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Changes in parenting and child behavior after the home-start family support program: A 10 year follow-up

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ABSTRACT

Background: Home-Start is a parenting support program in which mothers experiencing difficulties in family life and parenting, receive weekly support at home from a volunteer. The present study extends the work of Hermanns et al. (2013), by examining self-reported and observed parenting and child behavior outcomes at 10.6 year follow-up.
Methods: The mothers of the Home-Start group ($n = 59$), who received Home-Start for on average 6.6 months, a comparison group, who reported elevated parenting stress and need for support ($n = 56$), and a randomly selected community sample ($n = 36$), reported on their feelings of competence about parenting, their parenting behavior and their child's problem behavior. Observational data were collected on five of the seven measurement occasions, until 8.8 year follow-up.
Results: Improvements on feelings of competence, consistent and non-rejecting parenting behavior and internalizing and externalizing problem behaviors during intervention period are sustained. That means that on the long term, the parent and child's improvements did not further improve, nor did they deteriorate. Observational measures showed a decrease in positive and negative parenting and positive and negative child behaviors in general for all groups.
Conclusions: Home-Start, a volunteer-based community wide family support program, contributes to positive short term changes, which are sustained in the long-term.

1. Introduction

In order to help families who perceive difficulties with family life or parenting, parenting support programs have been developed (e.g., Early Head Start; Love et al., 2005). Volunteer-based in-home services gained popularity in political circles because it is relatively inexpensive and easily accessible. Because the goal of parenting support programs is to improve parenting behavior and to prevent maladaptive child development, it is important to investigate whether volunteer-based, home-visiting programs lead to the desired changes (Powella, 2013). One of such interventions is Home-Start, a volunteer-based program which aims to support and empower the mother and takes great care in doing so in line with mothers' needs (Frost, Johnson, Stein, & Wallis, 2000). The desired change is an improved maternal sense of competence with regard to parenting. The present study extends prior work (Asscher, Deković, Prinzie, & Hermanns, 2008; Asscher, Hermanns, & Deković, 2008; Deković et al., 2010; Hermanns, Asscher, Zijlstra, Hoffenaar, and Deković (2013)), by reporting on changes in self-

reported and observed parenting and child behavior after participating in Home-Start in the Netherlands at 10 year follow-up.

In general, meta-analyses have found positive effects of home-visiting programs on maternal behavior (Filene, Kaminski, Valle, & Cachat, 2013; Nievar, Van Egeren, & Pollard, 2010; Sweet & Appelbaum, 2004). However, the effect sizes range from 0.14 (Sweet & Appelbaum, 2004) to 0.37 (Nievar et al., 2010) indicating that the effect sizes (Cohen's *d*) are small to medium and vary widely. Also, positive effects on child behavior outcomes were found to have small to medium varying effect sizes (MacLeod & Nelson, 2000; Sweet & Appelbaum, 2004). The varying effect sizes indicate that effects of parenting support programs may be program dependent (Filene et al., 2013; MacLeod & Nelson, 2000; Sweet & Appelbaum, 2004). Furthermore, programs aimed at parents may need longer follow-up periods before results on child development can be seen (Gray & McCormick, 2005). Therefore intervention specific studies that investigate long term effects may be more informative.

The intervention investigated in the current study is Home-Start. Home-Start describes itself as "An organization in which volunteers offer regular support, friendship and practical help to young families under stress in their own homes, helping to prevent family crisis and breakdown" (Frost et al., 2000). The intervention is aimed at families who have at least one child under the age of 6 and experience difficulties

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in family life or childrearing. The underlying idea of Home-Start (as with many other parenting programs) is that by empowering mothers, a chain of change is activated. By empowering mothers a) maternal competence increases, which will result in b) more effective parenting, which, in turn, is supposed to result in c) a decrease in child behavior problems. Eventually this is supposed to result in more optimal development.

Previous research on Home-Start in the United Kingdom shows a positive effect on maternal well-being for 64% of the participants, and improved parenting confidence for 51% of the participants (Frost et al., 2000). However, McAuley, Knapp, Beecham and McCurry (2004) as well as Barnes, Senior and MacPherson (2009) have found no evidence for enhanced parenting that could be attributed to Home-Start. In earlier articles of Home-Start in the Netherlands, positive changes were reported immediately after intervention for the parenting behavior on the dimensions consistency (structure) and sensitivity (warmth) for families who received Home-Start (Asscher, Hermanns, et al., 2008). At six months follow-up, Asscher, Deković, et al. (2008a) reported that of those families the ones who were worst off initially were most likely to show a reliable change, and the families who were best off before were more likely to show clinical recovery. Deković et al. (2010) found that maternal sense of competence of parenting practices mediated the link between Home-Start and improved parenting behavior, in the period from pretest to 1 year after the program started. Participation in Home-Start was related to a significant improvement in parental sense of competence, which in turn predicted improvements in parenting. At 3.5 year follow-up positive effects for child behavior were found, that is, a decrease in externalizing problem behavior as well as on internalizing behavior problems (Hermanns et al., 2013). However, for externalizing problem behavior, this change was also seen in the comparison group. The research group concluded that multi-informant assessment would be more convincing for assessing change after participation in Home-Start.

The present study expands on previous studies of Asscher, Deković, et al. (2008), Asscher, Hermanns et al. (2008), Deković et al. (2010) and Hermanns et al. (2013) by including two more measurement waves until 10.6 years after the first measurement occasion, with observational data at 8.8 years after the first measurement occasion. To our knowledge, this is the first follow-up study evaluating a volunteer-based home-visiting parent support program examining such a long-term follow-up period, providing the opportunity to test the assumption that parenting support indeed promotes more optimal development on the long run. To test whether the healthier development has occurred, components of the supposed chain of changes are investigated, i.e. maternal feelings of competence, parenting behavior and child behavior. First, by empowering mothers it is suggested that mothers show an increase in feelings of competence. According to the self-efficacy theory of Bandura (1997) people who regard themselves as more efficacious, think and act differently from those who regard themselves inefficacious. Therefore, by increasing feelings of competence about parenting, parenting behavior is supposed to improve. The link between the sense of competence and the actual parental behavior is well established (Jones & Prinz, 2005). Parenting behavior can be described in terms of the six dimensions warmth, rejection, structure, chaos, autonomy support and psychological control (Skinner, Johnson, & Snyder, 2005). Warmth, structure and autonomy support are related to healthy child development whereas rejection, chaos and psychological control are related to development of child problem behavior (Aunola & Nurmi, 2005; Laukkanen, Ojansuu, Tolvanen, Alatupa, & Aunola, 2014; Skinner et al., 2005). In the literature distinction is made between externalizing and internalizing problem behaviors. Internalizing problem behavior reflects problems within the self, such as emotional reactivity, anxiety, depression, somatic complaints without medical cause and withdrawal from social contacts, whereas externalizing problem behavior conflicts with other people and with their expectations for children's behavior represents (Achenbach & Rescorla, 2000). Thus, in order to examine whether the aims of Home-Start are realized, changes in the feelings of competence, parenting behavior and child behavior are investigated. Parenting and child behavior are measured with self-reports as well as observations on five of the seven measurement occasions. We expected that the improvements made during the intervention period further improved or were sustained from three years to ten years after the Home-Start intervention.

