crucial to address. It will support the development and refinement of SEL programs. This study investigated (1) the relationship among the social-emotional skills, (2) the association between the skills and psychosocial health variables, and (3) the mediating effect of the skills on psychosocial variables.

Methods: Using self-report questionnaires (N = 796) completed by adolescent students (aged 14–18) in preparatory vocational tracks in Dutch secondary education, associations were identified between five SEL skills and two psychosocial health variables, emotional-behavioral difficulties, and prosocial behavior.

Results: There was a high degree of overlap between the five skills (self-awareness, social awareness, self-management, relationship skills, and responsible decision-making). The skills were univariately associated with emotional-behavioral difficulties and prosocial behavior. In the multivariate model, self-management most strongly correlated with emotional-behavioral difficulties and mediated the relationship between self-awareness and emotional-behavioral difficulties. Social awareness showed the highest correlation with

prosocial behavior and mediated the relationship between prosocial behavior and three other skills: self-awareness, relationship skills, and responsible decision-making.

Discussion: Self-management and social awareness seem to be the central skills to promote the psychosocial health outcomes of students in preparatory vocational secondary education tracks. These two skills mediate the relationship between other social-emotional skills, emotional-behavioral difficulties, and prosocial behavior.

KEYWORDS

social-emotional skills, adolescent, psychosocial health variables, emotional-behavioral difficulties, prosocial behavior, preparatory vocational secondary education

1 Introduction

Globally, schools have implemented universal social-emotional learning (SEL) programs to improve students' psychosocial health, resilience, and academic performance. SEL programs focus on enhancing social-emotional skills based on various theoretical frameworks which assume that several socio-emotional skills are associated with psychosocial health variables (e.g., Duckworth and Yeager, 2015; Durlak et al., 2015; Jones et al., 2019a). Many SEL programs use a consensus-based concept of five interrelated social-emotional skills—self-awareness, social awareness, self-management, relationship skills, and responsible decision-making—developed by the Collaborative for Academic, Social, and Emotional Learning (CASEL; Weissberg et al., 2015). Meta-analyses of studies evaluating SEL programs have identified their short- and long-term positive effects on social-emotional skills and psychosocial health outcomes (e.g., Durlak et al., 2011; Sklad et al., 2012; Taylor et al., 2017; Ma et al., 2020). SEL programs often address multiple skills simultaneously, assuming that teaching them together increases their effect on psychosocial health outcomes (e.g., Durlak et al., 2015; Sancassiani et al., 2015; Jones et al., 2019b).

However, social-emotional skills are separately associated with psychosocial health variables. For example, improved relationship skills are related to less aggression, and a higher-level of self-management skills protect adolescents against substance use and criminal behavior (e.g., Moffitt et al., 2011; Burke and Loeber, 2016). Although the studies cited above provide evidence that social-emotional skills are associated with psychosocial health variables, insights into these associations are limited (Durlak et al., 2011, 2022; Sancassiani et al., 2015; Ura et al., 2020). A better understanding of the associations between individual social-emotional skills and between combinations of skills and psychosocial health variables is necessary. In addition, more insight into the social-emotional skills that are most strongly associated with psychosocial health variables is required. This knowledge can refine the theoretical models used in developing and improving SEL programs and understanding their effects.

Young people's social-emotional skills vary with background characteristics, such as developmental stage, learning abilities, and family background (e.g., Cook et al., 2008; Hecht and Shin, 2015; Wiley and Siperstein, 2015; Gaspar et al., 2018). Implementing SEL programs considering the students' skills and tailored to their needs are recommended to achieve the intended outcomes (Durlak et al., 2015). Recently, it has been particularly emphasized for students with multiple adversities, such as learning difficulties and low-income family backgrounds (e.g., Elias, 2019; Jagers et al., 2019).

Adolescence is a sensitive period for the development of advanced social-emotional skills. Development of these skills is associated with central developmental tasks such as acquiring autonomy and developing self-identity (Lerner and Steinberg, 2009; Blakemore and Mills, 2014; Casey, 2015). During adolescence, social-emotional skills first decrease, then develop to adult levels in later adolescence; moreover, these skills vary with sex and family background as shown by Ross et al. (2019) and West et al. (2020). These studies showed that girls scored higher in some social-emotional skills than boys did. Students who grew up in low-income and/or minority-group families scored lower than those raised in more affluent and majority-group families.

The literature shows that adolescents' social-emotional skills are associated with psychosocial health variables. For example, greater self-awareness protects young people from developing aggression (e.g., Bierman et al., 2010; Brackett et al., 2012; Mohammadiarya et al., 2012). Increased self-awareness is also associated with prosocial behavior (PSB; e.g., Trentacosta and Fine, 2010; Allemand et al., 2015; Crone and Fuligni, 2020; Zaki, 2020). Similarly, improved relationship skills have been associated with lower substance use (Faggiano et al., 2010). Although adolescents are assumed to develop several social-emotional skills, emotional-behavioral difficulties (EBD) are mainly associated with self-management (e.g., Polan et al., 2013; Casey, 2015; Laible et al., 2015; Miller et al., 2015; Van Genugten et al., 2017). Social awareness is mainly associated with PSB and the establishment and maintenance of positive relationships with others outside the family (e.g., Carlo et al., 2003; Lerner and Steinberg, 2009; Eisenberg et al., 2010; Crone, 2017; McClelland et al., 2018). In addition, social-emotional skills are interrelated and foster each other (Weissberg et al., 2015; Oberle et al., 2016). However, knowledge about the correlation between skills and their association with psychosocial health variables in adolescents is limited. Recently, it is suggested to restrict the social-emotional skills targeted in SEL programs for adolescents to those most indicated to meet their needs to prevent them from getting tired and teachers from having to teach skills the students already possess or will develop anyway (e.g., Yeager, 2017; Bailey and Jones, 2019; Ross et al., 2019).

