EUROPEAN JOURNAL OF PSYCHOTRAUMATOLOGY
2024, VOL. 15, NO. 1, 2430923
https://doi.org/10.1080/20008066.2024.2430923

BASIC RESEARCH ARTICLE

OPEN ACCESS Check for updates

Migrant students' self-reported executive function skills in relation to mental health, postmigration stress, and positive appraisals of self and the social context

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ABSTRACT

Background: Refugee and non-refugee migrant youths may carry a double burden of past adversities and post-migration stress while trying to continue schooling and adapt to their new social and cultural environment. Executive functioning skills are central to learning and navigating in the new context. Knowledge of how young migrants' executive functioning is associated with stressful factors and positive or potentially protective factors, could contribute to understanding and possibly finding ways to support these young learners.

Objective: To investigate how potentially stressful and positive factors are associated with executive function skills.

Method: In a secondary, explorative analysis of questionnaire responses from 1312 migrant students in secondary schools in five European countries, the associations of planning- and initiative executive function skills (PIS-EF) with stressful factors (e.g. emotional and behavioural problems, daily stress, discrimination) and positive factors (e.g. resilience, school belonging, social support) were analysed by linear regression. Furthermore, differences between male/female and refugee/non-refugee migrants were examined.

Results: Positive factors accounted for almost one-fifth of the variance in the students' self-reported PIS-EF and stress factors only one-tenth. Resilience showed the strongest association with students' PIS-EF, followed by Prosocial behaviour and School belonging. Hyperactivity, and symptoms of anxiety and depression were negatively associated with PIS-EF. Posttraumatic stress symptoms were minimally associated with the investigated aspects of executive functions. Adjusted for other variables, no variables showed significant differences in the association with EF between males and females, and refugee and non-refugee migrant students.

Conclusions: Positive factors were more strongly associated with executive functioning than stressful factors and could represent pathways to strengthen executive functioning. To support migrant youths' functioning, the school, healthcare, and social systems should take a resource-oriented perspective and lay the ground for migrant youth's feeling of belongingness and active use of their personal resources.

Auto-reporte en habilidades de función ejecutiva de estudiantes migrantes en relación con la salud mental, el estrés postmigratorio, las valoraciones positivas de sí mismos y del contexto social

Antecedentes: Los jóvenes migrantes refugiados y no refugiados pueden sostener una doble carga de adversidades pasadas y de estrés postmigratorio, mientras intentan continuar con sus estudios y adaptarse a su nuevo entorno social y cultural. Las habilidades de función ejecutiva son fundamentales para el aprendizaje y la adaptación en este nuevo contexto. Conocer cómo las habilidades de función ejecutiva en los jóvenes migrantes se relacionan con factores estresantes y con factores positivos o potencialmente protectores nos podría contribuir a comprender mejor y posiblemente encontrar, formas de apoyar a estos jóvenes estudiantes.

Objetivos: Investigar cómo los factores potencialmente estresantes y positivos se asocian con las habilidades de función ejecutiva.

Método: En un análisis exploratorio secundario de las respuestas a cuestionarios de 1.312 estudiantes migrantes en escuelas secundarias de cinco países europeos, se analizaron las asociaciones entre las habilidades de función ejecutiva de planificación e iniciativa (PIS-EF) y

ARTICLE HISTORY

Received 14 June 2024
Revised 6 November 2024
Accepted 8 November 2024

KEYWORDS

Migrant students; refugees; executive function; mental health symptoms; postmigration stress; resilience; school belonging; adolescents

PALABRAS CLAVE

Función ejecutiva; jóvenes refugiados y otros migrantes; problemas emocionales; estrés postmigratorio; resiliencia; apoyo social; pertenencia escolar; bienestar; aprendizaje; síntomas de estrés postraumático

HIGHLIGHTS

- Mental health symptoms and postmigration stressors as well as positive or potentially protective factors, such as resilience and social support, were investigated for their association with executive functioning among refugee and non-refugee migrant youth in secondary schools in five European countries.
- Resilience, prosocial behaviour, and school belonging were positively and more strongly associated with the studied aspects of executive functioning (PIS-EF), than hyperactivity and symptoms of anxiety and depression, which were negatively associated with PIS-EF.

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los factores estresantes (por ejemplo, problemas emocionales y de comportamiento, estrés diario, discriminación) y los factores positivos (por ejemplo, resiliencia, pertenencia escolar, apoyo social) mediante una regresión lineal. Además, se examinaron las diferencias entre migrantes masculinos/femeninos y refugiados/no refugiados.
Resultados: Los factores positivos explicaron casi una quinta parte de la varianza en las habilidades de PIS-EF auto-reportadas por los estudiantes, mientras que los factores estresantes explicaron solo una décima parte. La resiliencia mostró la asociación más fuerte con las habilidades de PIS-EF, seguida por el comportamiento prosocial y la pertenencia escolar. La hiperactividad, así como los síntomas de ansiedad y depresión, se asociaron negativamente con las habilidades de PIS-EF. Los síntomas de estrés postraumático mostraron una asociación mínima con los aspectos investigados de las funciones ejecutivas. Ajustado por otras variables, no se observaron diferencias significativas en la asociación con las PIS-EF entre estudiantes masculinos y femeninos, ni entre migrantes refugiados y no refugiados.
Conclusiones: Los factores positivos se asociaron más fuertemente con la función ejecutiva que los factores estresantes y podrían representar vías para fortalecer la función ejecutiva. Para apoyar el funcionamiento de los jóvenes migrantes, los sistemas escolares, de salud y sociales, deberían adoptar una perspectiva orientada a los recursos y sentar las bases de un sentimiento de pertenencia en los jóvenes migrantes y el uso activo de sus recursos personales.

- Interventions aiming to create the best possible conditions for migrant youths' resilience, opportunities for prosocial behaviour, and a school environment that fosters a sense of belonging, could strengthen these young learners' executive- and overall functioning.

1. Introduction

Executive functions, such as goal setting, planning, initiative taking, attention, and working memory, are acknowledged as prerequisites for learning and academic achievement (Donati et al., 2019; Escolano-Pérez & Bestué, 2021; Laurent, 2020), as well as for many aspects of social and overall functioning (Barr, 2018; Zelazo et al., 2016; Zorza et al., 2016). Young migrants' executive functioning (EF) may be affected by mental health problems and post-migration stressors, such as daily life problems and discrimination. Conversely, positive or potentially protective factors, such as resilience and social support, may mitigate the effects of such stress. Existing research has predominantly focused on mental health problems and stressful experiences in association with EF. However, few studies have investigated the associations of positive or potentially protective factors with EF in migrant youth populations (Scharpf et al., 2022). Due to the central role of EF for learning and social functioning, knowledge about factors associated with EF could inform actions directed at enhancing immigrant adolescents' school-related functioning and prospects to succeed in the new country.

Research extensively documents the traumatic experiences and losses faced by refugee children and youth during mass conflicts in their country of origin and during flight (Fazel et al., 2012). Thus, the risk of posttraumatic stress symptoms (PTSS), posttraumatic stress disorder (PTSD) and other mental health problems are found to be heightened among refugees (Blackmore et al., 2020). Among children and youth with other migrant backgrounds, traumatic experiences are not as common, but PTSS and other mental health problems are frequent also among these youths (Kouider et al., 2014; Spaas et al., 2022). Refugee and non-refugee migrant youth share the stress of adapting to a new country that may be more or less welcoming and culturally and linguistically different. Both groups commonly report stressful post-migration experiences such as discrimination (Metzner et al., 2022; Spaas et al., 2022). We presume for all learners, including refugees and migrants, that wellbeing and a mind that is not occupied by worries are fundamental to their ability to thrive and learn. Learning the language of the reception country and acquiring education are crucial for migrant youths' later adjustment in working life and society (Christensen & Stanat, 2007). Findings in a systematic review indicated that high academic ambition, supportive home environment, and supportive peer relationships were success factors for learning, while bullying, racial discrimination, and pre- and post-migration trauma were risk factors (Graham et al., 2016). Such positive factors along with different sources of stress have not, to our knowledge, been examined for young migrants' EF. This is where the current study aims to contribute.

In this paper, the term 'executive functions' (EFs) refers to the brain's higher order executive capacities, whereas 'executive functioning' (EF) refers to how these capacities operate in the present. We will shortly introduce the brain's executive functions, relevant research, factors often studied in relation to EF, and other factors that we consider relevant for exploration in relation to executive functioning.

1.1. The executive functions

EFs entail higher-order cognitive abilities that are crucial for learning and academic success in school and work (Bauer et al., 2021; Berthelsen et al., 2017; Maja et al., 2022), and for facilitating social behaviour (Zorza et al., 2016). Various terms are used to describe different cognitive tasks and subdomains of EF, including working memory, inhibition, and cognitive flexibility (Op den Kelder et al., 2018); complex tasks, verbal fluency, inhibition, shifting, and working memory (Nyvold et al., 2021); and Planning and

Initiative, Attention, and Self-Control and Self-Monitoring (sub-scales of the AEFI; see Methods; Van der Elst et al., 2012). These functions and their development are vital for conscious, goal-directed thought and action (Barr, 2018; Berthelsen et al., 2017). When operative, EFs enable the individual to regulate attention, resist distractions, tolerate frustration, inhibit impulsivity, flexibly shift between tasks and approaches, to draw on past experiences in the consideration of alternative acts and their consequences, and to plan for the future (Zelazo et al., 2016). When impaired, working memory may suffer, and focusing, following directions, and handling of emotions can be difficult (Federico & Orsolini, 2022). EFs start to develop in early childhood and undergo extended development during adolescence and early adulthood (Berthelsen et al., 2017; Laub et al., 2020).

Dependent on the timing, adverse childhood experiences (ACEs) and extreme life stress may negatively affect the development or functioning of cognitive processes falling under the label of EFs (Maja et al., 2022). Executive dysfunction has been found to moderate the relationship between ACEs and mental health (Trossman et al., 2021) and in particular between ACEs and posttraumatic stress disorder (PTSD), suggesting a centrality of executive dysfunction in developing PTSD after trauma exposure (Aupperle et al., 2012; Hodgeon et al., 2018). However, adversity in childhood may also lead to enhanced cognitive skills, rather than deficits. Neural plasticity may facilitate the development of stress-adapted capacities and skills that enable the individual to function within harsh and volatile environments (BJ Ellis et al., 2020). Furthermore, studies have shown that when discriminating between threat-related and deprivation-related childhood adverse experiences, only deprivation was linked to inadequate development of EFs (Lambert et al., 2016; Sheridan et al., 2017).

