From BookStart to BookSmart: about the importance of an early start with parent-child reading

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Chapter 1

General Introduction

Cognitive development in children does not occur automatically but needs an abundance of parent input. In her blog 'Too Small to Fail', Hillary Clinton (2013) concluded that millions of parents talk too little with their children. In particular, parents raising their child in economically disadvantaged circumstances do not spend sufficient time talking with their babies.

The main aim of BookStart is the promotion of an early start with verbal interaction with babies and young infants in Dutch families. The project, supported by the Dutch Ministry of Education and implemented in the Netherlands since 2008, aims at enhancing the frequency of storytelling, singing songs, and rhyming through baby books. As language input may vary due to other variables than the socio-economic status of the family (Weisleder & Fernald, 2013), BookStart does not focus solely on parents in economically disadvantaged circumstances, unlike most other early interventions. Parents are likely to postpone reading activities until the child is expected to be more receptive to book sharing, in particular when the first attempts to involve the child in reading are distorted by negative child behavior (Karrass, VanDeventer, & Braungart-Rieker, 2003). Children who are temperamentally reactive may be less involved in book sharing and therefore may be particularly at risk of lagging behind in language skills when entering school (Slomkowski, Nelson, Dunn, & Plomin, 1992).

Why reading to babies?

Research with the Language ENvironment Analysis system (LENA) shows large differences between families in parent-child verbal input (Weisleder & Fernald, 2013). Some children hear about 12.000 words during a day, while in other families the number of words does not exceed 670. Language exposure at home and especially verbal interaction with the child can enhance the language development of young children (Hart & Risley, 2003; Ramírez-Esparza & Kuhl, 2014). Sharing books with young children seems a particularly effective way to promote their vocabulary (DeBaryshe, 1993; Payne, Whitehurst, & Angell, 1994). Book reading is found to be more stimulating for language development than playing or daily interactions during eating, drinking, and putting the child to bed (Crain-Thoreson, Dahlin, & Powell, 2001; Landry & Smith, 2006). There is evidence showing that the more complex sentence constructions in books can, in combination with pictures, enhance multi-clause thinking in young children and support young children's word knowledge (Cameron-Faulkner & Noble, 2013). There is also evidence showing that parents use more complex language during book sharing than in other situations even when the books are simple cardboard or fabric books that barely contain any text.

We expected therefore that, as children are more frequently involved in singing songs, storytelling, or labelling pictures as a result of an early start with book sharing, children's language development as well as their interest in stories may accelerate. When children show more interest, parents are more likely to read to their child. As a consequence, the time spent on book sharing increases and children's language skills advance correspondingly. Raikes and colleagues (2006) used the metaphor of a snowball to explain such effects of an early start with shared book reading.

Efficacy of a low-dosage program like BookStart

In the past decades, center-based interventions have been initiated to promote language development and prevent children lagging behind in language skills when starting school. Since 2002, early and pre-school education programs [Vroeg- en Voorschoolse Educatie (VVE)] - have been financially supported by the Dutch government, even though evaluations did not reveal effects on short or long-term language measures (Leseman, Otter, Blok, & Deckers, 1998; Leseman, Veen, Triesscheijn, & Otter, 1999; Veen, Derriks, & Roeleveld, 2002; Veen, Roeleveld, & Leseman, 2000).

The current research aims to test whether a low-dosage program, like BookStart, targeting verbal interactions in the family can be effective for children's language development (Hoogeveen & Versteegen, 2013). Unlike most other early intervention programs in the family (e.g., Boekenpret [Fun with Books], Reach out and Read, Providence Talks), BookStart does not offer coaching for the parents but mainly offers materials and the opportunity to get advice. When the children are about three months old, the parents receive a letter from the local government. A voucher is attached to this letter that the parents can use to collect a free BookStart case at their local library. In the library, there is an attractive corner with baby reading materials. Information in this corner shows parents how to engage their baby in reading (see www.boekstart.nl). Library employees are trained to welcome parents to the library and to show them where they can find materials for young children. Additionally, librarians inform the nurses at the well-baby clinics about the BookStart project. During the child's 7-month visit to the well-baby clinic, the nurses encourage participation in BookStart by asking parents whether they have already started reading with their baby and whether they have collected the BookStart case at the library. Since the project started in 2008, it has spread rapidly throughout the Netherlands and in 2013 the project had already been adopted by 99% of the local libraries (www.leesmonitor.nu, 2013)

Previous evaluations

Studies into BookStart in the United Kingdom over more than two decades indicate that this project can be of great value for the development of children by making an early start with shared reading (Baily, Harrison, & Brooks, 2002; Hall, 2001; Moore & Wade, 2003; Wade & Moore, 1998). A small-scale study (N = 41) showed that BookStart made parents start early with sharing books with their baby and that these parents involved their baby in library visits (Wade & Moore, 1998). Furthermore, the parents became more positive about the possibilities for verbal interaction and shared reading with the baby and its importance for later language development (Vanobbergen, Daems, & Tilburg, 2009). At the start of primary school, BookStart children performed better than their peers in reading according to observations by their teachers (Wade & Moore, 2000). Nevertheless, important questions regarding the effects of BookStart remain unanswered by the research in the United Kingdom. None of the BookStart studies tested whether changes in parental book sharing as a result of BookStart affect children's language development. Furthermore, none of the studies that examined effects on cognitive skills presented data collected with standardized tests.

It should also be noted that the BookStart project in the United Kingdom differs somewhat from the Dutch variant. Parents in the United Kingdom receive a BookStart package with baby books at two time points spread over the first four years of their child's life, starting when the child is eight months old. In the Netherlands, parents of newborn children receive a voucher for a BookStart case with exemplary age-appropriate materials and free access to the library for the baby. Unlike BookStart in the United Kingdom, there is no subsequent follow-up in the Netherlands.

Research questions

The main aim of the current study was to test whether changes in book sharing behavior are due to BookStart and whether an increase in book sharing as a result of BookStart affects children's language development. We were not interested in *direct* effects of BookStart on language development because - given that the study's design is quasi-experimental - such effects may indicate that parents with a natural inclination to verbally interact with the baby and share books from an early age are more inclined to participate in BookStart. These parents read from early on to their child but not because of BookStart. Their children may be more advanced in language skills but not due to activities that result from participating in BookStart.

Secondly, we studied the effects of BookStart in a subsample of children with a difficult temperament (high levels of reactivity and low levels of self-regulation). In

such cases, the parent may be less inclined to involve the child in verbal activities like book reading (Karrass, VanDeventer, & Braungart-Rieker, 2003), because reading to these children is less fun. As a result the child is at risk of language delays. Parents may, as a result of BookStart and despite negative responses from the baby, start to read to their baby at an early age. They may thus offer, through BookStart, an environment that counteracts the negative effects of a difficult temperament. In other words, we tested whether BookStart parents might be more inclined to read to their child despite their child's negative responses and thus promote language development of their baby.

Thirdly, we tested whether parents are more motivated to participate in BookStart when they experience problems interacting with the child. Not all parents accept the invitation from the municipality inviting them to participate in BookStart. About 40% of the parents actually collect the BookStart case from the library. One worst case scenario could be that, in particular, parents who would read anyhow to their child participate in BookStart. A best case scenario on the other hand would be: if parents get the idea that the verbal interaction with their child is not optimal and that their child is at risk of a word gap when starting school, they might be seek advice on how to improve the intensity of parent-child verbal interaction and feel attracted to BookStart. The invitation letter emphasizes the importance of interacting verbally with young children in order to promote children's verbal skills and points out that a word gap may arise when child-directed word exposure at home is insufficient (Weisleder & Fernald, 2013). In other words, problems that parents experience in involving their child in verbal interactions may influence the parents' decision to participate in BookStart. Less educated parents may be less concerned when they are not successful in involving their child in verbal interaction and therefore participate to a lesser extent than highly educated parents.

The research projects

In a large-scale project, parents completed questionnaires about verbal activities at home, children's language development, and their child's temperament. Parents were recruited when the child was aged between six and nine months and they completed three questionnaires at 7-month intervals when children were about 8, 15, and 22 months old. The participants were recruited from 70 cities and villages in the provinces Drenthe, Gelderland, Limburg, Overijssel, Brabant, North Holland and South Holland, and Utrecht. Parents in the BookStart group lived in cities and villages where BookStart was implemented. We only included parents who had collected the BookStart case at the library. Parents in the control group lived in cities and villages where BookStart was not yet implemented and they had neither

received an invitation to participate in BookStart nor collected the BookStart case at a library.

Using the data collected, we tested whether BookStart affects the frequency of book sharing and whether book sharing at 8 months as a result of BookStart predicts the vocabulary of children at 15 and 22 months (Chapter 2). In a second study (Chapter 3), we also tested whether children with high levels of temperamental reactivity (anger, irritation) would benefit more from BookStart than their less reactive peers in terms of reading frequency and vocabulary skills. Effects of BookStart were studied in a group with low scores on temperamental reactivity (N = 144) and a group with average or high scores on temperamental reactivity (N = 440).

During the 8-month visit to the well-baby clinic, we selected 70 parents to participate in a third study. We recruited a comparable amount of highly-, middle-, and less-educated parents and administered questionnaires orally. These data were used to test whether parents choose to participate in BookStart because they feel that the intensity and quality of verbal interaction in the family needs improvement (Chapter 4).

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Chapter 2

Causal Impact of the Low-Dosage Intervention BookStart on Language Development

Abstract

In this study we tested the causal impact of BookStart, a nationwide project in the Netherlands, low in dosage and budget, on language development. BookStart provides parents of newborn babies with a sample baby book, and an information flyer about an early start with book sharing as well as free access to age-appropriate reading materials at the library. We examined whether compliance with the BookStart suggestion to read books to a child as early as the first year increases infants' early language development. We obtained an unobtrusive indicator of book sharing around 8 months by asking parents to tick the baby books among images of book covers of 40 real books and 23 'foils' (fake book covers). In a sample of 640 parents and children we found that if parents comply with the BookStart suggestion to expose their young child to books from an early age, their children's language scores, assessed with the MacArthur-Bates CDI at 15 and 22 months, were higher than those of a similar group of children who had not been exposed to BookStart. We took care to estimate effects of book sharing on language development only if parents had changed their behavior due to BookStart. This study is one of the first to provide evidence for a causal relationship between an exogenous stimulus for an early start with book sharing, and children's language scores at 15 and 22 months. From 15 to 22 months effect sizes increased, which may indicate that a reading routine becomes more influential over time.

