

Chapter 2

2 The Bamberg BiKS Research Group¹

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Summary

BiKS, the German acronym for the current study, stands for “educational processes, competence development, and selection decisions in preschool and school-age children.” The present chapter provides an overview of the research conducted within in the research group, the study’s design, its samples, participants, and assessments. The interdisciplinary research group was supported by the German Research Foundation (DFG) and conducted by several researchers from psychology, education, and sociology. Across a period of more than 7 years, the study followed more than 4,000 Bavarian and Hessian children in two cohorts

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across very decisive phases of their academic careers. The first cohort, called BiKS-3-10, focused on 547 children from the age of 3 when they had just entered preschool until the end of primary school in Grade 4 and followed an additional 443 children attending the same classes across primary school. In the second sample, BiKS-8-14, a total of 2,395 students were assessed during the same time period from Grade 3 across the transition to secondary school until the end of secondary school in Grade 9. After the transition into secondary school, the sample was augmented by an additional 879 secondary school students. Not only the children, but their families, their preschool teachers, and their teachers were involved in the study as well.

Objectives of the study

As international studies on student assessment have shown, there are serious deficits in the German school system with regard to the students' achievement (Baumert et al., 2001). After the so-called "PISA shock" of the year 2000, the achievement of German students improved overall as shown in recent PISA assessments (OECD, 2010).

It is widely accepted that the development of the students' achievement is a result of their predispositions as well as their cumulative experiences in academic, pre-academic, and family contexts (e.g., Baumert et al., 2001; Hattie, 2009), but details about the factors that have contributed to the (differential) development of student achievements are still needed. This was one of the reasons why the BiKS research group (the German acronym for "Bildungsprozesse, Kompetenzentwicklung und Selektionsentscheidungen im Vorschul- und Grundschulalter"; English: "educational processes, competence development, and selection decisions in preschool and school-age children") was founded in 2005 at the Otto-Friedrich-University in Bamberg, Germany. The BiKS research group is supported by the German Research Foundation (DFG) to provide a close cooperation between researchers from psychology, education, and sociology to study the diverse factors that contribute to children's development. From a longitudinal perspective, BiKS focuses on developmental processes that are relevant to education and achievement in preschool as well as in elementary and secondary school by studying children from the ages of 3 to 15 in two panel studies that are aligned with each other.

BiKS also looks closely at the formation of transition decisions, examines their preconditions, and follows the effects of these decisions across the ensuing school years. Within that time period, the transitions from preschool institution² to elementary school and – especially in the German multi-tracked school system – from elementary to secondary school constitute important milestones for the children and for the research as well. In addition to the (pre)conditions in which the students live and learn within their institutional and family contexts, the relationships between these contexts are also important within the BiKS project.

The subprojects within the BiKS longitudinal study

When the study was first designed, one of the main intentions was to create a close research network of representatives from education, psychology, and sociology. To address the multifaceted research questions of the study, the BiKS project is divided into eight subprojects with different foci with regard to their main research topic. Each of these subprojects, which will be introduced below, consists of several researchers who work autonomously but within the framework of the overall project and belong to one of the previously mentioned disciplines. However, although all subprojects will be introduced, Subprojects 2, 3, 4, and 8 (listed below) are of special importance with regard to this book as these focus on facets of reading development.

Subproject 1

“Framing project – familial and institutional conditions for the linguistic and cognitive development of children’s abilities and decisions concerning children’s education in preschool and school-age children (longitudinal studies)”

Subproject 1 is responsible for the coordination of all subprojects and the supervision of the surveys run by the BiKS research group (see section “Design of the study”). The investigation of relations and interdependencies between the development of the children’s abilities and educational decisions are based on two longitudinal studies. In

² By this we mean the German ‘Kindergarten’, a pre-school establishment for children aged between three and six as part of child and youth welfare services - may be either publicly or privately maintained [not part of the school system].

these studies, children, their parents, and their preschool, primary school, and secondary school teachers are subjects of periodic research across a longer period. Several tests, questionnaires, interviews, and observations are used to examine the children's developing abilities as well as the parents', preschool teacher's and teacher's assessments, and more.

