Article

Dorothea Blomeyer, Katja Coneus, Manfred Laucht and Friedhelm Pfeiffer, "Early life adversity and children's competence development: evidence from the Mannheim Study of Children at Risk", Journal of Economics and Statistics, forthcoming.

Information on the Mannheim Study of Children at Risk (MARS)

For data protection reasons MARS data are not publicly available. In case you are interested in the data please contact:

Prof. Dr. Manfred Laucht, PhD

Head of Neuropsychology of Childhood and Adolescence Research Unit

Central Institute of Mental Health

Department of Child and Adolescent Psychiatry and Psychotherapy

PO Box 122 120

D-68072 Mannheim, Germany

Email: manfred.laucht@zi-mannheim.de

Further references

Laucht, M., Esser, G., Schmidt, M.H., Ihle, W., Löffler, W., Stöhr, R.-M., Weindrich, D. & Weinel, H. (1992). "Risikokinder": Zur Bedeutung biologischer und psychosozialer Risiken für die Entwicklung in den ersten beiden Lebensjahren. *Praxis der Kinderpsychologie und Kinderpsychiatrie*, 41, 274-285.

Laucht, M., Esser, G., Schmidt, M.H., Ihle, W., Marcus, A., Stöhr, R.-M. & Weindrich, D. (1996) Viereinhalb Jahre danach: Mannheimer Risikokinder im Vorschulalter. *Zeitschrift für Kinder- und Jugendpsychiatrie,* 24, 67-81

Laucht, M., Esser, G. & Schmidt, M.H. (2000) Längsschnittforschung zur Entwicklungsepidemiologie psychischer Störungen: Zielsetzung, Konzeption und zentrale Ergebnisse der Mannheimer Risikokinderstudie. *Zeitschrift für Klinische Psychologie und Psychotherapie, 29,* 246-262.

Laucht, M., Esser, G. & Schmidt, M.H. (2000). Entwicklung von Risikokindern im Schulalter: Die langfristigen Folgen frühkindlicher Belastungen. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, 32, 59-69.

Data Appendix: Description of the psychometric assessments

Cognitive, motor and non-cognitive competencies

Three months: Cognitive competencies, *IQ*, were measured using the Mental Developmental Index (MDI) of the Bayley Scales of Infant Development (Bayley, 1969). The fine and gross motor competencies, *MQ* (called the motor quotient), were assessed by the Psychomotor Developmental Index (PDI) of the Bayley Scales.

Two years: The *IQ* was derived from the Mental Developmental Index (MDI) of the Bayley Scales of Infant Development. A differentiation is made between verbal competencies, *V-IQ*, and nonverbal cognitive competencies, *NV-IQ*. The verbal competencies score is derived from the items of the Bayley Scales indicating language development, in combination with the expressive and the receptive language scales of the Münchener Funktionale Entwicklungsdiagnostik (MFED) (Köhler and Egelkraut, 1984). The nonverbal cognitive competencies are derived from the nonverbal items of the Bayley Scales, indicating basic, general abilities such as perception and logical and figural reasoning. The *MQ* was assessed by the Psychomotor Developmental Index (PDI) of the Bayley Scales.

Four and a half years: The composite score of the *IQ* contained the Columbia Mental Maturity Scale (CMMS) (Burgmeister et al., 1972) and the subtest "sentence completion" of the Illinois Test of Psycholinguistic Abilities (ITPA), (Kirk et al., 1968; for the German version, see Angermaier, 1974). From these, a differentiation is made between *V-IQ*, language-dependent abilities and *NV-IQ*, indicating nonverbal abilities. The *MQ* was derived from the Test of Motor Abilities (MOT) 4-6 (Zimmer and Volkamer, 1984).

Eight years: The composite score of the *IQ* was assessed by the Culture Fair Test (CFT) 1 (Weiss and Osterland, 1977), measuring nonverbal skills, such as the ability to perceive and integrate complex relationships in new situations, and the subtest "sentence completion" of the ITPA, mentioned above, indicating verbal reasoning (*V-IQ*). The *MQ* was assessed with the body coordination test for children (KTK) (Kiphard and Shilling, 1974).