Much of the research on EF uses experimental design and specific tasks to examine executive functions (Keating et al., 2022; Scharpf et al., 2022). Such performance-based measures provide observable and relatively neutral information on specific skills related to EFs (Maja et al., 2022). Still, the context, method, and content of performance-based testing could affect the results (Mirabolfathi et al., 2022; Snyder et al., 2014). Conversely, self-reported behavioural measures of EF (Dixson & Scalcucci, 2021) can provide ecologically valid information reflecting daily-life functioning connected with EF (Maja et al., 2022), but depend on how the respondents see themselves and choose to respond.

1.2. Stressful factors associated with executive functioning

Among adults and non-refugee youth, previous research has linked EF difficulties to higher levels of trauma exposure, higher levels of PTSS, an established PTSD, other trauma-related mental health problems, and to higher age (Barzilay et al., 2018; Li et al., 2019; Nyvold et al., 2021; Op den Kelder et al., 2018; Polak et al., 2012). According to Van der Kolk (2014), 'recovery from trauma involves the restoration of executive functioning'.

Research in refugee youth populations have found positive associations of EF with trauma exposure and PTSD (Scharpf et al., 2022) and a negative association of EF with current poverty rather than war-related potentially traumatic experiences (A Chen et al., 2019), which seem to support the findings that early adversity may lead to enhanced cognitive skills (BJ Ellis et al., 2020), while early deprivation may lead to their underdevelopment (Lambert et al., 2016; Sheridan et al., 2017). An additional explanation for the positive association of EF with trauma experiences and PTSS, suggested by Scharpf et al. (2022), was that youth with better EF might have higher reflective and introspective capacities enabling the reporting of more traumatic experiences and symptoms. A finding offering an important distinction was that adolescents with a traumatic background and with a high level of PTSS performed significantly worse on performance based EF tasks than controls who had not been exposed to previous trauma, but only when exposed to trauma-related distractors – not when exposed to neutral distractors (Mirabolfathi et al., 2022).

The present evidence indicates a complex relationship between EF and adversity, where early, severe stress may modify and deprivation or neglect obstruct the development of EFs, where later stress and trauma may impede or further modify EFs, where inadequately developed or impeded EFs may increase vulnerability to PTSD, where negative effects on EF of trauma and high levels of PTSS may primarily be found when individuals are distressed by trauma-reminders, and where perhaps research methods and context, and the population studied, will impact on whether PTSS in turn are found to aggravate or be positively or negatively related to EF.

Other distressing/stressful factors that have been related to EF in children and youth populations, are hyperactivity (Chwastek et al., 2022; Craig et al., 2016), anxiety, and depression (Alfonso and Lonigan, 2021; Friedman et al., 2018; Owens et al., 2012; Snyder et al., 2014), and experiences of discrimination (Keating et al., 2022). In general, post-migration stressors, such as uncertain asylum status, discrimination, lack of social support, language problems, and financial difficulties, are known to negatively affect the mental health and functioning of refugee children and youth (Bronstein & Montgomery, 2011; Juang et al., 2018; Spaas et al., 2022). However, knowledge about such

post-migration stressors in relation to EF in migrant populations is lacking.

1.3. Positive factors associated with executive functioning

In recent years, protective factors have gained focus in research related to mental health, trauma, and psychological and academic functioning at school (d'Abreu et al., 2021; Korpershoek et al., 2020; Renshaw et al., 2014). Among adolescents from refugee and other migrant backgrounds, studies of the associations between positive or protective factors such as social support or resilience and academic success/learning are scarce (Wong et al., 2018), and even scarcer in relation to EF. Relevant for our study could be positive factors such as resilience, prosocial behaviour, social support, wellbeing, and students' sense of school belonging, which have been studied in relation to EF in populations other than migrant adolescents (Bauer et al., 2021; Dixson & Scalcucci, 2021; Hirani et al., 2022; Scharpf et al., 2022; Taylor & Ruiz, 2019; Van der Graaff et al., 2018; Zorza et al., 2016), or studied in relation to aspects of functioning such as learning or academic success (Baker et al., 2019; Balaž et al., 2021; Graham et al., 2016; Khawaja & Schweitzer, 2017; Korpershoek et al., 2020; Lam et al., 2015; Pagel & Edele, 2022; Pekrun et al., 2017; Renshaw et al., 2014; Wong et al., 2018). Dixson and Scalcucci (2021) suggested psychosocial factors may represent a pathway to improve adolescent EF.

1.4. Differences relevant to executive functioning between genders and migrant backgrounds

Male and female young migrants and migrants with and without a refugee background are likely to have different histories of pre-migration hardships (Mundy et al., 2020), may face different strains in the new country (Hollander et al., 2011; Mohwinkel et al., 2018), and may experience different obstacles to learning and succeeding in the new country. Studies in the general literature on gender differences in EF yield inconsistent results depending on maturational level, cultural setting and the specific EF task (A Chen et al., 2019; Grissom and Reyes, 2019; Scharpf et al., 2022). We have not found studies on associations between EF and other variables comparing migrant boys and girls. Furthermore, there are few, if any, studies comparing refugee with non-refugee migrant youth regarding EF and associated variables.

1.5. Aims

Our aim was to explore the associations of stressful and positive factors with self-reported EF in a migrant youth population. Such knowledge may be essential for planning interventions aimed at supporting young migrants' learning and potential to succeed in their new country. We wanted to examine emotional and behavioural problems, daily life stresses and perceived discrimination for their expected negative associations with EF, and factors like resilience, a sense of school belonging, prosocial behaviour, wellbeing, and perceived support from family and friends for their expected positive associations with EF. We also aimed to examine how these relationships varied for male and female migrant students, and for migrant students with and without a refugee background.

2. Method

The current explorative study used questionnaire data from a large-scale intervention study, the RefugeesWellSchool project (RWS; an EU-Horizon 2020 funded project, grant number 754849), including refugee- and non-refugee migrant youths in secondary schools in Europe. The aim of the main study was to examine the effect of psychosocial interventions on migrant students' mental health and wellbeing. Ethical clearance was given in each country, and for the whole project. A comprehensive questionnaire on a range of topics was composed from whole or parts of commonly used questionnaires. It was translated to 22 different languages. Students were informed about the study, and that participating was voluntary. Data was collected in the classrooms or in smaller groups. Help was available from teachers, research staff, and interpreters where needed. For more details, see Spaas et al. (2022).

For our research aims, we used self-reported pre-intervention questionnaire data for all measures. These were collected in 2019–2020. The questionnaire included the 'Planning and Initiative' subscale (hereafter termed PIS-EF) of the Amsterdam Executive Function Inventory (AEFI; Van der Elst et al., 2012). The subscale included questions related to the EF area of cognitive flexibility, which was found to best predict educational attainment after age 11 (Federico & Orsolini, 2022). We examined the associations of PIS-EF with the questionnaire variables PTSS, emotional symptoms, conduct problems, hyperactivity, peer problems, daily life stress, and perceived ethnic discrimination (potentially stressful factors) and with wellbeing, resilience, school belonging, prosocial behaviour, and perceived support from family and friends (positive or potentially protective factors).

2.1. Participants

We used data from five of the six European countries taking part in the RWS project: Belgium, Denmark, Finland, Norway, and Sweden. The UK data was not

included, as we could not resolve some scoring inconsistencies in one of their scales. From the data set, we included migrant students age 11–24 years, with a length of stay in the resettlement country from zero to eight years, and who had reported their gender as male or female. Based on our selection criteria, the sample consisted of 706 male and 606 female students with a refugee or non-refugee migrant background (N = 1312). For details, see Table 1.

2.2. Measures

The Planning and Initiative Subscale of the Amsterdam Executive Function Inventory (**PIS-EF**; Van der Elst et al., 2012) is one of three subscales in the AEFI. The other two subscales are Attention, and Self-Control, and Self-Monitoring. The PIS-EF consists of five items that relate largely to goal-directed thought and action and to cognitive flexibility/shifting (*I can make fast decisions*; *I am well organised*; *It is easy for me to come up with a different solution if I get stuck*; *I am full of new ideas*; and *I am curious, I want to know how things work*). Responses are given on a 3-point Likert scale (1 = *not true*; 2 = *partly true*; and 3 = *true*). In our study, the mean score of PIS-EF was used, range 1–3.

The Children's Revised Impact of Event Scale (CRIES-8; Yule, 1992) is a self-report measure of PTSS for children from age 8 to 18. CRIES-8 comprises two subscales, Intrusion/Re-experiencing (four items) and Avoidance (four items). The eight items are scored on a 4-point Likert scale (0 = *Not at all,* 1 = *Rarely*, 3 = *Sometimes*, 5 = *Often*). The sum score, range 0–40, was used in this study. Clinical cut-off indicating possible PTSD is $\geq$ 17.

The Strengths and Difficulties Questionnaire (SDQ, R Goodman, 1997; 2001) is a measure of emotional and behavioural difficulties and strengths in children. Each of the 25 items is scored on a 3-point Likert scale (0 = *Not true*, 1 = *Somewhat true*, 2 = *Certainly true*). We used its five subscales, Emotional symptoms (tapping anxiety and depressive symptoms), Hyperactivity, Behavioural problems, Peer relationship problems, and Prosocial behaviour, and their individual sum scores, range 0–10.

The Daily Stressors Scale for Young Refugees (DSSYR; Vervliet et al., 2014) assesses post-migration daily stress during the last month by 15 items. Six items from the scale is used. Items are scored on a 4-point Likert scale (from 1 = *Never* to 4 = *Always*). We reversed values so that increasing values mean increasing daily stress. The sum score was used, range 6–24.

