



Social–Emotional Skills in Five-to-Six-Year-Olds in Social Hotspots in Germany: Individual Trajectories in a Prospective Cohort

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Abstract

Social–emotional skills as valid predictors for subsequent school success should be promoted in early childhood. Preschools are a relevant setting to reach children from families with low socioeconomic status. The federal state law for children’s day-care and preschools in the state of Mecklenburg-Western Pomerania offers preschools in difficult social areas financial support for the individual targeted promotion. Prospective longitudinal observational data of a cohort: annual application of Dortmund Developmental Screening for Preschools domains “social competence” and “social interaction” over two years of 5-to-6-year-olds. Calculation of prevalence rate ratios and ratios of rate of improvements are divided by rate of deteriorations after one year. The proportion of children with inconclusive findings in “social competence” decreases. > 50% have no finding after one year. In “social interaction,” the proportion of children with inconclusive findings increases. Both domains detected more improvements than deteriorations for all children after one year. The indicated improvement of developmental risks is possibly associated with a reduction of social inequalities and tend to improve equal opportunities for all children at school start. Nevertheless, results of some children are deteriorating. More effective promotion of social–emotional skills is needed also for children without developmental risks—especially for children with internalizing problems. Trial registration: German Clinical Trials Register, ID: DRKS00015134, Registered on 29 October 2018, retrospectively registered.

Keywords Social–emotional skills · Preschools · Reducing social inequalities · School readiness · Social hotspots · Developmental risks · Individual trajectories · Cohort study

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Résumé

Les compétences socio-émotionnelles en tant que prédicteurs valides du succès scolaire ultérieur devraient être promues dès la petite enfance. Les écoles maternelles sont un cadre pertinent pour atteindre les enfants issus de familles à faible statut socio-économique. La loi fédérale sur les garderies et les écoles maternelles pour enfants dans l'État de Mecklembourg-Poméranie occidentale offre un soutien financier aux écoles maternelles des zones sociales difficiles pour la promotion ciblée individuelle. Données d'observation longitudinale prospective d'une cohorte : application annuelle du dépistage du développement de Dortmund pour les domaines "compétence sociale" et "interaction sociale" sur deux ans pour les enfants de 5 à 6 ans. Calcul des taux de prévalence et de taux d'amélioration divisés par les taux de détérioration après un an. La proportion d'enfants présentant des résultats non concluants en matière de "compétence sociale" diminue. Plus de 50 % n'ont aucun résultat après un an. En ce qui concerne l'"interaction sociale", la proportion d'enfants présentant des résultats non concluants augmente. Les deux domaines ont détecté plus d'améliorations que de détériorations pour tous les enfants après un an. L'amélioration indiquée des risques de développement est possiblement associée à une réduction des inégalités sociales et tend à améliorer les chances égales pour tous les enfants au début de l'école. Cependant, les résultats de certains enfants se détériorent. Une promotion plus efficace des compétences socio-émotionnelles est nécessaire, y compris pour les enfants sans risques de développement, en particulier pour les enfants présentant des problèmes internalisés. Enregistrement de l'essai : German Clinical Trials Register, ID: DRKS00015134, Registered on 29 October 2018, enregistré rétrospectivement.

Resumen

Las habilidades socioemocionales como predictores válidos para el éxito escolar posterior deben fomentarse en la primera infancia. Los preescolares son un entorno relevante para llegar a los niños de familias con bajos recursos económicos. La ley estatal para el cuidado de niños y preescolares en el estado de Mecklemburgo-Pomerania Occidental ofrece apoyo financiero a los preescolares en áreas sociales difíciles para la promoción individual dirigida. Datos prospectivos de observación longitudinal de una cohorte: aplicación anual de la Evaluación del Desarrollo de Dortmund para los dominios "competencia social" e "interacción social" durante dos años en niños de 5 a 6 años. Cálculo de las tasas de prevalencia y las tasas de mejoras divididas por las tasas de deterioro después de un año. La proporción de niños con hallazgos inconclusos en "competencia social" disminuye. Más del 50% no tienen hallazgos después de un año. En "interacción social", la proporción de niños con hallazgos inconclusos aumenta. Ambos dominios detectaron más mejoras que deterioros en todos los niños después de un año. La mejora indicada de los riesgos de desarrollo posiblemente se asocia con una reducción de las desigualdades sociales y tiende a mejorar las oportunidades iguales para todos los niños al inicio de la escuela. Sin embargo, los resultados empeoran para algunos niños. Se necesita una promoción más efectiva de las habilidades socioemocionales, también para los niños sin riesgos de desarrollo, especialmente para los niños con problemas de internalización. Registro

del ensayo: German Clinical Trials Register, ID: DRKS00015134, Registered on 29 October 2018, retrospectivamente registrado.

