






Refugee Children's Early Development during Attendance of Specialized Preschool Programs and Transition into First Grade in Germany

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ABSTRACT

Research Findings: We assessed socio-emotional behavior, nonverbal reasoning, German receptive language, and motor skills of refugee children attending early childhood development

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Overall, experiences related to displacement increase children's risk of not acquiring the necessary developmental foundations required for positive learning trajectories

Report on the ECD Needs of BORN, RND, and TAD in ECD Programs and the Implications for Supporting Refugee Children among nine high-income countries (Park et al., 2018). This report suggested that countries' responses do not meet the legal requirements for this specific group (e.g., supporting access to national ECD services) and described a general lack of guiding evidence on how to effectively serve the ECD needs of refugee children. Achieving a better understanding of young refugee children's development therefore provides a basis for further action, thus creating targeted ECD programs that specifically address children's developmental needs, facilitating their learning and enrollment into elementary schools after resettlement.

Some previous studies on refugees and related underserved populations have focused on ECD programs initiated in conflicted and deprived settings by non-governmental institutions (see Murphy et al., 2018). For mother-child dyads affected by the Yugoslav wars, a 5-month-long caregiver-centered intervention in combination with medical checkups increased the quality of maternal caregiving behavior, improved children's cognitive development, and reduced their socio-emotional problem behaviors (Dybdahl, 2001). In a rural region of Pakistan, a community-based intervention providing psychosocial stimulation and nutrition promoted physical, social-emotional and cognitive development of deprived children (Yousafzai et al., 2014). In Uganda, refugee children's attendance of high-quality playgroups for 3 months fostered their well-being and overall child development (Metzler et al., 2019). Evidence suggests that specialized ECD programs for refugee children are effective in their specific contexts of implementation. Specifically, programs in low-resource contexts demonstrated effectiveness when they combined development-stimulating activities with the provision of basic needs, such as nutrition, health, and protection. Notably, ECD programs in low-resource contexts were less likely organized by governmental stakeholders and not linked to the national frameworks of ECD policies. In non-conflicted,

elementary schools in small groups, are run by better trained staff when compared to other BPs, and they offer frequent attendance. Preschool-based BPs aim to achieve high structural and process quality by providing fixed curricula. Those curricula

trained in child direct assessment procedures. The overall 12-h training comprised a theoretical (e.g., reading about constructs and procedures) and practical phase (e.g., introduction into child assessments, conducting mock assessments). At the end of the training, each observer had to demonstrate proficiency in assessment procedures in a final test. Research assistants administered child direct assessments of refugee children's development in separate rooms during BP program hours or, for the comparison group, during morning hours in elementary schools. The individual testing of each child lasted around 30–40 minutes. All research assistants participated in regular debriefings and were supervised by the study authors. Teachers were asked to assess refugee children's socio-emotional behavior within education contexts. Additionally, we assessed the quality of the preschool-based BPs in structured field observations. The full study protocol was approved by the Ethics Committee of the Faculty of Psychology, Ruhr-University Bochum (Num. 381, 2017).

Measures

We addressed the four developmental domains cognition, (host country) language, motor skills, and socio-emotional behavior. We selected indicators with the rationale to balance between (1) those skills that are required for progressing academically from first grade onwards (i.e., reflecting school readiness) and (2) constraining method bias (i.e., applying Western assessment procedures to diverse refugee children). In none of the assessment domains language was critical for the instructions and task per

(0 = not at all, 1, somewhat true; 2, certainly true), referring to child behaviors in the past two weeks. The SDQ comprises four 5-item problem subscales (hyperactivity/inattention, conduct problems, peer-relationship problems, emotional problems), a total problem score, and a positively worded scale for prosocial behavior. We overall adhered to the guidelines for SDQ scoring (sdqinfo.org) and used norm data for

posttest design. We therefore tested intra-individual changes among our indicators using linear mixed effect (LME) models, for which we centered the individual changes within subjects. For analysis of hypothesis (2), we compared indicators of children's development in a