2. Method

2.1. Participants

The current quasi-experimental design involved three groups: a Home-Start group ($n = 59$ mothers), a comparison group of mothers who experienced similar stress levels or reported need for support ($n = 56$ mothers), and a community group with no stress levels or reported need for support ($n = 36$ mothers) (for a more elaborate discussion on the method used, see Hermanns et al., 2013). In total, 151 mothers were assigned to participate. Only mothers were included since the intervention mainly addresses mothers.

The Home-Start participants were recruited by local coordinators of 26 Home-Start centers. In general, families can approach Home-Start through health clinics, social workers, child protection services, and self-referral. After enrollment, a local coordinator visits the family for an appointment, and matches the family with a suitable volunteer. The volunteers have attended a 3-day training program in which they were trained to be supportive in a non-directive way. In addition, the volunteers receive supervision once a month and attend a training day twice a year. After a match is made between the family and the volunteer, the volunteer visits the family once a week, adjusting the service to the mothers' needs, as indicated by the mother. These services cover different kinds of support: emotional support (e.g. listening to the mother's problems and comforting her); instrumental support (e.g. baby-sitting, helping the mother with household); and informational support (e.g. helping mothers to find community services or to fill out forms). Each center provided 2–5 participants. Families received Home-Start for a period of on average 7 months ($SD = 1.68$ months). The mean number of visits per month was 3.49 ($SD = .82$) with an average duration of 2.4 h ($SD = .46$). The intensity of the intervention in the sample was comparable to the way Home-Start is conducted commonly in The Netherlands (De Bruyn, Galama, & Thomas, 2013).

The comparison and community groups were recruited through child health centers in a region where Home-Start was not (yet) available. A thousand mothers with a child in the relevant age group were sent a short questionnaire assessing parental stress (Dutch version subscale parental stress of Parenting Stress Index-Short Form; De Brock, Vermulst, Gerris, & Abidin, 1992). In addition, the following questions were asked: "Do you need support regarding parenting every now and then?" (Yes/No), "If this support were to come from a volunteer who'd come to support you three hours each week, would you make use of this service?" (Yes/No), "How often do you find your child to be more difficult than other children?" (score ranging from (1) hardly ever to (4) almost always). From the returned questionnaires ($n = 375$) the comparison group was selected. The two criteria used to include families in this group were: (a) parental stress levels above the normed mean for non-clinical groups as assessed by the Parenting Stress Index ($M \geq 2.48$) or (b) at least two of the three additional questions answered in ways that indicate stress or need for support or both. The community sample was randomly selected from the rest of the families.

Demographic characteristics of the three groups are presented in Table 1. No differences between the Home-Start group and comparison group were found for age of the child, gender of the child, ethnicity, number of children and health problems. However, Home-Start mothers were significantly younger, had experienced more life events, had a

Table 1
Background variables of the families.

		Home-Start	Comparison	Community
Child	Gender (male)	50.8%	60.7%	47.2%
	Age (months)	30.4 (7.83)	30.2 (6.54)	28.6 (6.29)
Mother	Age (years)[a,b]	31.2 (5.62)	34.5 (5.26)	35.4 (3.76)
	Ethnicity (Dutch)	88.1%	94.5%	100%
	Marital status (single)[a,b]	46.6%	16.1%	0%
	Educational level [b]			
	University	3.4%	3.6%	5.6%
	Higher vocational	15.5%	30.4%	47.2%
	Intermediate vocational	44.8%	46.4%	38.9%
	High school	15.5%	12.5%	5.6%
	Lower	19.0%	5.4%	2.8%
	Family income[a,b]			
	Low	61.5%	14.6%	0%
	Moderate	28.9%	48.0%	46.4%
	High	9.5%	37.5%	53.6%
	Health problems	24.6%	18.2%	14.3%
	No. of children			
	1	25.4%	14.3%	19.4%
	2	47.5%	50.0%	50.0%
	3 +	27.1%	35.7%	30.6%
	Life events (more than 2)[a,b]	40.7%	30.4%	11.1%

Note.
[a] Significant difference between Home-Start and Comparison group p < .05.
[b] Significant difference between groups with needs and Community group p < .05.

lower income and were more often single parent than mothers from the comparison group. The same differences were found for the two groups with needs compared to the community group; mothers with needs were younger, had experienced more life events, had a lower income and were more often single parent than mothers from the community group. Additionally, a difference was found in the educational level, mothers with needs were lower educated than mothers without needs.

2.2. Procedure

For the parents who agreed to participate, one of the researchers contacted the family and explained the procedure of the study. If the participants wanted to join the study, an appointment was made for the first home visit by the researcher (T1) and the maternal self-report questionnaires were sent. At the end of the visit an appointment was made for the second visit (T2), on average 1.5 (SD = 1.15) months later. The posttest (T3) was on average 6.6 (SD = 1.54) months later. The first follow-up visit (T4) was on average 12.5 (SD = 2.09) months after the pretest. The second (T5), third (T6) and fourth (T7) follow-up occasions were 49.2 (SD = 6.15), 105.0 (SD = 4.55) and 127.5 (SD = 4.46) months after the pretest. At every measurement occasion the mothers were asked to fill out the questionnaires, while — in order to minimize the burden to the families — observations were only performed at measurement occasions T1 to T4 and T6. Thus, observational measures are not available at T5 and T7. An overview of the measurement occasions and number of participants is presented in Table 2.

Table 2
Number of participants.

	Measures	Years	Home-Start	Comparison group	Community sample
T1 (pretest)	Q + O	0	59 (100%)	56 (100%)	36 (100%)
T2	Q + O	.12	59 (100%)	56 (100%)	35 (97%)
T3 (posttest)	Q + O	.55	58 (98%)	56 (100%)	36 (100%)
T4	Q + O	1.04	55 (93%)	55 (98%)	36 (100%)
T5	Q	4.10	33 (56%)	45 (80%)	34 (94%)
T6	Q + O	8.75	21 (36%)	39 (70%)	31 (86%)
T7	Q	10.63	23 (39%)	41 (73%)	31 (86%)

Note. Q = questionnaires, O = observations.

