

Progress in the German Language Acquisition Short Before School Enrolment: Children Acquiring German Under Unfavorable Sociodemographic Conditions vs. Other Children

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Abstract

Usually, sociodemographic factors related to the limited quality and quantity of the language input as well as the presence of language impairments are associated with a comparatively slow first or second language acquisition. However, if a follow-up study design is used instead of a cross-sectional one, such negative correlations with the pace of the language acquisition can be turned into positive ones, that is, children who acquire their first or second language under unfavorable conditions can show the best progress in the language acquisition. Up to now, this phenomenon was shown only in one study. In the current follow-up study, another sample was utilized to scrutinize the same phenomenon. For this purpose, sociodemographic and medical factors associated with the improvement in four- to five-year-old kindergarten children's German language competence were analyzed. All children ($N = 1,022$) were tested with German language screenings KiSS.2 and SSV as well as with "quasi-universal" non-words in the first test session and re-tested with the school enrolment test at least six months later. Factors that contributed to a considerable improvement of German language skills were related to limited quality and quantity of the German language input (e.g., late age of German language acquisition onset) and to language(-related) impairments. This finding reflects the quick pace of the German language acquisition in children with weak German language skills due to the German language input and language courses in kindergartens. Short before school enrolment they were catching up with peers who had acquired German under favorable conditions earlier.

Keywords: language acquisition, language screening, language assessment, German language

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Introduction

In most studies, sociodemographic characteristics of children and their families that are related to limited quality and quantity of the language input were shown to influence negatively the pace of language acquisition. Such factors are, among other things, non-attendance of nursery schools (Ertanir et al., 2018), limited sociability (Rudasill et al., 2014), and late age of (second) language acquisition onset (Seuring & Will, 2022). However, this refers to the studies assessing language skills at a certain time point, that is, to cross-sectional studies. Zaretsky and Lange (2022) showed in a retrospective follow-up study design that the results can be reversed when changes in language competence, instead of cross-sectionally assessed children's language competence, are scrutinized. Factors that usually result in deficient language skills were shown to be significantly associated with a quick progress in language acquisition. The authors explain this finding as a statistical phenomenon that occurs when children with age-appropriate German language skills show a "ceiling effect" (language competence that cannot get much better because it had already been good to excellent in the first test session), whereas children with limited German language skills demonstrate a "floor effect", that is, lag behind in language acquisition and are in the process of catching up with their more linguistically developed peers.

Language-related impairments and disorders such as autism spectrum disorder (Naigles & Tek, 2017) or hearing disorder (Werfel et al., 2022) as well as familial predisposition for language impairments (Rice et al., 2020) clearly impede children's language acquisition. However, the study by Zaretsky and Lange (2022), again, showed that children with language(-related) impairments and disorders improved their German language skills more quickly than typically developing children due to the same statistical phenomenon as described above.

The study presented here scrutinized the influence of sociodemographic and medical factors on the improvement in children's German language competence in the last two years before the school enrolment and tried to replicate the findings of Zaretsky and Lange (2022) for another sample tested in the same country (Germany) and with the same German language test ("Kindersprachscreening"/KiSS; Holler-Zittlau et al., 2011) as well as with two other tests. Special attention was paid to the tasks assessing the phonological short-term memory (PSTM) because well-developed PSTM was shown to be linked to advanced language competence (Ertanir et al., 2018), whereas deficits in PSTM are associated with various language(-related) impairments, disorders (e.g., El-Wakil et al., 2021; Lee & Ha, 2018) or medical conditions such as pre-term birth (Gresch et al., 2018). Sociodemographic and medical variables that can be considered unfavorable for German language acquisition as well as a weak PSTM were expected to be associated with a quick progress in acquiring German. Due to very weak to non-existent associations between children's nonword repetition performance and their hearing disorders, risk or early birth, participation in speech-language therapies, late language onset, and familial predisposition for language disorders (Zaretsky & Hey, 2022), nonword repetition was not expected to be a strong predictor for children's linguistic development.