Subproject 2

“Longitudinal effects of the global and domain-specific quality of stimulation in the family, preschool, and elementary school on early childhood competence development”

Main focuses of Subproject 2 are the different learning environments the child is engaged in from early to middle childhood, how to measure quality of these learning environments and their effects on the development of language and more general cognitive competencies throughout early and middle childhood. In detail, the central aims of Subproject 2 are to investigate the effects of structural conditions, educational beliefs and domain-specific processes in early family and preschool settings on early childhood development and, as children go on to elementary school, the additional and interactional effects of the next institutional setting in the course of the children's development. Another aspect of Subproject 2 extends the longitudinal section to the last 2 years of elementary school to examine the characteristics that are important to this period of time in their educational trajectories (e.g., changes in curriculum, transition to secondary school, more peer contacts).

Subproject 3

“Analysis of the relation between language acquisition, (meta)cognitive development, and characteristics of adult-child interactions”

In the context of the overall study, Subproject 3 is responsible for the selection, development, and testing of instruments for measuring the abilities and skills of the children participating in the BiKS-3-10 sample. These measures include indicators of domain-specific as well as domain-general aspects of individual development. In addition to various measures of language and cognitive development selected control variables such as motivational aspects, self-concept, and personality variables are assessed.

Additionally, Subproject 3 is concerned with the analysis of the relation between language acquisition, cognitive development, and metacognitive progress (i.e., the acquisition of knowledge about knowledge and thought processes including children's developing "theory of mind"). A special interest lies in developmental differences in language and (meta)cognitive development due to social disparities. To investigate the impact of learning environment on these developments in more detail videos of adult-child interactions are analyzed. These include parent-child interaction situations (play, picture-book reading) at preschool age and teacher-child situations (classroom observation) in school age. Indicators derived from these interaction situations supplement measures assessed in Subproject 2. A special focus is on the developing (academic) language competencies of children, influencing variables and predictors (including characteristics of teachers' language) and their impact on school performance.

Subproject 4

"The development of students' competencies and interests in primary and secondary school"

Subproject 4 investigates the development of students' school competence development in the domains of mathematics, reading, and English as a foreign language and tries to explain interindividual differences by factors that occur at the school, classroom, and individual levels. In addition to the question of the interindividual stability of students' competence development, differential pathways of students' competencies for different groups of students, (e.g., different socio-economic backgrounds or different scholastic promotion) are demonstrated and linked to possible mediating processes. The second focus of the subproject is on the analysis of processes involved in the differentiation of students' interests. With respect to individual competence levels and subjective competence beliefs, we ask whether the expected decrease in the mean interest level can be attributed to processes of internal differentiation in favor of certain domains or subjects. Finally, the project focuses on the analysis of interrelations between competence and interest development and asks for instructional conditions that can promote successful development in both domains.

Subproject 5

“The formation of educational decisions in primary and secondary school”

Subproject 5 deals with educational decisions in primary school and during secondary school. In the first phase of the project, the focus was on the transition from primary to secondary school. After that, the stabilization or revision of the school choice was researched. Currently, the subproject plans to analyze the formation of educational decisions or those concerning vocational training at the end of lower secondary school in detail. With this new focus, the subproject works on five specific subjects:

- 1) The reconstruction of educational pathways to explain the differences of the cross-sectional results between PISA and IGLU,
- 2) the influence of institutional differences in frame conditions of secondary school on individual decision options,
- 3) the meaning of different actors (parents vs. peers) for educational decisions,
- 4) the influence of contextual conditions of school and non-school related educational processes and training facilities on decisions concerning education and vocational training respectively, and
- 5) the analysis of the development of school or work related interests and educational aspirations.

