Socio-Emotional Problems and Learning Skills of Roma and Recently Arrived Refugee Children in German Elementary Schools

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Abstract: *Background:* In Germany, many recently arrived and minority families live in multi-ethnic, high-poverty districts. Multiple risk factors threaten their children's development. *Aims:* We examined the socio-emotional problems of these children in relation to their academic learning skills and executive functioning. *Method:* We compared teacher-rated socio-emotional problems of $n = 112$ Roma children (90% foreign-born), $n = 101$ refugee children (all foreign-born), and $n = 56$ German-born immigrant children (age in months: $M = 99.66$, $SD = 13.61$) between groups and to norm data. We related socio-emotional problems to receptive vocabulary, cognitive reasoning, motor skills, and executive functioning in $n = 83$ refugee and Roma children. *Results:* Roma children showed higher rates above cut-off than norm data in all subscales, more problems in all subscales but emotional symptoms than immigrant children, and more hyperactivity/inattention and peer problems than refugee children. Refugee children showed higher rates above cut-off than norm data in all subscales and more peer problems than immigrant children. Academic learning skills were overall below average among recently arrived children. Prosocial behavior was positively linked to fine motor skills. Other socio-emotional problems were not linked to academic learning skills and executive functioning. Gross and visuo-motor skills correlated positively with other academic learning skills. *Limitations:* We analyzed cross-sectional data. We did not include risk factors or non-immigrant German children. *Conclusion:* The heightened socio-emotional problems and low academic learning skills of refugee and particularly Roma children in high-poverty districts could jeopardize their educational trajectories. Additional support measures could increase their chances for educational participation.

Keywords: mental health, primary education, minority, SDQ, behavior problems

During the past years, North Rhine-Westphalia (NRW) received more than one-fifth of all asylum-seekers in Germany (MKFFI, 2019). Recently immigrated families are likely to settle in multi-ethnic, high-poverty urban districts. Many families in these districts do not speak German, are unfamiliar with the German bureaucratic and education system, and lack the resources to support early learning. Two of the largest groups in urban areas of NRW are recently arrived refugee and Roma minority families. The challenging migration-related experiences (Bronstein & Montgomery, 2011) potentially put the children at risk of not reaching school readiness and not keeping pace in school. The relations of socio-emotional adjustment and academic learning skills among different recently arrived groups and minority children are still understudied.

Shared Risk Factors

Both recently immigrated refugee and Roma minority families in these districts are likely to share similar environments and post-migration factors that put their educational trajectories at risk. For example, a low socioeconomic status and associated living conditions have been linked to lower language skills and lower executive functioning (EF; Greenfader, 2019), lower cognitive and social outcomes (Berry et al., 2016), and a higher risk to develop socio-emotional problems (Araújo Dawson & Williams, 2008; Solari & Mare, 2012). Other post-migration factors that were found to influence the socio-emotional adjustment of recently arrived refugee children were negative parenting and mother's psychological distress (Sim et al., 2018),

father's presence on arrival, stability in school and home environments, financial stability, and external community support (Zwi et al., 2018). However, evidence also suggests that some risk factors differ between both groups.

Refugee Children

Flight experiences put refugee children's development and mental health additionally at risk (Bronstein & Montgomery, 2011). Increased levels of socio-emotional problems were repeatedly found in recently arrived refugee children in different resettlement countries (Borsch et al., 2018; Buchmüller et al., 2019; Fazel et al., 2012; Kien et al., 2018). Refugee children's socio-emotional problems have been linked to lower academic achievement in adolescents (Wong & Schweitzer, 2017) and elementary school-aged children (Özmen, 2020). Also, lower academic learning skills were found in refugee children when compared to non-immigrant peers (Pellizzoni et al., 2020). However, in a literature review on elementary school-aged refugee children, their time spent in the host country and their arrival time during the academic year influenced their academic achievements (Aghajafari et al., 2020). Arriving after elementary school enrolment was also linked to worse academic outcomes in ninth grade in immigrant students (Lundahl & Lindblad, 2018). Additionally, Lau et al. (2018) found good socio-emotional adjustment 2–3 years after arrival. These findings suggest that recently arrived refugee children initially show low socio-emotional adjustment and academic learning skills but can adapt over time.

Roma Minority Children

Roma minority children face different additional risk factors. The majority of Roma families are legal EU immigrants and therefore not eligible for the support asylum-seekers receive. Across Europe, Roma children face extreme poverty and poor education (Milcher, 2006). In several European countries, a substantial proportion of Roma children do not enroll in the education system or drop-out, spending only about half of the national average years in the education systems (Bennett, 2012). Roma parents are likely to lack information on the national education system (Dimitrova et al., 2018) and one-third of the Roma adults who grew up in Germany are illiterate (Strauß, 2021). While many refugee adolescents reported high educational aspirations (e.g., Stevenson & Willott, 2007), this is less likely the case for Roma parents (Dimitrova et al., 2018). Additionally, Buchmüller and colleagues (2019) found heightened levels of socio-emotional problems in Roma children in Germany.