The Perceived Ethnic Discrimination Questionnaire-Community Version (PEDQ-CV; Brondolo et al., 2005) assesses experiences of discrimination. We used nine items from a 17 items brief version (the Brief PEDQ-CV). Items are scored on a 4-point Likert scale (from 1 = *Never* to 4 = *Always*). We used the sum score of the nine items, range 9–36.

The Child and Youth Resilience Measure (CYRM-12; Liebenberg et al., 2013; Ungar, 2016) comprises 12 items tapping resilience. Responses are given on a 5-point Likert scale (from 1 = *Not at all* to 5 = *A lot*). We used the total sum score, range 12–60.

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) is a measure of psychosocial support. The scale comprises 12 items divided into three subscales. Two subscales were included, Support from family (four items) and Support from friends (four items), scored on a 4-point Likert scale from 1 (*Not at all*) to 4 (*A lot*). The mean for each subscale was used, range 1–4.

The Psychosocial Sense of School Membership (PSSM) scale (Goodenow, 1993) was used to tap students' sense of school belonging. Nine items from the original scale were included, and were scored on a 5-point Likert scale (from 1 = *Not at all true* to 5 = *Completely true*). Scores on items with a negative meaning were reversed. Increasing values mean a stronger sense of school belonging. The mean score for the nine items was used in this study, range 1–5.

Wellbeing was measured by one question: 'How would you rate your overall wellbeing?' Responses were given on a 5-point Likert scale from 1 to 5 (1 = *Very bad*, 2 = *Bad*, 3 = *Normal*, 4 = *Good*, 5 = *Very good*).

The instruments, developed for children and adolescents, are further described in previous publications from the study (e.g. Spaas et al., 2022, 2023). In this study, male and female, and refugee and non-refugee migrant students are termed subgroups, although group-membership is mutually exclusive only within each pair. When variables are directly referred to, variable names are capitalised, but when the variable constructs are referred to in their more generic meaning, we use lowercase.

2.3. Statistical procedures

For descriptives, t-tests and chi-squared tests were run for continuous and ordinal variables and for proportions/percentages, respectively, between male and female, and between refugee and non-refugee migrant students. In the variables, missing items were left missing. For computing mean scores, 75% of the items constituting the variable had to be completed. For sum scores, the ensuing mean was multiplied by the number of items in the scale. We calculated effect sizes for the differences in means between male and female, refugee and non-refugee students by Cohen's d, and by Cliff's delta for the difference in estimates between two groups on an ordinal variable (Wellbeing). Cliff's delta ranges from −1 to 1 (Mangiafico,

Table 1. Country of present residence, origin and reason for migrating.

Variable	All ($N = 1312$) M (SD)	Male migrant students ($N = 706$, 53.8% of all) M (SD)	Female migrant students ($N = 606$, 46.2% of all) M (SD)
Age (years)	15.5 (2.0)	15.5 (1.9)	15.5 (2.2)
Time in reception country (years)	1.93 (1.80)	1.78 (1.63)	2.11 (1.96)
Country of residence	Per cent (n)	Per cent (n)	Per cent (n)
Residing in Belgium	41.2 (540)	42.4 (299)	39.8 (241)
Residing in Denmark	18.4 (241)	19.1 (135)	17.5 (106)
Residing in Norway	17.1 (224)	16.9 (119)	17.3 (105)
Residing in Sweden	13.0 (171)	11.3 (80)	15.0 (91)
Residing in Finland	10.4 (136)	10.3 (73)	10.4 (63)
	All ($N = 1145$)	Males ($N = 628$)	Females ($N = 517$)
Origin	Per cent (n)	Per cent (n)	Per cent (n)
Middle East[1]	33.7 (386)	32.6 (205)	35.0 (181)
Asia[2]	20.6 (236)	25.2 (158)	14.9 (77)
Africa[2]	28.2 (323)	25.5 (160)	31.5 (163)
Europe within EU[3]	12.5 (143)	12.3 (77)	12.8 (66)
Europe outside EU	2.3 (26)	2.5 (16)	1.9 (10)
Other regions and CoO[4]	2.8 (32)	1.9 (12)	3.9 (20)
	All ($N = 1137$)	Males ($N = 612$)	Females ($N = 525$)
Reason for migrating[5]	Per cent (n)	Per cent (n)	Per cent (n)
Fleeing war[6]	37.3 (424)	39.7 (243)	34.5 (181)
Fleeing other danger/ persecution[6]	10.6 (120)	10.5 (64)	10.7 (56)
To be reunited with family	18.4 (209)	17.0 (104)	20.0 (105)
Parents' Labour migration	22.3 (253)	21.6 (132)	23.0 (121)
Other responses	11.5 (131)	11.3 (69)	11.8 (62)
Refugee background, per cent	47.0 (593)	49.3 (334)	44.3 (259)

Note. Countries according to participants' own text responses were divided into regions. [1]Middle East = The Asian and African countries around the Mediterranean coast + Iran, Iraq, Kurdistan, Palestine, and Azerbaijan. [2]Except countries included in the Middle East. [3]Including members of the European Economic Association (EEA). [4]CoO = Countries of origin. [5]Mutually exclusive categories. [6]The students who ticked one of these two categories were merged, and constitute 'Refugees' in this study.

2016). In our case, a positive value indicates that the proportion of cases to non-cases in the first group dominates that of the second, 0 indicates no substantial differences, and a negative value indicates that the proportion in the second group dominates that of the first group. Odds ratio was computed for 2×2 tables (Male/Female, Refugee/Non-Refugee migrant, above clinical cutoff for possible PTSD/ below clinical cutoff for possible PTSD). For Cohen's d the following benchmarks were used: small effect size ($d = 0.2$), medium ($d = 0.5$), and large effects size ($d = 0.8$) (Cohen, 1992). It is suggested that these d-values correspond with r and *Spearman's rho* = .1, .3, and .5 (Cohen, 1992), with OR = 1.68, 3.47, and 6.71 (based on 2 by 2 tables; H Chen et al., 2010), and with Cliff's delta values 0.15, 0.33, and 0.47 (Romano et al., 2006), for small, medium, and large differences, respectively.

In the regressions, PIS-EF was modelled as the dependent variable. All scale scores were transformed to a 0–100 scale, which makes it possible to compare the sizes of the coefficients directly. The coefficient then signifies the size of change in PIS-EF in percentage points (PP) per 1 PP increase in the independent variable. First, regressions were run individually for each independent variable. Then three linear regression models were fitted: Model 1 included all stress-related variables, Model 2 included all positive or potentially protective variables, and Model 3 included both stressful and positive variables. All explanatory variables were continuous except Wellbeing. In the regressions with Wellbeing, Very Bad was reference for the other Wellbeing response alternatives. Next, Model 3 was run separately for males and females, and for refugees and non-refugee migrants. Differences in variables' association with PIS-EF within each pair were judged as of possible interest if there was none or just some overlap in the confidence intervals. For these differences, a 95% percentile confidence interval was computed by a bootstrap procedure with 10,000 replications. Statistical level of significance: $p < .05$. Descriptives were run in IBM SPSS Statistics, 28.0. Linear regressions and bootstrap procedures were run in R4.1.0, with the R package boot for the bootstrap procedure.

3. Results

Table 2 shows that relative to male students, female students reported significantly more Emotional symptoms, had stayed significantly longer in the resettlement country, scored significantly higher on Prosocial behaviour, and tended to have a higher PTSS score. The difference between male and female participants on Emotional symptoms was of small to medium effect size, the other effect sizes were small. Differences between male and female students on executive functioning (PIS-EF), Wellbeing, and Perceived ethnic discrimination were non-significant and very small. Compared with the non-refugee migrant students, refugee students were significantly older, had stayed longer in the resettlement country, scored significantly higher on PTSS, reached more frequently the clinical cut-off score for possible PTSD,

Table 2. Descriptives for all participants, male and female, refugee and non-refugee migrant students, and analyses of the differences between them.