As can be seen from Table 2, a substantial number of participants withdrew from the study with the main loss in the Home-Start group. The main reason for the loss of participants was that families moved several times and therefore could not be traced anymore. Differences between Home-Start families that withdrew from the study and Home-Start families that finished all measurement occasions are significant for self-reported feelings of competence, observed parenting behavior, and observed positive child behavior on the pretest. The withdrawn mothers felt less competent about parenting, showed less positive parenting behavior on all observed parenting scales, and their children showed less observed positive behavior. No differences in demographic characteristics and self-reported parenting behaviors were found. In the comparison group the withdrawn mothers were more responsive at pretest. In the community group, the withdrawn mothers had health problems more often.

2.3. Measures

To measure parental and child behaviors, two types of indicators were used: self-reports of the mother and impressions of the observer after a home visit. Maternal competence was measured with self-reports only, parenting behavior and child problem behavior were measured with both self-reports and observations. All instruments that were used in the present study have been used in previous studies and have adequate psychometric qualities (Asscher, Deković, et al., 2008; Asscher, Hermanns, et al., 2008).

2.3.1. Maternal characteristics

Maternal sense of competence was measured with subscale competence of the Dutch version of the Parenting Stress Index (De Brock et al., 1992). Parents were asked to indicate how much they agreed with statements as: 'My child seems to be much harder to care for than most', on a 6-point scale ((1) = 'I totally disagree' to (6) = 'I totally agree'). The mean score of the thirteen items was used and ranged from 1.6 to 6. A higher score indicated more feelings of competence. Guttman's Lambda-2 coefficient ranged from .89 to .92 across all the measurement occasions.

2.3.2. Self-reported parenting behavior

The parents reported on their parenting behavior along the dimensions warmth, rejection and structure. Warmth was measured with the maternal self-report of responsiveness. Responsiveness was assessed with a subscale of the Nijmegen Parenting Questionnaire (Gerris et al., 1993). This subscale consisted of eight items such as 'I know very well what my child feels or needs'. The parents had to indicate on a six-point scale whether they totally disagreed (1) to totally agreed (6). A higher score indicated more maternal responsiveness. The mean score of the eight items was used, and ranged from 1 to 6. Guttman's Lambda-2 coefficient ranged from .78 to .89 across all the measurement occasions.

Rejection was measured with the maternal self-report of acceptance of the child, of which the reversed score was used. Rejection of the child was measured with the Dutch version of the Parenting Stress Index (De Brock et al., 1992). This subscale, consisting of twelve items, was rated on a 6-point scale ranging from I totally disagree (1) to I totally agree (6). An example item is 'My child is so slow that it irritates me'. The mean score of the twelve items was used, these ranged from 1 to 5.4. A higher score means a higher level of rejection. Guttman's Lambda-2 coefficient ranged from .77 to .89 across all the measurement occasions.

Consistency is a measure of the parenting dimension structure. It was measured with the Parenting Dimensions Inventory (PDI) (Slater & Power, 1987). The scale consisted of 8 items, which the participants answered on a 6-point scale ((1) = totally disagree, (6) = totally agree). An example of an item is 'I only threaten with punishment when I'm sure I'll be able to execute the punishment'. The mean scores were used, and ranged from 1.4 to 6, with a higher score indicating more

consistent parenting. Guttman's Lambda coefficient ranged from .71 to .83 across the measurement occasions.

2.3.3. Child problem behavior

The mothers reported on their child's behavior with the Child Behavior Check List (CBCL). The CBCL/2–3 (Achenbach, 1992) was used during the first four measurement occasions. At the following measurement occasions the CBCL/6–18 was used (Achenbach & Rescorla, 2000). The mother reported on their child's behavioral problems on a scale ranging from 0 (*not applicable*) to 2 (*often applicable*). Four subscales, two for externalizing and two for internalizing behavior, were used that are defined in both versions of the CBCL. Whenever the number of items of the subscales differed between both CBCL versions, the mean item score was multiplied by the largest number of items.

Internalizing problem behavior was assessed along the dimensions of affective problem behavior and anxious behavior. Affective child behavior was operationalized by six CBCL/2–3 items and five CBCL/6–18 items. Scores ranged between 0 and 12.0. Guttman's Lambda-2 coefficient ranged from .59 to .81. Anxious behavior was assessed by ten CBCL/2–3 and six CBCL/6–18 items. The scores ranged between 0 and 18.33. Guttman's Lambda-2 coefficient ranged from .67 to .83.

Externalizing problem behavior was assessed along the dimensions of oppositional child behavior and hyperactive behavior. Oppositional child behavior was composed of six CBCL/2–3 and five CBCL/6–18 items and the scores ranged from 0 to 12. Guttman's Lambda-2 coefficient ranged from .77 to .85. Finally, the hyperactive behavior scale consisted of six CBCL/2–3 and eight CBCL/6–18 items. Scores ranged from 0 to 12, Guttman's Lambda-2 coefficients ranged from .81 to .86 across all the measurement occasions.

2.3.4. Observations

The parenting and child behaviors were observed using the Coders Impressions Inventory (CII). The CII is a 72-item inventory adapted from the Observer Impressions Inventory (Capaldi & Patterson, 1989). The observers coded the items after the home-visit which indicated their impressions of the parenting and child behaviors. Six scales, as previously used by Hurlburt, Nguyen, Reid, Webster-Stratton, and Zhang (2013) assessed the parenting behavior and child behavior. All the items had to be scored on a scale of 0 to 3, ((0) = *no basis*, (1) = *did not occur*, (2) = *1–3 examples*, (3) = *4 or more examples*).

2.3.5. Observed parenting behavior

Observers rated the frequency of parenting behavior along four scales. The nurturing and responsive parenting scale related to affection, patience and respect for the child. This scale could be attributed to the warmth dimension. It consists of 13 items such as 'parent modeled positive behavior'. Sum scores were used with a higher score indicating more observed nurturing and responsive behavior of the mother. These scores ranged from 9 to 34. Guttman's Lambda-2 coefficient ranged from .57 to .82.

The harsh and critical parenting scale related to sarcasm, neglect and disregard of the child, which could be attributed to the parenting dimension rejection. The scale contained 16 items of which an example item is 'parent showed disapproval or criticized child'. The sum scores ranged from 11 to 37 with a higher score indicating more observed harsh and critical behaviors of the mother. Guttman's Lambda-2 coefficient ranged from .66 to .85.