Eleven years: The *IQ* was measured with the CFT 20 (Cattell, 1960; for the German version see Weiss, 1987) and a vocabulary test of the CFT 20, again allowing verbal, *V-IQ*, and nonverbal competencies, *NV-IQ*, to be distinguished. The *MQ* at age eleven years was assessed by means of a short version of the body coordination test for children (KTK).

Non-cognitive competencies were measured as the child's ability to pursue a particular activity and its continuation in the face of distractors and obstacles, defined as *persistence* (*P*). This measure was derived from a combination of a standardized parent interview and structured direct observations in four standardized settings on two different days in both familiar (home) and unfamiliar (laboratory) surroundings in order to reduce measurement errors. The ratings were generated by experts on five-point rating scales adapted from the New York Longitudinal Study NYLS (see Thomas and Chess, 1977). At the ages of three months and two years, the interrater reliability was measured in a subsample of thirty children. Satisfactory interrater agreement was obtained between two raters (three months: mean $\kappa = 0.68$, range $0.51 - 0.84$; two years: mean $\kappa = 0.82$, range $0.52 - 1.00$). Until the age of two, *P* is measured together with attention span within the same scale. *P* is available throughout the first five waves. *P* is a deep-seated

non-cognitive competencies related to effort regulation, perseverance, persistence and self-discipline.

We examined further dimensions from the NYLS scales, among them the initial reaction to a new stimulation, the length of time needed to adapt, and the prevailing mood. Our econometric analysis revealed that these dimensions showed no systematic correlations with the cognitive competencies, which seems to be in line with the early literature. Studies cited by Thomas and Chess (1977) indicated that none of these temperament measures were associated with the level of the *IQ*.

Table A3 contains summary statistics of the competencies *IQ*, *MQ* and *P* in the nine risk groups of MARS. Note that the *IQ* and the *MQ* were normalized in each developmental stage to a mean of 100 and a standard deviation of fifteen in an approximate normative sample of 110 children. For reasons of clarity, we restrict the presentation to the ages of three months and eleven years. There is a monotonic decrease in the *IQ* and the *MQ* in (nearly) all risk dimensions. Differences in average *IQ*, *MQ* and *P* increase between the ages of three months and eleven years in the risk matrix. At the age of three months, children without any risk have an average *IQ* of 103 compared to the children with high organic and high psychosocial risk, whose average *IQ* is 88. In addition, differences in the standard deviations increase with risk, from 13.2 in the non-risk group to 19.8 in the highest-risk group (Table A3). The results for the *MQ* provide a similar picture.

Average *persistence* decreases monotonically along both risk dimensions. There is a twenty-three percent difference between the non-risk and the high-risk group of children at the age of four and a half years (3.8 vs. 3.1, Table A3), with the heterogeneity of *P* (measured with the standard deviation) increasing along with the risk dimensions. At the age of eleven years, children without any risk have an average *IQ* of 108 (SD 15.3),

compared to the children with the highest organic and psychosocial risk, who achieve an average score of 87 (SD 27.3) (Table A3). The average gap in cognitive competencies at the age of eleven between the non-risk and the maximum-risk group increased from fifteen to twenty-one.

Home environment

In MARS, the socio-emotional home resources, *H* (HOME score), were rated with the Home Observation for Measurement of the Environment (HOME, Bradley, 1989), adapted to German living conditions. All items were evaluated by trained home visitors (interviewers), who were in contact with the primary caregiver. *H* is the sum of all items. Economic conditions were measured by the monthly net equivalence income per household member, *Y*.

When the children are aged 3 months, *H* consists of six subscales, taken and adapted from the Infant-Toddler HOME (Caldwell and Bradley, 1984). Table A4 displays the original scales and the adaptations. The largest difference between the original HOME and the adapted version had to be made in the infant – toddler HOME at age 3 months. Only 26 of the original 45 items were applicable for that age group and the prevailing sample.