	All $N = 1312$		Male migrant students $N = 706$ (53.8% of all)		Female migrant students $N = 606$ (46.2% of all)		Gender difference		Refugee students $N = 593$ (47.0% of 1262[1])		Non-refugee migrant students $N = 669$ (53.0% of 1262[1])		Difference refugee/non-refugee migrant students	
Dichotome variable	*N*	Per cent (*n*)		Per cent (*n*)	*N*	Per cent (*n*)	Chi-Square (df) *p*	Odds ratio (95% CI; *p*)	*N*	Per cent (*n*)	*N*	Per cent (*n*)	Chi-Square (df) *p*	Odds ratio (95% CI; *p*)
PTSD[2] (CRIES-8 ≥ cutoff)	1253	41.6 (521)	720	39.5 (263)	593	44.0 (258)	2.56 (1) .110	0.83 (0.66 - 1.04; .110)	559	50.6% (283)	652	33.7% (220)	35.330 (1) < .001	2.01 (1.60 - 2.54; < .001)
Variable	*N*	*M* (*SD*)	*N*	*M* (*SD*) /	*N*	*M* (*SD*)	*p*	Cohens *d* (95% CI)	*N*	*M* (*SD*)	*N*	*M* (*SD*)	*p*	Cohens *d* (95% CI)
Age (years)	1312	15.5 (2.0)	706	15.5 (1.9)	606	15.5 (2.2)	.874	−.01 (−.12,.10)	593	15.9 (2.2)	669	15.0 (1.8)	<.001	.44 (.33, .55)
Time in reception country (years)	1312	1.93 (1.80)	706	1.78 (1.63)	606	2.11 (1.96)	.001	−.18 (−.29, −.07)	593	2.09 (1.62)	669	1.77 (1.91)	.002	.18 (.07, .29)
PIS-EF[3] (AEFI)	1242	2.35 (0.42)	673	2.36 (0.43)	569	2.34 (0.40)	.342	.05 (−.06, .17)	556	2.37 (0.42)	641	2.33 (0.41)	.087	.10 (−.01, .21)
Posttraumatic stress symptoms (CRIES-8)	1253	13.8 (10.8)	666	13.3 (10.7)	587	14.4 (10.9)	.060	−.11 (−.22, .004)	559	16.3 (10.2)	652	11.9 (10.9)	<.001	.42 (.31, .54)
Emotional symptoms (SDQ)	1269	3.07 (2.34)	681	2.72 (2.22)	588	3.47 (2.42)	<.001	−.32 (−.44, −.21)	573	3.23 (2.36)	650	2.95 (2.34)	.039	.12 (.01, .23)
Conduct problems (SDQ)	1272	1.72 (1.50)	682	1.74 (1.56)	590	1.69 (1.42)	.565	.03 (−.08, .14)	577	1.60 (1.54)	650	1.79 (1.46)	.022	−.13 (−.24, −.02)
Hyperactivity (SDQ)	1265	2.95 (1.94)	679	3.01 (1.91)	586	2.88 (1.97)	.254	.06 (−.05, .18)	572	2.95 (1.98)	648	2.96 (1.91)	.943	−.004 (−.12, .11)
Peer problems (SDQ)	1263	2.86 (1.67)	680	2.91 (1.71)	583	2.80 (1.62)	.228	.07 (−.04, .18)	571	2.98 (1.63)	647	2.74 (1.69)	.012	.14 (.03, .26)
Daily stress (DSSYR)	1242	9.13 (4.07)	656	9.25 (4.14)	586	8.99 (3.99)	.261	.06 (−.05, .18)	558	9.72 (4.22)	638	8.66 (3.92)	<.001	.26 (.15, .38)
Perceived ethnic discrimination (PEDQ)	1245	14.1 (6.0)	674	14.3 (6.4)	571	13.8 (5.4)	.143	.08 (−.03, .20)	558	13.9 (5.8)	640	14.1 (6.0)	.606	−.03 (−.14, .08)
Prosocial behaviour (SDQ)	1271	8.24 (1.84)	682	8.09 (1.97)	589	8.40 (1.66)	.003	−.17 (−.28, −.06)	576	8.51 (1.68)	649	8.04 (189)	<.001	.26 (−14, .38)
Resilience (CYRM)	1259	47.4 (7.6)	679	47.1 (7.7)	580	47.8 (7.4)	.155	−.08 (−.19, −03)	568	48.2 (7.6)	645	46.8 (7.4)	.002	.18 (.07, .29)
Support from family (MSPSS)	1259	3.32 (0.75)	676	3.29 (0.77)	583	3.35 (0.73)	.195	−.07 (−.18, .04)	566	3.29 (0.80)	644	3.33 (0.71)	.385	−.06 (−.16, .06)
Support from friends (MSPSS)	1265	2.91 (0.84)	682	2.88 (0.82)	583	2.94 (0.86)	.197	−.07 (−.18, .04)	573	2.89 (0.83)	645	2.93 (0.85)	.343	−.05 (−.17, .06)
School belonging (PSSM[4])	1237	3.82 (0.66)	668	3.81 (0.66)	569	3.83 (0.65)	.561	−.03 (−.15, .08)	550	3.84 (0.62)	641	3.78 (0.68)	.112	.09 (−.02, .21)
	All		Male students		Female students		Gender difference		Refugee migrant students		Non-refugee migrant students		Difference refugees/other migrants	
Response on Wellbeing	*N*	Per cent (*n*)	*N*	Per cent (*n*)	*N*	Per cent (*n*)	Chi-Square (df) *p*	Cliff's delta (95% CI)	*N*	Per cent (*n*)	*N*	Per cent (*n*)	Chi-square (df) *p*	Cliff's delta (95% CI)
Wellbeing Very bad	1266	1.1 (14)	677	1.0 (7)	589	1.2 (7)	.07 (1) .793		574	0.9 (5)	643	1.2 (8)	.399 (1) .527	
Wellbeing Bad	1266	4.0 (51)	677	4.4 (30)	589	3.6 (21)	.61 (1) .434		574	4.2 (24)	643	3.9 (25)	.067 (1) .795	
Wellbeing Normal	1266	28.4 (359)	677	26.6 (180)	589	30.4 (179)	2.24 (1) .134		574	30.0 (172)	643	27.4 (176)	.999 (1) .318	
Wellbeing Good	1266	32.4 (410)	677	33.7 (228)	589	30.9 (182)	1.11 (1) .292		574	30.5 (175)	643	33.3 (214)	1.088 (1) .297	
Wellbeing Very Good	1266	34.1 (432)	677	34.3 (232)	589	34.0 (200)	.01 (1) .907		574	34.5 (198)	643	34.2 (220)	.011 (1) .918	
Wellbeing (total)							3.02 (4) .554	0.02 (-.05 to 0.08)					1.92 (4) .750	0.01 (−0.05 to 0.08)

Note. [1]Fifty participants did not respond to their reason for migration. [2]PTSD = Possible Posttraumatic stress disorder, clinical cutoff ≥ 17. [3]PIS-EF = The Planning and Initiative Executive Functions subscale. [4]Only nine items of the PSSM was used. For a meaningful level of accuracy, scales with values < 1 have three decimals; < 10 have two decimals; and > 10 have one decimal. Chi-Square test *p*-values: Asymptotic Significance. Odds ratio is computed for males compared to females, and for refugees compared to other migrants.

scored higher on Daily stress, Prosocial behaviour, Peer problems, Emotional symptoms, and scored lower on Conduct problems. Differences between refugee and non-refugee migrant students were of medium effect size for Age and PTSS, while the effect sizes of the other differences were small. The differences between refugee and non-refugee migrant students on Perceived ethnic discrimination and Well-being were negligible. About two fifths of the participants scored at or above cutoff for a possible PTSD according to the CRIES-8 guidelines. On Wellbeing, about 5% of the participants reported their wellbeing as 'Very bad' or 'Bad', and 66.5% as 'Good' or 'Very good'. Responses were about equally dispersed among the different subgroups. See Table 2 for details.

Table 3 displays the results for the unadjusted and adjusted regressions for all participants. Unadjusted for other independent variables, all variables except PTSS were significantly related to EF. The one-item Wellbeing variable with five response alternatives was positively and significantly related to PIS-EF, and responding better than Very bad on Wellbeing was associated with 15.1–25.5 percentage points' (PP) higher PIS-EF. Among the other variables, Resilience was most strongly associated with PIS-EF: A one PP increase in Resilience was associated with an increase of 0.530 PP on PIS-EF.

In Model 1, adjusted for all stress-related variables, three variables, Hyperactivity, Ethnic discrimination, and Emotional symptoms were negatively and statistically significant, but to a small or minimal extent associated with PIS-EF. Posttraumatic stress symptoms, however, was positively, statistically significantly, but minimally related to PIS-EF.

In Model 2, adjusted for all positive or potentially protective variables, Resilience, School belonging and Prosocial behaviour were significantly and positively associated with PIS-EF, with medium to small effect-sizes.

In Model 3, responding Very Good on Wellbeing (rather than Very bad) was significantly associated with an increase of 13.8 PP on PIS-EF. Among the other variables, Resilience, Prosocial behaviour, and School belonging accounted for the largest associations with PIS-EF, all significantly and in a positive direction. Hyperactivity and Emotional symptoms were negatively associated with PIS-EF with small effect sizes. The stress-related variable PTSS was, however, positively, minimally and non-significantly associated with PIS-EF.

Table 4 shows the fully adjusted regression with all explanatory variables included for each of the subgroups. Resilience was positively and significantly associated with PIS-EF in all subgroups, and most strongly for males. Prosocial behaviour was also significantly and positively associated with PIS-EF for all subgroups, and most strongly for refugees. Well-being was positively and significantly associated with

Table 3. Unadjusted and adjusted regression coefficients with the executive functioning variable PIS-EF as dependent variable (Models 1, 2, and 3).

	Unadjusted[1]	Model 1 Adjusted for stress-related variables	Model 2 Adjusted for positive factors	Model 3 Adjusted for all independent variables
Independent variable	coeff. (95% CI) *p*	coeff. (95% CI) *p*	coeff. (95% CI) *p*	coeff. (95% CI) *p*
Posttraumatic stress symptoms	.001 (−.043, .045) .968	.079 (.032, .125) < .001		.043 (−.002, .089) .061
Emotional symptoms	−.156 (−.204, −.107) < .001	−.100 (−.159, −.041) < .001		−.096 (−.154, −.038) .001
Conduct problems	−.224 (−.302, −.146) < .001	−.073 (−.162, .016) .106		.067 (−.020, .155) .131
Hyperactivity	−.255 (−.313, −.196) < .001	−.169 (−.236, −.102) < .001		−.098 (−.163, −.033) .003
Peer problems	−.152 (−.221, −.083) < .001	−.042 (−.116, .032) .267		.049 (.−.024, .123) .395
Daily stress	−.099 (−.151, −.047) < .001	−.052 (−.104, .001) .053		.017 (.−.034, .069) .512
Ethnic discrimination	−.217 (−.287, −.147) < .001	−.109 (−.187, −.030) .007		−.027 (−.104, .050) .490
Prosocial behaviour	.299 (.238, .361) < .001		.116 (.052, .180) < .001	.141 (.073, .210) < .001
Resilience	.530 (.463, .598) < .001		.376 (.292, .460) < .001	.335 (.246, .424) < .001
Support from family	.235 (.158, .311) < .001		.045 (−.033, .124) .260	.020 (−.061, .102) .622
Support from friends	.206 (.138, .274) < .001		−.004 (−.075, .066) .905	.001 (−.074, .077) .969
School belonging	.360 (.292, .429) < .001		.138 (.064, .212) < .001	.103 (.023, .182) .011
Response alternatives	coeff. (95% CI) *p*	coeff. (95% CI) *p*	coeff. (95% CI) *p*	coeff. (95% CI) *p*
Well-being Bad	15.1 (3.1, 27.1) .014		7.7 (−4.2, 19.6) .207	11.2 (−1.2, 23.6) .077
Well-being Normal	15.7 (4.9, 26.5) .004		5.7 (−5.2, 16.6) .305	9.7 (−1.7, 21.1) .096
Well-being Good	18.2 (7.4, 28.9) .001		5.4 (−5.5, 16.3) .332	9.4 (−2.1, 21.0) .109
Well-being Very good	25.5 (14.7, 36.3) < .001		9.7 (−1.3 20.7) .084	13.8 (2.2, 25.5) .020

Note. All variables are transformed to 0–100 scales. All regression coefficients are unstandardised. [1]Each independent variable was run separately. Model Summary: Model 1, adjusted for the stress related variables, 'explains' 9% of the variance in PIS-EF ($N = 1157$, $R^2 = .090$, $p < .001$). Model 2, adjusted for the positive factors 'explains' 19.5% of the variance in PIS-EF ($N = 1188$, $R^2 = .195$, $p < .001$). The fully adjusted model (Model 3) 'explains' 20.9% of the variance in PIS-EF ($N = 1126$, $R^2 = .209$, $p < .001$). Wellbeing Very Bad is here reference for the other Wellbeing response alternatives. For a meaningful level of accuracy, scales with values < 1 have three decimals; < 10 have two decimals; and > 10 have one decimal.