Subproject 6

“Formation of decision-making processes in connection with expectations in education and the development of competence: Transitions into primary school”

The central aspects of Subproject 6 are the ways in which parents and educators deal with primary school, the educational institution that follows kindergarten. A key phrase of the study is “school-readiness.” The project analyzes parents’ and educators’ understanding of this phrase and whether and how they assist their child’s development in this respect. Parents have limited input with regard to the age at which their children move on to primary school as well as the choice of the school itself. The study asks about the parents’ preferences for an earlier or later transition into primary school and about the point in time at which these questions become important to the parents. Which views do parents with a Turkish immigration background and their

children's teachers hold? In Bavaria in particular, those questions are of special interest because the school system intends to change the due dates concerning the age for mandatory school attendance for children, and this will result in younger primary school students there. Subproject 6 examines how the final decision about the child's schooling arrangements is formed based on the combined views and plans of the parents, the kindergarten and the chosen primary school. In addition, the success of school enrolment is observed in the view of parents and children and with regard to academic skills. Subproject 6 works in collaboration with Subprojects 2 and 5 by including corresponding questions in the surveys with parents and educators. Open guideline interviews were held with a small group of parents – including Turkish-speaking parents from Bavaria and Hesse.

Subproject 7

“Competence development and educational decisions of immigrant children in primary and secondary school”

Subproject 7 investigates the competence development of students with immigration backgrounds and parental decisions regarding the educational careers of their children in primary and lower secondary school. The research questions of this subproject address the educational aspirations of parents which are immigrants, the differences between parents and teenagers with and without an immigration status regarding the revision or stabilization of educational decisions, and the development of the occupational and educational aspirations of teenagers with immigration backgrounds. Furthermore, the perception of discrimination and gender-specific disparities in connection with school performance and aspirations are considered. Subproject 7 therefore analyzes quantitative data and conducts qualitative interviews with Turkish immigrant parents and their children.

Subproject 8

“Prerequisites, structure, and effects of teachers' diagnostic competence”

Subproject 8 focuses on the structure, the prerequisites, and the effects of teachers' diagnostic competence. This project aims to investigate the accuracy of teachers' diagnostic judgments concerning students' competencies in three different school-

related subject domains (German, Mathematics, and English) as well as judgments about students' motivations and emotions. The major goal of this subproject is to analyze the precursors and prerequisites of diagnostic competence. To this end, we differentiate between features of the class, the judgment object, and the teacher as predictor variables. In addition, the study assesses which of these variables might mediate the effect of teachers' diagnostic competence on students' performance.

Within the context of an additional study, the professional knowledge base of teachers' diagnostic competence was investigated in the domain of text comprehension. Thus, we were interested in the teachers' knowledge about factors affecting the difficulty of tasks and text characteristics and text comprehension strategies. Moreover, the variability and the promotion of the knowledge base were examined by comparing teachers with different professional backgrounds.

Design of the study

The BiKS research group runs a two-cohort longitudinal study using two different samples that are linked to each other in several ways. Both studies were originally designed to run for seven years.

In the BiKS-3-10 longitudinal study, the development of children's abilities, the influence of home learning environment and preschool quality, and decisions concerning the children's education – especially regarding the transition from preschool to primary school – are the objects of investigation. Beginning in the fall of 2005, an initial group of 547 3- and 4-year-old children were observed from the time they entered preschool across a period of 7 years until they had finished the fourth grade of primary school.

In the BiKS-8-14 longitudinal study, the objects of investigation are the development of children's abilities and decisions concerning the children's education – especially with regard to the development of the children's marks, competencies, interests, and aspirations as well as the transition from primary school to secondary school and the results of the decision to place a child in a special track. Beginning in the spring of 2006, a group of 2,395 primary school students were followed from the beginning of

the third grade across a period of 6 years until they completed the ninth grade of secondary school.