To contribute to the refinement of the theoretical models of SEL used to develop and improve school-based programs, the current study aimed to (1) investigate the extent to which the five social-emotional skills (self-awareness, social awareness, self-management, relationship skills, and responsible decision-making) are interrelated; (2) examine the extent of association between combinations of social-emotional skills and psychosocial health variables; and (3) identify the mediating role of social-emotional skills related to psychosocial health variables.

This study is part of a larger research project evaluating and implementing the Dutch Skills4Life (S4L) program for students in preparatory secondary education (PVSE in Dutch). These tracks prepare students for vocational education and vocational jobs. Almost half of the students in Dutch secondary education are on PVSE tracks (Statistics Netherlands, 2016). Teachers and students involved in a previous study evaluating S4L indicated that the program demanded high intellectual and learning abilities from the PVSE students (Kocken et al., 2011; Pannebakker et al., 2019). The S4L program was adapted to meet the students' needs. To indicate the students in this study requires insight into the Dutch secondary education system.

The Dutch mainstream secondary education system is highly stratified and consists of a general secondary education track (HAVO in Dutch) and a pre-university track (VWO in Dutch) and five qualitatively different PVSE tracks. Significant differences exist in performance levels of students in these PVSE tracks (OECD, 2016). In addition to mainstream education, the Dutch secondary education system also features schools for students with special educational needs.

2 Materials and methods

To explore the associations between different social-emotional skills and psychosocial health variables, we conducted an exploratory cross-sectional study. For this, we used baseline data ($N = 796$) from a longitudinal study on the effects of the Dutch S4L program adapted to the needs of PVSE students (Van De Sande, 2022). The data used in this study are available at https://doi.org/10.17026/SS/DNOJRU.

2.1 Participants and procedure

The participants were students aged 14–18 years. They were in two of the five PVSE tracks—the PVSE basic (PVSE-b, *vmbo-basis* in Dutch) or Practical Education (PrE, *Praktijkschool* in Dutch). Ten percent of Dutch secondary education students are in the PVSE-b and PrE tracks. Many of these students grow up in families with low-income and/or from migrant-background and poor neighborhoods (Korpershoek et al., 2016; Statistics Netherlands, 2016). They learn both at school and workplace internships and need additional educational support based on their intellectual capacities (varying from 60 to 90 on the IQ scale), learning abilities (more than 2 years of delay in reading Dutch and in learning mathematics), and/or EBD (Hop and Van Boxtel, 2013; Koopman et al., 2015).

We approached 20 schools with 3,024 students in the Netherlands to participate in this study. Twelve schools (1,233 students) agreed to participate. Classroom teachers introduced the study and distributed information letters to the students and their parents. Parents and students were asked to inform the school if they wished to refuse to participate. Written passive consent was declined by two percent of the parents, while students gave verbal consent.

Data were collected during regular classes using self-report questionnaires. Students were guaranteed confidentiality and were told that only the researchers would read their responses to prevent social desirability bias. Research assistants were available to clarify the questionnaire items, if necessary.

2.2 Instruments

Three self-report instruments were used to measure adolescents' social-emotional skills and psychosocial health. A pilot version of the questionnaire measuring social-emotional skills was pre-tested among 50 students whose school tracks were comparable to those of the study population. Based on this pilot study, we adapted some statements in the questionnaires to the language abilities of the study population.

We used the self-reported version of the Strengths and Difficulties Questionnaire for Adolescents (SDQ-A; Van Widenfelt et al., 2003) to measure the psychosocial variables. The SDQ-A comprises 25 statements: 20 related to EBD and 5 related to PSB. The SDQ-A has demonstrated satisfactory psychometric properties. The SDQ-EBD subscale contains statements such as "I worry a lot" and "I fight a lot." The SDQ-PSB subscale uses statements such as "I try to share with other people" and "I often volunteer to help others." The responses were obtained on a three-point Likert scale ("Not true," "Somewhat true," and "Certainly true"). Higher SDQ-EBD and SDQ-PSB scores indicate higher degrees of psychosocial difficulties and PSB, respectively (Van Widenfelt et al., 2003). In this study, Cronbach's α was 0.80 for SDQ-EBD and 0.59 for SDQ-PSB.

Four social-emotional skills were measured using a self-reported version of a Dutch questionnaire (the Questionnaire Psychosocial Skills) for young people aged 8–19 years (Van der Ploeg and Scholte, 2013). This questionnaire comprises 36 statements distributed equally in four subscales measuring self-awareness, social awareness, self-management, and relationship skills. Items are measured on a five-point Likert scale ranging from 1 ("Do not agree at all") to 5 ("I entirely agree"). Self-awareness is measured based on items such as "I am quiet and easy to get on with" and "I think before I do something" (α = 0.85). The social awareness subscale includes items such as "I can see how other people feel" and "I know what I can say to someone and what I cannot" (α = 0.82). The self-management skills subscale comprises items such as "In my free time, I do useful and meaningful things" and "I can concentrate on my schoolwork" (α = 0.86). Relationship skills are measured by items such as "I talk about my problems with my friends" and "I stand up for myself in an argument" (α = 0.86).