Introduction

The concept of psychosocial developmental tasks by Havighurst, first published in 1946, describes societal demands that are applied to different age-groups or that are set as individual targets by the individuals themselves (Havighurst, 1972; Quenzel & Hurrelmann, 2011). One of the significant developmental tasks is to develop an intellectual and social competence as well as building positive relationships with peers. However, since social interaction is accompanied by emotions, social competences are also determined by emotional competences. For example, an adequate and situation appropriate emotional expression and the regulation of one's own emotions are essential for a successful social interaction. Therefore, social and emotional skills are strongly related and are described as social–emotional competencies (Bierman & Motamed, 2016; Denham et al., 2003; Jungmann et al., 2015). Being social-emotionally competent means being able to adequately deal with one's own emotions and the emotions of others (Petermann & Wiedebusch, 2016). An important requirement for this competence is the awareness and expression of one's own emotions, and the regulation of one's own negative feelings and the recognition and appropriate consideration of the feelings of others (Schmitz & Röhr-Sendlmeier, 2016). The emotional competence enables the children for a successful social living and positive interactions with peers. Children need to be empowered to interact, to join a group of peers, to follow rules of conduct and even more to deal with disappointments and frustration (Bierman & Motamed, 2016; Kiese-Himmel et al., 2016). In general, problems in the social–emotional development can be categorized into two broad types: externalizing and internalizing problems. Externalizing (behavioral) problems are characterized by an under-controlled behavior, a tendency to act out and respond in a way that disturbs others (Buchanan-Pascall et al., 2018). Internalizing (emotional) problems include a range of difficulties characterized by personal emotional distress including over-controlled or inhibited behaviors (Buchanan-Pascall et al., 2018).

The early childhood years are the critical time period for the development of relevant social–emotional skills. Especially in the age of 3 to 6 years, most of the children transform into responsible and socially capable humans. Hence, the preschool years are a period of major development and of dramatic transformation in children's social–emotional skills. For example, children learn in different play-situations with peers how to share, communicate, or regulate their emotions (Bierman & Motamed, 2016).

Several authors have shown that social–emotional competencies are valid predictors for school readiness and subsequent school success (Bierman et al., 2008; Bierman & Motamed, 2016; Burchinal et al., 2020; Denham et al., 2009; U. Petermann & Petermann, 2015). Especially the transition from preschool to elementary school is a critical phase for children. They are confronted with high

demands in the transitional time: they have to adapt to a new social structure (the school class), they have to learn and comply with new social rules, and they have to build up new relationships (Bierman & Motamed, 2016). Likewise, the children have to adjust to the requirements of the school and of the teachers (Ladd & Price, 1987); rendering a successful interaction with teachers is important. So all in all, children have to be well prepared for the social changes and educational demands at the transition to elementary school (Bierman & Motamed, 2016). A meta-analysis from Taylor et al. (2017) reveals the chance of projects to promote children's intrapersonal and interpersonal competencies—such as self-regulation, problem-solving, and relationship skills—enhances children's academic performance and behavior. It also shows the effectiveness of projects to improve long-term outcomes like future social relationships, increasing high school graduation rates and college attendance, and reduces negative outcomes like arrests or the presence of clinical disorders (Taylor et al., 2017).

A recent OECD study (Organization for Economic Co-operation and Development) confirms that social–emotional skills are the most predictive skills for success in a wide range of important life outcomes, e.g., academic achievement, job performance, occupational attainment, health, longevity or personal and societal well-being (Chernyshenko et al., 2018).

Worldwide studies on programs that promote socioemotional learning have been growing in recent years and show effective strategies to promote social–emotional skills. A review of programs in early childhood (Durlak et al., 2011) shows the effectiveness of some of these interventions in improving relevant aspects of the social–emotional development like cognitive regulation (Webster-Stratton et al., 2008), reducing conduct problems and aggressive behaviors (Raver et al., 2011).

Annual results from the school entry examinations, however, indicate a considerable proportion of children affected by social–emotional delays (e.g., for the German federal state Mecklenburg–Western Pomerania: 15.6% in survey year 2016/2017) (Ministry of Economics, Employment & Health, 2017). The main problem is that most of the children's developmental risks are first discovered with the school entry examination or even after school entry, when the children are suddenly confronted with the new situation and higher demands than before. Thus, behavioral and developmental problems are very often recognized too late. Also, in the screening tests for young children (U1–U9, which means a screening scheme for children from their birth to their 6. birthday), which are a legal offer in Germany, behavioral and developmental problems are often not detected (Tröster et al., 2005). One reason for the low effectiveness of the early U-screenings for young children is the lack of standardization. Besides that a reliable detection of developmental risks is likely to fail because of the single, very short-term observation by the medical practitioner (Tröster et al., 2005). Children who have early reasonable grounds to suspect a developmental risk (“early starters”) show very stable developmental peculiarities over time, e.g., problem behavior and hyperactivity. Consequently, preventive intervention should start as early as possible to prevent a lasting manifestation. Therefore, early preventive actions to promote social–emotional competencies have to be initiated as early and consequently as possible (Tröster et al., 2005).