Many resources were dedicated to drawing the two samples to guarantee the quality of the research. Therefore, several criteria were formulated to guide the sampling procedures of both studies. The first criterion was a stratification by federal state. Sixty percent of the participants stemmed from Bavaria where the BiKS study is native, and 40% came from Hesse. The two federal states have differences with regard to their educational policies and institutional conditions, among others. A second stratification occurred with respect to city size. One third of the participants lived in major cities (Frankfurt/M. and Nuremberg); the other two thirds lived in market towns and rural regions. Furthermore, facilities (i.e., schools and kindergartens) with low, medium, and high immigration ratios each provided one third of the children. Last, an equal distribution of the number of groups per facility (1 to 3) was attempted.

The bar graph shown in Figure 1 illustrates that the BiKS measurement points cover an age range from kindergarten to the end of grade 9, with a 1.5 year overlap in grade 3 and 4.

Progress of the two samples

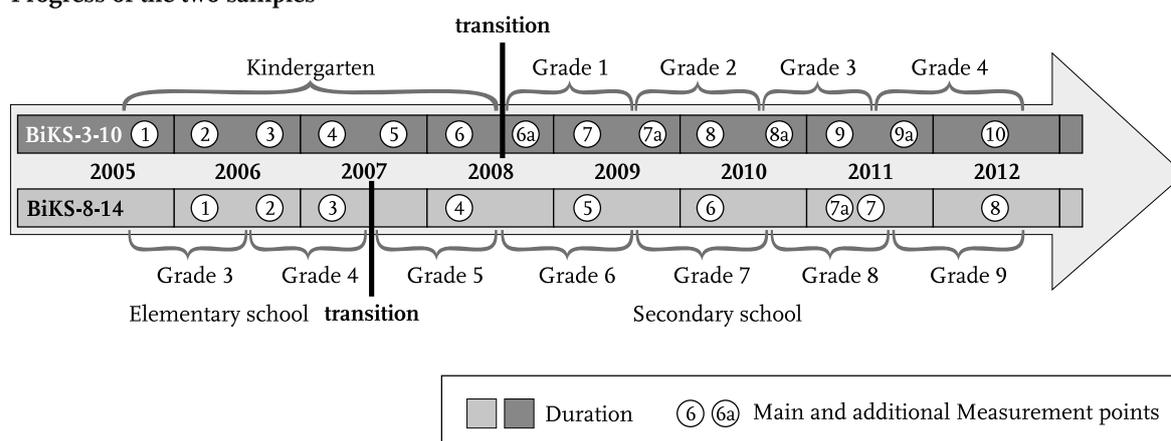


Figure 1. Time bar with measurement points of the two BiKS samples.

In the following section, the design of the two studies will be described in more detail, including the development of the samples from the beginning of the BiKS longitudinal

study until now as well as the wide variety of measurement instruments that have been applied across the years.

Design and study participants: BiKS-3-10

The BiKS-3-10 study uses a stratified (by immigration status, region, and federal state) random sample to survey the effects of different contexts on the processes that are relevant to the development and fostering of the children as well as to survey the effects of tracking decisions that are made in the school system. For better comparability across kindergartens, special facilities such as outdoor or integrative kindergartens and open facilities without regular groups were not included in the sample.

Table 1. Selected Characteristics of the BiKS-3-10 Sample at the Beginning of the Study

Sample size	N = 547 attending 97 Kindergarten groups
Children's mean age (t1)	M = 44.5 months (SD = 5.0)
Gender distribution	52.2% male 47.8% female
Family status	84.6% married 10.8% unmarried 4.4% divorced 0.2% widowed
Number of children in the families	23.0% families with a single child 51.7% families with two children 25.3% families with more than two children
Immigration background (by the parents' birth country)	78.1% no immigration background 11.7% one parent born in a foreign country 10.2% both parents born in foreign countries
Highest school leaving certificate in the family	0.7% no certificate 18.6% certificate of secondary education 31.3% general certificate of secondary education 46.3% general qualification for university entrance 3.1% foreign certificate