In sum, evidence suggests that Roma children live in similar circumstances as refugee children do, yet likely without the resources many refugee children have.

Socio-Emotional Problems and Academic Learning Skills

As heightened socio-emotional problems and lower academic learning skills were found in refugees, and partly in Roma children, the question arises whether these are related to each other. Academic learning skills refer to a set of within-child developmental capacities necessary for progressing academically in education contexts. Such domains typically include motor, language, and cognitive development (High, 2008).

In majority populations, previous studies found links between socio-emotional problems and academic learning skills such as language skills (Arnold et al., 2012; Bornstein et al., 2013; Menting et al., 2010; Séguin et al., 2009), while other studies did not (Gooch et al., 2016; Karasinski, 2015; Nelson et al., 2006) or only for children of certain ages (Helland et al., 2018). In Latinx minority children in the US, language skills were not linked to socio-emotional problems at school entry (Greenfader, 2019) and only to externalizing, but not internalizing, symptoms in elementary school-aged children (Araújo Dawson & Williams, 2008). Socio-emotional problems were also related to EF in children aged 4–7 (Gooch et al., 2016), in elementary school-aged children (Maasalo et al., 2020; Wang & Liu, 2020), and Latinx children in the US at school entry (Greenfader, 2019). A meta-analysis also negatively linked EF to Attention-Deficit/Hyperactivity Disorder symptoms in school-aged children (Martinussen et al. 2005). Also, poorer mathematical skills were linked to socio-emotional problems in preschool-aged children (Arnold et al., 2012; Dobbs et al., 2006), but not in students with emotional disturbances (Nelson et al., 2006). Additionally, a limited number of studies suggest links between different domains of academic learning skills in pre- and elementary school-aged children, but no such evidence exists for refugee or minority populations. Language skills were repeatedly linked to motor skills (Becker et al., 2014; Roebbers et al., 2014) and EF (Gooch et al., 2016; Tran et al., 2019). Additionally, motor skills were related to cognitive ability (Roebbers et al., 2014) and EF (Becker et al., 2014). While EF was linked to non-verbal intelligence (Roebbers et al., 2014) and mathematical skills (Purpura et al., 2017), other studies found neither relations between EF and language skills in preschool- and school-aged children (Karasinski, 2015; Purpura et al., 2017) nor academic mastery in children of Latinx farmworkers in the US (Taylor et al., 2019).

This Study

Previous work suggests heightened levels of socio-emotional problems and low educational achievement among refugee and Roma children while comparative studies are limited. Both groups often live in high-poverty, multi-ethnic districts but likely have different resources. Our study examines socio-emotional problems in Roma, recently arrived refugee, and German-born immigrant children in multi-ethnic, high-poverty districts and relates these to their academic learning skills and EF.

Hypothesis 1 (H1): Roma and refugee children show more socio-emotional problems and lower academic learning skills when compared to norm data as well as to German-born immigrant children.

Hypothesis 2 (H2): More socio-emotional problems are related to lower receptive vocabulary, cognitive reasoning, motor skills, and EF.

Hypothesis 3 (H3): The different components of academic learning skills and EF are positively related to each other.

Methods

Participants and Procedure

We collected data from $N_{\text{total}} = 305$ children attending grades 1–4 in two elementary schools in the Ruhr area during the first 2 weeks of March 2020. Both schools were situated in high-poverty, multi-ethnic urban districts. Class teachers provided information on children's socio-emotional problems and demographic data. Trained research assistants additionally collected data on children's academic learning skills with $n = 104$ children of one school. Further testing had to be canceled due to the COVID-19 lockdown in mid-March 2020. Thus, we had a teacher-report dataset with demographic and socio-emotional problems data (i.e., SDQ sample) and a subsample with additional data on academic learning skills (i.e., subsample). All children of both schools were initially eligible to participate in our study if their parents signed an informed consent form beforehand. The internal review board of the Faculty of Psychology at the Ruhr University Bochum approved the study protocol.

We excluded $n = 32$ children with German mother tongue, and $n = 4$ recently arrived children from EU countries who were neither Roma nor refugee children. Thus, the SDQ sample consisted of $N = 269$ children ($M = 99.66$ months, $SD = 13.61$; 48.70% female) including $n = 112$ Roma minority children (all but 10% were born abroad),

$n = 101$ recently arrived refugee children, and $n = 56$ German-born immigrant children with a non-German mother tongue. The majority of the refugee children spoke Arabic at home (59.41%), another 10.89% came from Iraq or Syria and spoke Kurdish, Farsi, or Hebrew. The remaining refugee children spoke a total of 10 different languages, most of these children were from African or Asian countries. Children from the three groups did not differ regarding age, gender, and distribution across grades one to four. The mean number of years the families had spent in Germany was $M = 3.82$ ($SD = 1.80$) for recently arrived refugee children and $M = 4.79$ ($SD = 2.10$) for Roma children. All three groups differed regarding children's rates of preschool attendance, $\chi^2(2) = 43.911$, $p < .001$, and parents' literacy, $H(2) = 28.16$, $p < .001$, but not regarding the number of siblings, $H(2) = 3.929$, $p = .14$ (Table 1).