Based on:
Van den Berg, H., & Bus, A. G. Causal impact of the low-dosage intervention BookStart on language development. Manuscript submitted for publication.

Sharing books with your baby may be one of the most promising ways to realize verbal interaction that may create life-long advantages for cognitive development. In several studies the prospective connections between the onset of book reading in infancy and early development of language skills have been assessed: If parents regularly shared books with their child, 2- to 4-years old children have better receptive and expressive language skills than less well-read-to children (DeBaryshe, 1993; Fletcher & Reese, 2005; High, Lagasse, Becker, Ahlgren, & Gardner, 2000; Payne, Whitehurst, & Angell, 1994; Raikes et al., 2006). In this study we tested the impact of BookStart on an early start with book sharing and, through book sharing, on early language development. BookStart is a nationwide project in the Netherlands that provides parents of newborn babies with access to age-appropriate reading materials.

BookStart started in 1990 in Britain and has since been adopted in other European countries, among which the Netherlands, as well as Australia, Canada, Colombia, Jamaica, Japan, Korea, New Zealand, and Thailand. In the Netherlands, parents of newborn babies living in areas where BookStart is adopted receive a BookStart case that includes a flyer explaining the importance of an early start with shared reading, and a sample baby book. Parents also receive free access to the local library so that they can make use of a large collection of baby books. The librarians are trained to advise parents about age-appropriate books and how to engage babies in shared reading.

There is some evidence in the literature that the ingredients of the BookStart program - access to a variety of books at the library - stimulate parents to make an early start with book reading which, in turn, may enhance vocabulary knowledge of young children (Birckmayer, 2001; Neuman, 1996; Peifer & Perez, 2010). Peifer and Perez (2010) found in a cross-sectional study that two years after the start of extensive community based literacy programs comparable to BookStart (e.g., Raising a Reader, Prenatal to Three Initiative, Reach out and Read) parents visited the library more frequently. When parents accessed the library on a more regular basis they increased shared reading with children under the age of three (Birckmayer, 2001). Neuman (1996) showed that 4-year old HeadStart children of low-income parents had higher scores on posttests of the Peabody Picture Vocabulary Task and the Concepts of Print Test after a 12 week period during which parents had free access to books and received training in how to share books with young children during a book club.

More specifically, evaluations of BookStart in the United Kingdom have indicated that, unlike those parents not involved in the project, BookStart parents visited the library frequently in the six months after receiving the book package and advice on book sharing from health visitors when their children were about eight months old (Wade & Moore, 1998). From the questionnaire also appeared that BookStart parents

were more likely to use book sharing as a way to interact with their child. From a follow-up (Wade & Moore, 2003) comes evidence that BookStart children were better prepared for the first grades of elementary school than children not involved in BookStart. At the start of primary education Wade and Moore applied three observation scales from the Birmingham Baseline Assessment including 'speaking and listening', 'reading', and 'writing'. Scores on the 'reading' scales revealed an effect for BookStart: Bookstart children were, as a whole, ahead of the comparison group.

However, there are complicating factors in the interpretation of these findings. We may, for instance, wonder whether any benefits of BookStart do not just accrue to the individual parent. We can expect three different responses to receiving a BookStart case and free access to a large collection of baby books in the library. Some parents comply and are willing to have their behavior determined by the BookStart project. These parents may intensify their habits of verbal interaction with their baby and share books with their baby from an early age as a result of the project. But in many other cases, receiving a BookStart package and free access to the library may hardly change parents' behavior. Parents may go their own way, insisting on choosing the interaction patterns that they prefer, irrespective of whether they receive a BookStart case or not. It is especially higher educated parents who are aware of the need to verbally interact with young children from early on, and who may share books with their infant regardless of whether they participate in BookStart. Their mirror image are parents who do not expose their very young children to books under any circumstances. In other words, some people comply with BookStart while others do not. Such differences in compliance are problematic for a researcher interested in the unbiased estimation of the causal impact of BookStart on children's language development. Therefore, our main question is *not* whether participating in BookStart stimulates language development. Because there are various responses to being assigned to BookStart, we tried to answer a different question: Does compliance with the BookStart suggestion to expose your young child to books from an early age increase infants' early language development? In other words, we wanted to end up with an unbiased estimate of the critical relationship between children's language development and BookStart, and we tested whether early language skills improved when parents changed their book sharing behavior due to BookStart.

This study

To test causal effects of BookStart on language development we focused on those parents who had responded positively to the invitation to collect a BookStart case at the library. The 'control' parents, by contrast, lived in similar areas where BookStart

was not yet adopted and had not received an invitation to participate in the program. The variable BookStart enabled us to locate and isolate the exogenous part of the variability in the potentially endogenously determined predictor 'early book sharing' (Murnane & Willett, 2011). We tested whether BookStart affected children's early book exposure, over and above the impact of any personal factors (such as parents' interest in reading, or personal beliefs about children's development) that may affect children's book exposure endogenously. This exogenous part of the variation in the extent to which babies are exposed to books in the first year is illustrated in Figure 1 by the medium-grey ellipse representing variation in book sharing overlapping the dark-grey ellipse representing variation in BookStart. To obtain an unbiased estimate of the causal impact of BookStart on language development we carried the part of the variation in book sharing that is exogenously determined by BookStart through to a second stage in the analyses in which we tested the effects of book sharing on language development. In this way we excluded the variance in book sharing that is determined endogenously and reflects participants' personal choices and attributes.

In testing whether BookStart did affect a child's language through changing parents' book sharing behavior, we restricted ourselves to the overlap between the complete light-grey ellipse representing variation in the outcome language development and the darkened partial ellipse representing exogenous variation in book sharing (Figure 1).

In other words, it was only the variation in book sharing that was affected by BookStart, and we capitalized upon this when estimating the effect of book sharing assessed when children were approximately eight months old on later language development. Thus, the estimate will not provide any information about the impact of book sharing on language development for individuals who did not participate in BookStart (striped part in Figure 1). It should be noted that by using BookStart to provide an unbiased estimate of the causal relationship between exogenously determined book sharing at eight months and language development about seven months and one year later, we may lose some precision and power resulting in a rather conservative estimate of effects of BookStart, which may make it harder to reject the null hypothesis of no relationship between book sharing and language development.

It should be noted that BookStart can be used as an instrument to study causal effects of an early start with book sharing at 8 months on language development at 15 and 22 months only if two additional conditions are fulfilled. Logically, the instrumental variable, BookStart, must be related to book sharing, because if those variables are unrelated we cannot isolate that part of the variation in book sharing at 8 months that is affected by BookStart. If the relationship is weak it will be difficult to

detect a relationship with language development unless the sample is extremely large. A second condition is that BookStart cannot be related to the outcome variables, i.e., language development at 15 and at 22 months. If BookStart is related to the outcome measures, we cannot know whether BookStart is actually instrumental in promoting language development or just an endogenous variable that reflects individual differences. For instance, parents may collect the BookStart case and visit the library because it enriches their collection of books, but they read anyhow to their baby. In other words, we will then not be able to distinguish endogenous from exogenous explanations of the relationship between book exposure and language development.

In sum, our main aim in this study was to test the hypothesis that BookStart is likely to affect a child's early language development at 15 and 22 months by promoting an early start with book sharing. We were interested only in the unbiased estimation of the causal impact of BookStart through book sharing on children's language development, and therefore excluded those connections between book sharing and language skills that could be compromised by the personal choices of parents with

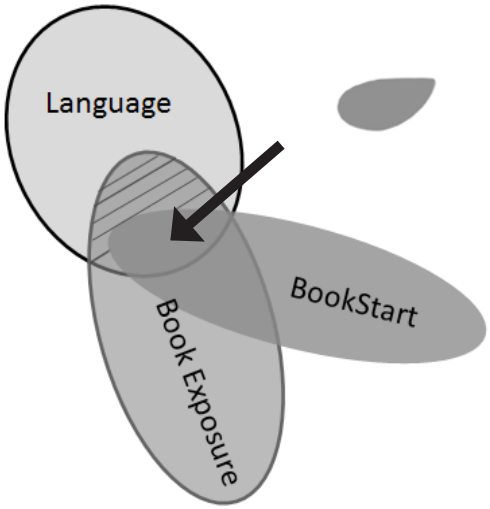

Figure 1. Venn diagram showing the three main variables used in this study: language development at 15 and 22 months as *outcome variables*, book exposure at 8 months as *predictor*, and BookStart as *instrumental variable*. We hypothesize that it is endogenous variables, such as how the parent values verbal interaction with infants, that mainly determine the variability in book exposure at 8 months. A much smaller part of variability in early book exposure may relate to the extraneous variable BookStart (darkened partial ellipse). The aim of this study was to test whether there is indeed an overlap between this darkened partial ellipse and the light-grey ellipse representing language development. In that case (overlap here represented by the leaf-shaped part extracted from the diagram), we may conclude that language development for some part does depend on BookStart, and is therefore a viable intervention. If there is hardly any overlap between the three variables, or none at all, we should conclude that there is no evidence for BookStart as an effective intervention.

different motivations, and perhaps different efforts to initiate verbal interactions with their infant from an early age. We restricted ourselves to working with those connections between language development at 15 and at 22 months and an indicator of book exposure around 8 months that overlapped with the instrumental variable BookStart.

Method

Participants

Parents of babies around 8 months in 35 BookStart sites all over the Netherlands were invited to participate in the study. These parents had collected the BookStart case at the local library. A control group of parents not involved in BookStart was recruited through 35 child health care centers in comparable sites where BookStart had not yet been implemented during the period in which our study took place. These parents received invitations to complete the book exposure list and a questionnaire about background variables from employees of the child health care centers when they were around 8 months old (SD = 1.39; N = 782). Families were included in the final sample if (a) Dutch was the first or second home language, and (b) they had completed the questionnaire at 8 months, and the MacArthur-Bates CDI when the child was about 15 (SD = 1.47) and/or 22 months (SD = 1.47). Six questionnaires were not included in the final analyses because Dutch was not the first or second language at home. In all, 640 parents completed the MacArthur-Bates CDI when the children were approximately 15 and 22 months in addition to the questionnaire at 8 months. A group of 142 parents completed the first questionnaire, but did not complete the CDI language skills list at 15 months, nor at 22 months, and were therefore excluded from the analyses. The excluded group did not differ from the included group in gender and age but had a lower average level of parent education ($t(780) = -3.44$, $p < .05$). Average education levels on a scale from 0 (no education for both parents) to 6 (both parents received a university degree) of the included and excluded families were 4.25 (SD = 1.32) and 3.83 (SD = 1.42), respectively.