The Dutch Life Skills Questionnaire (Diekstra and Gravesteijn, 1998) was used to measure responsible decision-making. It comprises five items on a four-point Likert scale ranging from 1 ("Strongly agree") to 4 ("Strongly disagree") and includes statements such as "I hold people to their agreements" and "I can imagine several reactions in a difficult situation" (α = 0.71).

2.3 Data analyses

To gain insight into the relationships between adolescents' background characteristics, social-emotional skills, and psychosocial health variables, we analyzed the following descriptive statistics: frequencies, means (M), and standard deviations (SD). We used t-tests to determine whether social-emotional skills and psychosocial health variables were differentially distributed based on background characteristics. Correlation coefficients were calculated to identify associations between the five social-emotional skills. Factor analyses provided no reason to define the subscales differently from those used in the validated measurement instruments.

To explore the relationships between the five social-emotional skills and two psychosocial health variables (EBD and PSB), we performed backward elimination regression analyses. This stepwise approach was used to identify the social-emotional skills, or combinations of skills, most strongly associated with EBD and PSB. In the first step, all five skills were included in the (full) model. Thereafter, skills that were not significantly associated with the full or further models were eliminated. The final model included only those skills that remained significantly associated with psychosocial health variables. We assumed that these skills had the strongest association with these variables. To identify the differences based on students' backgrounds, we performed interaction analyses between background characteristics and different social-emotional skills in the full and final models with EBD and PSB. The criterion for eliminating and maintaining a skill in the backward elimination model was set at $p > 0.10$ (P Out) and $p < 0.05$ (P In), respectively (Henderson and Denison, 1989; Stevens, 2012). In the next step, we tested the elimination of variables with $0.05 \leq p < 0.10$. When another variable was no longer significantly associated with EBD or PSB we eliminated both variables. We consider the remaining skills are most strongly associated with EBD or PSB. The final model included all predictors with $p < 0.05$.

Subsequently, we analyzed the interactions between background characteristics and each social-emotional skill included in the final EBD and PSB models to identify differences in skills according to sex, sociocultural background, and school track. We did not analyze these interactions according to age as the majority of students (91%, **Table 1**) were aged 14–18 years.

Finally, mediation analyses were performed to unravel the relationships between the five social-emotional skills and two psychosocial health variables. We included only those skills that had shown significant correlations ($\beta \geq 0.30$) with the psychosocial health variables in the backward elimination analyses. A straightforward mediation model was used, defined by four paths according to the steps indicated by Baron and Kenny (1986; see **Figure 1**).

In this model, social-emotional skills were either independent variables or mediators. The steps in this model assumed that when a variable M is included to predict Y controlled for X in a multivariate regression analysis, a mediating function of M is identified when coefficients *a, b,* and *c* indicate significant and independent correlations between Y, M, and X and when the relationship X-Y (c) decreases to almost zero (c').

First, univariate regression analyses were used to calculate the associations between the five skills (self-awareness, social awareness, self-management, relationship skills, and decision making; **Figure 1**, path *a*). Second, the univariate associations between skills and psychosocial health variables were calculated (**Figure 1**, paths *b* and *c*). Finally, multivariate associations between each social-emotional skill and the two psychosocial health outcomes were calculated using variables X, Y, and M. In these analyses, we controlled for the independent variable (X; **Figure 1**, path c').

3 Results

The background characteristics of the study population are shown in **Table 1**. The study sample comprised 54% boys and 46% girls. Sixty-one percent of students were aged 15 years or above (M = 15.8). Half (51%) were on the PrE track and the remaining (49%) were on the PVSE-b track. The sample composition was 49% Dutch or other Western European backgrounds (Dutch/WE) and 51% migrant backgrounds, as identified by self-reports.

Boys scored significantly lower than girls on social awareness, relationship skills, responsible decision-making, and PSB (**Table 1**). The youngest participants obtained significantly higher self-awareness and self-management scores. Relative to other students, those with migrant backgrounds scored significantly higher on self-awareness, social awareness, self-management, responsible decision-making, and PSB. Students on the PrE track scored significantly higher in self-awareness, self-management, and responsible decision-making than those on the PVSE-b track. The PrE track comprised more students with migrant backgrounds (61%) than the PVSE-b track (39%; not shown in **Table 1**). No differences were found in EBD based on students' background characteristics.

Table 2 shows the interrelations among the five social-emotional skills. The correlation coefficients ranged from strong for self-awareness and self-management (r = 0.75) to weak for relationship skills and responsible decision-making (r = 0.29). A higher score for each skill was related to milder EBD. The correlation coefficients between the skills and EBD ranged from $r = -0.47$ for self-management to $r = -0.30$ for social awareness and responsible decision-making. Higher PSB scores were associated with better social-emotional skills. The correlation coefficients between skills and PSB ranged from r = 0.51 for social awareness to r = 0.35 for responsible decision making.