The original sample was recruited from 60 Bavarian and 37 Hessian preschool classes with 547 children in 97 kindergartens with a mean age of 44.5 months (cf. Table 1). The average number of children assessed per preschool class was 5.6. This number is not equivalent to the class size of the preschools as preschool classes were usually comprised of age-mixed groups and not all the children in a class did necessarily meet

the inclusion criterion. Children were included in the study if mandatory school enrollment was due in the fall of 2008. Males comprised 52.2% of the children who were chosen to be in the sample. With respect to the initial sample and based on the parents' birth country, three fourths of the children (78%) were German, 12% had a mother or father who was born in a foreign country, and 10% of the sample had parents who were both immigrants. Nearly 8% of the children in the sample usually spoke a language other than German with their families. Furthermore, 85% of the parents were married, and in almost one half of the sample, the highest level of education in the families was the general qualification for university entrance.

In 2008, there were still 94 daycare centers participating in the study, corresponding to exactly 5 children per facility. However, this is only the number of children whose parents permitted them to participate. At each measurement point, part of the sample did not fill out some measures because they were absent for some reason; thus, the real level of participation was – depending on the measurement point and the instrument – approximately 2% to 8% lower than Figure 2 and Figure 3 suggest. In 2009, most children in the sample transitioned to elementary school. New classmates were asked to join the study, first, so that we could obtain more information about the class context with regard to the mean socio-economic status and the achievement level among other things, and second, to increase the number of children who began school 1 year before or 1 year after the usual point in time. When the children transitioned to elementary school at the expected age, 471 children (86% of the original sample) continued to participate in the BiKS study. We were then able to recruit an additional 528 families to participate. Thus, the sample size was increased to 999 children. In 2011, when most children in the sample were in the third grade, it was necessary to again ask the parents for their permission. Unfortunately, a substantial number of parents refused to agree to the further participation of their children so that the sample was reduced. (cf. Figure 2).

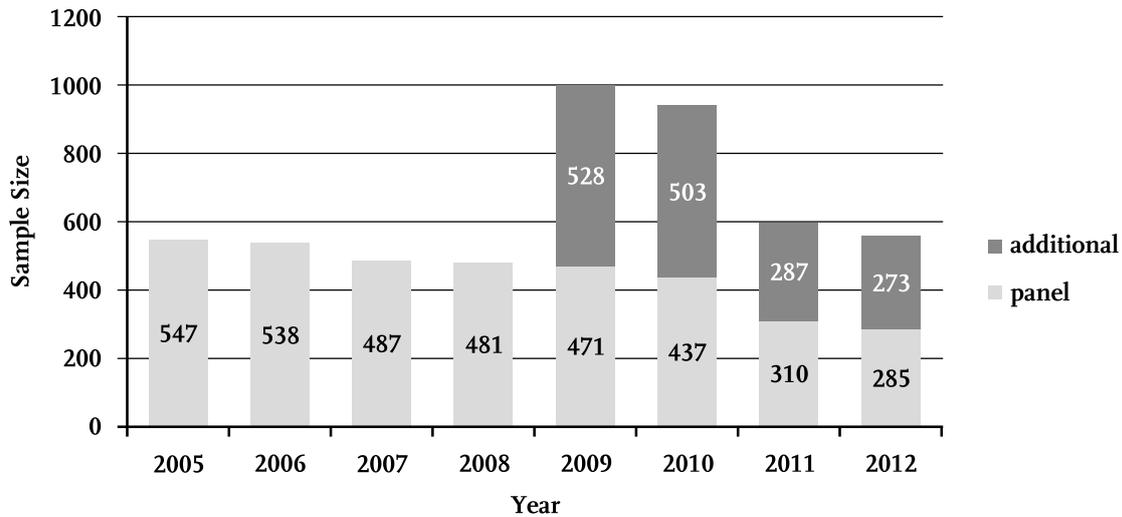


Figure 2. Sample enhancement and panel attrition for BiKS-3-10³

Of course, the children did not all begin school at the same time. It was especially challenging to longitudinally follow the children who began school one year earlier or one year later than the majority of their peers who began school at the expected age. An additional focus within the BiKS study lies on these children, but because they are not relevant to this book, they are merely mentioned here.