Table 4. Regressions with the executive functioning variable PIS-EF as dependent variable, adjusted for all independent variables for males and females, refugees and other migrants.

Independent variable	Males students Coeff. (95% CI) *p*	Female students Coeff. (95% CI) *p*	Refugees Coeff. (95% CI) *p*	Non-refugee migrants Coeff. (95% CI) *p*
Posttraumatic stress symptoms	.041 (−.026, .109) .229	.046 (−.017, .109) .153	.029 (−.044, .103) .435	.056 (−.006, .118) .078
Emotional symptoms	−.089 (−.176, −.002) .045	−.083 (−.167, .000) .050	−.047 (−.137, .043) .306	−.142 (−.223, −.062) < .001
Conduct problems	.097 (−.021, .216) .107	.015 (−.121, .151) .828	.045 (−.088, .179) .505	.054 (−.069, .177) .390
Hyperactivity	−.090 (−.181, .002) .054	−.113 (−.208, −.017) .020	−.094 (−.196, .007) .068	−.091 (−.180, −.003) .043
Peer problems	.047 (−.057, .152) .374	.047 (−.061, .156) .391	.037 (−.076, .151) .518	.061 (−.042, .165) .241
Daily stress	−.011 (−.085, .063) .768	.044 (−.031, .119) .248	.021 (−.058, .100) .605	.022 (−.052, .096) .565
Ethnic discrimination	−.027 (−.128, .074) .599	−.034 (−.156, .088) .587	−.026 (−.148, .097) .681	−.036 (−.142, .071) .511
Prosocial behaviour	.143 (.051, .234) .002	.135 (.027, .242) .014	.196 (.087, .305) < .001	.133 (.037, .230) .007
Resilience	.358 (.235, .482) < .001	.311 (.180, .441) < .001	.338 (.198, .479) < .001	.302 (.180, .425) < .001
Support from family	.016 (−.096, .128) .785	.016 (−.104, .137) .791	.070 (−.047, .186) .241	−.042 (−.162, .078) .489
Support from friends	−.018 (−.128, .092) .744	.022 (−.083, .127) .680	.008 (−.107, .123) .893	.007 (−.097, .111) .897
School belonging	.129 (.017, .241) .025	.085 (−.030, .200) .149	.094 (−.035, .222) .153	.125 (.018, .232) .022
Response alternatives	coeff. (95% CI) *p*	coeff. (95% CI) *p*	coeff. (95% CI) *p*	Coeff. (95% CI) *p*
Well-being Bad	15.9 (−2.7,, 34.5) .093	4.2 (−13.0, 21.3) .632	26.6 (5.5, 47.7) .014	−0.6 (−17.7, 16.4) .940
Well-being Normal	12.3 (−5.2, 29.8) .169	6.5 (−8.9, 22.0) .407	22.6 (2.7, 42.5) .026	0.6 (−14.8, 15.9) .941
Well-being Good	11.2 (−6.5, 28.9) .215	6.7 (−9.0, 22.4) .404	25.2 (5.1, 45.4) .014	−2.3 (−17.9, 13.3) .770
Well-being Very good	16.9 (−0.9, 34.7) .062	9.9 (−6.0, 25.8) .222	27.8 (7.4, 48.1) .008	2.9 (−12.8, 18.6) .719

Note. All variables transformed to 0–100 scales so that their effect on PIS-EF can be compared. Unstandardised coefficients. For Male students, the model 'explains' 22.0% of the variance in PIS-EF (R^2 = .220, p < .001). For Female students, the model 'explains' 20.6% of the variance in PIS-EF (R^2 = .206, p < .001). For Refugee students, the model 'explains' 24.2% of the variance in PIS-EF (R^2 = .242, p < .001). For Other migrant students, the model 'explains' 19.4% of the variance in PIS-EF (R^2 = .194, p < .001). Wellbeing Very Bad is here reference for the other Wellbeing response alternatives. For a meaningful level of accuracy, scales with values < 1 have three decimals; with values < 10 have two decimals; and scales up to values > 10 have one decimal.

PIS-EF for refugee students, and non-significantly for the other groups. School belonging was positively and significantly associated with PIS-EF for male and for non-refugee migrant students, and non-significantly for female and refugee migrant students. Hyperactivity was negatively associated with PIS-EF in all the regressions, significantly for females and non-refugees, and non-significantly for males and refugees. Emotional symptoms were negatively and most strongly associated with PIS-EF for non-refugee migrant students, and to some extent for male and female migrant students, but non-significantly for refugees. The remaining variables were all non-significantly associated with PIS-EF.

Bootstrapping was performed for the following variables between male and female participants: Hyperactivity, Prosocial behaviour, Resilience, and School belonging. Between refugee and non-refugee participants, bootstrapping was performed for the following variables: Emotional symptoms, Prosocial behaviour, Resilience, School belonging, Wellbeing bad, Wellbeing normal, Wellbeing Good, Wellbeing very good, and PTSS. None of these variables' relationships with PIS-EF were significantly different between male and female, and between refugee and non-refugee migrant students.

To check for some associations with EF reported in the literature, we *post hoc* performed the following correlations: Between PTSD-level of symptoms and PIS-EF (Spearman's rho = .03, p = .267), between Age and PIS-EF (r = .03, p = .240), and between Time in reception country and PIS-EF (r = -.06, p = .044). The first two correlations were minimal and statistically non-significant, the last was statistically significant, negative, but minimal.

4. Discussion

Among the participating migrant students in this study, positive factors, and especially resilience, were more closely associated with PIS-EF than stress-related factors. All relationships with PIS-EF, except PTSS, were in the expected direction. There were no significant differences between male and female - and between refugee and non-refugee migrant students in the associations of the examined variables with PIS-EF. According to the normative data for the Planning and Initiative subscale of the AEFI for adolescents aged between 15 and 18 years (Van der Elst et al., 2012), our results on the PIS-EF correspond with around the 60th percentile for responders with an average level of education, and around the 65th percentile for youth with a low level of education. This means that the participants scored at least as good as 60–65% of other responders in this age group and educational level. This indicated that the migrant students scored comparably to the general youth population on PIS-EF. Van der Elst et al. (2012) found that age, gender, and educational level influenced scores on the AEFI. Age has been associated with poorer psychological adaptation/mental health in some of the cited studies (Pagel & Edele, 2022), with potential implications for EF. However, we found no significant correlation between age and PIS-EF. Despite potential differences in demography and other background factors, self-reported Planning and initiative EF skills were about the same in male and female, refugee and non-refugee migrant students.

For the whole group, adjusted for both stressful and positive or potentially protective factors, resilience, prosocial behaviour, school belonging, and wellbeing turned out as positively and significantly associated

with PIS-EF. Studies have demonstrated the importance of resilience to the functioning of refugee and migrant youth (Gatt et al., 2020; Taylor & Ruiz, 2019). The participants' high mean score on resilience, especially within the refugee group, could be linked with an inclination among these young people, based on their experience with conflict and the breaking of social ties, to mobilise their resources and rely on themselves. Promotion of refugee youth's resilience is noted to be of key importance to their positive adaptation and wellbeing (Jafari et al., 2022).

Resilience, prosocial behaviour, and the way individuals elicit or recognise social support may be an expression of well-functioning EFs (Bauer et al., 2021; Ellis et al., 2020; Zorza et al., 2016). In return, some such positive factors could also protect or enhance EF in the face of challenges and strains. In line with this, Dixson and Scalcucci (2021) suggested that psychosocial factors may represent pathways to improve adolescent EF. Our finding of a relationship between school belonging and PIS-EF among non-refugee migrants and male migrant students, resonates with Dixson and Scalcucci's (2021) finding that school belonging predicted EF positively among high school students, and may resonate with the finding of a relationship between students' sense of school-belonging and academic achievement (Korpershoek et al., 2020). Our finding that wellbeing was significantly associated with PIS-EF for refugee students, can, by extension, be seen in relation to Renshaw et al.'s (2014) proposition that wellbeing may be critical to success at school, and conversely, to Graham et al.'s (2016) conclusion that success at school is critical to the wellbeing of resettled children with a refugee background.

Social support from family and friends came out as weakly related to EF in our study. However, this should not be understood as indicating that family and friends are of little importance in (migrant) adolescents' lives and to their learning. Social support at home and among peers have been found to be success factors for learning (Graham et al., 2016), and of importance to young people's resilience (Sleijpen et al., 2017). Family support is found to be important to many areas of the lives of young people (e.g. Baker et al., 2019), and thus the participants' fairly high mean score on support from family could be important to their EF in more indirect ways. Furthermore, the participants' somewhat lower mean score on support from friends may indicate a weakness of social ties with peers among migrant youth. This finding is worrying in a developmental period when EFs are found to be significantly affected by peer relationships and children's social life at school (Lecce et al., 2020). However, migrants' social ties can be positively influenced by the conditions created at school, as argued by Jørgensen (2017).