In the subsample, we excluded $n = 5$ children with German mother tongue and $n = 16$ German-born immigrant children, resulting in $n = 83$ Roma and refugee children. Consistent with our study scope, we thus ensured that the observations on academic learning skills and their relations to socio-emotional problems exclusively referred to recently arrived refugee and Roma children. When comparing the subsample to the refugee and Roma children in the SDQ sample ($n = 213$), there were no differences regarding rates of preschool attendance, $\chi^2(1) = 0.310$, $p = .578$, parents' literacy, $U = 3.170$, $p = .22$, or number of siblings, $U = 6.267$, $p = .799$.

Measurement

Socio-Emotional Problems

Class teachers reported children's socio-emotional problems using the German adaptation of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). It consists of five subscales (hyperactivity/inattention, conduct problems, emotional symptoms, peer relationship problems, and prosocial behavior) with five items each, computed into sum scores. The 3-point Likert scale ranges from 0 = *absolutely not true* to 2 = *absolutely true*. Additionally, all problem subscales are summarized into a total difficulties score. Cronbach's α s in the SDQ sample ranged from $\alpha = .73$ ($\alpha = .80$ in the subsample) for peer relationship problems to $\alpha = .88$ for hyperactivity/inattention ($\alpha = .88$ in the subsample).

Academic Learning Skills

Research assistants tested each child individually, following a standardized assessment protocol. German language skills were measured via receptive vocabulary with a tablet-based version of the German adaptation (Lenhard et al., 2015) of the 4th edition of the Peabody Picture Vocabulary Test. The child has to match a spoken word to one of

Table 1. Descriptives on children in the three groups and subsample

	Frequency by study group (%)			
	Immigrant	Refugee	Roma	Subsample
Preschool attendance ¹ (n = 49; 83; 88; 78)				
Yes	93.88	55.17	35.23	39.74
Literacy of parents (n = 44; 67; 57; 46)				
Both parents	88.64	64.29	42.11	43.48
One parent	11.36	34.29	29.83	36.96
Number of siblings (n = 52; 95; 93; 68)				
None or one	32.69	33.33	31.19	33.82
Two or three	55.77	58.58	39.78	41.18
Four or more	11.54	8.08	29.03	25.00

Notes. n = number of cases. Subsample refers to children with available academic learning skills data. ¹Either abroad or in Germany.

four pictures. We used the subtest *Object Assembly* of the German version of the *Wechsler Preschool and Primary Scale of Intelligence-III* (Petermann & Lipsius, 2009) to measure visual concept formation by the number and accuracy of combined puzzle pieces as an indicator of cognitive reasoning. For measuring motor skills, we used the gross, fine, and visuo-motor skills subscales of the *Intelligence and Development Scales* (Grob et al., 2009). The gross motor subscale includes balancing on and jumping across a rope and throwing and catching a ball. The fine motor subscale includes threading with beads, and the visuo-motor subscale copying geometrical pictures with a pencil.

Executive Functioning

We used the tablet-based *Hearts and Flowers Task* (Diamond et al., 2007), an alternate *Dots task* (Davidson et al., 2006) version, to measure cognitive flexibility, inhibitory control, and working memory. The child has to press either a button on the same or opposite side as a stimulus on the screen or combine both (mixed condition). We used an efficiency score reflecting all three subcomponents (Hughes & Devine, 2019). The quotient of the total number of correct trials in the mixed condition divided by the total response time in the mixed trials and technically ranges from about 0.015 to 33. We cannot reference EF to norm data.

Statistical Analysis

All analyses were conducted in R using packages *car*, *gvlma*, *hmisc*, *lrm*, and *psych*. We used raw scores of academic learning skills. First, we compared SDQ scores to German norm data based on a community sample of children aged 6–16 (Woerner et al., 2004). Therefore, we compared proportions above cut-off values between our study groups and the norm data, splitting scores into the three categories

normal, borderline, and abnormal. We also compared academic learning skills to norm data as described in the user manuals. Next, using hierarchical multiple linear regression modeling, we compared SDQ scores between dummy-coded groups and linked SDQ scores in the subsample to academic learning skills and EF, controlling for age and gender. We used the functions *gvlma* and *vif* to examine assumptions for linear modeling. We used bivariate correlations to interrelate academic learning skills and EF. As theory substantiated directions for our hypotheses, we used one-tailed *p*-values ($\alpha = .05$). Holm-Bonferroni correction (Holm, 1979) was used to control α -level error inflation.

