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Improving Mother–Child Interaction in Low-income Turkish–Dutch Families: A Study of Mechanisms Mediating Improvements Resulting from Participating in a Home-based Preschool Intervention Program

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This study examined whether the effects on cognitive and language outcomes of a recently developed home-based educational intervention program, Opstap Opnieuw, for 4–6-years-old disadvantaged children could be explained by improved mother–child interaction. The present sample (*n*=30) was drawn from a larger sample of Turkish–Dutch families (*n*=181) for which in a previous study significant effects of Opstap Opnieuw were found on children's (first) language and cognitive pre-math skill, 5 months after the program ended. The present study focused on two facets of interaction quality as possible mediators of these program effects: the mean cognitive distancing level of mothers' communication and instruction behaviour as an indicator of the cognitive and verbal stimulation provided, and the degree of cooperation as an indicator of mothers' social-emotional support to their children. Both measures were based on systematic observation of mother–child interaction during sorting tasks. Participation in the program appeared to improve mothers' social-emotional support behaviour substantially, but not their cognitive distancing behaviour. For Turkish (first language) vocabulary, about half of the program effect appeared to be mediated by the improved social-emotional support. For cognitive pre-mathematical skills, two-thirds of the program effect appeared to be mediated by improved social-emotional support. Mothers' cognitive distancing was moderately-strongly related to children's vocabulary development, but did not mediate program

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effects. Some implications of the results are discussed.

Key words: early educational intervention program; mediating mechanisms; mother–child interaction; home-based program

INTRODUCTION

Children growing up in low income and ethnic minority families are at risk of later school failure (Barnett, 1995; Leseman and De Jong, 1998; Farran, 2000; Halpern, 2000). Statistics on early school achievement in several countries show that early educational disadvantages are already manifest at the start of formal education in grade one of primary school. Worldwide early educational intervention programs are brought into action to prevent early school problems by promoting the development of preschool language, literacy, numeracy and social-emotional skills that are the starting points of formal learning in reading, writing and mathematics, beginning in grade one.

The predominant model of early educational intervention programs is the *preschool* (Barnett, 1995; Bowman *et al*., 2001; Farran, 2000). Preschools provide rather intensive (usually half-day) centre-based educational programs, delivered by professionals over several years before entry in kindergarten or first grade. Less frequently, home-based programs are provided to low income and minority families, requiring parents to work systematically with their children as 'informal teachers'. At first sight, the benefits of the home-based approach seem obvious. Since parents and children already share so much time together in daily household routines, social events and leisure time activities, talking, playing, solving problems, and—occasionally—reading and writing, the family setting seems to provide an excellent site for implementing an intensive educational program with comparatively low costs. Furthermore, since low income and minority parents with only a few exceptions have high expectations regarding their children's school career and later social prospects (Okagaki and French, 1998), they seem highly motivated to take up the role of educator, if sufficiently and adequately supported. Finally, investing in the educational potential of the family in early childhood may prove to be very cost-effective in the long term, because the family continues to be an important context for children's development far beyond the preschool years.

However, the efficacy of home-based programs is on average much lower than that of centre-based programs or combined centre-based and home-based programs, as systematic reviews reveal (Barnett, 1995; Farran, 2000; Goodson *et al*., 2000; Halpern, 2000; Van Tuijl *et al*., submitted; White *et al*., 1992). Although some recent high-quality home-based programs yielded sizeable effects with some target groups on some outcome measures (Baker *et al*., 1999; Kağıtçıbaşı *et al*., 2001; Riksen-Walraven *et al*., 1996; Van Tuijl *et al*., 2001), overall results are disappointing. Several explanations have been offered, in addition to poor program quality and poor implementation (Farran, 2000). Some critics have emphasized that relevant aspects of parenting and parental informal instruction to children are hard to change fundamentally by a home-based approach (Halpern, 2000). Others contend that home-based programs can change parents' beliefs, attitudes and behaviour, but cannot affect children's development through these changes (Goodson *et al*., 2000). Still others differentiate between effects of home-based programs in the social-emotional and the cognitive-

language domain, where the latter is seen as relatively hard to influence (Riksen-Walraven, 2002; Riksen-Walraven *et al*., 1996). Therefore, three questions arise: Do home-based programs address relevant aspects of the home-environment? If so, are the methods employed to change these aspects effective? And, finally, if so, do these changes in the home-environment promote children's development, in particular regarding cognitive and language skills? Answers to these questions are important for the improvement of the home-based strategy in early childhood intervention.