Most modifications had to be made in the scales '*provision of appropriate play materials',* where only 1 out of 9 items could be used due to the limited motor abilities of the 3-month-olds, and *maternal involvement with the child* with 2 out of 6 items due to the limited cognitive abilities. In the scale *opportunities for variety in daily stimulation,* two items concerning possession of books and having meals with both parents were replaced by ratings of adequate furnishment in the nursery and a child-friendly surrounding. At

the age of two years, *H* comprises the same six subscales including 40 out of the original 45 items. Again, most modifications had to be made in the scale *maternal involvement with the child*: four out of the six items were deleted, because they could not be observed or were not applicable to the sample. One item concerning encouragement of developmental advance was specified in the direction of language fostering.

At the age of four and a half years, *H* consists of the eight subscales of the HOME-inventory for families of preschool children (Caldwell and Bradley, 1984). In total 45 out of the 55 items were applied.

While in the scales *learning stimulation, warmth and acceptance, academic stimulation, modeling, variety in experience* and *acceptance* one or two items were deleted, the scales assessing *language stimulation* and *physical environment* remained unchanged except slight adaptations to German living conditions sustaining the original meaning of the item.

At the age of eight and age eleven years, MARS used the translated version of the HOME inventory for families of elementary children (Caldwell and Bradley, 1984), respectively the version for families of early adolescents (Bradley et al., 2000), consisting of eight and seven subscales with fifty-nine and sixty items without any modifications.

Social outcomes

To assess social outcomes, from the ages of four and a half to eleven years, the *Scales for Levels of Functioning* (Marcus et al., 1993) were used. Based on expert ratings the scales measure hobbies (*interests*), and integration into groups and social life (*peers*) (for descriptive statistics see Table A5).

School achievement

School achievement at the age of 8 years is measured with grades in *math, spelling* and *reading*. Note that in the German educational system, grades range from 1.0 (excellent) to 6.0 (insufficient). As a general rule, school choice in the German tracking system takes place after class four at the age of ten. On average, forty-five percent of the children in the MARS attend a *Gymnasium*, which is the highest-track/grammar school in Germany (for descriptive statistics see Table A6). Thirty percent attended a *Realschule (medium track school)*, sixteen percent a *Hauptschule* (lowest secondary school track) and nine percent more specific school types (*Förderschule*, *Rudolf Steiner Schule*).

A *Förderschule* is a school type for children with (learning) disabilities. According to official statistics on the 2006/07 school year in Baden-Württemberg, twenty-eight percent of the students in the ninth grade attended a *Gymnasium*, thirty-one percent a *Realschule*, twenty-nine percent a *Hauptschule*, eleven percent a *Förderschule* and 1.3 percent a *Rudolf Steiner Schule*.

In our data, more children attend the higher-track secondary school compared to the average in Baden-Württemberg for the ninth grade. One explanation for this finding is that children from immigrant families with poor German language skills, and children with severe handicaps, were not included in MARS.

Table A3: Children's competencies at three months and eleven years evaluated in the risk matrix (means, standard deviations in parentheses)

		Psychosocial Risk					
		non-risk		moderate		high	
		IQ (Intelligence Quotient)					
		3 months	11 years	3 months	11 years	3 months	11 years
Organic Risk	non-risk	103* (13.5)	108* (15.3)	102* (16.7)	107* (16.3)	96* (15.9)	100* (18.9)
	moderate	101* (16.0)	105* (10.4)	99* (16.5)	98* (13.3)	97* (16.3)	97 (19.2)
	high	95 (13.2)	101* (20.0)	93 (17.4)	92 (24.0)	88 (19.8)	87 (27.3)
		MQ (Motor Quotient)					
		3 months	11 years	3 months	11 years	3 months	11 years
Organic Risk	non-risk	103* (12.1)	104* (13.0)	102* (12.5)	106* (17.2)	103* (13.9)	104* (12.8)
	moderate	101* (13.6)	97* (12.3)	98* (15.7)	103* (14.1)	99* (13.6)	98* (18.1)
	high	93 (12.1)	98* (16.9)	92 (13.5)	97* (23.6)	89 (13.8)	86 (26.5)
		P (Persistence score) (measured at 4.5 years instead of 3 months)					
		4.5 years	11 years	4.5 years	11 years	4.5 years	11 years
Organic Risk	non-risk	3.82* (0.68)	4.27* (0.54)	3.50* (0.73)	4.13* (0.59)	3.17 (0.83)	3.84 (0.79)
	moderate	3.54* (0.63)	4.02* (0.53)	3.38 (0.75)	3.87 (0.59)	3.20 (0.80)	3.63 (0.73)
	high	3.61* (0.64)	3.99* (0.56)	3.14 (0.70)	3.71 (0.64)	3.07 (0.77)	3.55 (0.91)