or large. Because the model estimates of the pre-models did not considerably change after exclusion of one potential outlier, we conducted our analyses based on the complete data set. For the influence of our covariates on the SDQ subscales, we found an influence of gender on the hyperactivity/inattention subscale ($\beta = 0.195, p = .003$). Regarding our focal predictor, a longer duration of BP attendance did not predict overall values on SDQ subscales. Only prediction of the subscale score for peer-interaction problems was on a trending level ($\beta = -0.184, p = .046$), yielding lower scores for a longer duration of BP attendance. For the child direct measures, we found the covariate age to positively influence raw scores for all assessments and, for predicting the fine motor scale, covariates gender ($\beta = 0.601, p = .002$; higher values for female gender) and time since arrival ($\beta = -0.327, p = .001$; shorter time since arrival linked to better scores) showed additional influence. A longer duration of BP attendance predicted better German receptive language skills only ($\beta = 0.257, p = .008^*$). For detailed results see Table 3 and for full models Appendices (C) and (D).

Longitudinal Analysis: Changes in Children's Development Throughout 5 Months of BP Attendance

For pre-analyses of the longitudinal approach for hypothesis (1), we computed attrition analysis to examine longitudinal selection bias in participants of the repeated measurement subsample T_2 . Using T_1 sample data, we therefore compared those refugee children who were considered in the repeated measure subsample assessments (T_2) and those who dropped out before ($n_{drop} = 79$, threshold at $p < .10$). Those refugee children who dropped out tended to show higher levels of "conduct problems" at T_1 ($t(120) = -1.90, p = .06$). They, however, did not differ regarding socio-demographic and migration-related characteristics (age at T_1 , time since arrival in Germany, previous length of BP attendance, region of origin and gender). Note that several children of the T_1 sample transitioned to first grade shortly before the repeated assessment (T_2). We thus additionally compared children at T_2 assessments who previously transitioned into first grade to those children who remained in BPs (threshold at $p < .10$). Children who had transitioned were older, demonstrated better development regarding all domains, yet tended to have more emotional problems ($t(46) = 2, p = .05$). For

Table 3. Associations of Bridging Project attendance with behavior problems and indicators of child development.

Child outcome	Cross-sectional analysis (at T_1)				Longitudinal analysis (T_1 to T_2)			Quasi-experimental design (T_{1m} vs. T_c)		
	Predictor "previous length of BP attendance"				Within-subject changes			Between-group comparison		
	<i>Std err</i>	p^b	R^2		<i>Std err</i>	p^b		<i>Std err</i>	p^b	
Behavior problems										
Emotion problems	-0.095	0.092	.302	0.011	0.371	0.223	.097	0.316	0.235	.182
Hyperactivity/Inattention	-0.037	0.096	.699	0.003	0.278	0.306	.365	0.631	0.244	.011*
Conduct problems	0.007	0.010	.942	0.003	0.437	0.256	.088	0.378	0.236	.113
Peer-interaction problems	-0.184	0.091	.046	0.035	0.040	0.289	.889	0.093	0.236	.696
Total problems	-0.122	0.093	.192	0.017	1.128	0.771	.144	0.531	0.221	.018
Prosocial behavior ^a	0.044	0.091	.630	0.003	-0.022	0.294	.941	-0.706	0.231	.003*
Child development										
Nonverbal reasoning	0.107	0.095	.266	0.015	8.257	1.599	.001*	-0.702	0.226	.003*
Receptive vocabulary	0.257	0.096	.008*	0.070	9.777	1.923	.001*	0.078	0.202	.701
Gross motor skills	-0.054	0.098	.581	0.007	0.921	0.196	.001*	-0.045	0.218	.837
Fine motor skills	0.156	0.099	.120	0.010	0.529	0.243	.030	-0.663	0.212	.002*
Vis motor coordination	-0.029	0.103	.781	0.005	0.700	0.227	.001*	0.187	0.230	.418

Summarized results of the effects of "length of BP attendance" in regression analyses (study 1), the pre- post-effects in linear-mixed effect models (study 2) and effects of group-belongingness to BP attenders (=1) vs. non-attenders of early education (=0, study 3). See Tables C–F in the Appendix for detailed model reports.

β, pooled estimator for standardized regression weights; *Std err*, standard error for pooled estimator. *p*, *p*-value for pooled estimator (two-sided, no alpha-error correction); R^2 , change in adjusted R^2 by adding predictor "BP attendance."