Families as Learning Environments

In striking contrast to the disappointing evidence on the efficacy of home-based educational interventions, there is nowadays very little doubt about the essential role of the family in early childhood as the most important microcosm of the larger social world in which parents function as teachers and primary sources of knowledge that help young children to take their place in the world (Sigel *et al*., 1993). Research shows that the development of representational competence and cognition in general (Laosa, 1982; Leseman and van den Boom, 1999; Sigel *et al*., 1993), language skill (e.g. Bornstein *et al*., 1998; Hart and Risley, 1995; Hoff-Ginsberg, 1991; Weizman and Snow, 2001; Wells, 1985), emergent literacy (Bus *et al*., 1995; Leseman and de Jong, 1998; Whitehurst and Lonigan, 1998), emergent numeracy (Leseman and de Jong, 2001) and problem-solving skill (Fagot and Gauvain, 1997; Landry *et al*., 2000) are related to specific characteristics of parent–child interactions, such as parents' sensitive responsiveness and emotional support to the child, their vocabulary use and conversational style, and their informal instruction strategies. Several of these studies examined social class and ethnic-cultural differences in an attempt to explain early differences in cognitive, language and social-emotional development (cf. Bornstein *et al*., 1998; Hart and Risley, 1995; Hoff-Ginsberg, 1991; Laosa, 1982; Leseman and de Jong, 1998; Leseman and van den Boom, 1999; Wells, 1985). Lower class and ethnic minority parents were on average found to be less sensitive-responsive to their children and to offer them less emotional support in performing tasks, to use less extensive vocabularies and to engage less frequently in extended discourse with their children, to read less frequently to their children and to read less often in a dialogical way, and to use more directives and fewer open, cognitively challenging prompts and questions in joint play and problem-solving interactions. In statistical analyses, these proximal characteristics of the home environment were found to mediate social class and ethnic minority effects on development and early school achievement entirely (Bornstein *et al*., 1998; Leseman and de Jong, 1998; Leseman and van den Boom, 1999; Wells, 1985).

In summary, much is already known about the different ways families informally educate their children and prepare them for elementary school. This information could be used to improve early educational programs in general, and home-based educational programs working with parents in a family setting in particular. Ideally, a home-based program for low-income and minority families with children at risk for school failure would seek to change parental behaviour in all afore-mentioned respects covering cognitive, language, literacy, numeracy and social-emotional development. Even then, however, it remains to determine whether a program that was designed in accordance with the recent evidence will succeed in changing parent–child interaction patterns so as to promote the development of emergent school-skills.

This is the subject of the present article. In an in-depth study that was part of larger evaluation research of a recently developed and evaluated home-based program for ethnic-minority families in the Netherlands, the changes in mothers' interaction and instruction styles as induced by the program were assessed and related to program effects. The results to be reported may increase our understanding of how carefully designed home-based programs operate and may suggest ways to further improve this type of early childhood educational intervention.

The Dutch Home-based Program Opstap Opnieuw

As part of the Dutch educational priorities policy for bilingual immigrant families, a home-based educational program was developed, commissioned by the national government, that was to be carried out by mothers with a target child in the age range of 4 to 5 years of age in order to provide the child with a head start in primary school. The decision to develop this new program was a reaction to disappointing experiences with the Dutch version of the well-known Israeli HIPPY-program (Home Instruction Program for Preschool Youngsters) (Lombard, 1981), which in the Dutch context had been found to be ineffective (Eldering and Vedder, 1999). Although the basic structure of HIPPY was maintained, including the use of paraprofessional aides to guide mothers in working with the program, the program activities and materials were completely redesigned in accordance with recent theorizing in developmental and educational psychology. The new program, called Opstap Opnieuw ('A Step-up Revised', hereafter OO), aimed at improving the cognitive and social-emotional quality of mother–child interactions to enhance children's cognitive and language skills. Developmental domains addressed by the program were semantic and logo-mathematical concept knowledge, problem-solving skill, emergent numeracy, vocabulary, text comprehension skill, and emergent literacy. The program lasted 2 years and ran parallel to children's attendance of a regular kindergarten (starting at age 4 in the Netherlands, lasting two to three years before entrance in grade one, and attended by nearly 100% of 4- to 6-year-olds).

The core of the program consisted of a structured curriculum specifying different kinds of playful educational activities to be carried out collaboratively by mother and child at home. The activities gradually increased in complexity and demandingness over the 2 years. For instance, regarding language development, early in the program the emphasis was on vocabulary acquisition, whereas in the second year much time was devoted to the development of text comprehension skills. The curriculum covered 2 years (effectively, 30 weeks in each year) and was presented to the mothers on weekly instruction and worksheets, which specified activities for 5 days each week. In total, there were 150 planned activities per year. Instructions to the mothers about how to carry out the activities were written on instruction sheets in clear, simple language and illustrated by pictures. Stories and songs were also made available on audiotape.

The mothers were supported by paraprofessionals who were to explain the worksheets, to demonstrate appropriate interaction behaviour during home visits, and to monitor the faithful implementation by the mothers of the scheduled program activities. These paraprofessionals were experienced mothers themselves, belonged to the same communities as the target families and spoke their languages. They received a brief introductory training on developmental and educational principles (e.g. how young children learn) and were coached by professional coordinators during the implementation of the program. The

paraprofessionals visited the families every two weeks. In addition to the support by paraprofessionals, there were also monthly group meetings for the mothers in a neighbourhood centre to provide information about authoritative child-rearing and sensitive-responsive interaction styles. A videotape showing a model mother–child interaction was used for demonstrating these principles.