MARS, 364 observations; *IQ* and *MQ* are normalized to a mean of 100 and an SD of 15 in the normative group; persistence scores vary between 1.0, 1.1, … (low) and 5.0 (high); * indicates the significance of differences relative to the highest-risk group at the 5 percent level.

Table A4: Subscales of the HOME (original compared to the MARS adapted version)

Age	HOME Version	Original		MARS adaptation	
		scales	items	scales	items
3 m	Infant/Toddler (0-3)	6	45	6	26
	(1) Emotional and verbal responsivity of the mother				
	(2) Avoidance of restriction and punishment				
	(3) Organization of physical and temporal environment				
	(4) Provision of appropriate play materials				
	(5) Maternal involvement with the child				
	(6) Opportunities for variety in daily stimulation				
2 y	Infant/Toddler (0-3)	6	45	6	40
	Same scales as 3m				
4.5 y	Preschool (3-6)	8	55	8	45
	(1) Learning materials				
	(2) Language stimulation				
	(3) Physical environment				
	(4) Resposivity				
	(5) Academic stimulation				
	(6) Modeling				
	(7) Variety in experience				
	(8) Acceptance				
8 y	Elementary children (6-10)	8	59	8	59
	(1) Emotional and verbal responsivity				
	(2) Encouragement of maturity				
	(3) Emotional climate				
	(4) Growth fostering materials and experiences				
	(5) Provision for active stimulation				
	(6) Family participation in developmentally stimulating experiences				
	(7) commitment of the father				
	(8) Aspects of the physical environment				
11 y	Early Adolescents (11-18)	6	81	6	81
	(1) Physical environment				
	(2) Learning materials				
	(3) Modeling				

(4) Fostering self-sufficiency

(5) Regulatory activities

(6) Variety of experiences

(7) Acceptance and responsivity

Table A5 Social outcomes at the age of 8 years evaluated for children in the risk matrix (means, standard deviations in parentheses)

		Psychosocial Risk		
		non-risk	moderate	high
		interests / autonomy (expert ratings)		
Organic Risk	non-risk	5.09* / 4.64* (0.74 / 0.81)	4.87* / 4.84* (0.89 / 0.73)	4.37 / 4.78* (1.17 / 0.98)
	moderate	4.98* / 4.83* (0.68 / 0.88)	4.42* / 4.52 (0.75 / 1.15)	4.09 / 4.35 (0.99 / 1.13)
	high	4.92* / 4.59 (0.83 / 1.04)	4.31 / 4.26 (1.06 / 1.31)	3.95 / 4.07 (1.21 / 1.42)
		peer relations (expert ratings)		
Organic Risk	non-risk	4.82* (0.92)	4.62* (0.89)	4.57* (1.15)
	moderate	4.48* (0.89)	4.45* (0.94)	4.39 (1.05)
	high	4.81* (0.91)	4.41 (1.02)	3.98 (1.24)

MARS, 364 observations; social competence scores range from 1.0 (low), 1.1, … to 5.0 (high), self-concept scores range from 10 (low) to 24 (high); * indicates significant mean differences relative to the high risk group at the 5 percent level.