According to the literature, the development (Aupperle et al., 2012) or perception (Zelazo et al., 2016) of stressors could be affected by the quality of individuals' EFs. We anticipated that a daily life characterised by mental health problems and external stressors could in return also have a negative effect on individuals' actual executive functioning. However, as noted, the only two variables that were significantly and negatively associated with PIS-EF for the whole group of participants, when adjusted for all variables, were hyperactivity and emotional symptoms. The negative association we found between hyperactivity and PIS-EF is not surprising, as hyperactivity implies difficulties with sustained attention, distractibility, and problems with behavioural self-control, organisation, and consideration of the consequences of one's acts (ICD-11), whereas EF, on the other hand, implies almost the opposite (Zelazo et al., 2016). Contrasting our findings, one study conducted in elementary schools in Germany including refugee children, newly arrived Roma children, and German-born immigrant children found that hyperactivity was not significantly associated with EF (Chwastek et al., 2022). Differences in age groups and the parts of EF being measured, and that teacher ratings of socio-emotional problems and performance tests of EF were used, may explain different results between their study and ours.

There are opposing findings regarding the relationship between anxiety and EF (Alfonso and Lonigan, 2021; Owens et al., 2012; Snyder et al., 2014), and between depression and EF (Friedman et al., 2018; Snyder et al., 2014). Emotional symptoms in the questionnaire that we used, consisted of questions regarding both anxiety and depression. Therefore, we cannot tell whether the respective items pulled the result in the same, or different directions, resulting in the modest, negative association of emotional symptoms with EF that we found. Participants' depression could have exerted a more stable negative view of themselves, including questions related to PIS-EF. However, respondents' presence or absence of situational anxiety (Alfonso and Lonigan, 2021) should not have influenced their results on PIS-EF since we used self-report rather than performance tests for assessment of EF. Furthermore, the context for responding to the questionnaire in our study was relatively non-stressful, was conducted in familiar classrooms, was voluntary, and did not ask about traumatic experiences.

Initially, we thought PTSS would be a potent source of disruption of the EF of the participants, as several studies in adult, children, and youth populations point to a negative association of trauma, of PTSS, or a complete PTSD, with EF (Barzilay et al., 2018; Nyvold et al., 2021; Woon et al., 2017). Our finding that PTSS, although high, was minimally related to

PIS-EF, is in keeping with the results of studies by Chen et al. (2019) and Scharpf et al. (2022). Contingent on whether the context for the study and the methods used to assess EF are perceived as emotionally taxing, evoke trauma memories, or act as triggers of trauma-related reactions, or not, studies could find different associations between PTSS and EF/cognitive functioning (Mirabolfathi et al., 2022).

Post-migration living problems often represent disturbing elements in refugee's daily lives (Bronstein & Montgomery, 2011; Spaas et al., 2022; Tomren & Opaas, 2024; Verelst et al., 2022). Recent discrimination has been found to be negatively associated with EF among college students of mixed ethnic origin (Keating et al., 2022). In our unadjusted regression, living problems such as peer problems, daily stress, and perceived ethnic discrimination were all significantly and negatively related to the EF variable used. However, none of these variables were significantly related to EF when adjusting for all the other variables included in the study. The self-reported data of the participants, who were in their early phase of resettlement (see Wu et al., 2021), showed that positive factors were more strongly associated with their PIS-EF. We tentatively suggest that the developmental impetus in childhood and adolescence may spur migrant youth to focus on positive forces within and without, rather than the more problematic sides of their daily lives.

Strengths of this study were the large number of participants from five countries in Europe, the investigation of the associations of both stressful and positive variables with PIS-EF, and the examination of differences between genders and between migrant students with and without a refugee background. Having data only from one of three subscales of the AEFI limited the chance to see how results on a fuller spectre of EF would have been associated with the included variables. Another limitation is that our discussion of, and comparison with other studies on EF was rather crude, as different ways of testing, and different EFs could yield different relationships with the examined variables. The self-reported data could imply bias, but can also have provided valid information of how executive functions operated in participants' daily lives. Another aspect of self-report is that the students' responses to some of the items could be influenced by a tendency to evaluate oneself in the same way, positively or negatively. Finally, the study is cross-sectional and explorative, and cannot justify causal assumptions.

5. Conclusion and implications

The self-reported resilience of the migrant adolescents in this study, and to a somewhat lesser degree their prosocial functioning and sense of school belonging were positively related to their self-reported executive functioning (in terms of PIS-EF), and more strongly so than their self-reported mental health symptoms and post-migration difficulties. This applied to male and female as well as refugee and non-refugee migrant students. A reported feeling of wellbeing was especially related to refugee students' executive functioning. The students' executive functions probably had contributed to forming many of the factors investigated here as independent variables. However, the possibility that present day stressful or benign conditions could work back on the students' actual executive functioning, could open up for ways to support or protect the students EF.

A concern for the potential negative impact of PTSS on migrant students' learning has been voiced (Spaas et al., 2022). However, to the extent that PIS-EF is connected to migrant students' learning, PTSS does not seem to be the problem – except, maybe, when cognitive functioning is acutely disturbed by traumatic intrusions (Mirabolfathi et al., 2022). Judging from the present study, there are other sources of distress and stress that may be more urgent obstacles to learning for migrant youth, such as emotional symptoms, hyperactivity, conduct problems, and ethnic discrimination. These should be actively addressed to prevent or alleviate their possible negative impact on EF (and their certain negative impact on various other aspects of life).

Adverse events and stressors before and after migration do not simply add up to increasing maladaptive or pathological outcomes. Positive and potentially protective factors may counteract the effects of various forms of stress upon EF. In extension of our findings we suggest that strengthening social ties to support migrant youths' resilience, creating opportunities for prosocial behaviour, as well as laying the ground for a socially welcoming context that allows for a feeling of school belonging and wellbeing could protect or enhance migrant students' EF. Albeit not forgetting the negative effects of mental health problems and the importance of adequate help, when needed, these study findings highlight the importance of being resource oriented, and work for migrant students' experience of themselves as coping, prosocial, and resourceful members of school and the new society.

Steps to forward this explorative investigation of factors related to migrant youths' EF would be to perform more rigorous studies. Most important is to identify factors related to the present that could be prevented, lessened, or strengthened in order to affect migrant students' EF and ability to succeed in school and in the new country, irrespective of the characteristics or experiences they bring with them from the past.

Acknowledgements

The authors are grateful to the adolescents, schools and teachers who participated in this study. We also thank all who contributed through different phases of the study. The RefugeesWellSchool project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 754849.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Horizon 2020 Framework Programme.

Data availability statement

The data that support the findings of this study are not publicly available due to different licences in each country and concerns of adequate de-identification of the data for this vulnerable population. However, the data can be made available for researchers upon reasonable request.

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References

Alfonso, S. V., & Lonigan, C. J. (2021). Trait anxiety and adolescent's academic achievement: The role of executive function. *Learning and Individual Differences*, *85*, 101941, 1–10. https://doi.org/10.1016/j.lindif.2020.101941

Aupperle, R. L., Melrose, A. J., Stein, M. B., & Paulus, M. P. (2012). Executive function and PTSD: Disengaging from trauma. *Neuropharmacology*, *62*(2), 686–694. https://doi.org/10.1016/j.neuropharm.2011.02.008

Baker, J. R., Raman, S., Kohlhoff, J., George, A., Kaplun, C., Dadich, A., Best, C. T., Arora, A., Zwi, K., Schmied, V., & Eapen, V. (2019). Optimising refugee children's health/wellbeing in preparation for primary and secondary school: a qualitative inquiry. *BMC Public Health*, *19* (812), 1–11. https://doi.org/10.1186/s12889-019-7183-5

Balaž, B., Marković, I. H., & Brajša-Žganec, A. (2021). The exploration of the relationship between positive achievement emotions and academic success: testing the assumptions of the control-value theory of achievement emotions. *The Educational And Developmental Psychologist*, *38*(1), 77–87. https://doi.org/10.1080/20590776.2020.1856623

Barr, D. A. (2018). The importance of executive function in school readiness. *Kappan*, *99*(6), 39–44. kappanonline.org, retrieved February 2022.

Barzilay, R., Calkins, M. E., Moore, T. M., Wolf, D. H., Satterthwaite, T. D., Scott, J. C., Jones, J. D., Benton, T. D., Gur, R. V., & Gur, R. E. (2018). Association between traumatic stress load, psychopathology, and cognition in the Philadelphia Neurodevelopmental Cohort. *Psychological Medicine*, *49*(2), 325–334. https://doi.org/10.1017/S0033291718000880

Bauer, R. H., Gilpin, A. T., & Thibodeau-Nielsen, R. B. (2021). Executive functions and imaginative play: Exploring relations with prosocial behaviors using structural equation modeling. *Trends in Neuroscience and Education*, *25*, 100165. https://doi.org/10.1016/j.tine.2021.100165

Berthelsen, D., Hayes, N., White, S. L., & Williams, K. E. (2017). Executive function in adolescence: Associations with child and family risk factors and self-regulation in early childhood. *Frontiers in Psychology*, *8*(903), 1–14. https://doi.org/10.3389/fpsyg.2017.00903

Blackmore, R., Gray, K. M., Boyle, J. A., Fazel, M., Ranasinha, S., Fitzgerald, G., Misso, M., Gibson-Helm, M. (2020). Systematic review and meta-analysis: The prevalence of mental illness in child and adolescent refugees and asylum seekers. *Journal of the American Academy of Child & Adolescent Psychiatry*, *59*(6), 705–714. https://doi.org/10.1016/j.jaac.2019.11.011

Brondolo, E., Kelly, K. P., Coakley, V., Gordon, T., Thompson, S., Levy, E., Cassells, A., Tobin, J. N., Sweeney, M., & Contrada, R. J. (2005). The perceived ethnic discrimination questionnaire: Development and preliminary validation of a community version. *Journal of Applied Social Psychology*, *35*(2), 335–365. https://doi.org/10.1111/j.1559-1816.2005.tb02124.x

Bronstein, I., & Montgomery, P. (2011). Psychological distress in refugee children: A systematic review. *Clinical Child and Family Psychology Review*, *14*(1), 44–56. https://doi.org/10.1007/s10567-010-0081-0

Chen, A., Panter-Brick, C., Hadfield, K., Dajani, R., Hamoudi, A., & Sheridan, M. (2019). Minds under siege: Cognitive signatures of poverty and trauma in refugee and non-refugee adolescents. *Child Development*, *90* (6), 1856–1865. https://doi.org/10.1111/cdev.13320

Chen, H., Cohen, P., & Chen, S. (2010). How Big is a Big odds ratio? Interpreting the magnitudes of odds ratios in epidemiological studies. *Communications in Statistics —Simulation and Computation*, *39*(4), 860–864. DOI:10.1080/03610911003650383

Christensen, G., & Stanat, P. (2007). *Language policies and practices for helping immigrants and second-generation students succeed.* The transatlantic task force on immigration and integration. Migration Policy Institute & Bertelsmann Stiftung. 1-15.