The effectiveness of the approach was evaluated in a quasi-experiment involving bilingual Turkish and Moroccan immigrant families with a 4-year-old child. The design consisted of pre- and posttest assessments and the equivalence of the experimental and control groups was controlled by analysis of covariance (for a full report, see Van Tuijl *et al*., 2001). The program was overall very well-implemented, especially in the Turkish group: 93% of the prescribed activities were carried out, 83% of the group meetings were attended by the mothers, and 73% of the planned home visits actually took place. Information on the implementation fidelity was collected from several sources: structured lists kept by the paraprofessionals that were periodically handed over to the coordinators, attendance registration lists of the group meetings kept by the coordinators, and periodical work reports of the paraprofessionals (for more details, see van Tuijl *et al*., 2001). As to the outcomes, there were statistically significant medium-sized effects in the Turkish group immediately after the intervention on general cognitive-premathematical concept development, weak effects on Turkish productive vocabulary (children's first language), and no effects on Dutch vocabulary (children's second language). The fact that no effects were found on Dutch vocabulary in the Turkish group could be explained by the fact that the vast majority of Turkish families worked with the program in their own home language (a Turkish version was made available). In the Moroccan group there were no statistically significant short-term effects at all, for which a number of explanations were offered (Van Tuijl *et al*., 2001). A recently completed 2-year follow-up study, however, revealed a lasting effect of the program on grade retention rates, which were significantly lower in both the Turkish and Moroccan program groups compared to the Turkish and Moroccan control groups (Van Tuijl, submitted).

Aims of the Present Study

Having reported the overall results of the OO program elsewhere, the focus of the present in-depth study was on the possible mediating mechanisms through which positive results were obtained in the Turkish target group. More specifically, the study drew upon a representative subsample of the original Turkish cohort, and addressed two hypotheses: (a) the OO program improves the quality of mother–child interaction in Turkish program families, in both cognitive and social-emotional respects, and (b) the higher quality of mother–child interaction in these respects explains the program effects on children's Turkish vocabulary and general cognitive-pre-mathematical skill.

METHOD

Subjects

The study involved 30 Turkish immigrant families in the Netherlands, 9 families with a boy and 21 with a girl as target child. 17 families followed the OO program, 13 families served as controls. The families were recruited from the

larger cohort of Turkish families ($n = 181$; 122 program families and 59 control families) that was involved in the effect evaluation study of the OO program (Van Tuijl *et al.*, 2001). Families were eligible for the program if both parents were born in Turkey and had received fewer than 10 years of formal education. For the effect evaluation study, program families were contacted personally; 60% agreed to participate. Turkish control families of equivalent socioeconomic background, living in the same neighbourhood and not involved in any educational intervention program, were recruited *via* the kindergarten departments of the primary schools that were attended by the program children; 40% of the families that were contacted agreed to participate in the control group. Note that these families had little to gain by participating.

From the original cohort, 80 randomly chosen families were asked to participate in the in-depth study. The response rate was approximately 38%, yielding a sample of 30 families. The main reason for refusing participation concerned the use of a videocamera to record mother–child interaction.

Although the present sample is rather small for statistical generalization to a population, it comprises nearly 17% of the original cohort. This cohort, moreover, is accurately represented by the subsample, since no systematic differences on any of background variables and pretest measures were found. Note also that the present research aims were limited to explaining the program effects found within the larger cohort.

At pretest, all children attended a kindergarten department of a primary school. Their mean age was 56 months ($S.D. = 3.6$; range 48–63).

Design and Procedures

The study was designed as a non-randomized pretest—posttest quasi-experiment. At the start of the program, both control and program families were visited at home. During these visits video-recordings were made of mother–child interaction while jointly solving a sorting task consisting of 21 cards with familiar objects that had to be grouped in three. The group of 'fruits', for instance, consisted of three cards, one with an 'apple', one with 'cherries' and one with a 'pear'. At the posttest, 2 years later, 5 months after the program ended, mothers and children were videotaped at home again, using a more complex sorting task, requiring children to complete rows of three cards with two additional cards according to semantic–taxonomic relationships. The sorting tasks were adapted from two previous studies with socioeconomically and ethnically varied samples of families with 3–6-year-old preschool children, including Turkish families, revealing strong effects of SES and ethnicity (Leseman and van den Boom, 1999; Leseman and de Jong, 1998). Mothers received standard instructions on the tasks, explaining that the children were supposed to perform the task and that the mothers were allowed to assist and instruct the child whenever they thought this necessary. The first 5 min of the video-recordings were selected for detailed transcription and translation in Dutch by a bi-lingual Turkish–Dutch assistant, covering for most mother–child dyads the start and middle phase of the task performance, occasionally also the end phase. All verbal utterances and a predetermined set of non-verbal actions thought to be relevant for task performance (e.g., pointing to cards, assembling a row of cards) were transcribed and coded by trained coders.

In addition, at both pretest and posttest, trained Turkish–Dutch research assistants individually tested children to assess their language and cognitive-pre-mathematical skills. Information about the family structure and the family's

socioeconomic background was collected by means of a structured personal interview with the mothers.