Results

Hypothesis 1

Table 2 shows descriptive information on the SDQ subscales and proportions of children scoring above the cut-off for abnormal socio-emotional problems. Table 3 shows descriptive information on academic learning skills and their comparisons to norm data. Three gross motor items of one child were missing. The child was excluded from the analysis of the gross and total motor scores. There were no missing values in the SDQ subscales or other academic learning skills data. We found no differences for age, gender, and the SDQ subscales between the SDQ sample and the subsample using unpaired *t*-tests. Statistical assumptions were overall acceptable across all hierarchical regression models.

Roma children scoring in the abnormal range were descriptively above those of the norm data in all subscales and total difficulties. Proportions of refugee children scoring in the abnormal range were above those of the norm data in all subscales, but not total difficulties. Roma children showed more hyperactivity/inattention, conduct problems, peer problems, and less prosocial behavior when compared to immigrant children (Table 4). Additionally, Roma children showed more hyperactivity/inattention and peer problems when compared to refugee children. Refugee children also showed more peer problems when compared to immigrant children.

Based on norm data, children in the subsample scored below average for most academic learning skills (Table 3). The majority of children scored below or far below average in receptive vocabulary and visuo-motor skills. Most children scored average in gross and fine motor skills, however, more than 20% scored below or far below average in each measure. In cognitive reasoning, most children scored about average.

Table 2. Descriptive information on the socio-emotional problems of the study groups

	Immigrant			Refugee			Roma			Norm ¹	Subsample	
	<i>M</i>	<i>SD</i>	Cut-off	<i>M</i>	<i>SD</i>	Cut-off	<i>M</i>	<i>SD</i>	Cut-off	Cut-off	<i>M</i>	<i>SD</i>
Hyperactivity/inattention	3.0	2.88	14.3	3.55	2.96	17.8	4.38	2.99	28.6	9.8	4.05	2.88
Conduct problems	0.91	1.79	7.9	1.63	1.96	9.9	1.80	2.19	11.6	6.6	1.70	2.48
Emotional symptoms	1.61	2.48	10.7	1.57	2.03	10.9	2.19	2.70	16.1	7.7	2.29	2.72
Peer relationship problems	1.18	1.40	1.8	1.73	1.99	8.9	2.16	2.08	14.3	7.0	1.83	2.00
Prosocial behavior	7.96	1.92	14.9	7.39	2.36	14.9	7.13	2.67	17.9	7.1	7.42	2.46
Total difficulties score	6.70	6.16	10.7	8.50	6.50	8.9	10.50	6.94	25.0	10.0	9.87	7.46

Notes. *M* = mean; *SD* = standard deviation. ¹German norm data (Woerner et al., 2004). Cut-off indicates proportions of children scoring above the cut-off threshold for abnormal problems or prosocial behavior according to German norm data.

Table 3. Subsample: Descriptive information on academic learning skills

	<i>M</i>	<i>SD</i>	Far below average	Below average	Average	Above average	Far above average
Receptive vocabulary (<i>n</i> = 81)	74.56	32.19	77.8	19.8	2.5	–	–
Gross motor skills (<i>n</i> = 82)	7.59	2.18	3.7	18.3	73.2	4.9	–
Fine motor skills (<i>n</i> = 83)	8.23	1.38	3.6	20.5	75.9	–	–
Visuo-motor skills (<i>n</i> = 83)	7.17	2.73	27.7	34.9	37.3	–	–
Cognitive reasoning (<i>n</i> = 81)	38.83	15.24	3.7	16.0	46.9	33.3	–
Executive functioning (<i>n</i> = 83)	0.79	0.24	–	–	–	–	–

Notes. *M* = mean; *SD* = standard deviation. Relative numbers of children (%) per norm-referenced category.

Hypothesis 2

We did not find any relations between socio-emotional problems, academic learning skills, and EF, except for prosocial behavior positively relating to fine motor skills (Table 5). In the hierarchical regression analyses, we also found influences of the covariates age and gender on the child outcomes (Tables 4 and 5).

Hypothesis 3

We found relations between the different academic learning skills and EF (Table 6). After α -error adjustment, visuo-motor skills were positively correlated with receptive vocabulary ($p = .010$), and cognitive reasoning ($p < .001$). Additionally, gross motor skills were positively correlated with EF ($p = .013$), fine motor skills ($p = .009$), and visuo-motor skills ($p = .009$).

Discussion

This study aimed to comparatively identify socio-emotional problems of recently arrived refugee and Roma children attending elementary schools in multi-ethnic, high-poverty districts. We moreover related their socio-emotional problems to their academic learning skills and EF. We found heightened socio-emotional problems in Roma and refugee children compared to German-born immigrant children and norm data. Roma children also showed more

hyperactivity/inattention and peer problems when compared to refugee children. Descriptive findings indicated low academic learning skills. Contrary to our expectations, socio-emotional problems were mostly unrelated to academic learning skills. Gross motor skills and visuo-motor skills were related to other academic learning skills.