Besides that, preschool time is the developmental period of significant social skills (Humphries & Keenan, 2006). Therefore, this setting provides a good chance to integrate prevention activities to promote social competences. In Germany, preschools are attended by most of the children (for at least 3 years) and therefore provides a relevant setting for long-term prevention activities reaching all population groups (Cierpka, 2003; Tröster et al., 2005). Effective interventions provide the chance to reduce the school readiness gap, which is associated with socioeconomic disadvantage (Bierman & Motamed, 2016).

Federal State Law for Children’s Day-Care and Preschools in Mecklenburg-Western Pomerania

Preventive activities can reduce social disparities and improve equal opportunities for school readiness (Bierman & Motamed, 2016; Bierman et al., 2014). However, an appropriate monitoring of competences requires a systematic and standardized observation and documentation of developmental dynamics (Wiedebusch & Petermann, 2011). Therefore, developmental screenings are a key element in population-based prevention (Petermann & Petermann, 2015).

For this reason, the federal state law for children’s day-care and preschools in Mecklenburg-Western Pomerania was amended. Since 2011, the law grants additional funds to preschools in social hotspots. The law aims to foster children’s healthy development and to reduce social inequalities. In this context, two promotion strategies have to be distinguished: a whole daily-integrated promotion addressing all children conducted in daily preschool routine (“alltagsintegrierte Förderung”) and the targeted individualized promotion for children with one or more specific developmental risk (“gezielte individuelle Förderung”). The additional funds shall be used for the targeted individualized promotion strategy. To identify developmental risks, the preschools have to monitor and document each child’s development applying a standardized, objective and valid screening instrument. Another mandatory criterion for claiming these additional funds is the participation in a scientific evaluation according to Sect. “[Discussion](#)” Paragraph 1 BeDoVO.

Research Question

The scope of the available data for the target group of 5-to-6-year-olds is unique in Germany. The need for prevention measures for children from families with low socioeconomic status evidence for longitudinal data is highly indispensable. The legal foundation of the project is the federal state law for children’s day-care and preschools in Mecklenburg-Western Pomerania and therefore emphasizes the outstanding responsibility. Based on a legal mandate, we evaluated longitudinal data with respect to the children’s development. In detail, this paper focusses on individual trajectories of the social–emotional development in a cohort of preschool children. The question is whether the proportion of children with a developmental risk

changes within one year following the DESK score and whether the improvements are more frequent than deteriorations for the children in the cohort after one year. The authors assume that the proportion of improvements after one year is higher than the proportion of deteriorations.

Materials and Methods

Study Design

The evaluation of the federal state law for children's day-care and preschools Mecklenburg-Western Pomerania is designed as a dynamic prospective cohort study including 151 preschools [July 2020]. A detailed study design is published elsewhere (see Ernst et al., 2023). Based on the total number of preschools in MWP $n = 1097$ (Bock-Famulla et al., 2020a, 2020b), this reflects a proportion of 13.8%.

This paper examines standardized observational data in a cohort of preschool children in a longitudinal design. The data generated in the study have a descriptive level of evidence.

Study Region

Mecklenburg-Western Pomerania is a rural federal state in the north-east of Germany with a total population of 1.609.062 as of December 31, 2019 (Landesamt für Innere Verwaltung Mecklenburg-Vorpommern. Statistisches Amt., 2020).

In Germany, preschools are institutions for early childhood education and care for young children from age 3 to school entry (in German: “*Kindergarten*”). According to § 22 SGB (Federal Social Code) VIII, the aims of preschools are.

- to promote the development of every child into a responsible and sociable personality,
- to support and supplement the family care and education and
- to help the parents to manage their work and parenting tasks.

In MWP, the median of the preschool staffing ratio accounts for 13.2 children to teachers, which is presently the highest in Germany (Min: 1: 7.0) (K. Bock-Famulla et al., 2020a, 2020b).

Due to the high population-based utilization rate of preschools among 3–6-year-olds in Mecklenburg-Western Pomerania (2019: 94.9%; in Germany (2019): 93.0%) (Federal State Office, 2020), preventive activities implemented in this setting have the chance to reach almost all children, including children with a lower socioeconomic status.