Using backward elimination, we analyzed the multivariate associations between social-emotional skills, EBD, and PSB (**Table 3**). The full EBD model shows that four skills—self-awareness, social awareness, self-management, and responsible decision making—were significantly related to EBD. Relationship skills were not significantly related to EBD and therefore, were excluded from the model. In the EBD model, self-awareness, self-management, and responsible decision-making, but not social awareness, remained significantly associated with EBD. The final EBD model showed associations between the three social-emotional skills that remained significantly associated with EBD after excluding relationship skills and social awareness.

Furthermore, we included all five social-emotional skills in the backward elimination analyses, with PSB as the dependent variable. This full PSB model showed that four skills—self-awareness,

TABLE 1 Participants' background characteristics and the relationship between the characteristics and participants' social-emotional skills and psychosocial health variables (*M*, means; SD, standard deviations).*

	N[1] (%)	Self-awareness[2] *M* (SD)	Social awareness *M* (SD)	Self-management *M* (SD)	Relationship skills *M* (SD)	Responsible decision-making *M* (SD)	Psychosocial health[3]	
							SDQ-EBD *M* (SD)	SDQ-PSB *M* (SD)
Sex								
Male	433 (54)	24.13 (6.0)	22.94 (5.2)**	23.93 (6.3)	25.26 (5.4)**	8.54 (3.1)**	12.79 (6.2)	6.73 (2.0)**
Female	363 (46)	24.07 (5.5)	24.11 (5.1)	24.41 (6.1)	26.32 (4.9)	9.19 (3.0)	12.79 (6.4)	7.45 (2.0)
Total	796	24.10 (5.7)	23.47 (5.2)	24.14 (6.2)	25.74 (5.2)	9.53 (3.4)	12.79 (6.3)	7.06 (2.0)
Age								
13	59 (8)	25.72 (6.1)**	24.21 (5.5)	26.44 (6.0)**	26.51 (5.8)	9.53 (3.4)	13.25 (5.7)	6.82 (2.2)
14	243 (31)	23.59 (5.7)	23.38 (5.0)	23.46 (6.3)	25.63 (5.1)	8.45 (2.8)	13.02 (6.2)	7.05 (2.1)
15	326 (42)	24.00 (5.3)	23.31 (5.0)	24.01 (6.0)	25.60 (5.0)	8.86 (3.0)	12.43 (6.2)	7.18 (2.0)
16	142 (18)	24.04 (6.6)	23.43 (5.8)	24.05 (6.4)	25.95 (5.3)	9.03 (3.1)	12.92 (6.6)	6.97 (2.0)
17	13 (1)	25.62 (7.7)	25.18 (4.4)	27.15 (5.9)	24.77 (4.6)	8.31 (3.5)	13.38 (6.1)	6.69 (1.8)
Total	783	24.04 (5.7)	23.45 (5.2)	24.08 (6.2)	25.73 (5.2)	8.75 (3.0)	12.73 (6.3)	7.09 (2.0)
School track[4]								
PrE	404 (51)	24.89 (6.2)**	23.63 (5.6)	25.81 (6.2)**	25.71 (5.3)	9.21 (3.2)**	12.61 (6.1)	7.04 (2.1)
PVSE-basic	394 (49)	23.27 (5.1)	23.30 (4.7)	22.40 (5.7)	25.75 (5.0)	8.44 (2.8)	13.01 (6.4)	7.07 (2.0)
Total	798	24.09 (5.7)	23.47 (5.2)	24.13 (6.2)	25.73 (5.2)	8.83 (3.0)	12.81 (6.3)	7.06 (2.0)
Back-ground[5]								
Dutch/WE	392 (49)	23.37 (5.6)**	23.05 (5.2)**	22.97 (6.0)**	25.78 (4.9)	8.49 (2.9)**	13.05 (6.3)	6.91 (2.0)**
Migrant	404 (50)	24.80 (5.9)	23.89 (5.2)	25.26 (6.2)	25.72 (5.4)	9.17 (3.2)	12.59 (6.3)	7.21 (2.0)
Total	796	24.09 (5.7)	23.48 (5.2)	24.13 (6.2)	25.75 (5.2)	8.83 (3.0)	12.81 (6.3)	7.06 (2.0)

*$p < 0.05$ and **$p < 0.01$. SDQ, Strength and Difficulties Questionnaire. [1]Due to missing values, the total values may vary. [2]The higher the score, the more developed the social-emotional skill (self-awareness, social awareness, self-management, relationship skills, and responsible decision-making). [3]Two subscales of the SDQ were used: emotional-behavioral difficulties (EBD) and prosocial behavior (PSB). The higher the score on SDQ-EBD, the greater the EBD (lower is better). Similarly, the higher the score on SDQ-PSB, the greater the PSB (higher is better). [4]The PrE is a practical education track for students with additional educational needs (IQ from 60 to 85 on a 100-point IQ scale; delays in reading and mathematics >3 years); the PVSE-basic track is for students with additional education needs (IQ from 75 to 90 on a 100-point IQ scale; delays in reading and mathematics >2 years). [5]Dutch/WE: Native Dutch and Western European backgrounds, e.g., German, British, and Spanish; migrant: e.g., Turkish, Moroccan, Cape Verdean, and Somali.