The discipline competence scale is related to the mother's ability to obtain the child's compliance through disciplining techniques, and could be attributed to the parenting dimension structure. This scale contained 14 items such as 'parent had good control of child'. The sum scores ranged from 12 to 42 with a higher sum score indicating a more observed disciplining behavior. Guttman's Lambda-2 coefficient ranged from .83 to .87.

The lax/permissive parenting scale is related to the permissive and non-consistent parenting behavior, and could be attributed to the dimension chaos. This scale covered 10 items such as 'parent had little or no control/influence'. The sum scores ranged from 6 to 27 with a higher score indicating a more observed permissive parenting behavior. Guttman's Lambda-2 coefficient ranged from .64 to .84.

2.3.6. Observed child behavior

Observers indicated the frequency of child behavior along two scales. The first scale is affectionate and pro-social child behavior, consisting of 4 items. An example item is 'child was verbally affectionate to parent'. The sum scores ranged from 5 to 12 with a higher score indicating a more observed pro-social behavior of the child. Guttman's Lambda-2 coefficient ranged from .59 to .65. The second scale is related to non-compliant and aggressive child behavior. The scale comprised 6 items of which an example item is 'child shouted at parent'. The sum scores ranged from 5 to 18 with a higher score indicating a more observed non-compliant behavior of the child. Guttman's Lambda-2 coefficient ranged from .61 to .82.

2.4. Analyses

Multilevel analyses were performed to examine change over time, with measurement occasions nested within families. In the multilevel models, group effects are estimated with so called fixed parameters (or fixed effects) while deviations of individual families are modeled with so called random effects. The initial levels of the outcome variable per group as well as the progress in time were analyzed. For the self-reports, the progress in time was investigated from pretest to posttest, from posttest to three year follow-up, and from three year follow-up to ten year follow-up. We were interested in whether the families still make progress after the intervention has ended and whether the progress that was made still continued after three years, i.e. whether the progress did not deteriorate.

For each outcome variable, an unstructured variance/covariance matrix fitted the data best. For maternal-reported variables an intercept and three slopes were estimated (pretest–posttest, posttest–three year follow-up, three year follow-up–ten year follow-up) for each group. For observational measures, due to the lack of observations at T5 and T7, two slopes were estimated (pretest–posttest, posttest–eight year follow-up) for each group. A random effect was added for the intercept and for each slope. This means that the initial level and the slope of development may be different for each family. When the model could not be computed because of overparametrization, the last random slope was dropped.

3. Results

Table 3 shows the mean scores and standard deviations per group on each outcome variable on all measurement occasions. Fig. 1 (maternal reports) and Fig. 2 (observational reports) give an overview over the development over time per outcome variable. In Table 4 (maternal reports) and Table 5 (observational reports) the outcomes of the multilevel models are presented per outcome variable and per group. The estimates of the intercepts and slopes are given with their standard error and p-value. The intercepts indicate the initial status of the group. The slope estimates indicate the direction (positive or negative) and the steepness of the development over time, and the p-value indicates whether the estimate is significantly different from zero (lower than .05 indicates that with 95% confidence this value is different from zero). p-Values lower than .05 are presented in boldface. The variance estimates indicate the deviations of families from the fixed effect estimates. The random intercept variance indicates the variance between families at pretest while the residual variance indicates the variance within families over time. The random slope variance indicates the variation in slopes between families within groups. Finally, the covariances indicate the correlation between the family-dependent random intercepts and slopes.

Table 3
Means and standard deviations per group per measurement occasion.