The preschools receiving financial support in accordance with the federal state law for child day-care and preschools are located both in cities (e.g. Wismar, Schwerin, Greifswald, Stralsund) and in rural areas of the federal state of Mecklenburg-Western Pomerania.

Table 1 Translated items of the domain “social competence” of the revised Dortmund Developmental Screening for Preschools (Dortmunder Entwicklungsscreening für den Kindergarten, DESK 3–6 R) for children aged 5–6 years

- Follows group-rules
- Can solve conflicts peacefully
- Cooperates with older children
- Responds appropriately if criticized for own wrongdoing
- Is respectful of other children’s game results
- Responds appropriately to other children’s emotional statements
- Considers wishes of other children
- Wants to fix self-inflicted damage

Table 2 Translated items of the domain “social interaction” of the revised Dortmund Developmental Screening for Preschools (Dortmunder Entwicklungsscreening für den Kindergarten, DESK 3–6 R) for children aged 5–6 years

- Is confident to talk to other children
- Faces conflicts or problem situations
- Addresses other children’s play and contact offers
- Resists border transgressions
- Expresses its own wishes, needs and ideas in the group
- Has a friendship with another child (over at least few weeks)
- Takes an active role in role-playing games
- Is interested and wants to know a lot

Table 3 Tables of the normative sample for the domains social competence and social interaction for 5- and 6-year-olds of the DESK 3–6 R (*n* = 825)

Stanine value	Percentil rank	5-year-olds		6-year-olds	
		Social competence	Social interaction	Social competence	Social interaction
1	0–4	0–1	0–1	0–1	0–2
2	5–11	2	2	2	3–4
3	12–23	3	3–4	3–4	5
4	24–40	4–5	5	5	6
5	41–60	6	6	6	7
6–7	61–89	7	7	7	
8–9	90–100	8	8	8	8

Instrument

Dortmund Developmental Screening for Preschools (Dortmunder Entwicklungsscreening für den Kindergarten), DESK 3–6 R

The federal state law for child day-care and preschools in Mecklenburg-Western Pomerania defines the revised Dortmund Developmental Screening for Preschools (Dortmunder Entwicklungsscreening für den Kindergarten, DESK 3–6 R) as the instrument to monitor the development of preschoolers in the domains of motor,

language, cognitive, and social development by all preschools involved (Biermann et al., 2020; Tröster et al., 2011; Wolf & Tröster, 2017).

The instrument is standardized (inter-rater reliability for 5–6-year-olds in the domain social interaction and social competence = 90.9%) and reliable with a Cronbach's α for 5–6-year-olds in the domain social interaction of 0.77 and social competence of 0.88. It also shows a high validity in comparison with other screening instruments (for example, Strengths and Difficulties Questionnaire (SDQ))(Tröster et al., 2016; Wolf & Tröster, 2017).

This standardized and validated instrument helps preschool teachers to monitor the development of the children in daily situations and provides an indication for a developmental risk (Biermann et al., 2020; Franze et al., 2010, 2018; Gottschling et al., 2012; Tröster et al., 2005). The screening is conducted by the children's familiar preschool teacher and consists of both active and observational tasks (Tröster et al., 2005; Wolf & Tröster, 2017).

The DESK 3–6 R measurement is age-specific and available in three different age versions (one for 3-year-olds, one for 4-year-olds, and one for 5-to-6-year-olds). Based on identical items in the age version for 5- and 6-year-olds, this paper focusses on the trajectories of these age-groups. In addition, the version for 5- and 6-year-olds is more detailed in the assessment of the social development by differentiating two separated domains (Wolf & Tröster, 2017).

The DESK 3–6 R assesses the social–emotional development of 5- to 6-year-olds within the domains “social competence” and “social interaction.” In contrast to other DESK domains, there are no performance aspects to be assessed; rather, the preschool teacher has to monitor the social appropriateness of the child's behavior in daily routines. The domain “social competence” focusses on externalizing behavioral problems. This includes age-appropriate skills for a child's own conflict-management and skills for dealing with difficult situations. The screening also assesses if a child respects needs of others by pursuing his or her own goals (see Table 1).