Measurements

Language and Cognitive Measures

The pretest measures of language and cognitive skills consisted of an IQ-test and tests of Turkish receptive and productive vocabulary, all norm-referenced tests. The IQ-test used was a short form of the Revised Amsterdam Child Intelligence Test (RAKIT; Bleichrodt *et al.*, 1984). The vocabulary tests were part of the Diagnostic Test of Bilingual Development (DTT; Verhoeven *et al.*, 1995). To strengthen the measurement quality the receptive and productive vocabulary scores were combined into a composite score (the intercorrelation was $r = 0.58$, $p < 0.001$).

For the posttest, language and cognitive measures were selected that revealed program effects in the original effect evaluation study. In the language domain, the tests of Turkish productive vocabulary, used for the pretest measurement, was repeated. In addition, a norm-referenced test of cognitive pre-mathematical skill was used, testing knowledge of logo-mathematical concepts (e.g. size, amount, seriation), designed for student-monitoring in kindergarten classrooms (van Kuyk, 1996). The language of the test was Dutch. The reliabilities of all pre- and posttests measures were satisfactory (Cronbachs alphas were between 0.89 and 0.93).

Family Background

The interviews yielded measures of parents' education and employment status, years of residence in the Netherlands, home language use and the family composition. Duration of education was determined on a three-point scale, with 1 standing for *at most three years of school education*, 2 for *4 to 6 years of education* and 3 for *7 or more years of education*. Level of completed education was also determined on a three-point scale with 1 representing *primary school at most*, 2 *lower vocational secondary education*, and 3 *all higher levels of education*. Home language was either coded as *predominantly Turkish* or as *predominantly Dutch*.

Mother–child Interaction Quality

The transcriptions were coded on three aspects, focussing on the mother and combining real time coding and event-sampling procedures.

Each behavioural unit, viz. verbal utterance or non-verbal action, was evaluated as to the function for establishing and maintaining cooperation between mother and child, either as *initiation* (an instruction, question, suggestion), *cooperative response* (semantically coherent expansions and extensions of a child's utterance or action, responses that followed a child's initiative), or *non-cooperative* utterance or action (inner talk, solitary behaviour, ignoring or rejecting an initiation). The coding categories were based on previous work by Blank (1980) and Leseman *et al.* (2001), and many others. For the present purpose, the focus was on mother's *cooperative interaction* behaviour, which was computed as the rate of cooperative responses of all utterances and actions by the mother.

Further, in each transcript, the number of utterances by the mother that contained encouragements and praises but had no further task instruction content, was counted. The variable *encouragement* was the rate of encouraging and praising utterances by the mother of all utterances and actions by the mother.

In the analyses to be reported in the next sections, mother's cooperative interaction and encouragement were combined into a composite variable indicating mother's *social-emotional support* to the child (the intercorrelations ranged from $r = 0.60$, $p < 0.001$, at posttest to $r = 0.70$, $p < 0.001$, at pretest).

Finally, each behavioural unit was evaluated as to the cognitive distancing level, which is a measure, based in neo-Piagetian developmental theory, of the cognitive quality of parental instruction in parent–child interaction that has been used in several studies (cf. Cocking and Renninger, 1993; Leseman and van den Boom, 1999; Sigel *et al*., 1993). The original distancing scale of Sigel was tailored to the type of tasks used in the present study (viz. semantic-taxonomic classification). Three distancing levels were distinguished, ranging from 1 *low level* (not task directed behaviour, but instead, pointing behaviour, simple executive actions or simple concrete verbal directives, such as 'take this', 'put it there'), 2 *intermediate level* (thematic-syntagmatic categorization rules, such as 'what do you always see together, a chair and a ...', discourse extensions referring to personal experience and contextualized knowledge, such as 'look for what daddy uses when he is carpentering'), to 3 *high level* (explanations of the rules of the task, references to the superordinate concepts of the task, such as 'pick all pictures of tools', and to concept-defining semantic features, and discourse extensions conveying general decontextualized world-knowledge). The variable *distancing instruction* was computed as the mean distancing level of all utterances and selected non-verbal actions by the mother.

Intercoder Reliability of the Observation Measures

The reliability of the coding scheme was determined on the basis of a transcript that was coded independently by two trained coders. The correspondence between the two coders was computed using a formula described by Lytton (1980): $A/(A + D + \frac{1}{2}X)$, in which A represents the number of corresponding codes, D the number of different codes and X the number of different selections of observation units. Cohen's κ seemed less adequate given that the distancing categories represented a three-point scale. The results were satisfactory, with correspondence rates for cooperation of 78% at the pretest and 97% at the posttest, for encouragement by the mother of 78% at the pretest and 89% at the posttest, and for distancing instruction of 80% at the pretest and 87% at the posttest.