Procedure

Parents received an invitation letter to participate in the study that also gave information about the research purposes. The letter explained that we were interested in shared reading with babies, and contained a link to a website with the background questions, the book exposure list (to be completed at 8 months), and the MacArthur-

Bates CDI language skills list, a language test to be completed at 15 and 22 months. If parents did not have access to the online version but were willing to participate, we provided a paper version of the questionnaires. On each occasion at most 14 parents used this option. Completing each of the three questionnaires took about 20 minutes. A reminder was sent four weeks after the invitation. Parents received a small present after completing a questionnaire (for instance a baby calendar).

Measures

The description of questionnaires administered when the child was aged around 8, 15, and 22 months is limited to the variables involved in this report: background information (age, gender, parent education), condition (participating in BookStart or not), book exposure list, and MacArthur-Bates CDI language scores. Not reported in this study are questionnaires about parental beliefs concerning book reading to young children; the frequency of home activities (book reading, television viewing, listening to music); the incidence of problems like dyslexia in the family; and children's temperament.

Questionnaire. Background information included age, gender of the child, and parent education. Both parents indicated their highest education level on a 7-point scale: primary education, lower secondary vocational education, higher secondary education, higher vocational education, college or pre-university/university. A 7-point scale combining the education levels of both parents was composed, ranging from 0 (no education for both parents) to 6 (both parents received a university degree).

Book exposure list. To assess an early onset of book sharing we preferred an unobtrusive measure, the book exposure list, to shared-reading frequency as reported by the parent when the child was approximately 8 months old. We preferred an unobtrusive indicator for book sharing - assessing how familiar parents are with popular baby books – to a questionnaire, because in an experiment where parents receive flyers about the importance of an early start with book sharing, their responses to questions about book sharing may easily be compromised by socially desirable answers. From previous research we know that for children of preschool and kindergarten age, book exposure lists completed by parents do predict language and literacy skills (Mol & Bus, 2011). The book exposure list, modeled on the title recognition lists by Cunningham and Stanovich (1990), consisted of images of 63 baby book covers among 23 fake covers (cf. Mol, Neuman, & Strouse, 2014; Sénéchal, LeFevre, Hudson, & Lawson, 1996). The list was composed of baby books that were available in book stores and libraries at the time of the study. Parents were asked to tick all covers they recognized as "real". The total score was the proportion of correctly recognized baby books minus the proportion of foils ticked.

Language development. To assess the language development of the children at 15 and 22 months we used the shortened Dutch version of the MacArthur-Bates CDI (Fenson, Bates, Dale, Goodman, Reznick, & Thal, 2000; translated into Dutch by Zink & LeJaegere, 2003). The list included 55 words (e.g., *ooh*, *ah*, *car*, *book*, *flower*). For each word we asked parents to indicate whether the child could produce (expressive language scale) or comprehend (receptive language scale) it. The raw scores on both scales were added up to serve as an indicator of language development.

Plan of analysis

The Instrumental Variable Estimate approach (Murnane & Willett, 2011) involves the statistical modeling of two hypothesized relationships: (a) between the potentially endogenous predictor 'book exposure' and the BookStart instrument, and (b) between the outcome measure 'language development' and the exogenous predictor 'book exposure'. We can fit the two models simultaneously using Simultaneous-Equations Modeling (SEM). In Figure 2 the α and β paths together reflect the notion that the instrument BookStart is related to the predictor 'book exposure' and BookStart is related indirectly via book exposure to the outcome measure 'language skills'. By having

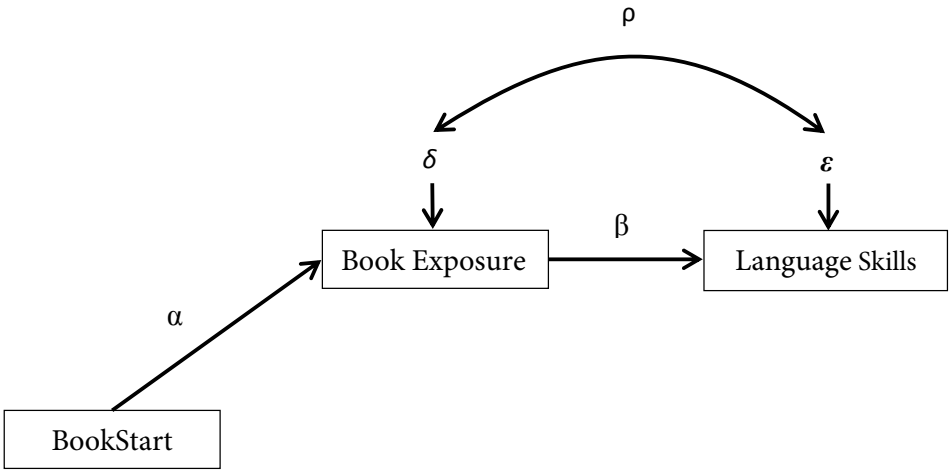

Figure 2. Path model with links that were tested in a large sample via assessments when children were 8, 15, or 22 months old. Book exposure at 8 months was assessed via a book exposure list, and language skills at 15 (N = 584) and 22 months (N = 561) via the MacArthur-Bates CDI. The first residual, δ, is that part of book exposure that is not predicted by BookStart. The second residual, ε, is that part of language development that is not predicted by book exposure. It is the link between the two residuals that ensures that only the part of variation in book exposure that has been predicted by BookStart determines the magnitude and direction of β. Thus, it is only the exogenous part of book exposure that determines the estimate of β. The absence of an arrow representing a direct path between the BookStart instrument and outcome measure 'language skills' exposes one of the critical assumptions of an Instrumental Variable Estimation.

BookStart predict the potentially endogenous predictor 'book exposure' we make a distinction between book exposure variation that is related to BookStart and therefore exogenous, and the unpredicted part or residual, which contains any endogenously determined variance of book exposure (like a parent's belief that book reading to infants is important). Both parts, the endogenous as well as exogenous, may be correlated with the outcome measure 'language development' but it was only the exogenous part that we wanted to use in order to estimate β. Via the covariation between the residuals δ and ε any endogenous component of book exposure can be related to the outcome language skills.

Results

For our outcome we chose as measure of language development the overall score on word knowledge, which takes a value of 110 if children know all words receptively and expressively, and a value of 0 if they do not know any word either receptively or expressively. Note in Table 1 that children on average knew more than a third of the words at 15 months; seven months later, at 22 months, they knew about twice as many. The book exposure list is a continuous variable that represents how many book covers parents recognized minus the number of fake covers they checked. To evaluate the impact of book exposure at 8 months on language development at 15 and 22 months,

Table 1 Descriptives of the general information provided on the questionnaire (N =640)

	Sample mean (N = 640)	BookStart (N = 394)	Control (N=246)	p-value
Covariates:				
• Age in months	8.14 (1.39)	8.10 (1.44)	8.20 (1.29)	.384
• Gender (boys)	50%	49%	52%	.477
• Education level (maximum score: 6)	4.25 (1.32)	4.35 (1.31)	4.11 (1.31)	.024
Endogenous predictor:				
• Book exposure list (% correct books minus foils)	16.63 (10.77)	17.66 (11.29)	14.99 (9.68)	.002
Instrument:				
• BookStart	62%	-	-	-
Outcomes:				
CDI (maximum score: 110)				.222
• at 15 months[a]	41.20 (19.73)	40.41 (19.94)	42.46 (19.36)	
• at 22 months[a]	80.06 (20.26)	79.62 (20.61)	80.84 (19.67)	.496

Note. [a]At 15 months N = 584 (61% BookStart); at 22 months N = 561 (64% BookStart)

we treated this variable as a potentially endogenous *predictor* in our analyses. The *instrumental variable* in the model is the dichotomous variable BookStart. Of the total number of participants, 62% received the BookStart package. In Table 1 we provide descriptive statistics for the subsample of families who participated in BookStart (BookStart = 1), and for the subsample not living in a BookStart area (BookStart = 0). Note that age and gender were the same in the two groups, as is to be expected if the same criteria are applied for group selection. The level of parental education was somewhat higher in the BookStart group, see Table 1. We therefore treated education level as a covariate, to improve the precision of the estimates. At 15 and 22 months the BookStart and control groups did not differ in scores on the CDI lists, which indicates that there were no direct effects of BookStart on language development. However, there were statistically significant differences in the book exposure scores between the two groups. The BookStart group scored almost 3 points higher than the control group. This confirms that there is a relationship between the potential instrument, BookStart, and the potentially endogenous predictor 'book exposure'. This means that the data meet the condition that the instrumental variable must be related to the predictor, for using BookStart as instrumental variable.

We argued that variation in the predictor 'book exposure' is potentially endogenous. The choice of whether to buy and borrow books for sharing with your baby may depend not only on collecting the BookStart case but also on many unseen characteristics of the family or parent, each of which may also affect language development. In order not to end up with a biased estimate of causal effects of BookStart on language development via book exposure we used a two-stage approach in analyzing the data. At the first stage the potentially endogenous predictor 'book exposure' was obtained by regressing this variable on BookStart. At the second stage, we used the predicted score on 'book exposure' in place of the corresponding observed values, and regressed language development on the book exposure predictor obtained in the first stage.

Using the SEM approach we estimated the impact of BookStart on language development at 15 months through book exposure at 8 months; see Table 2. Estimates, corrected standard errors, and approximate p values for the model parameters at both stages are provided in the upper and lower panels of Table 2. In the upper panel we can inspect the first path, which links the extraneous variable BookStart to the potentially endogenous predictor 'book exposure'. The relationship is strong and statistically significant ($p < .01$). The estimate indicates that the BookStart parents scored 2.66 points higher on the book exposure list than the parents who did not participate in BookStart, an effect that equaled .25 *SD* (Mean difference (2.67) / Standard Deviation in sample (10.77)). Thus, we might characterize BookStart as a useful instrument

Table 2 Estimation of the effects of the extraneous variable bookstart on language development at 15 months through book exposure at 8 months

First stage: Outcome - Book Exposure

	Parameter Estimate	Standard Error
Intercept	14.956***	.722
Instrument: BookStart	2.666**	.921
R^2	.014	

Second stage: Outcome - language development at 15 months, raw score on CDI

	Parameter Estimate	Corrected St. Error
Intercept	38.593***	1.481
Book Exposure (predicted values)	.157*	.075
R^2	.008	
ρ	.005	

Note. $^{\dagger}p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3 Estimation of the effects of the extraneous variable bookstart on language development at 22 months through book exposure at 8 months.