Table 4 Categorized changes of DESK results from DESK-R survey wave 1 (DESK-R-SW1) to DESK-R survey wave 2 (DESK-R-SW2)1 of DESK domains: “social competence” and “social interaction”

	DESK-R-SW2		PRR (95% CI) <i>p</i> value	Ratio of the rate of improvements divided by the rate of deteriorations ^b
	No finding	Possible finding		
<i>Social competence (n = 936)</i>				
DESK-R-SW1				
No finding	746 (93.3) ^a	54 (6.8%)	0.88 (0.7–1.1) <i>p</i> = 0.28	7.63
Possible finding	70 (51.5%)	66 (48.5%)		
<i>Social interaction (n = 940)</i>				
DESK-R-SW1				
No finding	759 (88.7%) ^a	97 (11.3%)	1.7 (1.32–2.19) <i>p</i> < 0.01	3.99
Possible finding	38 (45.2%)	46 (54.8%)		

^aPercentage frequency based on results at DESK-R-SW2

^bImprovements: possible finding at survey wave 1 (DESK-R-SW1), no finding at survey wave 2 (DESK-R-SW1); deteriorations: no finding at DESK-R-SW1, possible finding in DESK-R2

The second domain “social interaction” focusses on internalizing skills and skills that the children need to actively participate in social groups. This includes if a child can assert itself in contact with peers or if it can successfully express his or her own feelings and wishes (see Table 2).

The preschool teacher can rate the screening tasks with the following scale levels: *very often/often—sometimes—rarely/never*. The amount of successfully fulfilled tasks (scale very often/often) is converted into age-specific “stanine values” (standard nine values). Stanine values are based on the internal comparison with a normative sample of children in the respective age. Hence, children’s general development is already controlled for. Please see Table 3 for the age-specific tables of the normative sample for the domains social competence and social interaction for 5- and 6-year-olds (Tröster et al., 2016).

For example: a 5-year-old child was rated in the domain social competence 4 times with “very often/often”—> compared with the normative sample this child will have a stanine value of 4 in the domain social competence. If the child would be 6 years old, this result would correspond with a stanine value of 3.

A stanine value of 1 (corresponding to percentile ranks 0–4) indicates reasonable grounds to suspect a developmental risk in the dimension of social development. These children solved less tasks successfully than other children of their age. The result gives an indication for a developmental risk and suggests further diagnosis by an external expert. A stanine value of 2 (corresponding to percentile ranks 5–11) indicates an inconclusive finding. A definite decision about the prevalence of a developmental risk is not possible; further observation and repetition of the DESK are recommended. Stanine values between 3 and 9 (corresponding to percentile ranks 12–100) indicate a normal development (Biermann et al., 2020; Franze et al., 2018; Gottschling-Lang et al., 2014; Rudolph et al., 2013; Tröster, 2018; Wolf & Tröster, 2017).

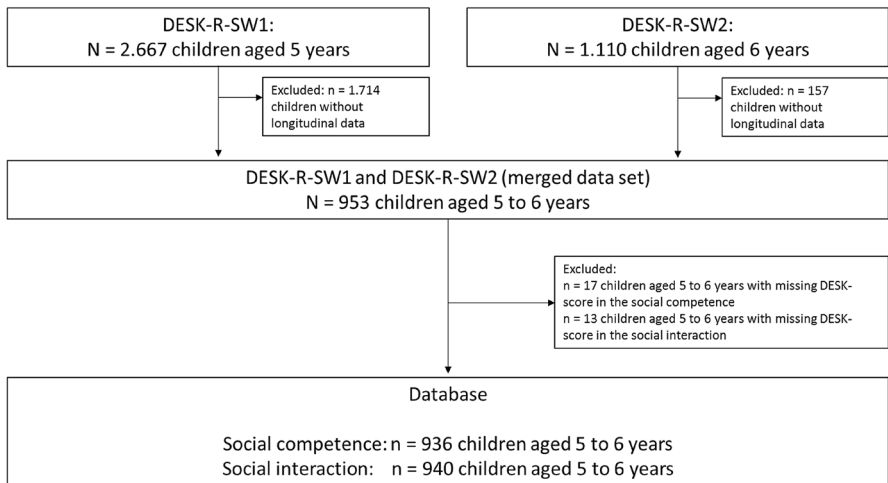


Fig. 1 Database referring to the longitudinally assessment of age-adjusted DESK scores in the DESK domains: social competence ($n = 936$) and social interaction ($n = 940$)

Implementation

Prior to applying the DESK 3–6 R, preschool teachers from every preschool were trained how to perform the developmental screening. Subsequently, to ensure that the person conducting the screening knew the children well the screening is conducted by a group's familiar preschool teacher. The training was developed earlier within the framework of a pilot project (Franze et al., 2010) and was conducted by the project team. Participation in the screening is mandatory for all children in the preschool involved, but the written consent of parents or legal guardians is required before the DESK 3–6 R questionnaires can be forwarded from the preschool to the evaluation team. For this reason, parents or legal guardians are informed in advance by the preschool teachers, receive an information sheet about the evaluation and usage of data, and provide written informed consent. The preschool teachers conduct the screening during their daily routines in the preschool (Table 4).