RESULTS

Descriptives

Table 1 presents background information on the program and control group of the current study. The two groups were reasonably equivalent with respect to socio-economic background and family structure, with the exception of the duration of mothers' education which was reported to be significantly longer for the program group ($F(1, 29) = 6.13$, $p < 0.05$). However, regarding the attained level of education there was no statistically significant difference. This finding may be indicative of a self-selection mechanism favouring the program group. Therefore, in further analyses of program effects on outcome measures, the observed non-equivalence between program and control group was controlled by including pretest measures of mothers' interaction behaviour, seen as *proximal*

Table 1. Family and child background characteristics, statistical significance of the *F*-statistic for between-group differences, and effect size (η^2)

Family and child characteristics	Range	Program ($n = 17$)		Control ($n = 13$)		η^2
		M	(S.D.)	*M*	(S.D.)	
Years of education of the mother	1–3	2.5	(0.6)	1.8	(0.9)	0.18*
Level of education of the mother	1–3	1.7	(0.8)	1.4	(0.7)	0.04
Years of education of the father	1–3	2.8	(0.4)	2.4	(0.9)	0.11
Level of education of the father	1–3	2.2	(0.7)	2.0	(0.9)	0.02
Father is unemployed	0–100	33%	(88)	10%	(70)	0.03
Years of mother's residence in NL	3– 21[a]	10	(5.6)	12	(5.2)	0.02
Years of father's residence in NL	5–28[a]	14	(6.8)	15	(7.0)	0.01
Home language (Turkish/total)	0–100%	93%	(26)	75%	(45)	0.01
Number of children	1–6[a]	2.1	(0.6)	2.7	(1.2)	0.10
Child's age in months at pretest	48–63[a]	57	(3)	55	(4)	0.08
Sex ratio (girls/total)	0–100%	85%	(50)	59%	(50)	0.08

Note: $^*p < 0.05$.
[a]Observed range.

family characteristics as opposed to *distal* family characteristics such as parental education, in addition to pretest testscores, as covariables.

Another important difference between program and control group concerned gender (X^2 (1)= 2.33, $p = 0.13$. In particular, there were slightly more girls in the program group than in the control group. As girls are reported to be developmentally advanced, especially in the verbal domain, in a precautionary spirit, gender was entered as a covariate in further analyses of program effects on outcome measures.

Table 2 reports the results for the language and cognitive measures at pretest and posttest. At pretest, the program children had statistically significantly higher scores on Turkish vocabulary ($F(1, 29) = 4.33$, $p < 0.05$), which is consistent with a possible self-selection mechanism. The difference on pretest IQ, however, was not statistically significant. To control for this observed non-equivalence, pretest Turkish vocabulary and IQ were included as covariables in further analyses of program effects on posttest outcome measures.

Table 2 also presents the raw and adjusted mean testscores at posttest, revealing statistically significant program effects (controlling for gender, pretest vocabulary and IQ, and pretest social-emotional support and cognitive distancing) on productive Turkish vocabulary ($F(1, 29) = 24.19$, $p < 0.01$) and cognitive pre-mathematical skills assessed in Dutch ($F(1, 29) = 8.28$, $p < 0.01$). The posttest differences in this study mirror the results of the original evaluation study accurately (see van Tuijl *et al.*, 2001).

Preliminary Analysis of the Observation Measures

Because of the small number of subjects, the observational data were first checked for outliers. One outlier of 3 or more S.D. below the mean was detected on one observation measure (mean cognitive distancing level). The score for this case was substituted by a less extreme score of 2 S.D. below the mean, respectively.

Table 3 presents the mean scores of the observation measures for the program and control group at pretest and posttest. *T*-tests were applied to test the

Table 2. Raw and adjusted means of testscores at pretest and posttest, statistical significance of the F-statistic for between-group differences (based on adjusted means), and effect size (η^2)

Raw testresults at pretest and raw and adjusted testresults at posttest	Range	Program ($n = 17$)		Control ($n = 13$)		η^2
		M	(S.D.)	M	(S.D.)	
Pretest						
IQ	55–114[a]	81	(14)	73	(15)	0.07
Turkish vocabulary	1–100	56	(13)	47	(12)	0.13*
Posttest						
Turkish productive vocabulary	1–40	28	(4)	20	(5)	0.46**
- Adjusted means[b]		27		20		
Cognitive-premath skill	1–42	30	(5)	24	(6)	0.23+
- Adjusted means[c]		29		25		

Note: $^{**}p<0.01$; $^{*}p<0.05$; $^{+}p<0.10$.
[a]Observed range.
[b]Adjusted means computed using following covariables: pretest Turkish vocabulary of child, mother's pretest support and cognitive distancing level and gender of child.
[c]Adjusted means computed using following covariables: pretest IQ of child, mother's pretest support and cognitive distancing level and gender of child.