	Pretest M (SD)	1 month M (SD)	Posttest M (SD)	F1 M (SD)	F2 M (SD)	F3 M (SD)	F4 M (SD)
Self-reports							
Maternal characteristics							
Feelings of competence							
Home-Start	4.01 (1.00)	4.24 (1.03)	4.47 (.94)	4.59 (1.00)	4.86 (.82)	4.71 (.84)	5.02 (.64)
Comparison	4.68 (.78)	4.75 (.87)	4.79 (.75)	4.85 (.77)	4.73 (1.00)	4.80 (.84)	4.76 (.87)
Community	5.46 (.39)	5.52 (.35)	5.51 (.41)	5.55 (.34)	5.63 (.32)	5.51 (.45)	5.42 (.48)
Parenting behavior							
Responsiveness							
Home-Start	4.91 (.75)	5.01 (.76)	5.09 (.60)	5.21 (.49)	5.31 (.59)	5.11 (.58)	4.95 (.87)
Comparison	5.03 (.62)	4.98 (.65)	5.08 (.50)	5.10 (.45)	5.23 (.53)	5.21 (.72)	5.05 (.62)
Community	5.31 (.58)	5.41 (.50)	5.32 (.88)	5.35 (.44)	5.43 (.39)	5.46 (.38)	5.28 (.53)
Rejection							
Home-Start	2.13 (.89)	2.00 (.79)	1.88 (.75)	1.92 (.76)	1.75 (.71)	2.12 (.97)	1.66 (.65)
Comparison	1.59 (.46)	1.61 (.52)	1.55 (.41)	1.66 (.51)	1.67 (.57)	1.77 (.83)	1.89 (.87)
Community	1.15 (.21)	1.18 (.28)	1.21 (.23)	1.15 (.19)	1.33 (.45)	1.48 (.67)	1.56 (.75)
Consistency							
Home-Start	4.16 (.91)	4.30 (.86)	4.46 (.88)	4.49 (1.02)	4.63 (.74)	4.21 (.92)	4.40 (1.07)
Comparison	4.42 (.81)	4.50 (.77)	4.46 (.81)	4.47 (.78)	4.49 (.84)	4.36 (.86)	4.48 (.87)
Community	4.70 (.77)	4.85 (.62)	4.93 (.58)	4.70 (.79)	4.88 (.61)	4.87 (.75)	4.82 (.72)
Child problem behavior							
Affective problems							
Home-Start	4.27 (2.93)	3.54 (2.49)	3.44 (2.73)	3.10 (2.30)	1.85 (1.70)	3.10 (2.57)	2.27 (2.70)
Comparison	2.32 (1.93)	2.32 (1.77)	2.02 (1.76)	1.98 (1.68)	1.59 (1.90)	2.47 (2.49)	2.33 (2.37)
Community	1.39 (1.44)	1.34 (1.85)	1.26 (1.34)	1.00 (1.28)	0.77 (0.85)	1.12 (1.36)	0.97 (1.59)
Anxious							
Home-Start	4.77 (3.47)	3.89 (3.08)	3.47 (2.83)	3.28 (2.85)	3.38 (3.45)	4.37 (3.55)	2.75 (3.78)
Comparison	2.58 (2.17)	2.63 (2.25)	2.31 (1.88)	2.11 (2.14)	2.87 (3.55)	3.29 (4.25)	2.97 (3.60)
Community	1.64 (1.27)	1.74 (2.13)	1.61 (1.52)	1.43 (1.72)	0.88 (1.38)	1.72 (2.74)	1.08 (2.42)
Hyperactive							
Home-Start	7.38 (3.12)	6.90 (3.44)	7.05 (3.15)	6.44 (3.02)	3.97 (2.82)	3.32 (2.21)	2.41 (2.20)
Comparison	6.07 (2.78)	5.25 (3.01)	4.91 (2.68)	4.79 (2.45)	3.24 (2.39)	2.48 (1.89)	2.36 (1.90)
Community	3.31 (2.62)	3.09 (2.54)	3.08 (2.44)	2.70 (2.49)	1.63 (1.79)	1.28 (1.33)	1.14 (1.30)
Oppositional							
Home-Start	7.38 (3.04)	6.47 (3.37)	6.48 (2.95)	5.84 (3.16)	4.27 (2.89)	2.96 (2.47)	2.40 (2.61)
Comparison	5.79 (2.53)	4.82 (2.51)	4.60 (2.32)	4.85 (2.26)	3.84 (2.68)	2.09 (1.76)	1.81 (2.03)
Community	2.81 (1.85)	2.69 (2.27)	2.61 (2.07)	2.57 (1.87)	1.91 (1.85)	0.81 (1.29)	1.16 (1.50)
Observations							
Parenting behavior							
Responsive parenting							
Home-Start	26.98 (4.23)	28.24 (3.66)	27.75 (3.62)	27.67 (3.40)		17.80 (4.18)	
Comparison	29.45 (2.69)	29.34 (3.16)	29.77 (2.92)	29.67 (2.91)		17.79 (3.55)	
Community	30.58 (1.81)	30.58 (2.01)	30.33 (1.96)	30.17 (1.96)		17.33 (3.21)	
Harsh parenting							
Home-Start	22.03 (4.77)	20.37 (4.42)	22.84 (6.13)	21.96 (5.25)		17.70 (2.66)	
Comparison	18.16 (3.51)	18.66 (3.09)	18.54 (2.96)	18.38 (3.34)		17.00 (2.62)	
Community	17.11 (1.92)	17.22 (1.59)	18.22 (2.44)	17.44 (1.63)		17.10 (3.51)	
Disciplining parenting							
Home-Start	32.98 (6.86)	33.78 (6.01)	34.11 (6.30)	33.76 (5.74)		21.05 (5.03)	
Comparison	37.55 (4.41)	37.00 (4.60)	37.95 (4.26)	37.91 (4.86)		24.92 (4.83)	
Community	39.53 (1.44)	38.89 (2.19)	39.78 (2.40)	38.39 (2.91)		24.47 (4.36)	
Lax parenting							
Home-Start	18.49 (4.24)	18.10 (3.84)	17.20 (3.75)	16.95 (3.28)		10.80 (3.44)	
Comparison	14.38 (2.28)	14.34 (1.97)	15.09 (2.40)	15.89 (2.57)		8.95 (3.45)	
Community	13.83 (1.99)	14.25 (2.12)	14.14 (1.55)	14.39 (2.05)		8.33 (3.09)	
Child behavior							
Child positive affectionate							
Home-Start	10.51 (1.75)	10.56 (1.86)	10.73 (1.69)	10.84 (1.44)		8.85 (1.90)	
Comparison	11.30 (1.39)	11.61 (0.82)	11.63 (0.96)	11.64 (0.82)		9.72 (1.39)	
Community	11.86 (0.49)	11.72 (0.70)	11.83 (0.51)	11.86 (0.59)		10.00 (1.05)	
Child non-compliant							
Home-Start	11.46 (3.42)	11.90 (3.67)	11.00 (3.46)	10.71 (2.94)		7.95 (1.64)	
Comparison	8.91 (2.18)	8.84 (1.78)	9.60 (2.36)	8.75 (2.25)		6.74 (1.53)	
Community	8.31 (1.21)	8.81 (2.15)	8.86 (1.69)	8.78 (1.94)		6.67 (1.12)	

3.1. Feelings of competence

The mothers in the Home-Start group showed a significant progress during the intervention period and until three year follow-up. No further change occurred until 10 years after the intervention has ended, that is, there was no further improvement but also no deterioration. In the other two groups no significant change was found in the maternal sense of competence.

3.2. Self-reported parenting behavior

Whereas positive changes in all the parenting dimensions were observed in the Home-Start group during the intervention period, no further positive change was seen at follow-up measures. From three years to ten years of follow-up no change was observed for consistent parenting and rejection of the child. However, the Home-Start group showed a decline in responsive behavior from three years until ten
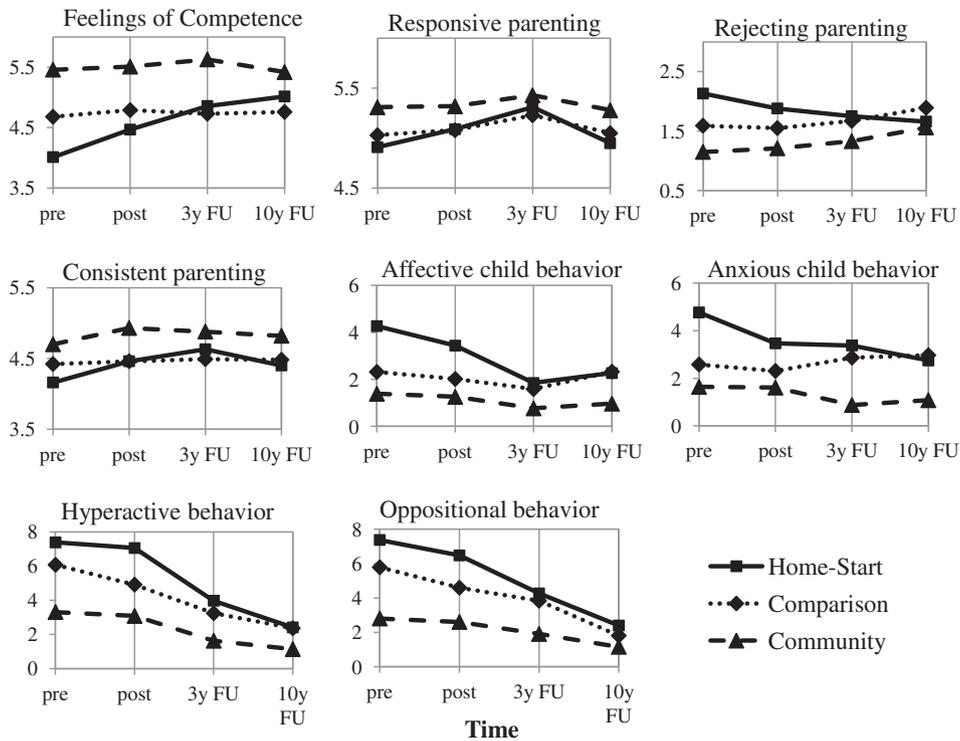
Fig. 1. Development over time per group for each self-reported outcome variable.

years of follow-up. For both comparison and community group no significant changes were observed.