First stage: Outcome - Book Exposure

	Parameter Estimate	Standard Error
Intercept	15.587***	.742
Instrument: BookStart	2.008*	.928
R^2	.008	

Second stage: Outcome - language development at 22 months, raw score on CDI

	Parameter Estimate	Corrected St. Error
Intercept	77.069***	1.600
Book Exposure (predicted values)	.177*	.080
R^2	.010	
ρ	.005	

Note. $^{\dagger}p < .10$; * $p < .05$; p **$< .01$; p ***$< .001$

that explained about 1.4% of the differences in scores on the book exposure list. At the second stage, we examined the second path linking the predicted values of the potentially endogenous predictor 'book exposure at 8 months' to children's subsequent language development at 15 months. We made sure that it was only the exogenous first part that determined the estimate of β by providing a "back door" route via the covariation between the residuals δ and ε. Thus, the estimate of regression slope β depended only on extraneously determined book sharing. Note in the lower part of Table 2 that the effect of the book exposure list on language skills was significant. The overlap between BookStart and the book exposure variable explained a significant part of the variance in the language test – R^2 equaled 0.8%, which indicates a small effect size.

In Table 3 we present the impact of book exposure at 8 months on language development at 22 months. If exactly the same participants had been included as in analyses concerning language skills at 15 months the upper part of Table 3 would have been exactly the same as the upper part of Table 2. However, because the groups that completed the CDI at 15 and 22 months differed a bit, there were some differences in the group of participants explaining the discrepancies between the upper parts of Tables 2 and 3. The prospective connection between book exposure at 8 months and the development of language skills at 22 months was statistically significant, and somewhat stronger than the connection that we found at 15 months; the overlap between BookStart and book exposure explained 1% of the differences in scores on the language test at 22 months.

Using SEM to estimate the fit of models simultaneously we obtained an estimate of the correlation between the residuals in the models (ρ). In both models (at 15 and 22 months) the estimated correlation between the errors (δ and ε) equaled .005, which is a small and insignificant correlation. Such a small error correlation indicates that the path by which the endogenous variation in book exposure could be linked to language development was not significant. In other words, removing the arrow between the errors would not change the results for the two models (at 15 and 22 months) significantly.

Discussion

An important educational-policy issue in the Netherlands is how to improve young children's educational attainments efficiently so that the number of children who are behind in language development at the start of primary education can be minimized. In this study we wanted to test how important it is to stimulate parents "to nourish the child's mind through book sharing" in the first year as is suggested to parents of newborn babies (Hillary Clinton, www.toosmall.org). We therefore focused on outcomes of a nation-wide project, BookStart, which promotes an early start with book sharing by offering parents exemplary materials, free access to the library and advice about book sharing with young children, and information about the importance of book reading. Results suggest a causal relationship between an early start with book sharing as a result of BookStart and early language skills. If parents complied with the BookStart suggestion to start in the first year of life with book sharing, their children's language scores in the second year were higher than those of a similar group of children who had not been exposed to BookStart. To the best of our knowledge it is a unique finding that extraneous incentives to book sharing affect language development assessed as early as 15 months. It should be emphasized that it is not likely that scores on the instrument to assess book sharing just reflected the information that BookStart parents received about the importance of this activity. In contrast to previous studies of early book reading inventions in which parents reported how often they read to their child (e.g., Burnett, Daniels, & Bailey, 2014), we used an unobtrusive measure – the book exposure list – as indicator of parent-child book sharing.

This study is one of the few to provide evidence for a causal relationship between an exogenous stimulus to an early start with book sharing, and children's language skills as measured by the MacArthur-Bates CDI. This finding is even more remarkable when we take into account that the BookStart approach, targeting all newborn children in the Netherlands, is low in dosage and budget. Participating in BookStart meant that, when the baby was about three months, parents received an example of a booklet appropriate for babies, had access to age-appropriate reading materials through the local library, could receive advice about book sharing with babies if they wanted, and could see examples of parent-infant book sharing on websites. Apart from these opportunities, parents did not receive intensive coaching of infant-parent interaction as in other Dutch book reading projects like *Boekenpret* [fun with books] and *Voorleesexpres* [book reading express]; parents themselves were responsible for taking their own benefits out of the intervention. We cannot be certain that this low-

profile approach to stimulating book sharing with babies is effective for all Dutch families, since not all educational levels were equally well represented in the current sample. In particular, the lowest educated group (only primary education or special education) was underrepresented.

Effects of BookStart through book exposure at 8 months on language development at 15 and 22 months were small. It is possible that such outcomes are to be expected at this early age due to the small variation in children's scores on language tests. Because other studies into the effects of early interventions on cognitive development report effect sizes comparable to those reported here (Coley, Lombardi, Sims, & Votruba-Drzal, 2013; Loeb et al., 2007), this may in fact apply. It should also be mentioned that we took great care to estimate effects in only the group of parents that changed their behavior due to BookStart, which may have resulted in rather conservative estimates of effect sizes. As we wanted to isolate influences of exogenous variance determined by BookStart from many possible endogenous factors (i.e., parental attitude towards book reading, knowledge about the importance of verbal interaction with babies) we preferred the Instrumental Variable Estimation to a regular linear regression in this study. Thus, we increased the probability of accepting the null hypothesis and finding low effect sizes, as the approach currently used is very strict in calculating effect sizes (Murnane & Willett, 2011).

There is some evidence that book sharing is a stronger predictor of language development at 22 months than of development at 15 months. To explain this finding we hypothesize that a book-reading routine expands over time, which may cause effects to increase (Raikes et al., 2006). An early start may improve the children's interest in books, so that children's pleasure in sharing books grows and parents and children spend more and more time on reading. Once parents are convinced that reading to young children is pleasant (e.g., Bingham, 2007), reciprocal influences between language skills and book sharing may be set in motion (Raikes et al., 2006), affecting later language and reading skills (Mol & Bus, 2011). When parents experience how engaging parent-child book sharing can be they may realize that in fact it is possible to create verbal exchanges with very young children and increase the frequency of book sharing. In other words, our findings agree with the hypothesis that if parents persist in a reading routine individual differences in language score will grow and will become stronger over time (Belsky et al., 2007; Deming, 2009).

Limitations and future directions

In the this study we did not have the opportunity to randomly assign participants to the BookStart or control condition – the preferred approach for testing effects of

interventions (see What Works Clearinghouse standards). In analyzing the data we chose therefore to use the Instrumental Variable Estimation procedure, a statistical model that enabled us to control for impact of endogenous variables that could affect the language outcomes in the current intervention study. As we wanted to isolate influences of exogenous variance determined by BookStart from endogenous factors (i.e., parental attitude and knowledge) we preferred this approach to a regular linear regression, even though it increases the probability of accepting the null hypothesis and finding low effect sizes.

Our BookStart group consisted of only those parents who actually collected the BookStart case, and not the *intent-to-treat* group, i.e., all parents who received an invitation to participate in BookStart. This selection of the experimental group might have distorted the results as the parents, who actually collected the BookStart case, might have been more motivated for book sharing than the parents in the control group. As a result we may have overrated the effect of BookStart on book sharing, even when attempts are made, as we did here, to exclude effects of endogenous characteristics of parents. On the other hand, control parents were willing to complete a questionnaire about book sharing, which may indicate that they, too, were interested in such activities with infants.

Because the data were collected via questionnaires, parents most in need of BookStart, from low educational background or bilingual families, might not have participated. About 1% of the parents in the sample belonged to the lowest educated, whereas this percentage is 8.29% for the Dutch population as a whole (*Centraal Bureau voor de Statistiek* [Statistics Netherlands], 2010). The lowest educated parents were underrepresented in both the control and BookStart groups, which may have caused rather homogenous scores on the book exposure list and language test. If more lowest educated parents had participated this might have led to more variation in answers, possibly resulting in greater effect sizes. Outcomes of a waiting-room study at child health care centers a year after this study in which we assessed the participation-rate of BookStart among the parents of six to nine months old babies, confirmed that the lowest educated parents were participating least in the project. More attention should therefore be paid to how these parents can be involved in a low-dosage intervention as BookStart.

Our results indicate that an early start with reading is important for the development of preschool language skills, and that effects of BookStart on parental reading behaviors are "real". We tried to exclude the possibility that the project is effective only because it is embraced by parents who, due to personal choices and interests, agree with the importance of book sharing from an early age. BookStart is a

compound of several elements that each may be important in promoting parent-baby verbal interaction and early development of language skills: Explaining new parents the importance of interacting verbally with babies, showing parents how they can share stories with very young children, and, probably most important, providing free access to appropriate materials.

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Chapter 3

Beneficial Effects of BookStart in Temperamentally Highly Reactive Infants

Abstract

At the birth of their child, parents living in areas where BookStart has been adopted receive a package containing a baby book, a CD, and a flyer about book sharing. In this study we tested whether this extensive, nation-wide intervention is a stimulus for language development. Three hundred and fifty-nine 'BookStart families' were compared with 225 control families. Assessments took place when the infant was 8 months old, and 7 months later. The overall effects of BookStart on language development at 15 months were small (d = 0.05) but moderately high (d = .46) in a sub-sample of temperamentally highly reactive children (25% of the sample). Findings were in line with the differential susceptibility model. A reactive temperament proved a risk factor for language development, due to low verbal stimulation from parents in the first years, but an asset when parents increased verbal parent–child interaction under the influence of BookStart.

Based on:
Van den Berg, H., & Bus, A. G. (2014). Beneficial effects of BookStart in temperamentally highly reactive infants. *Learning and Individual Differences*, *36*, 69-75. doi: 10.1016/j.lindif.2014.10.008

In the current study we tested effects of BookStart – a program first started in Great Britain and later adopted in other European countries and Australia, Canada, Colombia, Jamaica, Japan, Korea, New Zealand, and Thailand (e.g., Hall, 2001; Hardman & Jones, 1999; Wade & Moore, 1998). BookStart was first implemented in the south of the Netherlands in 2009, and has since then spread throughout the country. Parents of new-born babies living in areas where BookStart has been adopted receive a voucher from the local government for a baby book, a CD with children's songs, and a flyer explaining the importance of an early start with shared book reading. The package also includes free membership for the baby of a local library equipped with a rich collection of baby books. Librarians are trained to advise parents and organize workshops about how to involve infants in book sharing, singing songs, telling stories, or reciting rhymes.