Methods

Test Subjects

In this prospective follow-up study, 1,022 four- and five-year-old kindergarten children were tested in 2017-2019 and re-tested at least six months later with the linguistic part of the school enrolment examination. The inclusion criteria were (a) age 4;0-5;11 years in the first test session and (b) informed consent signed by parents. There were no exclusion criteria. Sample characteristics can be found in Table 1.

Table 1
Sample Characteristics

	MO	BM
<i>n</i>	208	814
Male	110 (52.9%)	415 (51.0%)
Female	98 (47.1%)	399 (49.0%)
Age (in months) 1 st test session: <i>M</i> ± <i>SD</i>	59.1 ± 4.2	57.2 ± 5.5
Age (in months) 2 nd test session: <i>M</i> ± <i>SD</i>	70.0 ± 4.1	72.1 ± 3.5
Months between two test sessions: <i>M</i> ± <i>SD</i>	10.4 ± 3.6	14.4 ± 5.5
Time span between two test sessions in months	6-24	6-30

Note. MO = monolinguals, BM = bi-/multilinguals, M = mean, SD = standard deviation

All children were classified as monolingual Germans (MO) or bi-/multilinguals (BM) on the basis of KiSS questionnaires for parents (item “Languages spoken at home”). Turkish, Arabic, and Russian speaking children made out almost one half of the BM subgroup. Because no statistical comparisons of MO and BM were carried out in the current study, their comparability in terms of age, biological sex, socioeconomic status etc. was not required.

Test Materials

In the first test session (t1), all children were tested in kindergartens using two language screenings and one list of “quasi-universal” nonwords. In the second test session (t2), children were tested in public health departments with one of official German school enrolment tests. For test names, characteristics, and references, see Table 2.

Due to the prominent role of PSTM performance among predictors for children’s linguistic development, three different PSTM tasks (nonword repetition tasks) were included in t1 (KiSS, SSV, QUNW) and compared with the nonword repetition subtest in SOPESS in t2. Nonword repetition tasks in t1 were either language-specific (KiSS, SSV) or language-unspecific (QUNW). For further characteristics of nonwords, see Table 3). Generally, articulation errors (e.g., rhotacism) were not considered as nonword repetition (or PSTM) errors.

Table 2
Characteristics of Tests

	KiSS.2	SSV	QUNW	SOPESS
Full test names in English	“Language Screening for Children”, 2 nd version	“Language Screening for the Preschool Age”, 2 nd version	“Quasi-universal non-words”	“Social-Pediatric Developmental Screening for School Enrolment Examinations”
Test authors	Holler-Zittlau et al. (2011)	Grimm (2017)	Chiat (2015)	Daseking et al. (2009)
Subtests	(1) speech comprehension (2) vocabulary (3) articulation (4) grammar (5) repetition of nonwords (6) repetition of sentences	(1) repetition of nonwords (2) repetition of sentences	(1) repetition of nonwords	(1) grammar (2) repetition of nonwords (3) articulation

Table 3
Characteristics of Nonwords

	KiSS.2	SSV	QUNW	SOPESS
<i>n</i> (nonwords)	4	18	16	6
German prefixes	2	1	0	0
German suffixes	2	8	0	2
German stems	0	2	0	0
Consonant clusters				
(a) 2 consonants	4	28	0	1
(b) 3	0	1	0	0
Phonemes /r, ʒ, ʃ, η, ʔ/*	4	12	0	4
Item length				
(a) 2 syllables	1	3	4	0
(b) 3	0	6	4	3
(c) 4	3	4	4	3
(d) 5	0	5	4	0
Linguistic load	high (morphology, phonology)	high (morphology, phonology)	zero	high (morphology, phonology)
Language-specific	yes	yes	no	yes
Nonword examples	<i>Triser,</i> <i>Nabolira</i>	<i>Kalifeng,</i> <i>Gattwutz</i>	<i>Lumika,</i> <i>Litisaku</i>	Not public
Test session	1	1	1	2

Note. QUNW = quasi-universal nonwords; * German-specific phonemes

For the direct comparability of language tests in t1 and t2, (a) KiSS subtests on speech comprehension and vocabulary as well as KiSS and SSV subtests on sentence repetition were excluded from statistical analyses because there are no such subtests in t2, (b) the KiSS grammar subtest was reduced to items on plural and preposition production because SOPESS grammar subtest contains tasks on these two domains only.