Socio-Emotional Problems

As expected in our first hypothesis, we found that Roma and refugee children showed heightened socio-emotional problems when compared to norm data and partly when compared to immigrant children. This is in line with previous literature (Buchmüller et al., 2019; Fazel et al., 2012; Kien et al., 2018). In addition, a higher percentage of immigrant children scored above SDQ cut-off values than norm data in all subscales except for peer problems. These findings suggest that, in addition to pre-migration experiences, post-migration living conditions and family factors may influence children's socio-emotional adjustment. This is supported by previous studies that linked risk factors related to living in multi-ethnic, high-poverty districts during post-migration periods to heightened socio-emotional problems (Berry et al., 2016; Solari & Mare, 2012).

The between-group differences in our sample suggest that the Roma and refugee children likely face similar sets of contextual risk factors in their neighborhoods but different levels of family resources or distinct migration experiences. Previous literature supported the idea that different profiles of risk and protective factors among groups of

Table 4. SDQ sample: Hierarchical regression analysis for group differences in SDQ subscales

		Model 1				Model 2		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Hyperactivity/Inattention								
Age	−0.044	0.013	−3.420	< .001	−0.047	0.013	−3.758	< .001
Gender	1.532	0.349	4.390	< .001	1.646	0.344	4.789	< .001
Mig-Ref ¹					0.560	0.468	1.196	.233
Mig-Roma ²					1.629	0.459	3.551	< .001***
Ref-Roma ³					1.068	0.387	2.762	.006**
<i>R</i> ²	<i>R</i> ² = .101, <i>F</i> (2, 265) = 14.940, <i>p</i> < .001				ΔR^2 = .029, <i>F</i> (2, 263) = 7.391, <i>p</i> < .001			
Conduct problems								
Age	0.004	0.009	0.476	.635	0.002	0.009	0.213	.831
Gender	0.860	0.244	3.526	< .001	0.890	0.243	3.663	< .001
Mig-Ref					0.623	0.331	1.882	.061
Mig-Roma					0.934	0.324	2.882	.004**
Ref-Roma					0.311	0.273	1.139	.256
<i>R</i> ²	<i>R</i> ² = .046, <i>F</i> (2, 265) = 6.400, <i>p</i> = .002				ΔR^2 = .029, <i>F</i> (2, 263) = 4.154, <i>p</i> = .017			
Emotional symptoms								
Age	−0.020	0.011	−1.894	.059	−0.021	0.011	−2.000	.047
Gender	−0.988	0.290	−3.408	< .001	−0.938	0.292	−3.216	.001
Mig-Ref					0.139	0.397	0.349	.727
Mig-Roma					0.601	0.389	1.544	.124
Ref-Roma					0.462	0.328	1.408	.160
<i>R</i> ²	<i>R</i> ² = .056, <i>F</i> (2, 265) = 7.853, <i>p</i> < .001				ΔR^2 = .011, <i>F</i> (2, 263) = 1.567, <i>p</i> = .211			
Peer problems								
Age	−0.028	0.009	−3.305	.001	−0.029	0.009	−3.414	< .001
Gender	0.434	0.233	1.860	.064	0.479	0.231	2.074	.039
Mig-Ref					0.632	0.314	2.011	.045*
Mig-Roma					1.074	0.309	3.490	< .001***
Ref-Roma					0.442	0.260	1.705	.089*
<i>R</i> ²	<i>R</i> ² = .050, <i>F</i> (2, 265) = 6.972, <i>p</i> = .001				ΔR^2 = .042, <i>F</i> (2, 263) = 6.151, <i>p</i> = .002			
Prosocial problems								
Age	0.018	0.010	1.747	.0817	0.020	0.010	1.981	.049
Gender	−1.507	0.282	−5.336	< .001	−1.555	0.282	−5.514	< .001
Mig-Ref					−0.523	0.384	−1.361	.175
Mig-Roma					−0.990	0.384	−2.632	.009*
Ref-Roma					−0.467	0.317	−1.473	.142
<i>R</i> ²	<i>R</i> ² = .104, <i>F</i> (2, 265) = 15.440, <i>p</i> < .001				ΔR^2 = .024, <i>F</i> (2, 263) = 3.573, <i>p</i> = .029			

Notes. *B* = unstandardized regression coefficient; *SE* = standard error of *B*; *t* = *t*-value; *p* = two-tailed, uncorrected *p*-values; ΔR^2 = incremental variance explained by group. Gender: 0 = female, 1 = male. Only *p*-values in bold were part of hypothesis testing. For those, asterisks indicate significance based on one-tailed testing with Bonferroni-Holm correction. Groups were dummy-coded. ¹Group difference between immigrant (Mig) and refugee children (Ref). Group difference between immigrant (Mig) and Roma children (Roma). ³Group difference between refugee (Ref) and Roma children (Roma). **p* < .05; ***p* < .01; ****p* < .001.