Is participating in BookStart beneficial for young children's language development, and what are the changes in activities that promote language development? Investigations into BookStart show positive effects on frequency of parent-child language activities (e.g., Wade & Moore, 1996), parental attitude towards sharing books with babies (Vanobbergen, Daems, & Tilburg, 2009), and language and literacy scores at the start of primary education according to the Birmingham Baseline Assessment (Wade & Moore, 1998). By comparing children from families who had collected the BookStart package at the library (n = 359) with children from similar families who were born in areas where BookStart had not yet been adopted (n = 225) we tested whether parents create a positive language environment under the influence of BookStart. We inquired about a broad range of verbal activities encompassing passive exposure to language such as television or computer as well as activities that include parent-child interaction. We expected that improvements in language resulting from BookStart are mediated in particular by verbal activities involving parent-child interaction, such as shared book reading or storytelling (e.g., Bus, 2001; Duursma, Augustyn, & Zuckerman, 2008). In a recent study, Ramírez-Esparza, García-Sierra, and Kuhl (2014) demonstrated, by means of the Language Environment Analysis device, that it is especially the quality of parent-child one-to-one interaction that promotes language development, rather than the quantity of words the child is exposed to during other activities.

To obtain an insight into which home activities are promoted by BookStart and mediate effects on language development, we asked parents to complete a questionnaire at two assessments, including questions about a range of their baby's verbal activities: book sharing, watching television, singing songs, listening to music, reciting rhymes, storytelling, playing with apps on digital devices, and other verbal

activities. To test which activities in particular may be linked to effects of BookStart we used mediation analysis (Baron & Kenny, 1986; MacKinnon, Fairchild, & Fritz, 2007; Preacher & Hayes, 2008).

Differential effects of BookStart

Backed up by a wealth of studies (e.g., Bus, 2001; DeBaryshe, 1995; Duursma et al., 2008; Hart & Risley, 2003; Sénéchal, 2000), most parents in Western countries are aware of the need for verbal interaction from an early stage to stimulate their infants' language. A minority of parents may nevertheless be less motivated to interact verbally with their child in the first years, due to their infants' negative responses. Children with a highly reactive temperament may typically respond negatively to verbal interactions as a result of their proneness to sadness, anger, and frustration. Because interactions are less rewarding and often frustrating, their parents may initiate verbal interactions less frequently than parents of temperamentally less reactive infants (e.g., Dixon & Smith, 2000; Karrass, VanDeventer, Mullins, & Lefever, 2002). We examined whether BookStart may be especially effective for temperamentally highly reactive children. By emphasizing the need for verbal interaction with infants despite the children's responses, BookStart may prevent parents from stopping interactions if the child reacts negatively.

As a result of negative interactions with their child, parents have been found to develop negative feelings about their parenting skills, and may, as a result, stop making regular attempts to involve their child in verbal interactions (e.g., Banerjee & Tamis-LeMonda, 2007; Machida, Taylor, & Kim, 2002; Usai, Garello, & Viterbori, 2009). Fathers, for instance, read less frequently to their children when they are temperamentally highly reactive (Karrass, VanDeventer, & Braungart-Rieker, 2003). Likewise, mothers of children who show negative distress speak less to their children and use less complex utterances than mothers of less distressed children (Machida et al., 2002; Vernon-Feagans et al., 2008). As appears from several studies on the effects of children's temperament on language development, highly reactive children are at risk for language delays (e.g., Dixon & Smith, 2000; Karrass et al., 2002; Usai et al., 2009). Infants who show negative affective behaviors (i.e., crying, hitting, throwing, withdrawing, and fearfulness) are found to lag behind on short- and long-term tests of language proficiency (Caulfield, Fischel, DeBaryshe, & Whitehurst, 1989; Laake et al., 2013; Paul & Kellogg, 1997; Slomkowski, Nelson, Dunn, & Plomin, 1992), in cognitive development (Fagen, Singer, Ohr, & Fleckenstein, 1987), and in their acquisition of reading precursors (Newman, Noel, Chen, & Matsopoulos, 1998).

In sum, it is especially children with a highly reactive temperament who may be at risk for delays in language development. When parents persist in reading to their highly reactive infant, under influence of BookStart their child may reach the same score on language skills as less reactive peers (Zuckerman, 1999). Thus, the interaction between temperament and intervention may take the form of the classical diathesis-stress model: groups differ without intervention but are alike when the environment offers extra stimuli (Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007). In other words, the interaction shows either an *ordinal* form without crossover point, or a crossover point near the extremes (Widaman et al., 2012).

Diathesis-stress versus differential susceptibility

There is some exciting new evidence in the literature for an alternative model of interactions between child characteristics and environmental factors, called differential susceptibility (Belsky et al., 2007). Unlike the diathesis-stress model, high reactivity is not just a risk for learning but a challenge as well (Belsky & Pluess, 2009). Under suboptimal conditions, more susceptible children lag behind their peers, but they actually outperform peers lacking the putative 'vulnerable' constitution under optimized learning conditions. If this model applies to infants showing a highly reactive temperament (Blair, 2002; Poehlmann et al., 2012; Widaman et al., 2012), we may expect a *disordinal* BookStart-by-temperamental interaction: without BookStart, children with a highly reactive temperament lag behind their peers, but if a highly reactive temperament helps to improve learning, infants in an optimal environment (here: BookStart) outperform their peers.

So far, only few experiments with early literacy interventions (e.g., Kegel, Bus, & Van IJzendoorn, 2011; Van der Kooy-Hofland, Van der Kooy, Bus, Van IJzendoorn, & Bonsel, 2012) tested differential susceptibility in the cognitive domain. In our study, we took into account the double-edged nature of temperamental reactivity – serving as a risk factor for academic skills under suboptimal conditions but as a potential asset under optimal conditions – as a possible outcome. If a highly reactive temperament actually implies high susceptibility to environmental factors, we may expect that, without BookStart, these infants lag behind in language development at 15 months, but outperform their temperamentally less reactive peers if parents participate in BookStart and create better learning conditions.

This study

In sum, the aim of our study was threefold: (1) testing whether BookStart affects language development, and which activities in particular mediate effects of BookStart

on language development, (2) testing whether BookStart is especially effective if children have a negative temperament and parents are less inclined to initiate verbal interactions with their infant, and (3) testing whether children with a highly reactive temperament are more susceptible to the environment; we expect that they lag behind their peers without intervention but outperform other children with BookStart.

Methods

Participants

The 'BookStart parents' came from eight provinces in the Netherlands, so covering most of the country. Only those parents who collected the BookStart materials at the library were invited to participate. The control group was recruited through 35 child health centers in comparable areas, where BookStart had not yet been introduced. The staff of the centers handed out invitation letters to parents of babies in the correct age range (control group). In both samples, all education levels were represented except for the lowest educated parents (primary or special education): Their number did not exceed 1% of the total sample, whereas this percentage is 8.29% for the Dutch population as a whole (*Centraal Bureau voor de Statistiek* [Statistics Netherlands], 2010). The low participation of the lowest educated families may be explained by the fact that the data were collected via a questionnaire. The BookStart and control groups did not differ in percentage of low-educated parents (i.e., no high school education for either one or both parents in the family), χ^2 (1) = 1.76, p = .19. The primary caregiver of the child (in 95% of the cases the mother) completed a questionnaire twice, the first time between March and December 2011 when the youngest child was on average 8 months (M = 8.15, SD = 1.42), and again about 7 months later when the target child was on average 15 months (M = 15.36, SD = 1.47). Participants were included when (a) they had completed the questionnaire at 8 and at 15 months, (b) all questions about background variables had been filled in, and (c) Dutch was the first or second language at home. Seventy-five percent of those who completed the questionnaire at 8 months (N = 782) filled in the second questionnaire as well (N = 584). Two parents were excluded because Dutch was not their first or second home language. Descriptive statistics for the BookStart and comparison groups are presented in Table 1. The families that we lost (N = 198) were similar to the families that completed both questionnaires regarding temperamental reactivity and background variables such as gender and age; the only difference was education level, which was lower in the families that dropped out (t(780) = -2.855, p < .05).

BookStart program

The BookStart parents in this study had collected the package free of charge at the local library, including a baby book, a CD with children's songs, and a flyer explaining the relevance of sharing books with babies. These parents also received free library membership for their baby, which enabled them to borrow baby books and receive advice from librarians about books, shared reading, and language and literacy-related activities such as reciting rhymes, storytelling, and singing songs. Parents also received invitations for workshops, which they rarely accepted.

Table 1 Descriptives of the BookStart and Control group (N = 584)

	BookStart (n = 359)	Control (n = 225)
Boys (%)	52%	49%
Age in Months (T1)	8.12 (1.46)	8.20 (1.30)
Age in Months (T2)	15.30 (1.52)	15.45 (1.38)
Time between T1 and T2 in months	7.18 (.47)	7.25 (.50)
Education level of parents[1]	4.35 (1.29)	4.10 (1.30)
Temperamental reactivity (factor score)	-.03 (1.03)	-.09 (.96)
CDI/expressive	9.63 (9.04)	10.43 (8.53)
CDI/receptive	30.78 (13.63)	32.03 (13.34)
Composite language measure (z-score)	.00 (.87)	.00 (.88)

Note. T1=first questionnaire; T2=second questionnaire; MacArthur-Bates CDI

[1] Scale ranged from 0 (no level of education for both parents) to 6 (both parents received university degree)

Procedure

At the first assessment, when children were on average eight months old, parents received an invitation letter or email from the child health center or the library asking them to fill in a questionnaire about the home literacy environment and the child's temperament. Completion took about 20 minutes. About seven months later the researcher invited the parents by email or regular mail to complete a similar questionnaire about the home activities and language development of their child. At both assessments, parents had the choice between a paper version of the questionnaire or an internet version. Parents received a small present (i.e., a baby calendar) after completing both questionnaires.

Measures

The first assessment (at about 8 months) included about 40 items assessing background information (including education level, home language, and child's gender and age),

home literacy activities (i.e., frequency of book sharing, telling stories, watching television, and listening to music), and the Infant Behavior Questionnaire. The second assessment (at about 15 months) included the same questions about home literacy activities as the first assessment, but was expanded with the MacArthur-Bates Communicative Development Inventory (MacArthur-Bates CDI) to measure language development.