Design and study participants: BiKS-8-14

The second sample, BiKS 8-14, was initially recruited in 2006 with a total of 2,395 children who attended the third grade in 155 different classes distributed across 82 Bavarian and Hessian elementary schools. Their mean age was 9 years and 3 months; 52.2% were male. The sample was deliberately chosen from schools into which the children of the BiKS-3-10 sample would probably move after kindergarten. Thus, we were able to directly compare the measures and facets of the BiKS-3-10 sample with the BiKS-8-14 sample in the third and fourth grades with a temporal distance of 5 years in the same institutional context.

³ Besides the main measurement points drawn in Figure 2, additional studies took place between them using subsamples for special research questions, the details of which cannot be given here.

Table 2. Selected Characteristics of the BiKS-8-14 Sample at the Beginning of the Study

Sample size	N = 2,395 attending 155 classes in 82 schools
Children's mean age (t1)	M = 111.1 months (SD = 5.7)
Gender distribution	52.2 % male 47.8 % female
Family status	83.6 % married 5.4 % unmarried 10.2 % divorced 0.8 % widowed
Number of children in the families	15.3 % families with a single child 51.5 % families with two children 33.2 % families with more than two children
Immigration background (by birth country of the parents)	73.5 % no immigration background 12.8 % one parent born in a foreign country 13.6 % both parents born in foreign countries
Highest school leaving certificate in the family	2.8% no certificate 22.0% certificate of secondary education 32.4% general certificate of secondary education 42.5% general qualification for university entrance 0.3% other

The sample characteristics were similar to the BiKS-3-10 sample. Slight differences existed with regard to family status, for which the proportion of divorced parents was more than twice as high, which was probably due to the higher age of the parents. Most likely for the same reason, the proportion of families with more than one child was somewhat higher in this older sample. The distribution of immigrants in the BiKS-8-14 sample was very similar to the one found in BiKS-3-10, but the percentage of children who usually did not speak German in their families was only half as high (i.e., 4%) as in the other sample.

After three measurement points, the children of the BiKS-8-14 sample moved from elementary school into secondary school. Then, for economic reasons, different approaches were used to follow the existing sample and enhance it with additional students from the classes the children moved into. The first approach that we applied affected about 800 children who could not be followed in the school context after they transitioned to secondary school (e.g., because they moved to schools outside of the research area). These children remained in the study by answering questionnaires that were sent by mail but no longer completed any competence tests. In a second approach, about 380 children took part in the assessment by filling out only questionnaires distributed by their class teachers within the class context. For the third

approach, the 920 children who had been in the study since elementary school were supplemented by an additional 879 new classmates (see Schmidt, Schmitt, & Smidt, 2009; Kurz, Kratzmann, & von Maurice, 2007). This sample was given questionnaires as well as competence tests to fill out, and therefore serves as the basis of the following sample description. Most students in this sample (62%) attended the Gymnasium then, 18% went to Realschule, and 21% chose the Hauptschule. Altogether, BiKS-8-14 had a total sample size of nearly 3,000 students.

Figure 3 shows the panel attrition across the seven measurement points from the year 2006 on. Similar to the first sample described above, only the sample size based on parental permission is shown regardless of the number of students who were absent on the test day. Generally, there was a decline across time as usually found in empirical research. The decrease in 2011 was – as happened in the other sample – due to the parents who declined to renew their permission. In this case, not only the parents had to agree to the further participation of their child, but the students themselves were also asked for their permission because most of them had reached the age of 14. At this age, the students had to be asked personally according to German law. Not surprisingly, a substantial part of the sample refused to give their permission. The remaining sample consisted of almost 2,000 students.