recently arrived children variably influence their academic achievements and socio-emotional problems (Berry et al., 2016; Solari & Mare, 2012). This might explain why Lau and colleagues (2018) found high socio-emotional adjustment levels for refugee children, although these had lived in the host country for shorter periods than our sample. The children in Lau and colleagues' (2018) sample were already more proficient in the host language, lived in relatively stable conditions, and received governmental

support. In contrast, the refugee children in our sample lived in less stable conditions and had lower German proficiency levels, and the Roma families were not eligible for programs available to refugees. This could further explain their heightened levels of socio-emotional problems.

Our findings suggest that different groups of immigrant children in high-poverty, multi-ethnic districts, on average, vary in their mental health risk profiles, with Roma children being at highest risk, followed by refugee children.

Table 5. Subsample: Hierarchical regression analysis for influences of SDQ scores on academic competences

	Model 1					Model 2			
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	
Receptive vocabulary									
Age	0.957	0.238	4.021	< .001	0.905	0.244	3.710	< .001	
Gender	8.764	6.841	1.281	.204	10.496	6.977	1.504	.137	
Hyp					−2.036	1.631	−1.248	.216	
Cond					2.513	2.089	1.203	.233	
Emot					0.168	1.540	0.109	.914	
Peer					2.933	1.989	1.475	.145	
Pros					3.574	1.862	1.919	.059	
<i>R</i> ²	<i>R</i> ² = .221, <i>F</i> (2, 75) = 10.62, <i>p</i> < .001				ΔR^2 = .070, <i>F</i> (5, 70) = 1.380, <i>p</i> = .242				
Gross motor skills									
Age	0.070	0.016	4.277	< .001	0.067	0.017	3.909	< .001	
Gender	−0.309	0.470	−0.656	.514	−0.344	0.491	−0.700	.486	
Hyp					−0.081	0.113	−0.716	.476	
Cond					0.145	0.149	0.978	.332	
Emot					0.040	0.106	0.379	.706	
Peer					0.112	0.137	0.815	.418	
Pros					0.098	0.129	0.764	.447	
<i>R</i> ²	<i>R</i> ² = .196, <i>F</i> (2, 76) = 9.285, <i>p</i> < .001				ΔR^2 = .026, <i>F</i> (5, 71) = 0.475, <i>p</i> = .793				
Fine motor skills									
Age	0.036	0.010	3.457	.001	0.027	0.010	2.619	.011	
Gender	−0.926	0.297	−3.119	.003	−0.993	0.294	−3.375	.001	
Hyp					−0.027	0.068	−0.390	.698	
Cond					0.161	0.089	1.810	.075	
Emot					0.116	0.064	1.806	.075	
Peer					−0.022	0.083	−0.269	.789	
Pros					0.212	0.078	2.710	.008*	
<i>R</i> ²	<i>R</i> ² = .184, <i>F</i> (2, 77) = 8.693, <i>p</i> < .001				ΔR^2 = .107, <i>F</i> (5, 72) = 2.165, <i>p</i> = .067				
Visuo-motor skills									
Age	0.059	0.021	2.745	.008	0.051	0.023	2.224	.029	
Gender	−0.516	0.620	−0.833	.407	−0.441	0.649	−0.679	.500	
Hyp					−0.093	0.150	−0.622	.536	
Cond					−0.007	0.197	−0.033	.974	
Emot					0.126	0.142	0.886	.379	
Peer					0.027	0.184	0.149	.882	
Pros					0.093	0.172	0.538	.592	
<i>R</i> ²	<i>R</i> ² = .089, <i>F</i> (2, 77) = 3.778, <i>p</i> = .027				ΔR^2 = .027, <i>F</i> (5, 72) = 0.434, <i>p</i> = .823				
Cognitive operation									
Age	0.245	0.122	2.006	.049	0.160	0.126	1.271	.208	
Gender	1.154	3.541	0.326	.745	1.415	3.540	0.400	.691	
Hyp					−1.526	0.825	−1.850	.069	
Cond					0.269	1.118	0.241	.811	
Emot					1.483	0.772	1.922	.059	
Peer					0.694	1.012	0.686	.495	
Pros					0.683	0.935	0.730	.468	
<i>R</i> ²	<i>R</i> ² = .059, <i>F</i> (2, 75) = 2.337, <i>p</i> = .104				ΔR^2 = .105, <i>F</i> (5, 70) = 1.761, <i>p</i> = .132				

(Continued on next page)

Table 5. (Continued)