^aFor the Prosocial Behavior scale higher values indicate more prosocial behavior

^bSignificant results (*) are highlighted in bold based on one-sided testing and Bonferroni-Holm corrections per study approach ($p < .05^*$)

longitudinal analyses, we imputed data using the multilevel imputation procedure described by Grund et al. (2016). Imputation yielded that FMI for time effects varied from moderate to large across the models. We found that SDQ subscales scores did not show a significant decrease throughout the 5-month period. Notably, positive regression coefficients of all SDQ subscales even suggested tendencies of further increase (e.g., total problems score: $\beta = 1.128, p = .144$). Scoring on all developmental indicators increased from low levels at baseline throughout five months of attendance (note that p -value of the fine motor skills indicator, $\beta = 0.529, p = .030$, became non-significant after alpha-error correction). Compared to norm data, however, especially performance in the nonverbal reasoning task (Median $T = 33.33$) and German receptive vocabulary task (Median $T = 27.00$) were still on low to very-low levels. For details on the norm comparisons at T_2 see Table 2, on the within-subject T_1 - T_2 changes see Table 3.

Group Comparison with Refugee Children without ECD Program Attendance

For hypothesis (2), we conducted a between-group comparison with children from the T_C sample. After propensity-score matching, the subsample of T_1 was on average $M = 78.49$ months old ($SD = 5.05$), had attended BPs for $M = 6.1$ months ($SD = 4.43$), had been in Germany for $M = 27.19$ months ($SD = 20.75$) and was gender-balanced (51% female). Most children of the age-matched T_{1m} subsample transitioned into first grade within 5 months after assessments (90.6%). Since both groups still differed regarding their age- and gender-distribution after matching, we added both as covariates in our UMR models with the dummy-coded focal predictor “BP attendance vs. no program attendance.” We applied missing data imputation analogously to study 1. For most predictors, FMIs were low to moderate. We found moderate to large FMIs for the predictors “time since arrival in Germany” in all models and for “gender” in models on indicators for development. For our covariates, we found male gender to be linked to more conduct problems ($\beta = -0.412, p = .043$) and female gender to more prosocial behavior ($\beta = 0.482, p = .019$). Regarding the focal predictor for hypothesis (2), refugee children with BP attendance demonstrated less hyperactivity/inattention ($\beta = 0.631, p = .011^*$) and more prosocial behavior ($\beta = -0.706, p = .003^*$) compared to refugee children without previous ECD program attendance. For child direct assessment measures, older age ($\beta = 0.058, p = .001$) and longer time since arrival ($\beta = 0.231, p = .034$) were linked to better German

Assessment of the Developmental Foundations for Academic Learning

We observed higher levels of socio-emotional behavior problems and low to very-low level performances in assessments on cognitive skills, German language, and partly also motor skills. Our findings support previous evidence and are consistent with our initial expectations that recently arrived refugee children are at risk of not achieving the expected developmental foundations before transitioning into first grade (Bouchane et al., 2018). While the developmental indicators we examined the established predictors of academic learning, the use of standardized and norm-based assessments with recently arrived refugee children need to be discussed. That is, test procedures and also reference data reflect the normative experiences of children from Western populations. The extent of refugee children's deficits could thus be overestimated due to method bias (Van de Vijver & Tanzer, 2004). Initially lacking early education experiences of Western contexts, refugee children might need time to familiarize themselves with the materials and activities used in the assessment procedures as these adopt common practices and materials from such contexts. Large gains in child direct assessments found in the longitudinal approach (i.e., repeated measurement) support this notion. Second, we only assessed German receptive language as the host countries' language is essential for academic learning after resettlement. Although host-country language skills are essential for academic success, they might only constitute a fraction of refugee children's overall linguistic abilities. Children's family language skills are a resource that could also be related to later academic achievement via transfer effects (Prevo et al., 2016). Given such caveats, our findings still inform on a set of developmental learning foundations assessed as relative to their non-refugee peers, who will become their classmates in first grade.