Background information. Parents indicated their highest educational level: primary education (normal or special), lower secondary vocational education, higher secondary education, higher vocational education, college, pre-university/university. The scale ranged from 0 (no level of education for both parents) to 6 (both parents received a university degree). Parents reported the target child's gender, and first and second home languages.

Home literacy environment. This part included questions about verbal home activities: How often do you involve your child in shared reading, singing songs, storytelling, rhyming, watching television, playing with internet applications, and listening to baby music? Parents answered these seven questions on a 4-point scale (daily, once or twice a week, once a month, (almost) never).

Infant Behavior Questionnaire. To assess temperament, we included 22 items of a Dutch version of the Infant Behavior Questionnaire - revised (IBQ-r), with high loadings on the 'smile and laughter' and 'activity' scales (Gartstein & Rothbart, 2003). The items were translated from English into Dutch by M. Roest-de Zeeuw and K. van Doesum and validated in a Dutch study (Klein-Velderman, Bakermans-Kranenburg, & Juffer, 2006). Parents completed 22 items describing child behavior in parent-child interaction (e.g., smiling, fussing, crying) on an 8-point scale (ranging from 'always' to 'not applicable').

MacArthur-Bates CDI. A Dutch adaptation (Zink & Lejaegere, 2003) of the shortened MacArthur-Bates Communicative Development Inventory (Fenson et al., 2000) was used to examine the language development of infants in their second year. On a list containing 55 words parents were asked to indicate which ones their child could produce and / or comprehend. The list included words such as *poes* [cat], *boek* [book], *deur* [door], and *bloem* [flower]. The composite score, based on the receptive ($\alpha = .95$) and expressive scales ($\alpha = .93$), was a moderately strong predictor of a Dutch adaptation of the Reynell Developmental Language Scales for the age range of two to seven years ($r = .405$, $p < .001$; Schlichting, Van Eldik, Spelberg, Van der Meulen, & Van der Meulen, 1995). We applied the Reynell Developmental Language Scales during home visits in a subsample of sixty-three randomly selected children one year after completion of MacArthur-Bates CDI.

Analyses

Testing interactions. A main aim was to test whether temperament moderates effects of BookStart and whether interactions, if present, are consistent with differential susceptibility. Therefore we regressed language skills on BookStart and temperament. In a first step, control variables were entered (age in months, gender, and education level); in the second, temperamental reactivity and condition (BookStart vs. control); and in the third, temperamental reactivity x condition. The predictor 'temperamental reactivity' was mean-centered (Aiken & West, 1991). Post hoc simple regressions were performed to determine the steepness of the slopes per condition (Cohen, Cohen, West, & Aiken, 2003). Using the point estimate of the crossover point and its confidence interval, we tested whether a BookStart-by-temperament interaction, if present, was ordinal or disordinal, following Widaman's procedure (Widaman et al., 2012).

Testing mediation. An effective way of examining home activities that cause effects of BookStart is provided by mediation analysis (Baron & Kenny, 1986; MacKinnon et al., 2007; Preacher & Hayes, 2008). For testing a mediation model we preferred the *bootstrapping* approach as described by Preacher and Hayes (2008) over the *causal steps* approach of Baron and Kenny (1986). The bootstrapping approach is a way to test if the indirect effect of the independent variable on the dependent variable is significant: (a) the independent variable (BookStart) relates to the mediator (home activities); and (b) the mediator (home activities) relates to the dependent variable (language skills). Unlike the causal steps approach, in the bootstrap approach the predictor is not necessarily related directly to the outcome variable (Preacher & Hayes, 2008). In a (multiple) mediation model one mediator can suppress the effects of other mediators and affect the direct relation between predictor and outcome variables (MacKinnon, Krull, & Lockwood, 2000). By using a resampling method, the bootstrap procedure can yield percentile confidence intervals of the total effect of indirect effects, which proved a basis to test whether mediator variables add significantly to the model and mediate the effect of independent variables on outcomes. The bootstrap mediation procedure makes it possible to include two or more mediators controlling for the influence of three covariates: age (in months), education level, and gender.

Results

Infant temperament

A PCA applied to all items of the Infant Behavior Questionnaire revealed the factors 'temperamental reactivity' and 'activity level', explaining 17.29% (eigenvalue= 3.80)

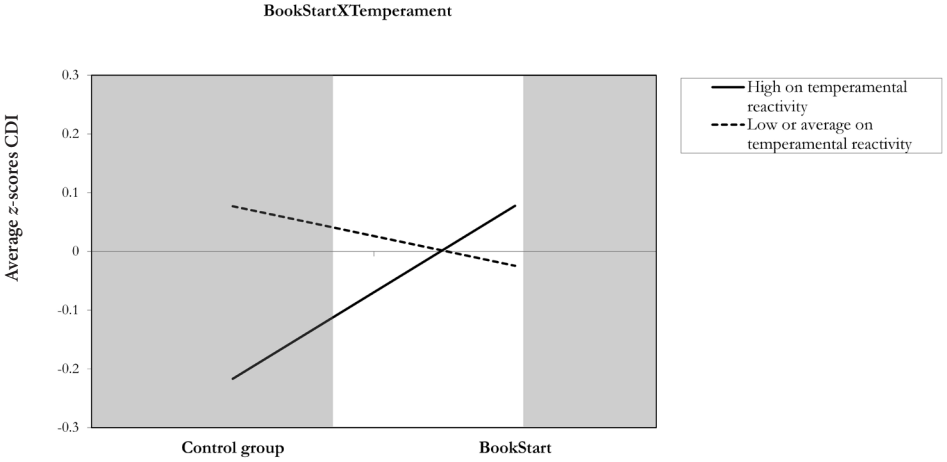

Figure 1. Predicted language scores at 15 months for children high in temperamental reactivity and average or low in temperamental reactivity controlling for influence of age in months, gender, and education level. Striped line: 75% children scoring low to average on temperamental reactivity (IBQ); dark line: 25% scoring highest on temperamental reactivity. Grey shaded areas indicate confidence intervals (CI) around the crossover point (Ĉ).

Table 2 Effects of BookStart in the total group and the subsample of children with the 25% highest score on temperamental reactivity on language skills, controlling for age, gender, and education level

	n	Estimate (SE)	95% CI *B*	*T*	*p*	*Cohen's d*[3]
Total group	584	.04 (.07)	-.09 - .17	.64[1]	.53	.05
Subsample high on temperamental reactivity (25%)	144	.37 (.14)	.10 - .64	2.72[2]	.007	.46
Subsample low on temperamental reactivity (75%)	440	-.07(.07)	-.21 - .07	-.97	.33	-.09

Note. CI = Confidence Interval. [1] $df = 581$. [2] $df = 141$. [3] For calculating Cohen's *d* Thalheimer and Cook's (2002) formula was used: $2t/\sqrt{(n - 2)}$.

and 11.92% of the variance (eigenvalue= 2.62), respectively. In this study we focused on the first factor that strongly overlapped with Rothbart's 'smile and laughter' scale, an indicator for 'temperamental reactivity' (Gartstein & Rothbart, 2003; Rothbart, 1981). The six items with high loadings on this scale are linked to emotions during lying on the back and bath-, dress-, play-, and face/hair wash activities. The temperamental reactivity scale was recoded so that higher scores indicated higher temperamental reactivity. These infants showed less positive and more negative emotions when lying on their backs and during bath-, dress-, play-, and face/hair wash activities. Loadings of the six items ranged from .56 for showing emotional reactivity during play, to .75 for showing emotional reactivity during hair washing. Alpha reliability equaled .74. Descriptive statistics are shown in Table 1.

Interaction BookStart-by-temperament. Our main analysis focused on the language scores when children averaged 15 months, and the extent to which these scores could be attributed to temperament and BookStart. The language score consisted of a composite measure of word level knowledge, formed by averaging *z*-scores for receptive and expressive word knowledge (r = .53, n = 584). As control variables we entered age in months at T2, education level, and gender as the first step. Results revealed significant positive effects for age (older children scoring higher), $t(580) = 12.86$, $p < .001$, and gender (boys scoring lower), $t(580) = 5.43$, $p < .001$, but not for education level. In step 2, temperamental reactivity and BookStart were entered. There was a main effect of temperamental reactivity on language, $t(578) = -2.39$, $p = .017$), but none of BookStart. The interaction between BookStart and temperamental reactivity, entered as a next step, was significant, $t(577) = 2.30$, $p = .022$, indicating that it was especially temperamentally highly reactive children who benefited from BookStart. Excluding the covariates from the analysis did not change the regression effects (Simmons, Nelson, & Simonsohn, 2011).

To create a plot of predicted values of MacArthur-Bates CDI scores for the temperament groups (Figure 1), the temperament scale was split into the 25% scoring highest on temperamental reactivity (n = 144) versus the 75% lowest (n = 440). In the low-reactive group BookStart was nonsignificantly related to MacArthur-Bates CDI scores, $ß = -.04$, $p = .331$. The effect size in this subsample was weak (d = .05; see Figure 1 and Table 2). However, BookStart was relatively strongly and significantly related to MacArthur-Bates CDI scores for children among the 25% highest scoring on temperamental reactivity, $ß = .20$, $p < .007$ (see Figure 1 and Table 2). The effect size of BookStart in this subsample was moderately strong (d = .46).

Table 3 Descriptives of home activities in BookStart and Control group

Activity	Time	BookStart (n = 359)	Control (n = 225)
Shared reading	1	2.20 (.77)	2.00 (.95)
	2	2.57 (.60)	2.44 (.69)
Rhyming	1	1.66 (1.10)	1.63 (1.17)
	2	1.58 (1.13)	1.55 (1.09)
Singing songs	1	2.78 (.48)	2.78 (.49)
	2	2.72 (.56)	2.71 (.55)
Storytelling	1	2.09 (.97)	1.99 (1.02)
	2	1.96 (.99)	1.92 (1.07)
Listening to music	1	2.12 (.86)	2.19 (.96)
	2	2.21 (.80)	2.26 (.86)
Watching television	1	1.55 (1.14)	1.70 (1.11)
	2	1.80 (1.12)	1.88 (1.10)
Use of (internet) applications	1	.32 (.74)	.33 (.73)
	2	.70 (.93)	.68 (.96)

Note. Scores ranged from 0 (never) to 3 (daily).