Study Sample

The study sample is selected at the level of preschools—and not at the individual level of children. The preschools are selected as follows: the youth welfare offices of each region in Mecklenburg-Western Pomerania determine the preschools' proportion of parental fees that is subsidized by social welfare. Inclusion criterion is a proportion above the average. Other parameters like parental income are not measured and therefore no criteria for inclusion.

For the longitudinal analysis, we used DESK data from survey wave 1 (DESK-R-SW1, conducted in 2017) and survey wave 2 (DESK-R-SW2, conducted in 2018) of 5-to-6-year-olds. Longitudinal matching of DESK data for each child was conducted in the Independent Trusted Third Party of the University Medicine Greifswald by using the ID Management solution E-PIX (Enterprise Identifier Cross Referencing). E-PIX allows for unambiguous participant management and efficient aggregation of research data (Bialke et al., 2015a, 2015b; Bialke et al., 2015a, 2015b).

A child-specific Master Patient Index (MPI-ID) is generated by using the variables surname, name, birth date, gender, and preschool ID. Missing values ($n = 30$) and data from 3-to-4-year-olds were excluded from analysis (see Fig. 1). All identifying information was stored in the Trusted Third Party. After linkage, data were pseudonymized and provided for analysis in pseudonymized format.

Data Analysis and Statistical Methods

The stanine scores were calculated using the SAS statistical software package (Version 9, SAS Institute Inc., Cary, USA).

The stanine values 1 and 2 were summarized into the category “possible finding,” which indicates a higher need for promotion activities (targeted individualized promotion). In contrast, the category “no finding” represents the stanine values 3–9; this category indicates no further need for targeted individualized promotion.

We examined the frequencies of the two categories (cross-tables) including the calculation of Fisher's exact test by using IBM SPSS Statistics (Version 26, IBM, Armonk, USA).

In a second step, we calculated the prevalence rate ratio (PRR): $PRR = 1$ indicates no difference among the proportions of children with "possible findings" between both survey waves. $PRR < 1$ indicates a reduction of the proportion of children with "possible findings" at DESK-R-SW2 compared to DESK-R-SW1. Thus, the PRR represents the longitudinal trend in the prevalence of developmental risks in our sample over the prospective period of one year.

We further calculated the ratio of the rate of improvements (i.e., possible finding at DESK-R-SW1, no finding at DESK-R-SW2) divided by the rate of deteriorations (i.e., no finding at DESK-R-SW1, possible finding in DESK-R-SW2). To calculate this ratio, we used Microsoft Excel (Microsoft Office Professional Plus 2019, Version 1808, Redmond, Washington, USA). A ratio > 1 indicates that the rate of improvements is higher than the rate of deteriorations.

All inference statistics were based on an α error probability of 0.05.

Results

DESK-Domain "Social Competence"

Referring to the DESK-domain "social competence" at DESK-R-SW1, the proportion of children with a possible finding is $70 + 66 = 136$ of 936 (see Table 4). This equals a prevalence of 14.5%. One year later, at DESK-R-SW2 the proportion of children with a possible finding decreased to $54 + 66 = 120$ of 936. This equals 12.8%. Therefore, the PRR is $12.8/14.5 = 0.88$ ($CI = 0.7-1.1$).

From $70 + 66 = 136$ children with a possible finding at DESK-R-SW1 70 children (51.5%) "no finding" one year later. The other 66 children (48.5%) in this group still have a possible finding after one year.

Based on the $746 + 54 = 800$ children's DESK scores categorized as "no finding" at DESK-R-SW1 only 54 children (6.8%) one year provide a DESK result, which is (i.e., DESK-R-SW2) categorized as "possible finding." For the remaining 746 children (93.3%), there is no change of the categorization "no finding" over one year. Hence, after one year the proportion of the children with improved DESK scores is 7.63 times higher than the proportion of children with deteriorated DESK results.

DESK-Domain "Social Interaction"

The proportion of children with a possible finding in the domain "social interaction" at DESK-R-SW1 is $38 + 46 = 84$ of 940 (see Table 3). This equals a prevalence of 8.9%. One year later, at DESK-R-SW2 the proportion of children with a possible finding increased to $(97 + 46)/940$. This equals 15.2%. Therefore, the PRR is 1.7 ($CI = 1.32-2.19$). The increase of the number of children with a possible finding is statistically significant ($p < 0.01$).

From $38 + 46 = 84$ children with a possible finding at DESK-R-SW1, 38 children (45.2%) have a DESK result, which is one year later (i.e., DESK-R-SW2) categorized as “no finding.” Forty-six children (54.8%) within this group still have a possible finding after one year.