Our findings revealed high levels of socio-emotional problems that are overall consistent with previous evidence on recently arrived and preschool-aged refugee children in high-income countries (Almqvist & Broberg, 1999; Buchmüller et al., 2018). Our findings, however, more strongly suggest externalizing behavior and peer-interaction problems. Such differences could be due to observer bias across studies. While Buchmüller et al. (2018) surveyed refugee children's parents and their preschool teachers, we exclusively focused on teacher assessments. As teachers experience child behavior in groups within education settings, they tend to focus on children's externalizing behaviors (Achenbach & Rescorla, 2001). Additionally, our findings reflect young children's situation in center-based programs during post-migration periods. As we found highest scores for peer-interaction problems, especially social situations with diverse peers might challenge refugee children within education settings. This context-related effect is also supported by other studies, similarly reporting distinct peer-interaction problems in young refugee children when attending kindergarten or center-based early education programs in Germany (Buchmüller et al., 2020; Chwastek et al., 2021).

Links of the Assessment Results to Bridging Project Attendance: Cognitive, Motor, and Language Development

We hypothesized links between BP attendance and child development. With regard to nonverbal reasoning, motor skills and German language skills, findings inconsistently supported our expectations that BP attendance would link to better development. In the cross-sectional analysis on time of previous BP attendance, we only found links to improvements in German language development. In the longitudinal design, however, we found that cognitive, language, and motor development (except for the fine motor skills subscale) improved after 5 additional

be linked to improvements in children's pre-academic skills (Burchinal et al., 2000) – although evidence is inconsistent (Kohl et al., 2020). As we found high program quality among the BPs under investigation, especially high process quality with a focus on host-country language development could have contributed to the positive changes observed. As the variability across the program quality domains was limited, we were not able to further explore the impact of quality variations on developmental domains.

Notably, German language was the only domain with consistent links to BP program attendance among cross-sectional *and* longitudinal analyses. Effects of BP attendance on language development could be strongest for two reasons. First, as second language learners are especially sensitive to language exposure during early development, young refugee children likely benefit from German language exposure in BPs. Second and related to this, BPs facilitate language immersion as German is the connecting language between diverse refugee children and their teachers. While cognitive and motor domains might be stimulated in other contexts as well, the BPs were likely to provide a major German language context for young refugee children.

In our longitudinal research design, it is difficult to disentangle development-stimulating effects of BP attendance from maturation. Having used raw scores from child direct assessments, the positive changes observed might, at least partially, reflect maturation. That notion is supported by our cross-sectional approach where we found influence of age (added as a covariate) on raw scores of language, cognition, and motor tasks. However, findings from the between-group comparison with refugee children without ECD program experience attending first grade more strongly supported our initial expectations. While group differences in the fine motor and nonverbal reasoning task reached significance, all domains yielded on average better raw scores for those children attending BPs (note that child age was also added as a covariate). Still, those raw score comparisons could have even underestimated true differences because the T_C sample was on average older. We, however, cannot preclude that those refugee families who had previously placed their children into BPs might systematically differ from other refugee families whose children transitioned into first grade without any ECD program attendance (e.g., regarding families' educational aspirations).

Links of the Assessment Results to Bridging Project Attendance: Socio-Emotional Behavior

We further hypothesized that BP attendance would generally be linked to less behavior problems in refugee children. The cross-sectional approach yielded null-effects and the longitudinal suggested even increasing levels of behavior problems. While those findings overall contradicted our initial expectations, such inconsistencies among our study results could refer to the different methodological approaches. In the longitudinal approach, first, a distinctive increase of behavior problems was possibly undetected, as attrition analyses yielded a higher likelihood to dropout before T_2 for those children who exhibited higher levels of conduct problems at T_1 . Second, several refugee children were assessed around their transition into first grade. Here, the longitudinal approach (T_1 - T_2) was potentially not able to disentangle distressing effects of transitioning into first grade (e.g., behavioral adjustment to new classroom settings) from promoting effects of BP attendance (i.e., continuous BP attendance contributing to decreased behavior problems).

Longitudinal and cross-sectional analyses along with norm comparisons jointly support that refugee children's externalizing behavior problems could persist in the short term of BP attendance. We found that refugee children's behavior problems persisted after BP enrollment and tended to unfold even further throughout 5 additional months of program attendance.