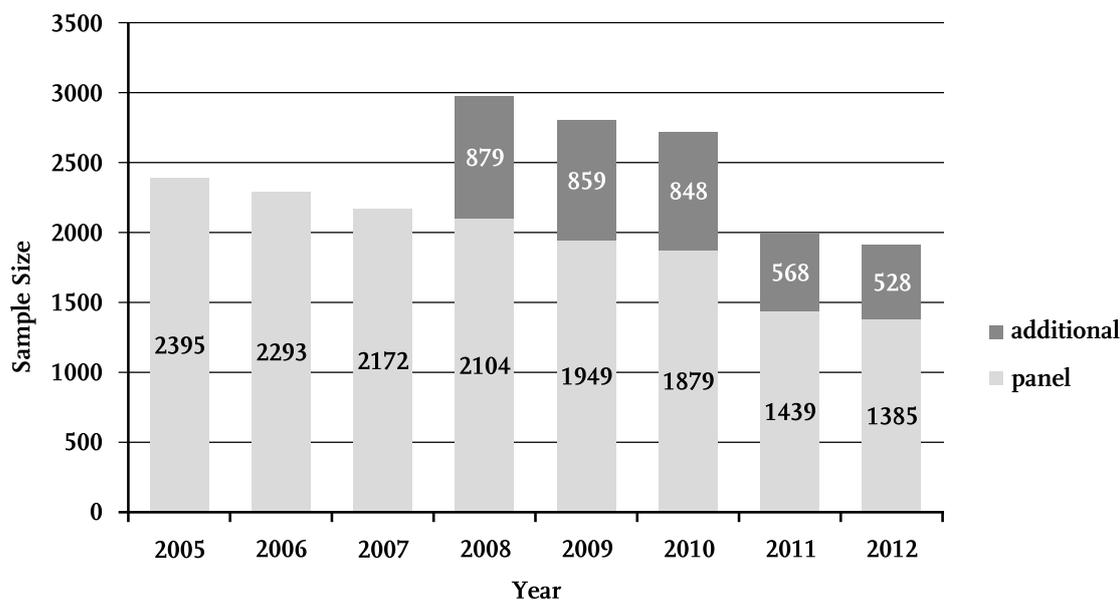


Figure 3. Sample enhancement and panel attrition for BiKS-8-14.

Measurement methods

A variety of different information was surveyed in the BiKS study. At each of the measurement points (i.e., 14 in BiKS-3-10 and nine in BiKS-8-14; cf. Figure 1), multiple instruments were applied. These instruments can be roughly divided into instruments related to or applied in institutional settings (e.g., questionnaires for preschool teachers and teachers, monitoring instruments, and competence tests administered in individual or group settings for the children and students), instruments related to or applied in family settings (e.g., questionnaires and computer-assisted telephone interviews for parents, monitoring instruments in the family context, and competence tests as individual tests for the children and students); in addition, qualitative interviews (personal interviews with teachers, parents, or children) were conducted. Some of the instruments were applied only to a subsample (e.g., only to Bavarians or only to some Turkish participants). Due to the frequent observations and repetition of the same or similar instruments, the BiKS data provide an excellent opportunity to trace the children's development very closely and to explore the conditions of this process with a unique variety of factors.

To provide deeper insight into the variety of competence instruments applied in the BiKS study, the two following tables present the main competence facets that were surveyed over time. Whereas BiKS-3-10 focused initially on language acquisition and cognitive development in kindergarten as precursors of the academic competencies measured from the first grade on, BiKS-8-14 naturally had academic measures at the center of its research from the beginning. The competence tests that were used consisted of either self-developed and piloted or established instruments. All tests were chosen to be appropriate for the children's age at each measurement point and allow for comparability over time.