Table 3. Mothers' cognitive distancing and social-emotional support at pretest and posttest, statistical significance of the F-statistic for between-group differences, and effect size (η^2)

	Range	Program ($n = 17$)		Control ($n = 13$)		η^2
		M	(S.D.)	M	(S.D.)	
Pretest:						
Mother's cognitive distancing	1.0–2.2	1.5	(0.2)	1.6	(0.3)	0.02
Mothers' social-emotional support	8–100	62.7	(17.4)	48.1	(15.7)	0.17*
Posttest:						
Mother's cognitive distancing	2.0[a]–3.4	2.8	(0.3)	2.8	(0.5)	0.00
Mothers' social-emotional support	74–113	96.5	(9.4)	86.5	(8.1)	0.25**

Note: $^{*}p<0.05$; $^{**}p<0.01$.
[a]Corrected for outliers.

statistical significance of the observed differences between program and control group. There were no significant differences in mean cognitive distancing level between the program and control group at pretest, but there was a significant difference in social-emotional support for the program group ($F(1,29) = 5.66$, $p<0.05$). At posttest, mothers in the program group were again observed to be more supportive than mothers in the control group ($F(1,29) = 9.44$, $p<0.01$). However, the difference had increased substantially due to the program. There was no statistically significant posttest difference with respect to cognitive distancing. Note that the social-emotional support and cognitive distancing scores in both the program and control group increased from pretest to posttest, which may be attributable to the fact that all children became older, more

Table 4. Intercorrelations of pretest and posttest measures of children's Turkish vocabulary, cognitive pre-mathematical skills in Dutch, and mothers' interaction behaviour

Measures	Pretest Distancing	Support	Posttest Distancing	Support	Vocabulary
Pretest					
Cognitive distancing	1.00				
Social-emotional support	−0.33	1.00			
Posttest					
Cognitive distancing	0.58**	−0.40*	1.00		
Social-emotional support	0.02	0.15	0.00	1.00	
Productive vocabulary	0.13	0.19	0.47**	0.53**	1.00
Pre-mathematical skills	0.08	0.24	−0.08	0.48**	0.40*

Note: $^{**}p<0.01$; $^{*}p<0.05$.

compliant and more skilled, allowing a higher level of instruction, leading to more cooperation and eliciting more instances of praise and encouragement. Table 4 presents the correlations between the pretest and posttest observation measures and the dependent variables.

Explaining Program Effects

Following a procedure proposed by Baron and Kenny (1986), two hierarchical regression analyses were carried out with Turkish productive vocabulary and cognitive pre-mathematical skill as dependent variables, respectively, to test the hypothesis that program effects could be explained by a higher quality of mother–child interaction in the program families. For each dependent variable, two different models were tested by changing the entry order of the dummy variable *Opstap Opnieuw vs control* with the predictor block containing the two mother–child interaction quality indicators, viz. cognitive distancing and social-emotional support. To control for the unequal gender distribution, gender was entered as the first block of predictors. To control for differences between program and control group in pretest vocabulary (in the models with Turkish vocabulary as dependent), pretest IQ (in the models with pre-mathematical skills as dependent) and pretest mother–child interaction quality (in all models), these variables were always entered as the second block of predictors. Comparing the results of the two models, in particular the *change* in the predicted variance, R^2, upon entering the third and fourth blocks of predictors enables determination of the extent to which program effects indeed were mediated by improved mother–child interaction quality.

Table 5 shows the results of the hierarchical regression analyses with Turkish vocabulary as dependent variable. Pretest measures, in particular Turkish vocabulary at pretest, not surprisingly predicted Turkish productive vocabulary at posttest substantially (the autoregression effect $\beta = 0.61$). However, participation in the OO program and mother–child interaction quality at posttest predicted substantial, and statistically significant, amounts of variance additionally. Note that there was no statistically significant effect of gender. Comparing the first and second model revealed two interesting findings. First, about half of the program effect on Turkish vocabulary appeared to be mediated by posttest mother–child interaction quality. This can be inferred from the decrease

Table 5. Predicting posttest Turkish productive vocabulary: testing mediator effects of mother–child interaction quality ($n = 30$)

Dependent variable: productive Turkish vocabulary at posttest				
	Model 1	R^2 *Change*	Model 2	R^2 *Change*
1	Gender	0.04	Gender	0.04
2	Pretest covariables: - Turkish vocabulary composite - Mothers' cognitive distancing - Mothers' cooperation	0.32^{*}	Pretest covariables: - Turkish vocabulary composite - Mothers'cognitive distancing - Mothers' cooperation	0.32^{*}
3	Opstap Opnieuw program	0.25^{**}	Posttest interaction quality: - Mothers' cognitive distancing - Mothers' cooperation	0.29^{**}
4	Posttest interaction quality: - Mothers'cognitive distancing - Mothers'cooperation	0.17^{**}	Opstap Opnieuw program	0.13^{**}
	R^2-total (adjusted)	0.79^{**}	(0.73)	

Note: $^{*}p<0.05$; $^{**}p<0.01$.

in the R^2-*change* from 0.25 to 0.13 upon changing the entry order. Given that program participation did not lead to improved cognitive distancing behaviour by the mothers but was associated with an improvement of social-emotional support, only this aspect of mother–child interaction quality can be seen as a mediating process variable. Note that the pretest difference in social-emotional support between the program and control group was controlled for by including the pretest measure in the regression model as a covariable. Second, the program only partly succeeded in improving relevant mother–child interaction quality. This can be inferred from the remaining R^2-*change* of 0.17 in model 1 that was uniquely associated with mother–child interaction quality after controlling for pretest measures, including interaction quality, and the program effect.