Table 4 Partial correlations between BookStart, parent child activities at home, and language skills controlled for age, gender, and education level

	BS	Verbal	Media	CDI
BookStart	---	.19*	-.02	.23**
Verbal parent-child interaction	.04	---	.03	.42***
Exposure to media	-.09	-.04	---	.21*
CDI	-.05	.24***	.10*	---

Note. Below diagonal correlations for children demonstrating low to average scores on temperamental reactivity (df = 437) and above diagonal correlations for highest scores on temperamental reactivity (df = 141)

Diathesis-stress or differential susceptibility?

To make a distinction between diathesis-stress and differential susceptibility we tested if the nature of the BookStart-by-temperament interaction was ordinal or disordinal. We estimated the crossover point and CIs following Widaman's procedure. The point estimate of the crossover point, $\hat{C}$ = -(.321/-.436) = .74 (*SE* = .17), 95% CI [.40, 1.07], fell slightly above the sample mean of the dummy variable BookStart (*M* = .61; *SD* = .487). The lower limit of the CI for $\hat{C}$ fell .43 *SD* units below the sample mean of dummy variable BookStart, and the upper limit fell .94 *SD* units above the sample mean. According to Widaman et al. (2012), given that $\hat{C}$ falls within the range of the dummy variable 'BookStart', the interaction in the current sample is disordinal, which indicates differential susceptibility. The CI for $\hat{C}$, however, covers values that, to the right of the crossover point, fall outside the range of the dummy variable (grey areas in Figure 1). With the CI for $\hat{C}$ falling partly outside the range of BookStart we cannot reject the hypothesis of an ordinal (diathesis-stress) model in the population (Widaman et al., 2012).

Parent-child verbal interactions as mediator

We expected the gains in language made by the BookStart group to be the result of an increase in exposure to verbal input. As indicator of home activities we calculated the sums of the two assessments (T1 and T2) for all home activities. Scores on singing songs and playing with apps were dropped, due to ceiling effects for singing songs and bottom effects for apps (Table 3).

PCA applied to the home activities revealed two components, together explaining 65% of variance. The first component (explaining 44%) covered activities that included *verbal parent-child interaction*: book reading (.75), the parent telling stories to the infant (.84), and reciting rhymes (.71); alpha-reliability equaled .68. The second component (*exposure to media*), explaining 21%, included listening to music (.61) and watching television (.91); alpha-reliability equaled .41. The distribution of the aggregated variables was normal for both the BookStart and the control groups.

As a next step, we carried out mediation analysis in the group with temperamentally highly reactive children, where BookStart predicted language skills. We tested whether effects of BookStart on language skills resulted from an increase in verbal parent-child interaction and/or media exposure, controlling for variation in age via techniques as described by Preacher and Hayes (2008). Partial correlations (controlling for children's age, gender, and education level) among measures that were included in mediation analysis are shown in Table 4, for temperamental reactivity groups separately.

BookStart was a significant predictor of language development (c-path; point estimate = .37 (*SE* =.14), $t(143) = 2.72$, $p = .007$) and verbal interaction (a_1-path; point estimate = .40 (*SE* = .18) ; $t(143) = 2.27$, $p = .025$), but was not related to media exposure (a_2-path; point estimate = -.05 (*SE* = .18); $t(143) = -.27$, $p = .79$). Verbal interaction was a significant covariate of language skills (b_1-path; point estimate = .30 (*SE* = .06); $t(143) = 5.07$, $p = .000$), as was media exposure (b_2-path; point estimate = .16 (*SE* = .06); $t(143) = 2.74$, $p = .007$). BookStart remained a significant predictor of language skills if entered simultaneously with verbal interaction and media exposure, but the effect was less significant (c_1'-path; point estimate = .26 (*SE* = .13); $t(143) = 2.07$, $p = .041$). We bootstrapped the indirect effect of BookStart on language and found that verbal interaction was a significant mediator between BookStart and language (point estimate = .1195 (*SE* =.0588); 95% Bias Corrected CI [.0272 - .2703]; 95% Bias Corrected and accelerated CI [.0272 - .2713]), whereas media exposure was not (point estimate = -.0078 (*SE* =.0292); 95% Bias Corrected CI [-.0744 - .0470]; 95% Bias Corrected and accelerated CI [-.0741 - .0477]). The total indirect effect of BookStart through the two mediators had a point estimate of .1117 with a 95% BCa bootstrap CI of .0010 to .2788, indicating that the mediators add significantly to the model. The model, with only verbal interaction as mediator, explained 40% of the variance in language outcome. In all regressions required for testing mediation, age, and gender were significant covariates (p's < .05), but education level was not (point estimate = -.0174, $p = .72$). Excluding the covariates from the analyses did not significantly change the regression effects in the model (Simmons et al., 2011).

Discussion

BookStart did not cause any direct effects on language development in an average Dutch sample including the whole range of low- to high-educated families. BookStart shows effects when children have a highly reactive temperament, whereas the effects are not significant in a less temperamentally reactive group. Our results were in line with research on differential susceptibility, as appears from the finding that temperamentally reactive infants are more at risk for language delays but outperform less reactive peers if parents participate in BookStart. Parents may be less inclined to initiate verbal interactions with reactive children, but become more motivated through BookStart to initiate interactions despite negative responses of the child.

Parent-infant verbal interaction as mediator

As a result of BookStart, parents initiate more verbal interactions with their infants, to stimulate early language development despite negative behavior on the part of the child. In the group showing temperamentally reactive behavior, the BookStart group's score on verbal interaction (M = -.06) was higher than the score in the control group (M = -.46), whereas scores in the temperamentally less reactive group were equally high for the BookStart (M = .11) and control group (M = .03). The results of the mediation analysis indicate that language development is promoted via activities that imply parent-infant verbal interactions: book reading, reciting rhymes, and telling stories. In the temperamentally highly reactive group, verbal interactions as they occur while sharing a book, rhymes, or stories, partly mediate the improvements in children's word-knowledge assessed when children are on average 15 months old. In sum, BookStart stimulates parents of temperamentally highly reactive children to interact verbally with their baby despite negative responses of their child, and thus stimulate language skills.

Support for a disordinal, differential susceptibility model

Our findings support the conclusion that high temperamental reactivity is a risk under suboptimal conditions but an asset under optimal conditions, in line with the differential susceptibility model (Belsky et al., 2007). According to our results, under less favorable learning conditions temperamentally reactive children lag behind their less reactive peers, regarding language, but they are likely to benefit from an optimal environment as created by BookStart. These results are in accordance with previous research in other domains which has shown that temperamentally reactive children thrive under supportive caregiving and then even outperform their less reactive peers in social-emotional development (Poehlmann et al., 2012; Blair, 2002). As indicated in previous experiments on differential susceptibility with 4- and 5-year-olds (Kegel et al., 2011; Van der Kooy-Hofland et al., 2012), our current results show that some children are more susceptible to aspects of the learning environment, whether good or bad for better and for worse. BookStart not only has a protective effect when children are at risk of a delay in cognitive development, but enables the more malleable children to perform at the top of their learning potential.

On the basis of the results presented here, we cannot fully reject the hypothesis of an ordinal diathesis stress model. The interval around the point estimate of the crossover point indicates that in other samples children with a highly reactive temperament may catch up under the influence of BookStart, but will not outperform their less reactive peers under optimized learning conditions as we found in the current

sample. BookStart only prevents temperamentally reactive children from receiving insufficient incentives to develop early language skills. We expect, however, that more suggestions for structuring interactions between parents and temperamentally highly reactive children may result in full support for the differential susceptibility model. For instance, libraries might offer optional parental training for parents of temperamentally highly reactive infants, and provide tips for dealing with unpleasant child responses.

Limitations

An important limitation of this study is the quasi-experimental nature of the design. An unavoidable element of BookStart is self-selection, given that parents are free to collect or ignore the BookStart materials, and make use of the library and the support offered or not. Parents dissatisfied with their child's responses in attempts to initiate verbal interactions may be more inclined to ignore the invitation and not participate in BookStart. Therefore, we may have missed the most temperamentally reactive children in our present sample and hence a chance to establish the differential susceptibility model beyond doubt.

Also due to the self-selection the lowest educated families were underrepresented, although they may be most in need of a program such as BookStart. After visits to the homes of 42 families from various socio-economic backgrounds, to assess the ways in which daily exchanges between a parent and child shape language and vocabulary development, Hart and Risley (1995; 2003) found unprecedented disparities between the sheer number of words spoken as well as the types of messages conveyed. Thus, in our sample self-selection may also have reduced the variation in activities that imply infant-child verbal interaction, which in turn may have reduced variance explained by BookStart.

On the other hand, BookStart could be particularly effective in an average sample, because average or highly educated parents do not need coaching in how to interact verbally with infants, but merely incentives to initiate interactions despite their child's difficult behavior. Parents who are not used to verbal interaction with babies might need more support than BookStart offers. As a critical test of the underrepresentation of lowest educated risk families and behaviorally difficult children, future research should, unlike our study, also incorporate parents who received an invitation for BookStart but did not collect the materials or make use of the free advice by librarians or workshops.

A final limitation is our use of questionnaires to assess activities at home. This may have reduced variation in actual behavior, because parents are inclined to report

behavior that they consider to be socially desirable. Besides parent reports of their interactive activities future studies should also incorporate observational data.

Conclusion

Although BookStart only provides sample materials for babies, access to similar materials at the library, and advice on request, the program did enhance language development in part of our sample. The program stimulates parents to initiate verbal interaction with their infants in a temperamentally highly reactive group. In the complete sample, the effect size was low (d = .05), but substantial - slightly less than half a standard deviation (d = .46) - in a subsample of temperamentally highly reactive infants. When infants exhibit difficult behavior during daily routines, they may be more sensitive or reactive to environmental input and easily irritated; if parents consistently fail to involve these children in verbal interactions this may be particularly deregulating for language growth. When their parents receive BookStart materials and suggestions, and continue to involve their child in verbal interactions despite the child's negative responses, children score higher on language skills than their less reactive peers (Figure 1). Our results therefore support the idea that temperamentally reactive children are more susceptible to the environment than less reactive peers; they are at risk of lagging behind under suboptimal learning conditions, but at the same time can outperform their peers under optimal conditions created with the help of BookStart. Results suggest that BookStart is especially vital for temperamentally highly reactive children. We expect the effects of BookStart at 15 months to extend to later development, because they may set in motion a pattern of reciprocal influences that may cause language and cognitive development to "snowball" (Raikes et al., 2006), thereby creating more opportunities to enrich later oral language, literacy, and comprehension skills (e.g., Mol & Bus, 2011). Such long-term effects need to be examined in follow-up research to our study.