3.3. Self-reported child behavior

The anxious problem behavior of the Home-Start children decreased during the intervention period and affective problems even until the three year follow-up. No further change was observed from the three years until ten years of follow-up. However, children from the comparison families showed a negative change for affective problems (i.e. more affective problems) from the three years until ten years of follow-up, as reported by their mothers. Oppositional behavior decreased from pretest to follow-up for both the Home-Start families and comparison families and this change continued until ten years of follow-up. The hyperactive behavior of Home-Start children decreased from posttest to

three years of follow-up, and this positive change continued until ten years of follow-up. This change was observed for the comparison families as well.

3.4. Observed parenting behavior

After increases in responsive, disciplining and harsh parenting, and a decrease in lax parenting during the intervention period, Home-Start families show a marked, overall decrease in observed parenting behavior variables from posttest to eight years of follow-up. Comparison families showed an increase in responsive, disciplining and lax behavior during the intervention period and an overall decrease in observed parenting behavior at follow-up. This decrease in observed parenting behavior, which is a negative change for responsive and competent disciplining behavior and a positive change
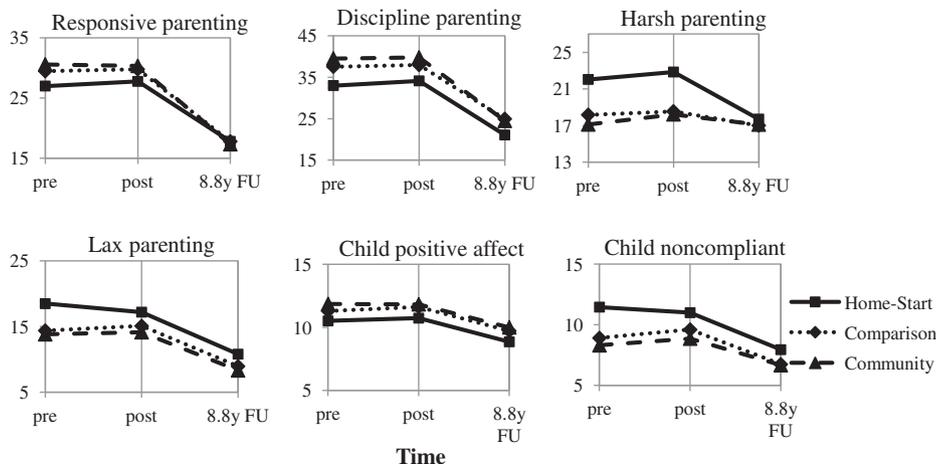
Fig. 2. Development over time per group for observed outcome variables.

Table 4
Estimates of intercepts and slopes of maternal-reports.

Parent Fixed effects	Feelings of competence		Responsiveness		Rejection		Consistency	
	Est. (SE)	p	Est. (SE)	p	Est. (SE)	p	Est. (SE)	p
Intercept								
Home-Start	4.09 (.10)	.00	4.95 (.08)	.00	2.08 (.08)	.00	4.19 (.10)	.00
Community	5.49 (.13)	.00	5.35 (.10)	.00	1.15 (.10)	.00	4.78 (.13)	.00
Comparison	4.71 (.10)	.00	5.00 (.08)	.00	1.60 (.08)	.00	4.46 (.10)	.00
Slope 1: pretest–posttest								
Home-Start	.71 (.12)	**.00**	.30 (.13)	**.02**	−.29 (.12)	**.02**	.53 (.15)	**.00**
Community	.07 (.15)	.66	−.03 (.16)	.88	.05 (.15)	.72	.10 (.19)	.60
Comparison	.20 (.14)	.15	.18 (.15)	.22	.02 (.14)	.89	−.08 (.17)	.66
Slope 2: posttest–3 years								
Home-Start	.07 (.03)	**.01**	.05 (.03)	.07	−.03 (.03)	.31	.02 (.03)	.40
Community	.03 (.03)	.30	.03 (.03)	.31	.04 (.03)	.22	.01 (.04)	.84
Comparison	.00 (.03)	.93	.05 (.03)	.11	.02 (.03)	.51	.03 (.03)	.30
Slope 3: 3 years–10 years								
Home-Start	.01 (.02)	.65	−.05 (.02)	**.01**	.01 (.02)	.57	−.02 (.02)	.32
Community	−.03 (.02)	.06	−.01 (.02)	.36	.04 (.02)	.07	−.02 (.02)	.47
Comparison	.01 (.01)	.47	−.03 (.01)	**.05**	.03 (.02)	.07	−.01 (.02)	.61
Random effects								
Residual variance	.15 (.01)		.19 (.01)		.13 (.01)		.25 (.02)	
Intercept variance	.51 (.07)		.26 (.04)		.27 (.04)		.41 (.07)	
Slope variance								
Slope 1	.18 (.10)		.24 (.12)		.32 (.11)		.28 (.16)	
Slope 2	.01 (.00)		.01 (.00)		.01 (.00)		.01 (.01)	
Slope 3	.00 (.00)		–		.01 (.00)		.00 (.00)	
Covariance								
Intercept–slope 1	−.07 (.06)		−.17 (.06)		−.15 (.05)		−.01 (.08)	
Intercept–slope 2	−.02 (.01)		−.02 (.01)		−.02 (.01)		−.03 (.01)	
Intercept–slope 3	−.00 (.00)		–		−.00 (.01)		−.00 (.01)	
Slope 1–slope 2	.02 (.02)		.02 (.02)		−.00 (.02)		−.03 (.02)	
Slope 1–slope 3	−.01 (.01)		–		.01 (.02)		.02 (.02)	
Slope 2–slope 3	−.00 (.00)		–		.00 (.00)		−.00 (.00)	
Deviance	1358.90		1333.84		1240.41		1641.50	