Chwastek, S., Leyendecker, B., & Busch, J. (2022). Socio-emotional problems and learning skills of Roma and recently arrived refugee children in German elementary schools. *European Journal of Health Psychology*, *29*(1), 38–49. https://doi.org/10.1027/2512-8442/a000096

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112* (1), 155–159. https://doi.org/10.1037/0033-2909.112.1.155

Craig, F., Margari, F., Legrottaglie, A. R., Palumbi, R., de Giambattista, C., & Margari, L. (2016). A review of executive function deficits in autism spectrum disorder and attention-deficit/hyperactivity disorder. *Neuropsychiatric Disease and Treatment*, *12*, 1191–1202. https://doi.org/10.2147/NDT.S104620

d'Abreu, A., Castro-Olivo, S., Ura, S. K., & Furrer, J. (2021). Hope for the future: A qualitative analysis of the resettlement experience of Syrian refugee adolescents and parents. *School Psychology International*, *42*(2), 132–156. https://doi.org/10.1177/0143034320983595

Dixson, D. D., & Scalcucci, S. G. (2021). Psychosocial perceptions and executive functioning: Hope and school belonging predict students' executive functioning. *Psychology in the Schools*, *58*(5), 853–872. https://doi.org/10.1002/pits.22475

Donati, G., Meaburn E, L., & Dumontheil, I. (2019). The specificity of associations between cognition and attainment in English, maths and science during adolescence. *Learning and Individual Differences*, *69*, 84–93. https://doi.org/10.1016/j.lindif.2018.11.012

Ellis, B. J., Abrams, L. S., Masten, A. S., Sternberg, R. J., Tottenham, N., & Frankenhuis, W. E. (2020). Hidden talents in harsh environments. *Development and Psychopathology*, *34*(1), 95–113. https://doi.org/10.1017/s0954579420000887

Escolano-Pérez, E., & Bestué, M. (2021). Academic achievement in Spanish Secondary School Students: The interrelated role of executive functions, physical activity and gender. *International Journal of Environmental Research & Public Health*, *18*(4), 1816. https://doi.org/10.3390/ijerph18041816

Fazel, M., Reed, R. V., Panter-Brick, C., & Stein, A. (2012). Mental health of displaced and refugee children resettled in high-income countries: Risk and protective factors. *Lancet*, *379*(9812), 266–282. https://doi.org/10.1016/S0140-6736(11)60051-2

Federico, F., & Orsolini, M. (2022). Child migration and school achievement. In A. Federico, W. Grissold, & M. E. Alaoui-Faris (Eds.), *Neurology in migrants and refugees* (Chapter 7, pp. 68–77). Sustainable Development Goals Series. Springer.

Friedman, N. P., du Pont, A., Corley, R. P., & Hewitt, J. K. (2018). Longitudinal relations between depressive symptoms and executive functions from adolescence to early adulthood: A twin study. *Clinical Psychological Science*, *6*(4), 543–560. https://doi.org/10.1177/2167702618766360

Gatt, J. M., Alexander, R., Emond, A., Foster, K., Hadfield, K., Mason-Jones, A., Reid, S., Theron, L., Ungar, M., Wouldes, T. A., & Wu, Q. (2020). Trauma, resilience, and mental health in migrant and Non-migrant youth: An international cross-sectional study across Six countries. *Frontiers in Psychiatry*, *10*, 997. https://doi.org/10.3389/fpsyt.2019.00997

Goodenow, C. (1993). The psychological sense of school membership among adolescents: Scale development and educational correlates. *Psychology in the Schools*, *30*(1), 79–90. https://doi.org/10.1002/1520-6807(199301)30:1<79::AID-PITS2310300113>3.0.CO;2-X

Goodman, R. (1997). The strengths and difficulties questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, *38*(5), 581–586. https://doi.org/10.1111/j.1469-7610.1997.tb01545.x

Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*(11), 1337–1345. https://doi.org/10.1097/00004583-200111000-00015

Graham, H. R., Minhas, R. S., & Paxton, G. (2016). Learning problems in children of refugee background: A systematic review. *Pediatrics*, *137*(6), 1–15. https://doi.org/10.1542/peds.2015-3994

Grissom, N. M., & Reyes, T. M. (2019). Let's call the whole thing off: evaluating gender and sex differences in executive function. *Neuropsychopharmacology*, *44*(1), 86–96. https://doi.org/10.1038/s41386-018-0179-5

Hirani, S., Ojukwu, E., & Bandara, N. A. (2022). Prosocial behavior and youth mental health outcomes: A scoping review protocol. *PLoS One*, *17*(6), 1–9. https://doi.org/10.1371/journal.pone.0270089

Hodgeon, H. B., Liebman, R., Martin, L., Suvak, M., Beserra, K., Rosenblum, W., & Spinazzola (2018). The effects of trauma type and executive dysfunction on symptom expression of polyvictimized youth in residential care: Trauma type and executive dysfunction. *Journal of Traumatic Stress*, *31*(2), 255–264. https://doi.org/10.1002/jts.22267

Hollander, A.-C., Bruce, D., Burström, B., & Ekblad, S. (2011). Gender-related mental health differences between refugees and non-refugee immigrants- a cross-sectional register-based study et al. *BMC Public Health*, *11*(1), 180. https://doi.org/10.1186/1471-2458-11-180

Jafari, H., Kassan, A., Reay, G., & Climie, E. A. (2022). Resilience in refugee children and youth: A critical literature review. *Canadian Psychology*, *63*(4), 678–694. https://doi.org/10.1037/cap0000320

Jørgensen, C. H. R. (2017). 'Peer social capital' and networks of migrants and minority ethnic youth in England and Spain. *British Journal of Sociology of Education*, *38*(4), 566–580. https://doi.org/10.1080/01425692.2015.1131144

Juang, L. P., Simpson, J. A., Lee, R. M., Rothman A, J., Titzmann, P. F., Schachner, M. K., Korn, L., Heinemeier, D., & Betsch, C. (2018). Using attachment and relational perspectives to understand adaptation and resilience among immigrant and refugee youth. *American Psychologist*, *73*(6), 797–811. https://doi.org/10.1037/amp0000286

Keating, L., Kaur, A., Mendieta, M., Gleason, C., Basello, G., Roth, A., & Brondolo, E. (2022). Racial discrimination and core executive functions. *Stress and Health*, *38*(3), 615–621. https://doi.org/10.1002/smi.3116

Khawaja, I. O., & Schweitzer, R. D. (2017). Mental wellbeing of students from refugee and migrant backgrounds: The mediating role of resilience. *School Mental Health*, *9*(3), 284–293. https://doi.org/10.1007/s12310-017-9215-6

Korpershoek, H., Canrinus, E. T., Fokkens-Bruinsma, M., & de Boer, H. (2020). The relationships between school belonging and students' motivational, social-emotional, behavioural, and academic outcomes in secondary education: A meta-analytic review. *Research Papers In Education*, *35*(6), 641. https://doi.org/10.1080/02671522.2019.1615116

Kouider, E. B., Koglin, U., & Petermann, F. (2014). Emotional and behavioral problems in migrant children and adolescents in Europe: A systematic review. *European Child and Adolescent Psychiatry*, *23*(6), 373–391. https://doi.org/10.1007/s00787-013-0485-8

Lam, U. F., Chen, W.-W., Zhang, J., & Liang, T. (2015). It feels good to learn where I belong: School belonging, academic emotions, and academic achievement in adolescents. *School Psychology International*, *36*(4), 393–409. https://doi.org/10.1177/0143034315589649

Lambert, H. K., King, K. M., Monahan, K. C., & McLaughlin, K. A. (2016). Differential associations of threat and deprivation with emotion regulation and cognitive control in adolescence. *Development and Psychopathology*, *29*(3), 929–940. https://doi.org/10.1017/S0954579416000584

Laub, C., van den Bos, W., & Fandakova, Y. (2020). The relationship between pubertal hormones and brain plasticity: Implications for cognitive training in adolescence. *Developmental Cognitive Neuroscience*, *42*, 100753. https://doi.org/10.1016/j.dcn.2020.100753

Laurent, P. (2020). Entre pouvoir et vouloir apprendre, évolution des relations entre les fonctions exécutives et l'apprentissage autorégulé de l'enfance à l'adolescence. (Between being able and wanting to learn, evolution of the relationships between executive functions and self-regulated learning from childhood to adolescence). Psychologie. Université de Nanterre - Paris X, 2020. Français. (NNT: 2020PA100014).

Lecce, S., Bianco, F., & Ronchi, L. (2020). Executive function in the school context: The role of peer relationships. *Infant and Child Development*, *29*(1), e2151. https://doi.org/10.1002/icd.2151

Li, G., Wang, L., Chengqi, C., Fang, R., Cao, X., Chen, C., Elhai, J. D., & Hall, B. J. (2019).) Posttraumatic stress disorder and executive dysfunction among children and adolescents: A latent profile analysis. *International Journal of Clinical and Health Psychology*, *19*(2), 228–236. https://doi.org/10.1016/j.ijchp.2019.07.001

Liebenberg, L., Ungar, M., & LeBlanc, J. (2013). The CYRM-12: A brief measure of resilience. *Canadian Journal of Public Health*, *104*(2), e131–e135. https://doi.org/10.1007/BF03405676

Maja, R. A., Kilshaw, R. E., Garcia-Barrera, M. A., & Karr, J. E. (2022). Current posttraumatic stress symptoms mediate the relationship between adverse childhood experiences and executive functions. *Psychological Reports*, *125*(2), 763–786. https://doi.org/10.1177/0033294120979690

Mangiafico, S. S. (2016). cliffDelta: Cliff's delta in rcompanion: Functions to support extension education program evaluation (rdrr.io), in summary and analysis of extension program evaluation in R, version 1.20.01. Retrieved Feb. 1, 2023.