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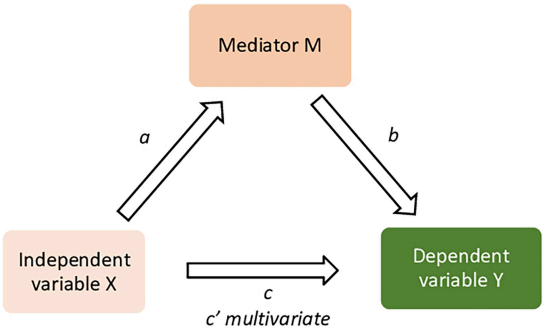

FIGURE 1
Straightforward mediation model (Baron and Kenny, 1986).

social awareness, relationship skills, and decision making—were significantly associated with PSB (Table 3). Self-management was not significantly associated with PSB. The final PSB model showed that the four skills remained significantly related to PSB after excluding self-management.

We analyzed the interaction effects between the social-emotional skills included in the final EBD and PSB models and the background variables of sex, sociocultural background, and school track. We found no significant differences in the interactions between the four skills—self-awareness, social awareness, relationship skills, and responsible decision-making–and sex, sociocultural background, or school track in the final PSB model. The final EBD model showed no significant differences in the included skills (self-awareness, self-management, and responsible decision-making) based on sex. However, we found a significant interaction effect of sociocultural background on self-awareness (F = 53.81, p = 0.000) and of school track on self-awareness (F = 57.90, p = 0.000) and self-management (F = 56.65, p = 0.000). No interaction effects of sociocultural background and school track were found on responsible decision-making.

Additional analyses showed that EBD was significantly associated with self-awareness and self-management (Table 4), in Dutch/Western students. In migrant students, EBD was significantly associated with self-management, but not with self-awareness. Regarding school track, EBD was significantly associated with self-management but not with self-awareness among PrE students. In PVSE-b students, EBD was significantly associated with self-awareness and self-management. Additional analyses were not conducted for responsible decision-making as no significant interaction effects of background characteristics were found on this skill.

We performed mediation analyses to determine the extent of any overlap between (1) the social-emotional skills most strongly related to EBD and PSB in the backward elimination analyses (Table 3), and (2) one or more other social-emotional skills. Self-management—the skill with the most significant association with EBD—was treated as a mediator. At the univariate level, self-awareness and self-management were significantly correlated (Table 2). At this level, each skill was significantly associated with EBD. After including self-management as a mediator variable in the model, the association between self-awareness and EBD decreased but was still significant (Figure 2, model 1). In addition,

TABLE 2 Correlation coefficients (r^*) between the five social-emotional skills and the two psychosocial health variables.

		Self-awareness	Social awareness	Self-management	Relationship skills	Responsible decision-making	Psychosocial health variables[1]	
							SDQ-EBD	SDQ-PSB
Self-awareness		1	–	–	–	–	–	–
Social awareness		0.74**	1	–	–	–	–	–
Self-management		0.75**	0.66**	1	–	–	–	–
Relationship skills		0.62**	0.70**	0.59**	1	–	–	–
Responsible decision-making		0.47**	0.44**	0.43**	0.29**	1	–	–
Psychosocial health[1]	SDQ-EBD	−0.43**	−0.30**	−0.48**	−0.34**	−0.30**	1	–
	SDQ-PSB	0.46**	0.51**	0.38**	0.45**	0.35**	−0.28**	1

$^*p < 0.05$ and $^{**}p < 0.01$;
[1]Psychosocial health variables: Two subscales of the Strengths and Difficulties Questionnaire (SDQ) were used: Emotional and Behavioral Difficulties (SDQ-EBD) and Prosocial Behavior (SDQ-PSB). The higher the score on SDQ-EBD, the greater the EBD (lower is better). Similarly, the higher the score on SDQ-PSB, the greater the PSB (higher is better).

TABLE 3 Backward elimination analyses: associations (standardized β's) between social-emotional skills (independent variables) and EBD and PSB (dependent variables).*

	SDQ-EBD[1]				SDQ-PSB			
	Full EBD model		Final EBD model		Full PSB model		Final PSB model	
	β	*p*	β	*p*	β	*p*	β	*p*
Self-awareness	−0.16	0.003**	−0.13	0.004**	0.15	0.005**	0.13	0.008**
Social awareness	0.11	0.037*	–	–	0.26	0.000**	0.26	0.000**
Self-management	−0.33	0.000**	−0.34	0.000**	−0.46	0.321	–	–
Relationship skills	−0.09	0.053	–	–	0.16	0.000**	0.15	0.000**
Responsible decision-making	−0.11	0.002**	−0.10	0.005**	0.11	0.000**	0.12	0.005**

*$p < 0.05$ and **$p < 0.01$. SDQ, Strength and Difficulties Questionnaire. [1]Two subscales of the SDQ were used: emotional-behavioral difficulties (EBD) and prosocial behavior (PSB). The higher the score on SDQ-EBD, the greater the EBD (lower is better). Similarly, the higher the score on SDQ-PSB, the greater the PSB (higher is better).

TABLE 4 Final EBD model: associations (standardized β's) of self-awareness and self-management (independent variables) and EBD (dependent variable), in student sub-groups after interactions with sociocultural background and school track.