Child behavior Fixed effects	Affective problems		Anxious		Hyperactive		Oppositional	
	Est. (SE)	p	Est. (SE)	p	Est. (SE)	p	Est. (SE)	p
Intercept								
Home-Start	3.99 (.26)	.00	4.44 (.32)	.00	7.23 (.36)	.00	7.03 (.33)	.00
Community	1.37 (.34)	.00	1.69 (.41)	.00	3.23 (.47)	.00	2.72 (.43)	.00
Comparison	2.27 (.27)	.00	2.62 (.33)	.00	5.80 (.37)	.00	5.40 (.34)	.00
Slope 1: pretest–posttest								
Home-Start	−1.09 (.42)	**.01**	−1.86 (.46)	**.00**	−.64 (.48)	.18	−1.19 (.47)	**.01**
Community	−.29 (.53)	.58	−.12 (.57)	.83	−.26 (.61)	.67	−0.00 (.59)	.99
Comparison	−.51 (.48)	.30	−.91 (.54)	.10	−1.50 (.55)	**.01**	−1.29 (.54)	**.02**
Slope 2: posttest–3 years								
Home-Start	−.34 (.11)	**.00**	.04 (.15)	.77	−.70 (.11)	**.00**	−.50 (.11)	**.00**
Community	−.13 (.13)	.29	−.18 (.17)	.30	−.43 (.14)	**.00**	−.26 (.13)	**.04**
Comparison	−.13 (.11)	.26	.22 (.15)	.15	−.52 (.12)	**.00**	−.29 (.11)	**.01**
Slope 3: 3 years–10 years								
Home-Start	.02 (.06)	.68	−.07 (.11)	.53	−.24 (.06)	**.00**	−.31 (.07)	**.00**
Community	.05 (.05)	.28	.06 (.09)	.54	−.08 (.05)	.15	−.13 (.07)	**.05**
Comparison	.13 (.05)	**.01**	.04 (.09)	.66	−.16 (.05)	**.00**	−.36 (.06)	**.00**
Random effects								
Residual variance	1.76 (.12)		2.67 (.19)		2.10 (.14)		2.14 (.16)	
Intercept variance	3.08 (.48)		4.33 (.69)		6.50 (.90)		5.26 (.76)	
Slope variance								
Slope 1	3.35 (1.23)		1.90 (1.52)		5.08 (1.83)		4.20 (1.59)	
Slope 2	.28 (.06)		.57 (.13)		.34 (.07)		.21 (.07)	
Slope 3	–		.16 (.04)		–		.04 (.02)	
Covariance								
Intercept–slope 1	−1.56 (.64)		−1.73 (.83)		−1.96 (.96)		−1.84 (.87)	
Intercept–slope 2	−.44 (.13)		−.45 (.23)		−.98 (.19)		−.35 (.17)	
Intercept–slope 3	–		−.03 (.15)		–		−.32 (.10)	
Slope1–slope 2	−.16 (.22)		−.04 (.35)		−.22 (.27)		−.12 (.26)	
Slope 1–slope 3	–		.13 (.22)		–		.04 (.14)	
Slope 2–slope 3	–		−.10 (.06)		–		−.01 (.03)	
Deviance	3334.50		3773.38		3564.58		3552.59	

bold emphasis: p<.05.

for lax parenting, is observed in the community group as well. The marked pattern of a decrease in parenting behavior of all the groups was unexpected. Looking at the slope estimates, the decrease in positive parenting was the smallest for Home-Start families, and the biggest for harsh parenting. Comparison families showed the biggest decrease in lax parenting.

Table 5
Estimates of intercepts and slopes of observational measures.

Parenting behavior Fixed effects	Responsive		Harsh		Discipline		Lax	
	Est. (SE)	p	Est. (SE)	p	Est. (SE)	p	Est. (SE)	p
Intercept								
Home-Start	27.49 (.38)	.00	21.14 (.43)	.00	33.33 (.58)	.00	18.41 (.34)	.00
Community	30.63 (.49)	.00	17.08 (.56)	.00	39.24 (.75)	.00	14.01 (.44)	.00
Comparison	29.28 (.39)	.00	18.41 (.44)	.00	37.17 (.59)	.00	14.43 (.35)	.00
Slope 1: pretest–posttest								
Home-Start	1.45 (.72)	**.05**	2.42 (0.86)	**.01**	2.40 (1.12)	**.03**	−1.60 (.68)	**.02**
Community	0.71 (.89)	.43	1.34 (1.06)	.21	1.23 (1.38)	.37	1.01 (.82)	.22
Comparison	2.63 (.83)	**.00**	0.15 (1.00)	.88	3.50 (1.30)	**.01**	2.69 (.81)	**.00**
Slope 2: posttest–8 years								
Home-Start	−2.54 (.26)	**.00**	−1.17 (.22)	**.00**	−3.33 (.32)	**.00**	−1.73 (.19)	**.00**
Community	3.99 (.23)	**.00**	−0.18 (.22)	.41	−4.60 (.30)	**.00**	−1.79 (.18)	**.00**
Comparison	−4.03 (.22)	**.00**	−0.39 (.21)	**.07**	−4.40 (.29)	**.00**	−1.95 (.18)	**.00**
Random effects								
Residual variance	5.93 (0.50)		9.33 (0.66)		14.76 (1.23)		6.93 (.49)	
Intercept variance	4.97 (1.03)		5.35 (1.31)		11.01 (2.40)		2.72 (.83)	
Slope variance								
Slope 1	6.55 (4.15)		6.19 (4.52)		13.88 (9.74)		1.07 (2.60)	
Slope 2	0.65 (0.26)		–		0.53 (0.48)		–	
Covariance								
Intercept–slope 1	−3.27 (1.67)		−2.01 (2.10)		−5.97 (3.79)		−1.21 (1.32)	
Intercept–slope 2	−0.62 (0.45)		–		−1.41 (0.89)		–	
Slope 1–slope 2	0.49 (0.83)		–		1.00 (1.63)		–	
Deviance	3304.12		3519.97		3858.43		3255.76	

Child behavior Fixed effects	Positive affectionate		Non-compliant	
	Est. (SE)	p	Est. (SE)	p
Intercept				
Home-Start	10.55 (.15)	.00	11.60 (.32)	.00
Community	11.79 (.20)	.00	8.49 (.42)	.00
Comparison	11.40 (.15)	.00	8.91 (.33)	.00
Slope 1: pretest–posttest				
Home-Start	0.50 (.31)	.11	−0.68 (.57)	.23
Community	0.26 (.38)	.49	0.85 (.70)	.23
Comparison	0.76 (.36)	**.04**	1.00 (.66)	.13
Slope 2: posttest–8 years				
Home-Start	−.40 (.09)	**.00**	−.92 (.14)	**.00**
Community	−.60 (.08)	**.00**	−.66 (.14)	**.00**
Comparison	−.70 (.08)	**.00**	−.83 (.13)	**.00**
Random effects				
Residual variance	1.17 (.09)		3.80 (.27)	
Intercept variance	0.64 (.16)		3.85 (.72)	
Slope variance				
Slope 1	1.02 (.61)		3.98 (2.02)	
Slope 2	.02 (.03)		–	
Covariance				
Intercept–slope 1	−.62 (.27)		−2.90 (1.05)	
Intercept–slope 2	−.02 (.07)		–	
Slope 1–slope 2	.06 (.14)		–	
Deviance	2133.76		2962.56	

bold emphasis: p<.05.