	<i>B</i>	Model 1			<i>p</i>	<i>B</i>	Model 2		<i>p</i>
		<i>SE</i>	<i>t</i>				<i>SE</i>	<i>t</i>	
Executive function									
Age	0.007	0.002	4.190	< .001	0.007	0.002	4.017	< .001	
Gender	0.072	0.050	1.459	.149	0.064	0.052	1.241	.219	
Hyp					−0.006	0.012	−0.481	.632	
Cond					0.005	0.016	0.308	.759	
Emot					0.006	0.011	0.488	.627	
Peer					−0.018	0.015	−1.213	.229	
Pros					−0.013	0.014	−0.952	.344	
<i>R</i> ²	<i>R</i> ² = .239, <i>F</i> (2, 77) = 12.12, <i>p</i> < .001					ΔR^2 = .027, <i>F</i> (5, 72) = 0.534, <i>p</i> = .750			

Notes. Hyp = hyperactivity/inattention; Cond = conduct problems; Emot = emotional symptoms; Peer = peer relationship problems; Pros = prosocial behavior; *B* = unstandardized regression coefficient; *SE* = standard error of *B*; *t* = *t*-value; *p* = two-tailed, uncorrected *p*-values; ΔR^2 = incremental variance explained by group; Gender: 0 = female, 1 = male. Only *p*-values in bold were part of hypothesis testing. For those, asterisks indicate significance based on one-tailed testing with Bonferroni-Holm correction.

Table 6. Subsample: Correlation matrix for socio-emotional problems and academic learning skills

Variable	Age	Gender	Hyp	Cond	Emot	Peer	Pros	PPVT	CR	GM	FM	VM	EF
Age	1												
Gender	0.25	1											
Hyp	−0.01	0.16	1										
Cond	−0.03	0.18	0.67	1									
Emot	0.16	0.18	0.31	0.18	1								
Peer	−0.03	0.03	0.46	0.44	0.30	1							
Pros	0.14	−0.08	−0.53	−0.69	−0.13	−0.37	1						
PPVT	0.43	0.23	−0.06	0.00	0.15	0.05	0.19	1					
CR	0.23	0.09	−0.19	−0.14	0.25	0.00	0.19	0.28	1				
GM	0.45	0.05	0.00	0.07	0.14	0.09	0.06	0.19	0.21	1			
FM	0.30	−0.24	−0.06	−0.05	0.11	0.01	0.26	0.05	0.25	0.37**	1		
VM	0.30	−0.02	−0.11	−0.11	0.12	−0.03	0.15	0.37**	0.50***	0.37**	0.27	1	
EF	0.46	0.26	0.00	0.04	0.10	−0.10	−0.02	0.18	0.23	0.35*	0.08	0.19	1

Notes. Gender: 0 = female, 1 = male; Hyp = hyperactivity/inattention; Cond = conduct problems; Emot = emotional symptoms; Peer = peer relationship problems; Pros = prosocial behavior; PPVT = receptive vocabulary; CR = cognitive reasoning; GM, FM, VM = Gross, fine, visuo-motor skills; EF = executive functioning. We used point-biserial correlation for gender, Pearson's correlation coefficient for all other variables. We only tested correlations between PPVT, CR, GM, FM, VM, and EF for significance. **p* < .05; ***p* < .01; ****p* < .001.

Indicators of socioeconomic status were substantially lower for Roma children than for refugee children. Roma children in our study were more likely not to have attended preschool and to have two illiterate parents. This is consistent with the findings of other studies that Roma parents likely lack the resources needed to support their children's school adjustment and academic learning (Dimitrova et al., 2018; Milcher, 2006). Compared to the Roma children, the refugee children in our study were more likely to have attended preschool, and almost all refugee children had at least one literate parent. Except for peer problems, we found no differences in socio-emotional problems between refugee children and immigrant children. These findings align with other studies suggesting that family resources could buffer

the effects of pre- and peri-migration experiences on socio-emotional problems (Fazel et al., 2012).

Socio-emotional problem profiles of refugee children differed from those of immigrant and Roma children. Refugee children tended to have average-level total difficulties while showing high-level problems in few distinct subscales. Thus, more refugee children tended to have heightened problems in only one or two subscales, which differed from child to child. In contrast, those Roma and immigrant children with socio-emotional difficulties tended to have increased symptom levels in several subscales yielding increased levels of total difficulties for these children. Likely, punctual adverse experiences thus lead to different patterns of socio-emotional problems than permanent

exposure to low resources and multiple risk factors. The refugee children were not necessarily permanently exposed to low family resources or challenging neighborhoods such as some Roma or immigrant children but might have been exposed to more severe flight-related experiences for a shorter period before living in the same post-migration surroundings.