Table 6 presents the results for cognitive pre-mathematical skill, showing a slightly different pattern. First, there was a significant contribution of the child's gender ($R^2 - change = 0.20$), with girls having *lower* scores on the posttest for cognitive pre-mathematical skill. As the comparison of models 1 and 2 revealed, about two-thirds of the program effect could be explained by the improvement of mother–child interaction quality as related to participation in the program. Given that the program only improved mothers'social-emotional support, we conclude that the program effect was entirely mediated by this aspect. The remaining R^2-change of 0.09 in model 1 indicates that after including the participation in the program, posttest interaction quality did not statistically significantly contribute to posttest cognitive pre-mathematical skills, whereas in model 2 program participation did not statistically significantly contribute to the posttest scores when included as the last block.

In summary, the results indicate that for both posttest Turkish productive vocabulary and posttest cognitive pre-mathematical skill, the program effect was partially mediated by the improved interaction quality, more specifically mothers' social-emotional support to the children.

Table 6. Predicting posttest cognitive pre-mathematical skills: testing mediator effects of mother–child interaction quality ($n = 30$)

Dependent variable: cognitive pre-mathematical skills at posttest (assessed in Dutch)				
	Model 1	R^2 *Change*	Model 2	R^2 *Change*
1	Gender	0.20*	Gender	0.20*
2	Pretest covariables: - IQ - Mothers' cognitive distancing - Mothers' cooperation	0.12	Pretest covariables: - IQ - Mothers' cognitive distancing - Mothers' cooperation	0.12
3	Opstap Opnieuw program	0.16*	Posttest interaction quality: - Mothers'cognitive distancing - Mothers' cooperation	0.20*
4	Posttest interaction quality: - Mothers'cognitive distancing - Mothers' cooperation	0.09	Opstap Opnieuw program	0.05
	R^2-total (adjusted)	0.57**	(0.43)	

Note: *$p < 0.05$; **$p < 0.01$.

DISCUSSION

The present study tested two hypotheses in order to gain more insight in the operation of a home-based education program for disadvantaged minority preschool children in the Netherlands, Opstap Opnieuw. The hypothesis that the OO program would improve the mother–child interaction quality in the participating Turkish–Dutch families was partly confirmed. A program effect on mother–child interaction quality was found for the indicator of social-emotional support by the mother (i.e. being cooperative and child-following, encouraging and praising the child frequently), but not for the indicator of cognitive quality of the interaction (i.e. the mean cognitive distancing level of mothers' task-directed instruction behaviour). The hypothesis that program effects on outcome measures could be explained by improved mother–child quality was also only partly confirmed. The program effect on cognitive pre-mathematical skills could be entirely attributed to improved social support, the program effect on Turkish productive vocabulary only half. Cognitive distancing by the mother appeared to be relevant for vocabulary development (see Table 4: $r = 0.47$, $p < 0.01$), as was found in several studies referred to in the introduction of this article, but the program did not effectively improve this aspect.

The answer to the question posed in the introduction section whether relevant aspects of parenting and parental instruction can be fundamentally changed by a well-designed intensive home-based approach, such as Opstap Opnieuw, is mixed, given the results of the present study. Poorly educated Turkish–Dutch mothers can be helped to be more supportive to their children, but changing their interaction style to a more cognitively challenging one appeared to be difficult. Although improving social-emotional support led to an important increase of children's emergent school skills, the full potential of mother–child interaction for promoting in particular language development was probably not entirely exploited by the OO program, given the remaining effect of

cognitive distancing—not affected by the program—on, in particular, vocabulary development.

An important issue for further study is how mothers' improvement in social-emotional support affected cognitive and language testscores. A possible explanation is that, due to affectively positive interaction with Opstap Opnieuw activities (and perhaps similar activities occurring at home, as well, such as, for instance, joint play and problem-solving, mealtime talks, joint reading), children became more involved, enthusiastic and concentrated in doing these activities, thereby learning more at deeper levels of information-processing. A related explanation is that, due to the affectively positive mother–child relationship, Opstap Opnieuw activities and similar normally occurring activities in the home became more frequent, thereby increasing exposure beyond the program. Evidence for this possibility is reported by Bus and Van IJzendoorn (1995) who found effects of mother–child attachment quality on the frequency of joint book reading. Finally, the improved social-emotional support by the program mothers may have promoted the development of general social-emotional skills concerning, for instance, children's perseverance, self-esteem and self-efficacy, and their skill in establishing social relationships with teachers and peers, which in turn influence cognitive and language outcomes (cf. Pianta *et al.*, 1997). Unfortunately, the present study did not include social-emotional outcome measures, so that this possible route of program effects could not be further explored.