3.5. Observed child behavior

No change was observed for the child behavior during the intervention period of the Home-Start group. The children of the comparison group showed an increase in pro-social behavior. At follow-up all the groups showed a decrease in pro-social and non-compliant behavior. The Home-Start families showed the smallest decrease of pro-social behavior and the biggest decrease in non-compliant behavior.

Summarizing the self-reported and observational results of the last follow-up, the mothers who participated in Home-Start showed a stable pattern in feelings of competence, self-reported consistent and rejecting parenting, and self-reported internalizing problem behavior of their children. The negative changes that occurred during the last follow-up are a decrease in self-reported responsive parenting, a decrease in observed responsive and disciplining parenting, and a decrease in observed pro-social child behavior. The positive changes that occurred during the last follow-up are a decrease in mother-reported externalizing problem behavior, a decrease in observed harsh and lax parenting and a decrease in observed non-compliant child behavior. The comparison group differed from the Home-Start group in their development of self-reported responsive parenting (no change occurred) and affective problems of the child (more affective problem behavior). The community group differed in their development from the Home-Start families in self-reported responsive parenting (no change occurred), self-reported child behavior (no change occurred) and observed harsh parenting (no change occurred).

From Figs. 1 and 2 it may be observed that the Home-Start level on some variables come close to the community level. A one-way analysis of variance is performed to check whether the difference in group level has disappeared at follow-up. The group means are equal for the

outcomes on maternal reported responsive (F(1,52) = 2.912, p = .09), rejecting (F(1,52) = 0.235, p = .63) and consistent (F(1,52) = 2.935, p = .09) parenting and observed responsive (F(1,48) = 0.199, p = .66) and harsh (F(1,48) = 0.422, p = .52) parenting. In conclusion, while the Home-Start group showed a significantly worse group mean on these parenting behaviors at pretest, at 10 year (maternal reports) and 8.8 year (observer reports) follow-up, the mean level of the group is not different anymore.

4. Discussion

The current study was set up to assess the long term changes in parenting and child behaviors after participation in Home-Start. Using multilevel analyses, it was shown that the improvements in maternal competence between pre- and posttest and between posttest and the first follow-up were largest in the Home-Start group, but these effects were no longer present at 10 years post intervention. This means that the progress made during the intervention period and the first follow-up did not further increase nor did it fall back, these are sustained effects. The same pattern was found for the self-reported parenting: the Home-Start families showed the most pronounced positive changes, but the differential changes were no longer present at 10 year follow-up. In contrast, Home-Start mothers showed a decline in self-reported responsive parenting. However, the group means of the Home-Start mothers at 10 year follow-up are not significantly different anymore from the community levels on the three parenting dimensions.

A decrease in internalizing problems was seen for the Home-Start children during and directly after intervention, and no further change was observed at 10 year follow-up. Positive change in externalizing behavior until 10 year follow-up was observed for both the intervention group and the comparison group. This may be a normal way of life, changes in the community group occurred as well. As a result, these changes could not be attributed to Home-Start. However, the Home-Start children showed the most decrease in externalizing problem behavior, though they did not decrease to the community level. In conclusion, the self-reported results partly confirm our expectation: most changes that were made during the intervention period remained stable or further improved until ten year post intervention.

The observational measures showed a somewhat less clear pattern. After the intervention period, responsive, harsh, disciplining and lax parenting as well as affectionate and non-compliant child behavior decreased for all the three groups. The observational instrument, the CII, is used to count the frequency of the occurrence of behavior. Therefore, a decrease in parenting and child behavior indicates that less parent–child interactions occurred. This seems a direct result of children growing up. However, this could not be confirmed by other studies using the CII, i.e. no study has been found that assessed the development of parent–child interactions using the CII for this period. At the age of ten, children need less intensive parenting behavior than at the age of two (T1) or three (T3). These changes in family practices cause difficulties in measuring change in long-term studies (Collins & Shanahan, 1998). Since the CII is mainly used for families with children in early childhood (e.g. Hurlburt et al., 2013), it is recommended to adapt the CII or search for other observational measures that do take into account the changing family practices, when conducting long-term studies.

Based on maternal self-reports, and taking into account that the design of the study only allows for tentative conclusions (see limitations below), the findings of the present study suggest that the Home-Start parenting support program contributes to improvements in parenting behavior, and that the changes made during the intervention remain stable until 10 years after the intervention. These results partly support the theoretical model underlying the parenting support programs literature. That is, changes in maternal competence during and immediately after the intervention lead to improvements in parenting behavior (i.e.: responsiveness, consistency and acceptance of the child), which may be related with less externalizing child behavior problems later

in life and suggests a healthier development. These results support the findings that early home-visiting programs may have long lasting effects (Eckenrode et al., 2000; Filene et al., 2013; Nievar et al., 2010; Sweet & Appelbaum, 2004).

One of the limitations of the present study is that the number of participants per group was small. Also, groups were not randomly assigned to treatment and control conditions. Service providers are strongly opposed to randomization because assignment to a control group would deprive families in need of the Home-Start support. Also, it was expected that these vulnerable families would not agree with or would not be able to participate in complex, formal procedures of random allocation. Therefore, the groups were not completely comparable, and a direct comparison could not be made. As a result, we cannot imply that the Home-Start program has led to the changes by itself, as groups may differ on other unmeasured dimensions. Another weakness of the study is the drop-out ratio, with its biggest loss in the Home-Start group. The withdrawn mothers felt less competent about parenting and showed less positive parenting during observation. Though this is not uncommon in studies like this, it forms a threat to the internal validity of the study, because selective attrition cannot be ruled out.

Nevertheless, a 10 year follow-up is rarely seen in this field of research, taking into account the hard-to-trace vulnerable families. It takes a prolonged presence of the researcher, steadfastness, a long term plan, and lots of time. Therefore, this study is a valuable contribution to the field of knowledge, which suggests that Home-Start as an inexpensive and easy accessible intervention delivered by volunteers, has a positive effect on maternal feelings of competence, self-reported parenting behavior and internalizing child behavior directly following intervention, and that most of these progresses are sustained until 10 years after the intervention.

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