Table A6: School achievement (grades) at age 8 and higher-track

secondary school attendance at age 11

| | | Psychosocial Risk | | |
		non-risk	Moderate	high
		Grades in reading, spelling and math [a) at age 8		
Organic Risk	non-risk	2.0*/ 2.1*/ 2.1*	2.2*/ 2.2*/ 2.1*	2.3/ 2.6 / 2.4*
	moderate	2.2*/ 2.2*/ 2.2*	2.4 / 2.4*/ 2.4	2.8 / 2.9 / 2.7
	high	2.1*/ 2.2*/ 2.3*	2.4 / 2.4 / 2.6	2.8 / 3.0 / 2.9
		Higher-track secondary school attendance Gymnasium / Realschule / others [b) at age 11 (in percent)		
Organic Risk	non-risk	74* / 24* / 02*	77* / 09* / 14*	43 / 21* / 36
	moderate	45 / 40* / 15*	38 / 38* / 34*	33 / 23 / 44
	high	54* / 23* / 23*	27 / 38 / 45	15 / 28 / 67

MARS, 322 to 357 observations, depending on the available information; [a) in the German educational system, grades range from 1.0 (excellent) to 6.0 (insufficient), [b)Haupt-, Förder- and Rudolf-Steiner-Schule, *indicates significant mean differences relative to the high-risk group at the 5 percent level.

References

Angermaier, Michael (1974). *Psycholinguistischer Entwicklungstest*, Beltz, Weinheim.

Asendorpf, Jens B., and Marcel A.G. van Aken (1993). Deutsche Versionen der Selbst-konzeptskalen von Harter. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, 25 (1), 64-96.

Bayley, Nancy (1969). *Bayley Scales of Infant Development*, Psychological Corporation, New York.

Bradley, Robert H. (1989). The Use of the HOME Inventory in Longitudinal Studies of Child Development. In: Marc H. Bornstein, and Norman A. Krasnegar (Eds.), *Stability and continuity in mental development: Behavioral and biological perspectives*. Hillsdale, New Jersey: Lawrence Erlbaum, 191-215.

Bradley, Robert H., Corwyn, R.F., Caldwell B.M., Whiteside-Mansell, L., Wassermann,G.A. & Mink, I.T. (2000). Measuring the Home Environments of Children in Early Adolescence. *Journal of Research on Adolescence, 10,* 247-288.

Burgemeister, Bessie, Lucille Blum, and Irving Lorge (1972). *Columbia Mental Maturity Scale,* Harcourt Brace Jovanovich, New York.

Caldwell, Bettye M., Robert H. Bradley (1984). Administration Manual (revised Edition) Home observation for measurement of the environment. University of Arkansas at Little Rock, Little Rock, Arkansas.

Cattell, Raymond B. (1960). *Culture Fair Intelligence Test*, Scale 1 (Handbook). 3 ed., IPAT, Champaign, Ill.

Harter, Susan, and Robin Pike (1984). The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children. *Child Development*, 55 (6), 1969-1982.

Kiphardt, Ernst J., and Friedhelm Schilling (1974). *Körperkoordinationstest für Kinder (KTK)*, Beltz, Weinheim.

Kirk, Samuel A., James J. McCarthy, and Winifred D. Kirk (1968). *Illinois Test of Psycholinguistic Abilities*, University of Illinois Press, Urbana.

Köhler, Götz, and Heinz Egelkraut (1984). *Münchner Funktionelle Entwicklungsdiagnostik für das 2. und 3. Lebensjahr: Handanweisung*, Institut für soziale Pädiatrie und Jugendmedizin der Universität, München.

Marcus, Alexander, Bernd Blanz, Günter Esser, Joachim Niemeyer, and Martin H. Schmidt (1993). Beurteilung des Funktionsniveaus bei Kindern und Jugendlichen mit psychischen Störungen. *Kindheit und Entwicklung*, 2, 166-172.

Thomas, Alexander, and Stella Chess (1977). *Temperament and Development*, Brunner/Mazel, New York.

Weiss, Rudolf, and Jürgen Osterland (1977). *Grundintelligenztest CFT 1*, Westermann, Braunschweig.

Weiss, Rudolf (1987). *Grundintelligenztest CFT 20*, Hogrefe, Göttingen.

Zimmer, Renate, and Meinhart Volkamer (1984). *Motoriktest für 4-6jährige Kinder (MOT 4-6)*, Beltz, Weinheim.