	Final EBD[1] model				Final EBD[2] model			
	Dutch/western		Migrant		PrE		PVSE-b	
	β	*p*	β	*p*	β	*p*	β	*p*
Constant		0.000**		0.000**		0.000**	29.660	0.000**
Self-awareness	−0.23	0.001**	−0.022	0.747	−0.02	0.839	−21	0.001**
Social awareness[3]	–	–	–	–	–	–	–	–
Self-management	−0.34	0.000**	−0.35	0.000**	−0.38	0.000**	−0.37	0.000**
Relationship skills[3]	–	–	–	–	–	–	–	–
Responsible decision-making[3]	–	–	–	–	–	–	–	–

**$p < 0.01$.
[1]Final Emotional and Behavioral Difficulties (EBD) Model related to Sociocultural background. The higher the score on EBD, the greater the EBD (lower is better). Dutch/Western: Native Dutch and Western European backgrounds, e.g., German, British, and Spanish; Migrant: e.g., Turkish, Moroccan, Cape Verdean, and Somali.
[2]Final Emotional Behavioral Difficulties (EBD) Model related to School type. PrE, Practical Education track students with additional educational needs (IQ from 60 to 85 on a 100-point IQ scale; delays in reading and mathematics > 3 years); PVSE-b, Preparatory Vocational Secondar Education-basic track students with additional education needs (IQ from 75 to 90 on a 100-point IQ scale; delays in reading and mathematics > 2 years). [3]Social awareness and Relationship skills are not included from the final EBD model resulting from backward elimination analyses. Responsible decision-making was not included in this model, as no significant interaction effects were found of this skill with either sociocultural background or school track.

the association between EBD and self-awareness was significant in Dutch/Western and PVSE-b students, but not in migrant and PrE students (Table 4). Therefore, we assumed that the association between self-awareness and EBD was mediated by self-management for migrant and PrE students, but not for Dutch/Western and PVSE-b students.

Responsible decision-making was significantly associated with EBD in the backward elimination analyses (Table 3, final EBD model). Further analysis did not indicate a mediating function of self-management in the relationship between responsible decision-making and EBD.

The four skills that were significantly associated with PSB in the backward elimination analyses—self-awareness, social awareness, relationship skills, and responsible decision-making—were included in the mediation analyses (Table 3). These skills were also significantly associated at the univariate level (Table 2). No differences were identified in the associations between PSB and these skills based on students' background characteristics. Social awareness, the skill with the strongest association with PSB, was treated as the mediator in three models: self-awareness, relationship skills, and responsible decision-making. These models showed that the associations between self-awareness, relationship skills, and responsible decision-making and PSB decreased substantially (Figure 2, models 2, 3, and 4). Based on these findings, it was assumed that social awareness partly mediates the following associations: self-awareness and PSB, relationship skills and PSB, and responsible decision-making and PSB.

4 Discussion

This study explored the relationships between five social-emotional skills and two psychosocial health variables in PrE and PVSE-b students. The results showed significant medium-to-large correlations ($r > 0.50$) between the five social-emotional skills (study aim 1). These findings are partly consistent with those of studies involving self-report instruments to assess social-emotional skills. Van der Ploeg and Scholte (2013) used the same questionnaire as in the current study and found medium-to-large correlations between self-awareness, social awareness, self-management, and relationship skills in a sample of adolescents from different school tracks in Dutch mainstream secondary education. Gresham et al. (2020) and Mantz et al. (2018) used other skill-related questionnaires and identified large correlations ($r > 0.65$) between all social-emotional skills in students from pre- to high-school. Ross and Tolan (2018) identified significantly large