Chwastek et al. (2021). Adding to that, accumulating stressful experiences outside the BPs during resettlement periods could also take teachers' perceptions of BPs into account (Almqvist & Broberg, 1999; Montgomery, 2008). Alternatively, increasing levels of teacher-reported problems might reflect an observation bias. BP teachers get to know refugee children better over time and more likely recognize socio-emotional distress. Findings by Chwastek et al. (2021) support this notion albeit with a different explanation. They found that preschool teachers who had longer work experience with refugee children were more likely to have negative stereotypes, which in turn were linked to reporting more externalizing behavior problems among refugee children.

Amid inconsistent evidence from the longitudinal and cross-sectional approaches, findings comparing refugee children attending first grade with and without prT

standards, and on average lower resources compared to regular state-funded German preschools or kindergartens. Apart from the potential benefits of establishing BPs during years with peaking demands, stakeholders should generally work toward a timely inclusion of refugee children into regular early education services and thereby counteract the emergence of parallel early education services for refugee- and non-refugee children.

Overall, our study moves research empirically forward in two regards. First, findings emphasize the importance of specifically addressing the needs of recently arrived refugee children, as they are at risk for low developmental learning foundations. Second, findings provide first evidence that flexibly organized preschool-based ECD programs could support refugee children's successful transition into first grade.

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Data Availability Statement

The dataset supporting the conclusions of this article is available from the corresponding author or Birgit Leyendecker on reasonable request.

Disclosure Statement

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

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Appendices

Appendix A

Table A. Structural quality of preschool-based Bridging Projects according to the “Bridging Project Evaluation Scale.”

Observed structural quality per dimension	<i>M (SD)</i>	
	Preschool BPs	Various BPs
Premises <i>Structural aspects of the setting such as availability of sufficient space for activities, areas for relaxation, or sanitary facilities</i>	1.48 (0.22)	1.45 (0.24)
Equipment <i>Availability and condition of the movable interior and its suitability for preschool-aged children</i>	1.48 (0.23)	1.57 (0.35)
Structuring of a Session <i>Formal structure of the program, e.g., clearly indicated start and ending times, establishment of rituals, rules, and routines</i>	1.70 (0.43)	1.18 (0.51)
Team Coherence <i>Characteristics of team climate and the degree of effective cooperation among staff</i>	1.86 (0.23)	1.69 (0.43)
Educational materials <i>For pre-academic activities and play, as well as for language facilitation in multilingual groups</i>	1.67 (0.27)	1.42 (0.41)

Mean ratings (*M*) and standard deviations (*SD*) for structured observations using the “Bridging Project Evaluation Scale” (BREVIS) in the preschool-based BPs of our sample (*N* = 10) and other BPs with various implementation strategies (*N* = 22). Only aggregated values on domain level are reported. BREVIS overall consists of 24 quality indicators to be ranked on a 3-point Likert scale (*Inadequate* = 0, *Moderate* = 1, *Excellent* = 2). All observers were trained in using the BREVIS and conducted observations in all BPs. Corresponding author provides the full observation protocol on request.

Appendix B

Table B. Teacher–child interaction quality of preschool-based Bridging Projects according to the “Classroom Assessment Scoring System Pre-K.”

Observed interaction quality per dimension	<i>M (SD)</i>	
	Preschool-based BPs	Various BPs
Positive climate	6.38 (0.63)	6.18 (0.89)
Negative climate	6.93 (0.11)	6.84 (0.28)
Teacher sensitivity	5.93 (0.68)	5.64 (1.05)
Behavior management	6.28 (0.62)	5.66 (1.08)
Productivity	6.15 (0.70)	5.21 (1.35)
Language Modeling	3.68 (1.26)	3.61 (1.32)

Mean ratings (*M*) and standard deviations (*SD*) for structured observations using the “Classroom Assessment Scoring System Pre-K” (CLASS; La Paro et al., 2002) in the preschool-based BPs of our sample (*N* = 10) and other BPs with various implementation strategies (*N* = 22). CLASS dimensions were rated on a 3-point Likert scale (lowest = 1, medium = 4, highest quality = 7). All observers were licensed by Teachstone® at the time of assessments and proved reliability in the official CLASS

Appendix C

Table C1. Cross-sectional approach, univariate multiple regression models predicting behavior problems.