Based on the $759 + 97 = 856$ children’s DESK scores categorized as “no finding” at DESK-R-SW1, only 97 children (11.3%) provide a DESK result, which is (i.e., DESK-R-SW2) categorized as “possible finding” one year later. For the remaining 759 children (88.7%), there is no change of the categorization “no finding.” After one year, the proportion of the children with improved DESK scores is 3.99 times higher than the proportion of children with deteriorating DESK results (see Table 4).

Discussion

The transitions from individual parental care to attending a preschool and later from preschools to elementary school are periods associated with significant challenges for young children to cope with (Bierman & Motamed, 2016). Children should be well prepared for these transitions—especially children from families with a lower socioeconomic status. Application of valid screening instruments and subsequent targeted preventive interventions therefore should start early. Due to the high utilization rate of preschools in Germany, these institutions provide a relevant setting to promote social–emotional skills. Preschools reach a very high proportion of children largely independent of their social, economic, educational, religious, and cultural background.

The goal of the federal state law for children’s day-care and preschools in Mecklenburg-Western Pomerania is to support school readiness and equal opportunities for all children prior to school entry by monitoring each child’s development and promote his or her individual skills. In the context of the evaluation, there is a unique chance to analyze trajectories on an individual level based on a standardized screening instrument.

The presented longitudinal data can be considered as representative for preschools in social hotspots of one German federal state, and given the degree of completeness and data quality, the results can be considered a valid base for future research. The targeted individualized promotion in preschools focuses on children with a first indication of a developmental risk.

Due to the character of the longitudinal observational data, the level of evidence is descriptive. However, the marked trajectories indicate that interventions on the individual level are probably successful.

Our results show that the proportion of children with a possible finding in the DESK-domain “social competence” decrease after one year (from 14.5% in DESK-R-SW1 to 12.8% in DESK-R-SW2). The result “reasonable finding” leads to a targeted individual attention and promotion by the child’s familiar preschool teacher. The findings are remarkable, since this categorical change of the DESK result is based on a time period of only one year. Since the domain “social competence” focusses on externalizing problems, we presume that a developmental risk in this domain is rather visible in preschool’s daily routine. This may lead to an intense conduction of promoting

activities because children with a finding in this domain show aggressive behavior, noisy interruptions and, respectively, do not follow rules. This kind of behaviors is disturbing and annoying in the daily routine of a preschool, and preschool teachers may see more need for action.

The proportion of children with a possible finding in the DESK score for the domain “social interaction” increases after one year (from 8.94% in DESK-R-SW1 to 15.21% in DESK-R-SW2). Since the domain “social interaction” focusses on internalizing problems, we assume that children with internalizing behavioral problems are more easily “overlooked” because they do not disturb openly. Children with internalizing problems are often shy, afraid of new situations and introverted. So, for preschool teachers this misbehavior is much less obvious. As a consequence, preschool teachers need to be sensitized more for the broad spectrum of children’s social–emotional development, especially for children with internalizing problems.

We would like to highlight that of the 136 children with a possible finding at DESK-R-SW1 in the domain “social competence,” 70 children (51.5%) have no finding in their DESK result one year later. From 84 children with a possible finding at DESK-R-SW1 in the domain “social interaction” 38 children (45.2%) have no finding in their DESK result one year later. These results indicate that the targeted individualized promotion based on domain-specific assessment of the children is probably successful.

Considering the daily-integrated preschool promotion addressed to all children (i.e., not only targeted to those with a reasonable finding), the ratio of the rate of improvements divided by the rate of deteriorations shows that the rate of improvements is higher in both DESK domains compared to the deteriorations (for “social competence”=7.63, for “social interaction”=3.99). Due to the lack of a control group, these findings cannot prove a causal link between the early detection of a developmental risk and its amelioration.

However, our results show the potential of an early prevention activity, which aims to support children’s skills that promote success at school entry—and which could ultimately reduce the school readiness gap. As known from the previous research, projects to promote social–emotional skills in early years have the potential to reduce negative long-term life outcomes and promote the well-being. Preventive activities have to start early to foster equal opportunities in social development domains—which puts the focus on the time before school entry. Moreover, this example of a governmental program shows the benefit of a valid screening instrument in preschools that allows an assessment and prospective monitoring of each child’s development. On a standardized, valid, and reliable database, the preschool teacher can initiate individual prevention activities that in many cases successfully promote skills.