Sociodemographic and medical characteristics of children and their families were documented in KiSS questionnaires for parents and kindergarten teachers. Questionnaire items refer to the quality and quantity of children's German language input, their sociability and playing behavior, their language(-related) impairments, and familial predisposition for such impairments (see Table 4). In the current study, extended versions of questionnaires with some explorative items were used (14 relevant items in the questionnaire for parents and 28 items in the questionnaire for kindergarten teachers). Among other things, the KiSS questionnaire for kindergarten teachers contains a subjective estimation of children's German language skills with German school grades on a scale from 1 (= excellent) to 6 (= inadequate). In SOPESS, there is a comparable subjective estimation of children's German language skills on a scale from 1 (= inadequate) to 5 (= excellent).

Table 4a*KiSS Questionnaire Items: Questionnaire for Kindergarten Teachers*

Questionnaire items	Coding
Length of kindergarten attendance	months
Languages spoken at home	1 German, 2 more German than (an)other language(s), 3 more (an)other language(s) than German, 4 only (an)other language(s)
Kindergarten attendance for half a day or a full day	1 half a day, 2 full day
Attendance of a nursery school	1 yes, 2 no
The child likes to play with other children	1 never, 2 seldom, 3 sometimes, 4 often, 5 always
The child plays with German-speaking children	1 never ... 5 always
The child speaks out when playing	1 never ... 5 always
The child does not hear well	1 never ... 5 always
Language(-related) disorders/impairments	1 yes, 2 no
Attendance of associations or study groups	1 yes, 2 no
Speech-language therapy (in the kindergarten or beyond)	1 yes, 2 no
Participation in German language courses (in the kindergarten or beyond)	1 yes, 2 no
The child plays with child(ren) speaking his/her non-German L1	1 never ... 5 always
Child's age of the German language acquisition onset	years
Estimation of the child's current German language skills with a school grade	1 excellent, 2 good, 3 satisfactory, 4 sufficient, 5 deficient, 6 inadequate

Table 4b
KiSS Questionnaire Items: Questionnaire for Parents

Questionnaire items	Coding
Biological sex	1 male, 2 female
Languages spoken at home	1 German, 2 more German than (an)other language(s), 3 more (an)other language(s) than German, 4 only (an)other language(s)
Attendance of associations or study groups	1 yes, 2 no
Language-related impairments/disorders	1 yes, 2 no
Speech-language therapy	1 yes, 2 no
Other therapies	1 yes, 2 no
Participation in German language courses	1 yes, 2 no
Language delay in L1 (the first word after the 2 nd birthday)	1 yes, 2 no
Regular medication	1 yes, 2 no
Head injuries or operations	1 yes, 2 no
Auditory processing disorder	1 yes, 2 no
Permanent hearing disorder	1 yes, 2 no
Permanent sight disorder	1 yes, 2 no
Frequent otitis media	1 yes, 2 no
Motor disorder	1 yes, 2 no
Risk or early birth (before the 28 th gestation week or weight < 1500 gr)	1 yes, 2 no
The child attends pediatricians more often than other children	1 yes, 2 no
Dyslexia in the family	1 yes, 2 no
Language disorders in the family	1 yes, 2 no
Participation in the speech-language therapy in the family	1 yes, 2 no
Language delay in the family (the first word after the 2 nd birthday)	1 yes, 2 no
Father's educational level	1 no school certificate, 2 secondary school certificate, 3 intermediate school-leaving certificate, 4 Matura, 5 high school
Mother's educational level	1 no school certificate ... 5 high school
Father's age of German language acquisition onset	years
Mother's age of German language acquisition onset	years
Father's German language skills (own estimation)	1 not so good, 2 good, 3 very good
Mother's German language skills (own estimation)	1 not so good ... 3 very good
The child plays with German-speaking children	1 yes, 2 no

Statistical Analyses

For the direct comparability of language test results, total scores of correct answers in all subtests were *Z*-transformed (that is, standardized on the same scale, with a mean of 0.0 and a

standard deviation of 1.0). To quantify the progress in children's linguistic development, the following formula was used: " $Z(t2) - Z(t1)$ ". Positive values in the difference between Z values of two test sessions mean that the child's language competence improved considerably, negative values mean that the linguistic development was comparatively weak. Because nonword repetition was assessed in three tasks in $t1$ (KiSS, SSV, QUNW), and each of them was compared with the nonword repetition in SOPESS, the total number of Z -transformed total scores amounted to five: articulation (1), grammar (1), and nonword repetition (3).