In the following, Table 3 provides an overview of the competence facets that were assessed at each of the main measurement points of BiKS-3-10. They were given as either individual tests in the family context or as group tests in schools. Some of the measures (e.g., reading comprehension) were the same as in the second sample, BiKS-8-14, so that the children of the two samples could be linked to the time when each of the cohorts attended the fourth grade of elementary school. Competence facets were not necessarily measured with one and the same competence test, even if they are named equal across the measurement points in the table.

Table 3. Main Competence Facets Measured in the BiKS-3-10 Sample across Time*

	2005 1 st year kinder- garten	2006 2 nd year kinder- garten	2007 3 rd year kinder- garten	2008/09 1 st grade elementary school	2009/10 2 nd grade elementary school	2010/11 3 rd grade elementary school	2011/12 4 th grade elementary school
Language	vocabulary grammar indicators of language production	vocabulary grammar indicators of language production	vocabulary grammar indicators of language production	vocabulary grammar academic language indicators	vocabulary grammar academic language indicators	vocabulary grammar academic language indicators	vocabulary grammar academic language indicators
Reading				reading compre- hension	reading compre- hension reading speed	reading compre- hension reading speed	reading compre- hension reading speed
Working memory	verbal short term memory	verbal short term memory	verbal short term memory			verbal short term memory	verbal short term memory
	nonverbal short term memory	nonverbal short term memory	nonverbal short term memory				
Knowledge	factual and conceptual knowledge	factual knowledge	factual knowledge				
Speed of information processing		naming speed	naming speed	naming speed	naming speed		
Nonverbal cognitive abilities	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning
Mathe- matics	arithmetic	arithmetic	arithmetic	arithmetic	arithmetic	arithmetic	arithmetic
Indicators of meta- cognitive under- standing		meta- cognitive under- standing	meta- cognitive under- standing	meta- cognitive under- standing	meta- cognitive under- standing	meta- cognitive under- standing	meta- cognitive under- standing

*The table includes only the main assessment points (when all children were tested) and only central measures; some measurement instruments had to be changed according to age and measurement point. Some of the competence facets were, at some measurement points, assessed by various instruments/indicators and some were only gathered from subsamples.

Similar to the previous table above, Table 4 displays the competence measures of BiKS-8-14, starting in the third grade of elementary school in 2006 and going to the end of secondary school. The focus of this sample was on academic achievement and reading competence, Thereby, the development of these competencies can be described across

an 8-year period, including various factors collected by the other instruments that were applied.

Table 4. Main Competence Facets Measured in the BiKS-8-14 Sample across Time*

	2005/06 3 rd grade elementary school	2006/07 4 th grade elementary school, 1 st term	2006/07 4 th grade elementary school, 2 nd term	2007/08 5 th grade secondary school	2008/09 6 th grade secondary school	2009/10 7 th grade secondary school	2010/11 8 th grade secondary school	2011/12 9 th grade secondary school
Language	vocabulary	vocabulary grammar	vocabulary	vocabulary	vocabulary	vocabulary	vocabulary	vocabulary
	listening compre- hension			foreign language English	foreign language English	foreign language English		
Reading	reading compre- hension reading speed	reading compre- hension	reading compre- hension	reading compre- hension	reading compre- hension	reading compre- hension	reading compre- hension	reading compre- hension
Writing	ortho- graphy		ortho- graphy		ortho- graphy	ortho- graphy		
Non- verbal cognitive abilities	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning	abstract reasoning
Mathe- matics	arithmetic	arithmetic	arithmetic	arithmetic, geometry+ story problems	arithmetic, geometry+ story problems	arithmetic, geometry+ story problems	arithmetic, geometry+ story problems	

*Some of the competence facets were, to some measurement points, only gathered from subsamples.

Furthermore, both the BiKS-3-10 and BiKS-8-14 studies were specifically amended by several qualitative and quantitative surveys with different subsamples that are not depicted here separately. Such a detailed examination that follows children from age 3 to age 15 is unique in the field of educational research and, as this book demonstrates, provides a wide variety of options for analyses.

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