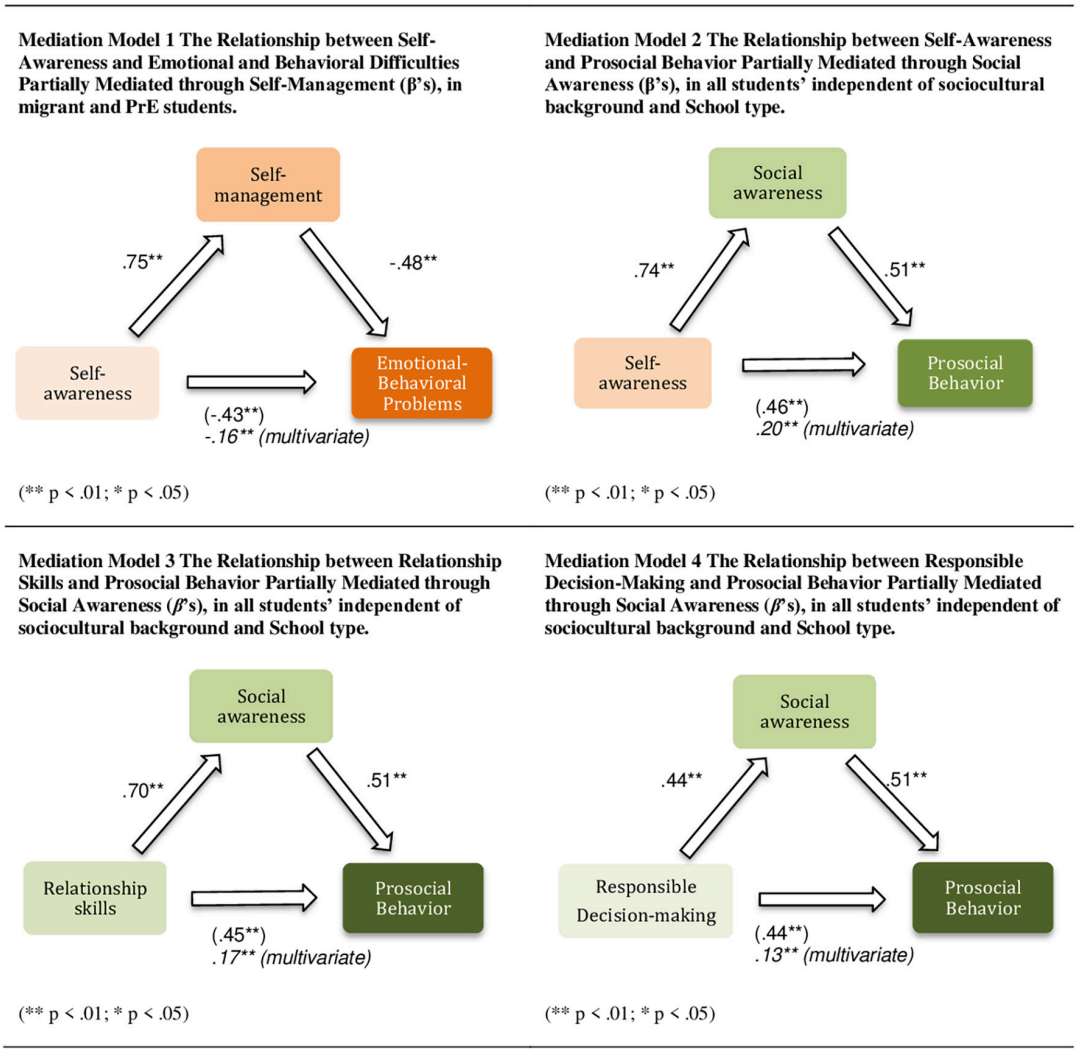

FIGURE 2
Mediation models 1–4 of the relationship between social-emotional skills and psychosocial health variables (based on Baron and Kenny, 1986).

correlations between a composite measure of five social-emotional skills and each of the five skills.

In our study, each social-emotional skill was independently related to two psychosocial health variables—EBD and PSB (study aim 2). Consistent with previous studies, in this study, self-management was most strongly related with EBD (e.g., Bierman et al., 2010; Moffitt et al., 2011; Brackett et al., 2012; Mohammadiarya et al., 2012), and social awareness was most strongly related to PSB (e.g., Trentacosta and Fine, 2010; Allemand et al., 2015; Crone and Fuligni, 2020; Zaki, 2020).

We found that the combination of three skills—self-awareness, self-management, and responsible decision-making—was negatively associated with EBD. This finding suggests that enhancing these skills may contribute to the prevention or reduction of EBD. However, we also identified differences in the association between EBD and social-emotional skills based on students' sociocultural backgrounds and school track. The mediating function of self-management confirms the relevance of this skill in the association between self-awareness and EBD among migrant and PrE students. It suggests that, for these students, improving self-management will increase self-awareness and decrease EBD. This importance of self-management in relation to EBD in adolescents is consistent with the findings of other studies (e.g., Pokhrel et al., 2013; Greenberg et al., 2015; Burke and Loeber, 2016) and with that in other student populations (Keogh et al., 2006; Moffitt et al., 2011).

Our finding that the combination of four skills—self-awareness, social awareness, relationship skills, and responsible decision-making—is positively associated with PSB suggests that enhancing these skills promotes PSB. Mediation analyses confirmed the relevance of social awareness in the association between social-emotional skills, except self-management, and PSB. The mediating function of social awareness suggests that improving this skill will enhance self-awareness, relationship skills, and responsible decision-making, and promote PSB (study aim 3).

The finding that some social-emotional skills are more strongly associated with psychosocial health variables than others is a valuable contribution to the CASEL framework and other theoretical models used in SEL programs (e.g., Pössel et al., 2011; Lewis et al., 2013; Weissberg et al., 2015).

The finding that social awareness is a central skill related to PSB is partly consistent with the findings of earlier research showing that social awareness is positively associated with PSB and negatively associated with EBD (LeBlanc et al., 2011; Allemand et al., 2015; Laible et al., 2015). Malti et al. (2021) found that social awareness fosters the development of self-awareness, relationship skills, and PSB in adolescents. Contrary to our findings, Vestad et al. (2021), using structural equation modeling, found that self-awareness mediated the relationship between self-management, relationship skills, and EBD among students in PVSE tracks. In this study, PSB was not used as a dependent variable. However, further robust research is required to support these findings. Mediation analyses regarding the relationships between different social-emotional skills and between these skills and psychosocial health variables are limited in the SEL literature (Durlak et al., 2011, 2022).

We found remarkable results concerning the relationship between the outcomes of skills measures and background characteristics of the sample. For example, students in the PrE track and those from migrant family backgrounds scored higher on some social-emotional skills than those in the PVSE-b track and those from Dutch/Western European backgrounds. Differences in skills associated to students' backgrounds are also identified. These findings may be attributed to the students' overestimation of their social-emotional skills. It is possible that PrE students have better social-emotional skills than PVSE-b students. Migrant students might have been allocated to the PrE track because of their limitations in Dutch language proficiency and not because they suffered from intellectual, emotional-behavioral, and/or learning difficulties, similar to their Dutch/Western counterparts in the PrE track.