Not only total scores of correct answers in language tests, but also subjective estimations of children's German language skills were compared. For a better comparability of these estimations (scale 1-6), the school grades 5 and 6 from KiSS questionnaires for kindergarten teachers were merged (because grade 6 hardly occurred), and the grades were re-coded, with 1 meaning "inadequate" and 5 meaning "excellent". Thus, there was no need to Z -transform subjective estimations of children's German language skills because both of them ranged from 1 to 5. Changes in estimations of children's German language competence were calculated by the formula " $\text{SOPESS scale} - \text{KiSS questionnaire scale}$ ". Again, positive values mean an improvement of the German language skills.

The statistical analysis begins with descriptive statistics on changes in the language competence between two test sessions. The most important influence factors on these changes were identified by 12 classification trees: ten with differences in Z -transformed total scores of correct answers and two with differences in the subjective estimations of children's German language skills on a scale from 1 to 5 as dependent variables (classification trees were calculated separately for MO and BM). Independent variables were (a) sociodemographic and medical variables from KiSS questionnaires, (b) children's age in months in $t1$ and $t2$, (c) time span in months between $t1$ and $t2$. Classification trees were chosen as the most relevant statistical method because they can demonstrate hierarchies of influence factors, with the most important ones as the highest branches.

Additionally, differences in Z -transformed total scores of correct answers in language tests as well as differences in the subjective estimations of German language skills between two test sessions were correlated with metrical and ordinal sociodemographic and medical characteristics of children and their families documented in KiSS questionnaires (Spearman's correlations). For dichotomous questionnaire items, point-biserial correlations were used. Also, Z -transformed total scores of correct answers in PSTM tasks, as possible predictors for changes in language competence, were correlated with differences in Z -transformed articulation and grammar scores as well as with differences in the subjective estimations of children's German language competence between $t1$ and $t2$ (Spearman's correlations). Again, all calculations were carried out separately for MO and BM. Only correlations $\geq .1$ are reported.

The study was approved by the ethics commission of Marburg University Hospital, Germany (approval number 117/16, 06. Sept. 2016).

Results

Descriptive statistics on (a) total scores of correct answers in language tests and subjective estimations of children's German language skills in both test sessions and (b) differences in test results between two test sessions can be found in Tables 5, 6.

Table 5

Descriptive Statistics on Total Scores of Correct Answers in Language Tests and on Subjective Estimations of Children's German Language Skills

TS	Tasks		MO	BM	Max. score
1	Articulation (KiSS)	M ±SD	11.87 ±1.81	11.03 ±2.30	13
2	Articulation (SOPESS)	M ±SD	9.51 ±0.93	9.53 ±0.90	10
1	Grammar (KiSS)	M ±SD	4.95 ±1.76	1.67 ±1.90	7
2	Grammar (SOPESS)	M ±SD	11.68 ±1.72	9.63 ±2.79	13
1	Nonword repetition (KiSS)	M ±SD	2.34 ±1.17	2.16 ±1.18	4
1	Nonword repetition (SSV)	M ±SD	10.78 ±3.74	9.52 ±4.08	18
1	Nonword repetition (quasi-universal nonwords)	M ±SD	11.34 ±2.70	11.43 ±2.86	16
2	Nonword repetition (SOPESS)	M ±SD	5.19 ±1.07	5.19 ±1.04	6
1	Subjective estimation of children's German language skills (KiSS questionnaire)	Median	4.0	3.0	5
2	Subjective estimation of children's German language skills (SOPESS)	Median	5.0	4.0	5

Note. TS = test session, M = mean, SD = standard deviation, MO = monolinguals, BM = bi-/multilinguals