	Emotion Problems			Hyperactivity/ Inattention			Conduct Problems		
	SE		<i>p</i>	SE		<i>p</i>	SE		<i>p</i>
Model 1									
Intercept	-0.392	0.598	.514	-0.095	0.632	.881	0.442	0.601	.471
Age	0.004	0.009	.685	0.006	0.009	.527	-0.006	0.009	.530
Gender	0.281	0.188	.138	-0.574	0.193	.004	-0.145	0.180	.425
Time since arrival	0.028	0.109	.798	0.039	0.105	.710	0.102	0.097	.291
Model 2									
Intercept	-0.396	0.598	.509	-0.097	0.634	.879	0.444	0.611	.469
Age	0.004	0.009	.661	0.006	0.009	.520	-0.006	0.009	.527
Gender	0.253	0.189	.182	-0.585	0.195	.003	-0.142	0.183	.441
Time since arrival	0.041	0.109	.710	0.044	0.107	.679	0.102	0.098	.300
Length BP attendance	-0.095	0.092	.302	-0.037	0.096	.700	0.007	0.010	.942
Model Comparisons									
Base vs. Model 1	$F(3, 143) = 0.843, p = .473, R^2 = 0.042$			$F(3, 143) = 2.889, p = .038, R^2 = 0.086$			$F(3, 143) = 0.676, p = .568, R^2 = 0.023$		
Model 1 vs. Model 2	$F(1, 142) = 1.074, p = .302, R^2 = 0.011$			$F(1, 142) = 0.150, p = .699, R^2 = 0.003$			$F(1, 142) = 0.005, p = .942, R^2 = 0.003$		

Univariate regression models predicting subscales of the Strengths and Difficulties Questionnaire on T_1 sample ($N = 152$). β , standardized beta-coefficients for predictors. SE , standard error for standardized beta-coefficient. p , two-sided alpha-error probability. R^2 , changes in adjusted R^2 for intercept-only model (base), model 1 (without predictor "length of BP attendance") and model 2 (with "length of BP attendance").

Table C2. Cross-sectional approach, univariate multiple-regression models predicting behavior problems.

Interaction problems	
	T©(m)kwm)K4mqmY6llllHhHhY6llllHhBä16TITH88l68LBHcmmL65Egsmqml6LllllHh

Appendix D

Table D1. Cross-sectional approach, univariate multiple-regression models predicting indicators for childhood development.

	Nonverbal Reasoning			German receptive vocabulary			Gross motor skills		
		<i>SE</i>	<i>p</i>		<i>SE</i>	<i>p</i>		<i>SE</i>	<i>p</i>
Model 1									
Intercept	-2.741	0.590	.001	-2.318	0.594	.001	-3.089	0.593	.001
Age	0.040	0.008	.001	0.034	0.009	.001	0.044	0.008	.001
Gender	-0.160	0.179	.374	-0.091	0.183	.622	0.056	0.180	.756
Time since arrival	-0.059	0.094	.533	0.159	0.106	.137	-0.150	0.101	.141
Model 2									
Intercept	-2.734	0.595	.001	-2.301	0.587	.001	-3.097	0.595	.001
Age	0.040	0.008	.001	0.033	0.008	.001			

Appendix E

Table E1. Between-group comparison, univariate multiple-regression models predicting children's behavior problems.

	Emotion problems			Hyperactivity/ Inattention			Conduct problems		
		<i>SE</i>	<i>p</i>		<i>SE</i>	<i>p</i>		<i>SE</i>	<i>p</i>
Intercept	-0.060	1.265	.962	1.723	1.298	.188	1.147	1.255	.363
Age	-0.002	0.016	.921	-0.023	0.0161	.159	-0.014	0.016	.373
Gender	0.046	0.217	.834	-0.395	0.211	.065	-0.412	0.201	.043
Time since arrival	-0.046	0.111	.683	-0.015	0.116	.897	-0.043	0.106	.687
BP vs. no program	0.316	0.235	.182	0.631	0.244	.011	0.378	0.236	.113

Univariate regression models predicting subscales of the Strengths and Difficulties Questionnaire on age-matched sample and comparison group of refugee children without previous early education attendance (T_{im} vs. T_c $N = 55 + 55$). The predictor of interest "BP"

Appendix F