4.1 Strengths and limitations

Research on social-emotional skills is often limited to a small number of skills or composite measures of these skills (Ura et al., 2020; Durlak et al., 2022). Therefore, the strength of our study is the inclusion of five social-emotional skills individually and in-combination and two psychosocial health outcomes in the correlation and multiple regression analyses. Moreover, the study had a large and diverse student population. The use of self-reporting instruments is both a strength and limitation. While self-report instruments provide insights into students' perceptions, they may not accurately reflect their skills because of social validity and/or social desirability biases (Podsakoff et al., 2003; Kimberlin and Winterstein, 2008; Duckworth and Yeager, 2015). The questionnaires used to measure social-emotional skills were not validated for students from various sociocultural family backgrounds (Diekstra and Gravesteijn, 1998; Van der Ploeg and Scholte, 2013).

The study has several limitations. It provided insights into the relationships between social-emotional skills and psychosocial health outcomes in a particular subgroup of adolescent students. Therefore, the findings cannot be generalized to other students. Another limitation is the use of cross-sectional data. While it enabled us to identify associations between variables, it limited the determination of causal relationships between the outcomes of social-emotional skills and psychosocial health. There was a risk of self-selection, as the schools included in this study participated because they thought that investing in students' social-emotional skills was important. Therefore, the findings are not generalizable to all PVSE-b and PrE track students. Finally, we used backward elimination analyses to explore the social-emotional skills most strongly associated with EBD and PSB. Statistical biases are associated with these analyses, therefore the analyses have to be treated with caution (Olusegun et al., 2015; Heinze et al., 2018).

4.2 Implications for practice, policy, and research

Research on SEL aims to identify the most crucial components of school-based programs that enhance students' socioemotional skills and psychosocial health outcomes (Embry and Biglan, 2008; Durlak et al., 2011; Jones et al., 2017; Dymnicki et al., 2020). Identifying these components is important to prevent students' exposure to less relevant components and save time and money.

This study explored the associations between psychosocial health variables and different social-emotional skills to help develop and refine SEL programs and theoretical frameworks. It identified specific combinations of social-emotional skills associated with psychosocial health variables in PVSE students. The findings suggest that specific social-emotional skills may be more relevant to psychosocial health outcomes for students and that these skills vary depending on students' characteristics such as sociocultural background (Dutch/Western vs. migrant) and school track (PrE vs. PVSE-b).

For the students in our study, self-management was most strongly related to EBD and mediated the relationship between self-awareness and EBD in PrE and migrant students. Social awareness was most strongly related to PSB and mediated the relationship between PSB and self-awareness, relationship skills, and responsible decision-making, independent of students' sex, sociocultural background, and school track. Therefore, we recommend focusing on enhancing self-management and social awareness when developing and refining SEL programs aimed at decreasing EBD and improving PSB, respectively, among these students.

Furthermore, schools and teachers aiming to promote students' psychosocial health should select SEL programs focusing on self-management to prevent or decrease EBDs and programs focusing on social awareness to promote PSB. Taking differences in background characteristics into account is indicated in enhancing these skills.

The two central social-emotional skills identified in this study are also relevant to policymakers in education and youth mental health fields. Based on our analyses, self-management and social awareness are central skills for improving the psychosocial health of migrant and PrE students. Enhancing skills that are most adaptive to students' needs has recently been emphasized in the SEL literature and is associated with providing equal opportunities for students facing educational and health adversities to benefit from SEL programs (e.g., Elias, 2019; Jagers et al., 2019). Therefore, educational and mental health policymakers should consider

differences in backgrounds when improving adolescents' social-emotional skills, to promote psychosocial health and provide equal opportunities for all students to profit from SEL programs.

Future SEL research should focus on measuring the psychosocial health and social-emotional skills of various student populations to analyze the relationship between these skills and the associations between these skills and more distal outcomes. It can be used to conduct more advanced analyses to identify the mediating functions of separate social-emotional skills (Fairchild and McQuillin, 2010). We recommend that future research conduct advanced mediation analyses to identify the central social-emotional skills that promote the psychosocial health of students. Differences between students (e.g., age, sex, sociocultural background, and school track) should be considered, as these factors impact the social-emotional skills students possess and those they need. Finally, Research using longitudinal data can also provide additional insights into the mediating role of social-emotional skills in varying distal outcome measures such as academic achievement and general health.

5 Conclusion

Preparatory vocational education students' social-emotional skills are highly interrelated. Two skills, self-management and social awareness, are particularly important for their association with psychosocial health. Self-management is a mediator in the relationship between self-awareness and EBD. Social awareness mediates the relationship between PSB and self-awareness, relationship skills, and responsible decision-making. Differences in students, background characteristics are associated with the relationships between their skills and psychosocial health variables. Therefore, developers of social and emotional learning programs intending to improve specific health variables should consider the relationships between social-emotional skills and the potential mediating functions of separate skills related to students' backgrounds. To provide equal opportunities for students facing multiple adversities to benefit from social emotional learning programs, policymakers and schools should focus on improving the social-emotional skills most central to promoting psychosocial health. Understanding the essential skills for improvement of psychosocial outcomes in particular student populations requires knowledge of students' social-emotional skills and needs.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://doi.org/10.17026/SS/DNOJRU.

Ethics statement

The studies involving humans were approved by the Dutch Central Committee on Research Involving Human Subjects (CCMO). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

MV and MF contributed to the conception and design of the study and performed the statistical analyses. MV organized the database and wrote the first draft of the manuscript. MF and PL contributed to this draft. All authors contributed to the manuscript revision, and read and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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