Table 6

Descriptive Statistics on Differences in Z-Transformed Total Scores of Correct Answers in Language Tests and (Not Transformed) Subjective Estimations of Children's German Language Skills Between Two Test Sessions

Tasks		MO	Min.	Max.	BM	Min.	Max.
Articulation	M ±SD	0.00 ±1.03	-3.81	4.31	0.00 ±1.11	-5.86	4.31
Grammar	M ±SD	0.00 ±1.04	-3.91	3.01	0.00 ±0.98	-2.38	2.09
Nonword repetition (KiSS)	M ±SD	0.00 ±1.23	-4.55	2.75	0.00 ±1.22	-4.86	2.62
Nonword repetition (SSV)	M ±SD	0.00 ±1.10	-5.97	2.30	0.00 ±1.11	-4.87	3.12
Nonword repetition (QUNW)	M ±SD	0.00 ±1.05	-4.34	3.28	0.00 ±1.07	-4.93	3.38
Subjective estimation of children's German language skills	Median	0.0	-1.0	4.0	1.0	-2.0	4.0

Note. M = mean, SD = standard deviation, MO = monolinguals, BM = bi-/multilinguals, QUNW = quasi-universal nonwords

In the classification trees, the following influence factors were identified as the highest branches and, thus, showed the highest predictive power for improvements in the children's German language competence:

- MO who had not attended nursery schools in the first three years of life improved their articulation skills ($F(1, 206) = 7.38, p = .007, n = 208$).
- BM who had never or seldom spoken out when playing with other children in the kindergarten improved their articulation skills ($F(2, 811) = 19.15, p < .001, n = 814$), nonword repetition skills (SSV: $F(1, 807) = 38.39, p < .001, n = 809$), and also got

better in the subjective estimation of their German language skills ($F(3, 607) = 28.37$, $p < .001$, $n = 611$).

- MO who had not attended any associations or study groups improved their grammar skills ($F(1, 206) = 5.50$, $p = 0.020$, $n = 208$).
- BM with a long time span between two test sessions improved their grammar skills ($F(3, 810) = 18.41$, $p < .001$, $n = 814$) and nonword repetition skills (KiSS: $F(1, 812) = 16.93$, $p = .002$, $n = 814$).
- Relatively young BM (QUNW: $F(1, 812) = 23.53$, $p < .001$, $n = 812$) and MO improved their nonword repetition skills (KiSS: $F(1, 206) = 7.38$, $p = .007$, $n = 208$; QUNW: $F(1, 206) = 11.80$, $p = .001$, $n = 208$).

For detailed results of classification trees, including lower branches, see Appendix (Figures A1-A10: https://www.researchgate.net/publication/389979232_Online_appendix). No significant influence factors were found for differences in nonword repetition skills (SSV vs. SOPESS nonwords) and for differences between subjective estimations of children's German language skills in the MO subgroup.

Correlations between changes in children's German language competence and their sociodemographic as well as medical characteristics yielded a number of significant results that can be found in Tables 7, 8.

Table 7a

Point-Biserial and Spearman's Correlations Between (a) Differences in Z-Transformed Total Scores of Correct Answers Between Two Test Sessions and (B) Sociodemographic/Medical Characteristics of Children and Their Families; Variables With at Least One

Questionnaire items	KiSS: articulation		KiSS: grammar		KiSS: nonwords	
	MO	BM	MO	BM	MO	BM
QK: attendance of a nursery school	.170*	—	—	—	—	—
QP: attendance of associations or study groups	.145*	—	.189*	—	—	—
QP: participation in German language courses	-.166*	—	—	—	—	—
QP: head injuries or operations	-.142*	—	—	—	—	—
QP: language-related impairments	—	-.116**	—	—	—	—
QP: language disorders in the family	—	-.105**	—	—	—	—
QP: The child attends pediatricians more often than other children	—	—	—	-.125**	—	-.105**
QP: frequent otitis media	—	—	-.178*	—	—	—