Limitations and Strengths

This study has several limitations. One limitation is the lack of a control group since the evaluation by definition includes all intervention preschools. Thus, we cannot compare to other preschools and analyze the quantitative effect of the intervention according to the federal state law of Mecklenburg-Western Pomerania. Therefore, causal links of the results cannot be proven.

We also do not know the size and directions of possible influences of other factors, like prevention activities outside the preschool or the influence of the parents. It needs to be considered that the parents have to give a written consent to provide the results for the evaluation. So, selection bias cannot completely be ruled out.

Any difference in the time periods between the two measurement waves could bias the measurement of both DESK domains measured. Since the average time between both waves was 321.79 days with a SD of only 63.42, this potential bias was probably small.

Another bias could result from the inclusion criteria (above average proportion of parental fees that is subsidized by social welfare). The data do not include child-specific indicators of the socioeconomic status of the parents like education levels or household income.

Due to the inclusion criterion adopted in the legislation, in all of the preschools involved in the evaluation the proportion of parents who receive state welfare benefits to subsidize their contribution payments for the day-care center is above average. So, the data can be considered to represent preschools in social hotspots of Mecklenburg-Western Pomerania and will likely not fully reflect the situation in preschools in less disadvantages areas.

Our study also has several strengths. Due to the annual conduction of the DESK 3–6 R, we could analyze longitudinal data. The program E-PIX (Enterprise Patient Identifier Cross Referencing) by the Trusted Third Party of the University Medicine Greifswald (Unabhängige Treuhandstelle der Universitätsmedizin Greifswald, 2019) allows an unambiguous and efficient match of DESK scores over consecutive years on the level of the individual child and still assures a maximum level of data privacy. Another strength of the study is the large sample of children aged 5–6 years. The high utilization rate of preschools in Mecklenburg-Western Pomerania allows the evaluation to include nearly every child in the study region rendering the preschool population almost population-based limiting any potential selection bias. Another strength is the instrument itself: the DESK 3–6 R is a valid tool, which is easy to use for preschool teachers in their daily work and needs less training.

Future Prospects

The law's goal is to provide equal opportunities for all children before they start school. Since we used data from only a one-year follow-up, further research is needed to evaluate the long-term effects of this federal state law. However, the DESK domains, "social competence" and "social interaction," are only applicable in 5- to 6-year-olds. Therefore, data from primary schools should be included.

Nevertheless, reflecting the high impact of the social–emotional development on important life outcomes, e.g., academic achievement, job performance, occupational attainment, health, longevity, and personal and societal well-being, an optimum promotion of children's social–emotional development in primary schools is necessary. Thereby, primary schools should use evidence-based DESK results collected previously by preschools for a seamless continuation of promoting activities. Child-specific longitudinal data from the preschool should be linked with the results

from their school entry examination survey and with data reflecting school success in subsequent school years, which leads to a contribution to a further standardization of the school entry examination. In detail, we recommend the application of the German version of the SDQ (Strengths and Difficulties Questionnaire) to improve the comparability and to validate the predictive value of the DESK for the results of the school entry examination. In conclusion, a continuous surveillance of children's development allows the evaluation of the effectiveness of the federal state law aiming to reduce social inequalities.

Conclusions

The federal state law for children's day-care and preschools in Mecklenburg-Western Pomerania is striving to improve the school readiness of children. Especially young children in low-income families are challenged by multiple risks and comparative disadvantages. Our data indicate that early prevention programs have a potential to positively influence children's social development. The law also provides one of the rare examples of an evidence-based social policy. The longitudinal analysis indicates an improvement of developmental risks in the cohort of children of preschools. Nevertheless, over the same time period the DESK results of some children have deteriorated from no indication to a possible finding for a developmental risk. This points out the need for more effective promotion also of children without a clear developmental risk. This holds for children with internalizing problems.

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Declarations

Conflict of interest The authors declare that they have no competing interests.

Ethics Approval and Consent to Participate The study was approved by the Ethics Committee of the University Medicine Greifswald, Institute for pharmacology (ethic approval BB109/11).

Informed Consent The preschools involved have to perform the screening with every 3–6-year-old child. All parents of the participating children must provide their written informed consent before the data are sent to the evaluation team. Exclusively children with a parental signed informed consent will be included in the evaluation. The signed consent remains in the preschools. The parents can withdraw their consent any time without negative consequences for them or their children.

Research Involving Human Participants and/or Animals All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study has been positively evaluated by the Ethics Committee of the University Medicine Greifswald (Reg. No. BB 109/11) and the data protection commissioner of Mecklenburg-Western Pomerania, the Ministry of Employment, Gender Equality, and Social Affairs Mecklenburg-Western Pomerania/ Ministry of Social Affairs, Integration, and Gender Equality Mecklenburg-Western Pomerania.

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