We found no group differences for emotional symptoms. This is in contrast to other studies that found higher levels of emotional problems for refugee children (e.g., Kien et al., 2018). Several factors might have contributed to this. First, all other SDQ subscales reflect better observable behaviors in education settings. Teachers might focus on problems that are more easily observed and potentially more relevant for class functioning. Second, the children in our study were younger than children in most studies. It remains unclear whether migration-related experiences affect older children differently than younger age groups and how this might reflect in their behavior. Third, child behavior likely differs between school and family contexts, as discrepancies between ratings of different informants were found (Achenbach et al., 1987). Therefore, future research should consider contexts beyond classrooms and involve multi-informant approaches to receive a more comprehensive picture of children's well-being.

In the group of immigrant children, peer problems were unexpectedly low. From a non-deficit-oriented perspective, children growing up in these ethnically diverse neighborhoods could have learned to manage better challenging social situations with other culturally and linguistically diverse children. Recently arrived refugee and Roma children might still need time to accustom to their new environments, both in Germany and after enrolment into elementary school. Their higher peer problems likely reflect, to some extent, the adaptation process to the new social contexts.

Academic Learning Skills

Descriptive analyses yielded low academic learning skills for refugee and Roma children when compared to norm data. This is in line with previous literature (Pellizzoni et al., 2020) and shows that these children are at risk of not keeping pace in school. Presumably, certain risk factors and a lack of resources (Dimitrova et al., 2018; Strauß, 2021) might hamper child development. The children scored especially low in receptive vocabulary and visuo-motor skills, which provide the basis for writing skills. Writing, in turn, feeds into vocabulary building. From a different perspective, the low receptive vocabulary scores are not surprising as the children in our study either arrived recently with their mother tongues not being German or

were of Roma descent with overall higher levels of parental illiteracy and lower preschool attendance rates.

Contrary to our second hypothesis, SDQ subscales were mostly unrelated to academic learning skills and EF in recently arrived refugee and Roma children. Previous literature, however, yielded mixed results on whether such relations exist (e.g., Arnold et al., 2012; Dobbs et al., 2006) or not (e.g., Helland et al., 2018; Karasinski, 2015). Notably, some of those studies built on teacher-biased outcomes such as grades. Such variables are generally biased by teachers' perceptions, teacher-student relationships, and students' socio-emotional behaviors. In our study, we assessed academic learning skills independent of teacher ratings and build the basis for constructs used in other studies. Another reason for no relations in our study could be that teachers at both schools were experienced in teaching refugee and Roma children. Therefore, they might be more successful in fostering academic learning skills despite children's increased levels of socio-emotional problems.

Regarding our third hypothesis, visuo-motor skills correlated positively with cognitive reasoning and receptive vocabulary. The second link is in line with the often-reported lower writing skills in recently arrived children, as drawing geometric figures and writing have a common basis (i.e., controlling a pen) and writing improves the vocabulary. Furthermore, we assumed that low language skills might hamper school adaptation and thus lead to lower academic learning skills and more socio-emotional problems. However, vocabulary was mostly unrelated to the other constructs. Some measures might not correlate, as they do not have a common basis or links that academic outcomes do (e.g., vocabulary is not needed for puzzling figures, but reading skills facilitate the understanding of mathematical tasks). Thus, our study's measured socio-emotional problems and academic learning skills might be important for actual academic outcomes, but not necessarily influence each other. Future research should investigate their influence on academic skills. Surprisingly, we also found no interrelations with EF, except for gross motor skills. This finding is supported by one study (Taylor et al., 2019) but does not replicate the findings of several other studies (e.g., Gooch et al., 2016; Tran et al., 2019).

Limitations and Future Research

We only collected cross-sectional data. Longitudinal data would further examine how socio-emotional problems and academic learning skills influence academic development and shape educational trajectories. Also, we only considered few risk factors and did not capture their influence on the outcomes between groups. Refugee- or minority-specific factors and additional post-migration living conditions could

be linked to heightened socio-emotional problems and lower academic learning skills. Future research should further investigate such living conditions and risk profiles among refugee and Roma children and deepen the understanding of children's differential socio-emotional problems profiles. Finally, we cannot preclude that the teachers perceived refugee and Roma children as more socio-emotionally challenged when compared to immigrant children due to teacher bias, as previous literature suggests (Chwastek et al., 2021).

Conclusion

We found that especially Roma and – albeit to a lesser extent – refugee children have heightened socio-emotional problems and low academic learning skills. Our findings suggest that these could be related to certain risk- and family factors (e.g., literacy of parents or preschool attendance). Overall, our findings suggest that refugee and Roma children need additional socio-emotional and academic support to thrive within the German education system.

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History

Received March 20, 2021

Revision received August 6, 2021

Accepted August 10, 2021

Published online January 28, 2022

Conflicts of Interest

We have no conflicts of interest to disclose.

Publication Ethics

The internal review board of the Faculty of Psychology at the Ruhr University Bochum approved the study protocol.

Funding

We gratefully acknowledge the funding from RuhrFutur. Open access publication enabled by Ruhr University Bochum.

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