Table 7b
KiSS, Spearman's Correlations

Questionnaire items	KiSS: articulation		KiSS: grammar		KiSS: nonwords	
	MO	BM	MO	BM	MO	BM
QK: length of kindergarten attendance	—	-.178***	—	-.133***	—	-.105**
QK: The child likes to play with other children	—	-.110**	—	—	—	—
QK: The child plays with German-speaking children	—	-.123**	—	—	—	—
QK: The child speaks out when playing	—	-.212***	—	—	—	—
QK: The child plays with child(ren) speaking his/her non-German L1	—	.165***	—	—	—	—
QK: child's age of German language acquisition onset	—	.159***	—	—	—	—
QP: mother's age of German language acquisition onset	—	.168***	—	.109**	—	—
QP: father's age of German language acquisition onset	—	.102*	—	.112**	—	—
QP: mother's German language skills	—	-.122**	—	—	—	—
QK: languages spoken at home	—	.202***	—	—	—	—
QP: languages spoken at home	—	.177***	—	.149***	—	—
Time span between t1 and t2	.150*	.238***	—	.236***	—	.125***
Child's age in t1	—	-.218***	—	-.207***	—	-.100**

Table 7c
SSV, QUNW, Point-Biserial Correlations

Questionnaire items	SSV: nonwords		QUNW	
	MO	BM	MO	BM
QP: language delay in the family	—	—	—	-.118**
QP: The child attends pediatricians more often than other children	—	-.105**	—	—
QP: language delay in L1	—	—	—	-.105**

Table 7d
SSV, QUNW, Spearman's Correlations

Questionnaire items	SSV: nonwords		QUNW	
	MO	BM	MO	BM
QK: length of kindergarten attendance	—	-.162***	—	-.134***
QK: The child speaks out when playing	—	-.189***	—	—
QK: child's age of German language acquisition onset	—	.164***	—	—
QP: father's age of German language acquisition onset	—	.125**	—	—
QP: father's German language skills	—	-.100**	—	—
QK: languages spoken at home	—	.171***	—	—
QP: languages spoken at home	—	.156***	—	—
Time span between t1 and t2	—	.172***	—	.135***
Child's age in t1	—	-.170***	-.191**	-.153***

Note. QP = questionnaire for parents, QK = questionnaire for kindergarten teachers, MO = monolinguals, BM = bi-/multilinguals, t1 = first test session, t2 = second test session, QUNW = quasi-universal nonwords

Table 8

Point-Biserial and Spearman's Correlations Between (a) Differences in Subjective Estimations of Children's German Language Skills (Documented in KiSS Questionnaires and SOPESS) Between Two Test Sessions and (b) Sociodemographic/Medical Characteristics of Children and Their Parents (Documented in KiSS Questionnaires); Variables With at Least One Statistically Significant Result

Questionnaire items	MO	BM
Point-biserial correlations		
QK: attendance of a nursery school	—	.185***
QP: attendance of associations or study groups	—	.112**
QK: participation in German language courses	-.249*	-.113**
QP: participation in German language courses	-.336**	—
QP: language-related impairments	—	-.113**
QP: dyslexia in the family	-.216*	—
QP: language delay	-.282**	—
QP: biological sex	—	-.125**
QK: speech-language therapy	-.287**	-.106**
QP: speech-language therapy	-.270**	-.114**
QP: risk or early birth	-.330**	—
Spearman's correlations		
QK: length of kindergarten attendance	—	-.200***
QK: The child likes to play with other children	-.254*	-.192***
QK: The child plays with German-speaking children	—	-.227***
QK: The child speaks out when playing	-.227*	-.373***
QK: The child plays with child(ren) speaking his/her non-German L1	—	.124*
QK: child's age of German language acquisition onset	—	.219***
QP: mother's age of German language acquisition onset	—	.181***
QP: father's age of German language acquisition onset	—	.134**
QK: languages spoken at home	—	.235***
QP: languages spoken at home	—	.145**
Time span between t1 and t2	—	.200***
Child's age in t1	—	-.213***

Note. QP = questionnaire for parents, QK = questionnaire for kindergarten teachers, MO = monolinguals, BM = bi-/multilinguals, t1 = first test session, t2 = second test session

Among correlations between PSTM scores in t1 and differences in articulation and grammar scores between t1 and t2, following calculations yielded significant results: low scores in KiSS ($\rho = -.228$), SSV ($\rho = -.238$), and “quasi-universal” ($\rho = -.207$) nonwords in t1 were associated with the improvement of BM's articulation skills (all $p < .001$). Also, low scores in KiSS ($\rho = -.193$, $p < .001$), SSV ($\rho = -.235$, $p < .001$), and “quasi-universal” ($\rho = -.125$, $p = .002$) nonwords in t1 were associated with improvements in BM's German language skills according to subjective estimations. All correlations in the MO subgroup were not statistically significant.