The results of the present study mirror previous findings by Riksen-Walraven (1977). She compared two experimental home-based programs with a randomly assigned control condition, one experimental program aiming at improving lower-class mothers' sensitive responsiveness (a construct related to the social-emotional support construct in the present study), the other aiming at improving mothers'verbal and cognitive stimulation. Only the first experimental program had strong short- and long-term effects on both social-emotional and cognitive outcomes, including later school achievement. Therefore, a possible conclusion might be to limit the ambitions of home-based programs to improving social-emotional support and to drop the cognitive stimulation component altogether. However, the evidence is far from conclusive yet. The children involved in Riksen-Walraven's study were 9-months-old at the time of the intervention, so that the verbal-cognitive intervention may not have been well timed. Recently, to explain the long-lasting effect of her sensitive-responsiveness program, Riksen-Walraven (2002) referred to brain-development research that has revealed that basic emotional control structures develop by the end of the first year of life, which makes children's development in this life phase extremely sensitive to the emotional support by the principal caregivers (cf. Phillips and Shonkoff, 2000). However, brain research also shows that in *later* phases of early childhood, brain structures develop in the frontal cortex, strongly dependent on experience as well, that support complex cognitive and language skills. Note that in a recent study of an update of Riksen-Walraven's original program, carried out in the Netherlands with Surinamese-Dutch immigrant parents with a one-year-old child, medium-sized effects were found on both social-emotional and cognitive development (Riksen-Walraven *et al.*, 1996).

Yet another aspect needs to be considered. The present study focused on mother–child task interaction quality as the main vehicle by which intellectual preschool development is stimulated. However, given the fact that the program effect on productive vocabulary could only partly be explained by the mother–child interaction quality measures, we hypothesize that doing program activities

as such, in particular activities in the verbal-literate mode (e.g. joint book reading, talking about pictures depicting complex scenes, using new words introduced by the program's weekly themes) affected language development. This would be consistent with studies showing effects on language development of *mere exposure* to vocabulary, connected discourse and literacy experiences (Bus *et al*., 1995; Hart and Risley, 1995; Leseman and de Jong, 1998; Leseman and van den Boom, 1999; Weizman and Snow, 2001), *in addition to* effects of interactive scaffolding (Weizman and Snow, 2001), cognitive distancing (Leseman and de Jong, 1998; Leseman and van den Boom, 1999) or dialogical interaction (Whitehurst and Lonigan, 1998)—concepts that all refer to cognitively challenging instruction behaviours by parents in interaction with their children. Put differently, we assume that the OO program effectively increased the *quantity* of verbal-literate experiences, including exposure to new or rare vocabulary, in these otherwise poorly literate Turkish–Dutch families, yet without improving the *quality* of instruction by the parents.

How can a program like Opstap Opnieuw be improved? The present version of the program consisted of theory-based, well-designed work sheets and accompanying materials, specifying 150 cognitive and language activities to be carried out over 2 years. Home visitors were recruited from the same poorly educated communities as the target mothers to monitor program implementation and to demonstrate appropriate interaction behaviour. Their training focused on promoting a sensitive-responsive interaction style in the families to be visited, which may have been too one-sided given the paraprofessionals' low level of education. It is interesting in this connection to discuss an important difference with Riksen-Walraven's program (Riksen-Walraven *et al*., 1996). Besides the age-range of the targeted children and the ethnic-cultural community served, a major difference concerned the deliberate use of *professionals* with a college or university degree in psychology or education to deliver the program and to guide the mothers.

Furthermore, group meetings were provided for a number of purposes, but concentrated on inducing a social-emotionally supportive child-rearing style. A video-recording was used to demonstrate appropriate interaction behaviour, showing mothers who followed their children's initiatives and who praised them. Less concentrated effort was spent to inducing scaffolding behaviour, cognitive distancing or co-constructive dialoguing. Thus, although the developmental model underlying the program was Vygotskian, the means to induce optimal instruction behaviour were comparatively limited. The findings of this study suggest that just working with developmentally appropriate materials, being exposed to language and literacy, doing games and solving problems may have some effect. Other empirical research, both descriptive (Leseman and De Jong, 1998) and experimental (Baker *et al*., 1999; Kağıtçıbaşı *et al*., 2001; Riksen-Walraven, 1996) indicates that changing cognitive distancing behaviour (and related characteristics of informal instruction) may increase program effects additionally. Therefore, this aspect could be improved in a new version of the program.

LIMITATIONS

The present study suffers from several limitations. The small sample size and low positive response rate limit the generalizability of the findings. Note, however, that the sample of the present in-depth study reflected the larger sample of the

original effect evaluation study quite accurately, including the pattern and sizes of the program effects. Another flaw is that no social-emotional outcomes measures were included, so that the social-emotional support route of the program's efficacy could not be fully explored. Finally, the sample of mother–child interaction situations used to determine interaction quality was rather limited. However, the tasks and procedures that were used have been proven to indicate quite accurately socioeconomic and ethnic differences in child rearing and to predict quite strongly cognitive and language development and later school achievement (Leseman and De Jong, 1998; Leseman and van den Boom, 1999).

CONCLUSION

The fact that home-based programs appear on average to be less effective than centre-based programs or combined programs does not mean that all home-based programs are ineffective, nor that further improvement of the home-based approach is impossible. The promising effects of Opstap Opnieuw for socio-economically disadvantaged Turkish–Dutch families underscore this statement. Given the theoretical potential, summarised in the introduction we should critically examine home-based programs and try to improve them instead of abandoning them. The present study contributed to this project by pointing to the less well developed cognitive stimulation program component as a possible starting point for future improvement and to the successful enhancement of support component as an effective mediating program aspect.

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