Metzner, F., Adedeji, A., Wichmann, M. L., Zaheer, Z., Schneider, L., Schlachzig, L., Richters, J., Heumann, S., & Mays, D. (2022, May 9). Experiences of discrimination and everyday racism among children and adolescents with an immigrant background - results of a systematic literature review on the impact of discrimination on the developmental outcomes of minors worldwide. *Frontiers in Psychology*, *13*, 805941. https://doi.org/10.3389/fpsyg.2022.805941

Mirabolfathi, V., Schweizer, S., Moradi, A., & Jobson, L. (2022). Affective working memory capacity in refugee adolescents. *Psychological Trauma: Theory, Research, Practice, and Policy*, *14*(6), 983–988. https://doi.org/10.1037/tra0000552

Mohwinkel, L.-M., Nowak, A. C., Kasper, A., & Razum, O. (2018). Gender differences in the mental health of unaccompanied refugee minors in Europe: A systematic review. *BMJ Open*, (7). https://doi.org/10.1136/bmjopen-2018-022389

Mundy, S. S., Foss, S. L. W., Poulsen, S., Hjorthøj, C., & Carlsson, J. (2020). Sex differences in trauma exposure and symptomatology in trauma-affected refugees. *Psychiatry Research*, *293*, https://doi.org/10.1016/j.psychres.2020.113445

Nyvold, O., Nygaard, E., Augusti, E., & Tamnes, C. (2021). Unity or diversity of executive functioning in children and adolescents with post-traumatic stress symptoms? A systematic review and meta-analysis. *Child Neuropsychology*, *28*(3), 374–393. https://doi.org/10.1080/09297049.2021.1979950

Op den Kelder, R., Van den Akker, A. L., Geurts, H. M., Lindauer, R. J. L., & Overbeek, G. (2018). Executive functions in trauma-exposed youth: A meta-analysis. *European Journal of Psychotraumatology*, *9*(1), 1450595. https://doi.org/10.1080/20008198.2018.1450595

Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2012). Anxiety and depression in academic performance: An exploration of the mediating factors of worry and working memory. *School Psychology International*, *33*(4), 433–449. https://doi.org/10.1177/0143034311427433

Pagel, L., & Edele, A. (2022). The role of different school organizational models in the psychological adaptation of refugee adolescents. *European Journal of Psychology of Education*, *37*(4), 1069–1092. https://doi.org/10.1007/s10212-021-00582-w

Pekrun, R., Lichtenfeld, S., Marsh, H. W., Murayama, K., & Goetz, T. (2017). Achievement emotions and academic performance: Longitudinal models of reciprocal effects. *Child Development*, *88*(5), 1653–1670. https://doi.org/10.1111/cdev.12704

Polak, A. R., Witteveen, A. B., Reitsma, J. B., & Olff, M. (2012). The role of executive function in posttraumatic stress disorder: A systematic review. *Journal of Affective Disorders*, *141*(1), 11–21. https://doi.org/10.1016/j.jad.2012.01.001

Renshaw, T. L., Long, A. C. J., & Cook, C. R. (2014). Assessing adolescents' positive psychological functioning at school: Development and validation of the student subjective well-being questionnaire. *School Psychology Quarterly*, *30*(4), 534–552. https://doi.org/10.1037/spq0000088

Romano, J., Kromrey, J. D., Coraggio, J., Skowronek, J., & Devine, L. (2006). Exploring methods for evaluating group differences on the NSSE and other surveys: Are the t-test and Cohen's d indices the most appropriate choices? Paper presented at the *Annual Meeting of the Southern Association for Institutional Research*, p. 1–51. October 14-17, Arlington, Virginia.

Scharpf, F., Mueller, S. C., & Hecker, T. (2022). The executive functioning of Burundian refugee youth: Associations with individual, family and community factors. *Journal of Applied Developmental Psychology*, *80*, 101399. https://doi.org/10.1016/j.appdev.2022.101399

Sheridan, M. A., Peverill, M., Finn, A. S., & McLaughlin, K. A. (2017). Dimensions of childhood adversity have distinct associations with neural systems underlying executive functioning. *Development and Psychopathology*, *29*(5), 1777–1794. https://doi.org/10.1017/S0954579417001390

Sleijpen, M., Mooren, T., Kleber, R. J., & Boeije, H. R. (2017). Lives on hold: A qualitative study of young refugees' resilience strategies. *Childhood (Copenhagen, Denmark)*, *24*(3), 348–365. https://doi.org/10.1177/0907568217690031

Snyder, H. R., Kaiser, R. H., Whisman, M. A., Turner, A. E. J., Guild, R. M., & Munakata, Y. (2014). Opposite effects of anxiety and depressive symptoms on executive function: The case of selecting among competing options. *Cognition & Emotion*, *28*(5), 893–902. DOI:10.1080/02699931.2013.859568

Spaas, C., Said-Metwaly, S., Skovdal, M., Primdahl, N. L., Jervelund, S. S., Hilden, P. K., Andersen, A. J., Opaas, M., Soye, E., Watters, C., Verelst, A., Derluyn, I., Colpin, H., & De Haene, L. (2023). School-based psychosocial interventions' effectiveness in strengthening refugee and migrant adolescents' mental health, resilience, and social relations: A four-country cluster randomized study. *Psychosocial Intervention*, *32*(3), 177–189. https://doi.org/10.5093/pi2023a12

Spaas, C., Verelst, A., Devlieger, I., Aalto, S., Andersen, A. J., Durbeej, N., Hilden, P. K., Kankaanpää, R., Langer Primdahl, N., Opaas, M., Osman, F., Peltonen, K., Sarkadi, A., Morten Skovdal, M., Jervelund, S. S., Soye, E., Watters, C., Derluyn, I., Colpin, H., & De Haene, L. (2022). Mental health of refugee and Non-refugee migrant young people in European secondary education: The role of family separation, daily material stress and perceived discrimination in resettlement. *Journal of Youth and Adolescence*, *51*(5), 848–870. https://doi.org/10.1007/s10964-021-01515-y

Taylor, Z. E., & Ruiz, Y. (2019). Executive function, dispositional resilience, and cognitive engagement in Latinx children of migrant farmworkers. *Children and Youth Services Review*, *100*, 57–63. https://doi.org/10.1016/j.childyouth.2019.02.025

Tomren, J. F., & Opaas, M. (2024). Adult refugees' perspectives on the impact of trauma and post-migration hardships on learning. *European Journal of Psychotraumatology*, https://doi.org/10.1080/20008066.2024.2403249

Trossman, R., Spence, S. L., Mielke, J. G., & McAuley, T. (2021). How do adverse childhood experiences impact health? Exploring the mediating role of executive functions. *Psychological Trauma*, *13*(2), 206–213. https://doi.org/10.1037/tra0000965

Ungar, M. (2016). Varied patterns of family resilience in challenging contexts. *Journal of marital and family therapy*, *42*(1), 19–31. https://doi.org/10.1111/jmft.12124

Van der Elst, W., Ouwehand, C., van der Werf, G., Kuyper, H., Lee, N., & Jolles, J. (2012). The Amsterdam Executive Function Inventory (AEFI): Psychometric properties and demographically corrected normative data for adolescents aged between 15 and 18 years. *Journal of Clinical and Experimental Neuropsychology*, *34*(2), 160–171. https://doi.org/10.1080/13803395.2011.625353

Van der Graaff, J., Carlo, G., Crocetti, E., Koot, H. M., & Branje, S. (2018). Prosocial behavior in adolescence: Gender differences in development and links with empathy. *Journal of Youth and Adolescence*, *47*(5), 1086–1099. https://doi.org/10.1007/s10964-017-0786-1

Van der Kolk, B. A. (2014). *The body keeps the score. Brain, mind, and body in the healing of trauma* (p. 207). Viking Penguin.

Verelst, A., Spaas, C., Pfeiffer, E., Devliger, I., Kankaanpää, R., Petonen, K., Vänskä, M., Soye, E., Watters, C., Osman, F., Durbeej, N., Sarkadi, A., Andersen, A., Primdahl, N. L., & Derluyn, I. (2022). Social determinants of the mental health of young migrants. *European Journal of Health Psychology*, *29*(1), 61–73. https://doi.org/10.1027/2512-8442/a000097

Vervliet, M., Lammertyn, J., Broekaert, E., & Derluyn, I. (2014). Longitudinal follow-up of the mental health of unaccompanied refugee minors. *European Child and Adolescent Psychiatry*, *23*(5), 337–346. https://doi.org/10.1007/s00787-013-0463-1

Wong, C. W. S., Schweitzer, R. D., & Khawaja, N. G. (2018). Individual, pre-migration, and post-settlement factors in predicting academic success of adolescents from refugee backgrounds: A 12-month follow-up. *Journal of International Migration and Integration*, *19*(4), 1095–1117. https://doi.org/10.1007/s12134-018-0589-6

Woon, F. L., Farrer, T. J., Braman, C. R., Mabey, J. K., & Hedges, D. W. (2017). A meta-analysis of the relationship between symptom severity of posttraumatic stress disorder and executive function. *Cognitive Neuropsychiatry*, *22*(1), 1–16. DOI:10.1080/13546805.2016.1255603

Wu, S., Renzaho, A. M. N., Hall, B. J., Shi, L., Ling, L., & Chen, W. (2021). Time-varying associations of pre-migration and post-migration stressors in refugees' mental health during resettlement: A longitudinal study in Australia. *The Lancet*, *8*, 36–47. https://doi.org/10.1016/S2215-0366(20)30422-3

Yule, W. (1992) 'Post-traumatic stress disorder in child survivors of shipping disasters: The sinking of the "jupiter"'. *Psychotherapy and Psychosomatics*, *57*(4), 200–205. https://doi.org/10.1159/000288599

Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2016). Executive function: Implications for education. NCER 2017-2000. National Center for Education Research.

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Zorza, J. P., Marino, J., & Mesas, A. A. (2016). Executive functions as predictors of school performance and social relationships: Primary and secondary school students. *The Spanish Journal of Psychology*, *19*, E23. https://doi.org/10.1007/s00787-018-1215-z