Discussion and Conclusion

Children whose German language skills improved between two test sessions did not attend nursery schools, associations and study groups, did not speak out much when playing with other children, did not acquire German since birth, and were comparatively young in t1. In

other words, their German language input was limited in terms of quality and quantity (or length) before t1, which resulted in unsatisfactory German language skills. Their German language competence improved considerably because there was much to improve. On the contrary, children with advanced German language skills in t1 showed ceiling effects, that is, could not get much better than very good or excellent and remained on the same level in their German language competence. No contradictions between objective (language tests) and subjective (estimations) results were found in terms of predictors for changes in the children's language competence.

One more significant influence factor for language improvement was a large time span between two test sessions. Because all children tested in the study attended kindergartens, it can be assumed that the real influence factor behind the variable "time span" is the length of kindergarten attendance. From that perspective, time spent in daycare facilities contributed to the higher quantity (length) of the German language input and thus to an improvement of German language skills (cf. Stich et al., 2017). Also, most kindergartens offer German language courses or at least German language assessment.

Univariate analyses (correlations) yielded a number of additional significant results with the same common denominator, namely, children with a limited quality and quantity of German language input before t1 considerably improved their German language skills. Almost all correlations were low ($< .3$) and many of them had to be excluded due to correlation coefficients below .1.

Univariate calculations revealed some aspects that remained invisible in the classification trees, namely the improvement of German language skills of children with various language(-related) impairments and disorders as well as of children with a familial predisposition for language impairments. This improvement was accompanied by the children's participation in speech-language therapies and German language courses. The factor "male sex" as a predictor for the improvement in the linguistic development can be explained by a higher prevalence of language impairments in boys compared to girls (Lange et al., 2016). Again, it is to assume that this relative improvement of German language skills can be traced back to a ceiling effect among typically developing children.

Three nonword repetition tasks were compared, including language-specific and language-unspecific ones. Children's age was identified as an important influence factor for changes in all nonword repetition scores, possibly indicating the relevance of some physiological/neurological factors that were still maturing between two test sessions and were not directly assessed in questionnaires (first and foremost, PSTM). However, for German-based nonword repetition tasks, variables related to German language input were also of importance (e.g., age of German language acquisition onset), whereas for QUNW, BM's language delay in their first language yielded a significant result, probably as an indicator of some language(-related) impairments and disorders. Thus, different kinds of nonwords showed qualitatively different influence factors.

Correlations between nonword repetition scores and changes in the German language scores showed that BM with a weak PSTM were catching up with BM who had better PSTM. Generally, QUNW yielded lower correlations than German-based nonwords and therefore can be considered weaker predictors for German language acquisition compared to German-based nonwords. However, German-based nonwords also demonstrated very low

correlations, which questions the predictive power of PSTM tasks, at least in the study design presented here.

To sum up, the identified influence factors can be subdivided into (a) those that had resulted in poor German language skills in t1 (factors related to limited quality and quantity of German language input as well as to language(-related) impairments and disorders) and (b) factors that contributed to an improvement of German language skills after t1 (e.g., participation in German language courses and speech-language therapies). The current study confirmed the finding of Zaretsky & Lange (2022) that sociodemographic and medical factors usually associated with limited German language skills under certain circumstances serve as (indirect) predictors for children's linguistic development. The same statistical phenomenon was found for children (BM) with a weak PSTM who were catching up with their peers. It is to be assumed that the same phenomenon can be found in future studies for children with below-average intelligence quotient, long-term memory, attention, and other physiological/psychological characteristics that are associated with a comparatively slow linguistic development.

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