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Chapter 4

Why Parents are Attracted to the Low-Dosage Intervention BookStart

Abstract

Parents of newborn babies are not only responsible for their baby's physical well-being but also for their cognitive development. BookStart provides parents with materials and, if wished, advice on book sharing with babies, in order to enhance a baby's language level. The current study included 70 randomly selected parents, some of whom (n = 21) participated in BookStart while the rest did not. The aim was to examine whether the participants included those parents for whom BookStart could be a crucial intervention. Results show that parents of temperamentally reactive babies were five times as likely to participate in BookStart than parents of less reactive babies. A subsample of parents (n = 38), who were willing to register all verbal input during one day, revealed that abnormalities in actual language input predict participation in BookStart. Both effects were found after we controlled for educational level of the parent, number of children in the family, library membership of the parent, and BookStart library in the municipality.

Based on:
Van den Berg, H., & Bus, A. G. Why parents are attracted to the low-dosage intervention BookStart. Manuscript submitted for publication.

Verbal interaction with babies from a very early age is important for cognitive development. In particular, book sharing can give a boost to the baby's language development (e.g., Rodriguez, Tamis-Lemonda, Spellmann et al., 2009). Parental talk during book sharing is much more complex than talk during play, even when the book only contains single or multiple word fragments as in baby books (e.g., Cameron-Faulkner & Nobles, 2013). The effects of BookStart - a low-dosage book reading intervention initiated in 1992 in Birmingham, England, and adopted in 2008 in the Netherlands – corroborate the importance of an early start with book sharing. In a nutshell our evaluation of BookStart indicates that if parents complied with the BookStart suggestion to start book sharing at around 8 months, children's vocabulary benefited at 15 months (van den Berg & Bus, submitted). At 22 months, the word gap between both groups had increased, probably due to snowballing (Mol & Bus, 2011). Findings thus provide evidence for a causal relationship between an exogenous stimulus promoting an early start with book sharing, BookStart, and children's language development.

A worst case scenario would be that those parents least in need of an intervention - like highly educated parents - are the most inclined to accept the invitation to participate in the BookStart project, because they are by nature attracted to activities like book sharing and other verbal activities (e.g., Griffin & Morrison, 1997; Kuo, Franke, Regalado, & Halfon, 2004; Raikes, Pan, Luze et al., 2006; Westerlund & Lagerberg, 2008), while parents who are most in need of BookStart may not participate (Vanobbergen, Daems, & Tilburg, 2009). BookStart should particularly appeal to parents when the intensity and quality of parent-child interaction is deficient. If parents have problems initiating verbal interaction with their baby and the child often responds in a negative manner, this should be a reason for participating in BookStart. To attract parents urgently in need of tips and tricks to improve verbal interaction with the baby, the BookStart invitation includes sentences like: '*Did you know that you can already 'read' small books with your baby*?' and '*Looking at pictures together and talking or singing together is good for the contact with your baby and for the language development of your child*' (Weisleder & Fernald, 2014).

The main aim of this study was to test whether those parents who really need to use BookStart actually participate in BookStart. We therefore tested whether parents tend to participate more when they perceive the baby's responses in interactive situations as being problematic. According to their scores on the Infant Behavior Questionnaire (Rothbart, 1981), these parents characterize their baby as more irritable during activities as hair washing, bathing, eating, and drinking. It seems plausible that in these families verbal interactions might differ from those in other families, that is,

either parents ignore the child, if possible, or they try to comfort their child, often without success. A previous study (van den Berg & Bus, 2014) showed that parents report low levels of significant verbal interaction with their children when the babies are highly irritable. As a result, parents might have developed negative feelings about their parenting skills (e.g., Banerjee & Tamis-LeMonda, 2007; Machida, Taylor, & Kim, 2002; Usai, Garello, & Viterbori, 2009) and are more in need of support than parents of easy-going babies when enhancing positive parent-child interaction.

This study

In this chapter our aim was to test whether the invitation to participate in BookStart appeals to those parents who are most in need of support because of the problems they experience in interacting with their reactive child. We tested both the effects of scores on a temperament scale (that is, whether parents perceive their child's behavior during daily activities as problematic) and also effects of the actual frequency and quality of verbal interaction between parent and child during a normal day.

Other obvious factors may affect participation in BookStart and were included as covariates in this study. As less educated parents may not value verbal interaction with their baby to the same extent as highly educated parents, they may be less concerned when they are not successful in involving their child in verbal interaction. BookStart may therefore be less effective at reaching less educated parents than highly educated parents as a result of which BookStart may be less effective in preventing a word gap compared to projects that offer direct coaching of parents most in need of the intervention.

We also controlled for other obvious factors as library membership of the parent and number of children. It seems plausible to presume that parents are more inclined to participate in BookStart when they have a library membership and come across BookStart materials during their visits to the library or when they have received an invitation from the municipality to collect a BookStart case at the library (Birckmayer, 2001; Neuman, 1996). Parents may also be more eager to optimize their behavior and more inclined to participate in BookStart with firstborn children. There is evidence that parents talk more to their firstborn child than to their other children (Gilkerson & Richards, 2009).

In sum, we tested the following hypotheses:

1. BookStart may be particularly attractive to parents when they characterize their children as showing high levels of negative emotionality and when verbal interaction with the baby is perceived as challenging by parents.
2. In the same vein, BookStart may appeal more to parents when actual verbal

interaction in the home is limited or, on the contrary, very intense, mainly to comfort their baby. In other words, extremely low or high scores on parent-child verbal interaction predict participation in BookStart.

3. We need to control for background variables that also affect participation in BookStart such as living in a BookStart area, library membership of parents, number of children, and parental educational level.

Method

Design

We recruited parents via well-baby clinics when children were six to nine months. Ninety-five percent of the babies attend in their first year (Actiz, 2014). To avoid the sample being positively skewed towards highly educated parents, we asked parents questions about background variables. Based on their education level we randomly selected 70 parents for participation in the study (about 25 parents per level: low-educated, middle-educated, and high-educated). Roughly equal numbers of parents were invited from BookStart and non-BookStart areas. During the home visit that took place when the child was on average 12 months old, the parent answered questions about the child's temperament (Infant Behavior Questionnaire (IBQ)) and questions that concerned involvement in BookStart. We conducted oral interviews with the parents to avoid less educated parents leaving the study.

Procedure

Over a period of two months, trained students interviewed parents visiting well-baby clinics located in five different municipalities (The Hague, Hilversum, Naarden-Bussum, Schiedam, and Vlaardingen). Parents with babies between six and nine months old visiting the clinic for their regular periodic not obligatory checkup were briefly interviewed, if they consented, about education level, home language, and whether they had received an invitation to participate in BookStart. At the end of the brief interview, parents were invited to consider participation in a study at home a few months later. They received a folder with information about the study's aims, and were contacted later by phone for permission. In total, 70 parents complied our selection criteria (able to answer questions in Dutch and about the same number of participants from low-, middle-, and high-educated families) and agreed to participate in the study. During the home visit at about 12 months parents answered questions about book reading and BookStart and completed the Infant Behavior Quesionnaire (IBQ).

We also observed parents during book sharing but these results are not reported in this chapter. All parents gave written informed consent for participation in the study. Part of this group agreed and succeeded (n = 38) in recording the language input from the child's environment including the number of words spoken by adults (Adult Word Count), child vocalization count, and the number of conversational turns for a whole day using the Language Environment Analysis System (LENA).

Participants

From a total of 174 parent-child dyads, willing to participate, 29 were insufficiently able to answer questions due to a limited proficiency in Dutch. From the remaining 145, twelve parents did not answer invitation emails and repeated phone calls and the other participants (n = 63) were not selected for inclusion in the study because they did not fit into the left-over slots. The final group of participants (N = 70) did not differ from the excluded group in gender and age but the educational level of the parents was higher in this group (χ^2 (1) = 7.43, p < .01). Table 1 presents descriptive data for both parents who reported to participate in BookStart (n = 21) and for parents who did not (n = 49).

Table 1 Characteristics of families participating in BookStart and families not participating in BookStart

	Participates in BookStart (N=70)			
	Yes (n =21)		No (n =49)	
Demographic variables	%		%	
SES				
High (> vocational level)	85.7		59.2	
Temperament (IBQ)				
≥ 4 (high reactivity)	42.9		28.6	
Number of children				
one child	52.4		32.7	
Library membership				
Yes	47.6		20.4	
Participation in workshops				
Yes	4.8		2.0	
Library visits (at least once a month)				
Yes	42.9		4.1	
Living in BookStart area				
Yes	81.0		46.9	
	M	*SD*	*M*	*SD*
Child's age during home visit (in months)	12.29	1.23	12.27	1.20

Measures

Background variables. During a brief interview at the clinic we asked questions about home language, whether they had received an invitation to participate in BookStart, number of children, and education level of the parent caring most for the child. Parents indicated the highest level of education: primary or special education, vocational level or college and university degree. For the data analyses we made a distinction between low-educated parents (at best vocational level) and high-educated parents (college or university degree).

Participation in BookStart. During the home visit parents were asked whether they had collected the BookStart package at the library and, if they did, whether they made use of free access to the library for their baby and followed BookStart workshops at the library.

Infant Behavior Questionnaire. Parents completed the Infant Behavior Questionnaire – revised (IBQ-r; Gartstein & Rothbart, 2003; translated from English into Dutch by M. Roest-de Zeeuw & K. van Doesum). On 8-point scales (ranging from always to not applicable) they described the child's behavior in parent-child interaction. The scale covered questions targeting the infant's temperamental reactivity while lying on its back, and bathing-, dressing-, play-, face-, and hair washing activities. We calculated a sum score of these items with, according to a previous study (van den Berg & Bus, 2014), high loadings on temperamental reactivity and classified all children with a mean score higher than four on the 8-point scales as having a more reactive temperament.

Language Environment Analysis System (LENA). Parents were asked to attach the Language Environment Analysis digital language processor (LENA dlp) for ten hours to their child's clothes a week after the home visit. We promised parents that the LENA data would be handled anonymously and that we had permission from the ethical board to use LENA dlp and associated software in our study. Registration took place between 10 a.m. and 5 p.m. We used the LENA software (Xu, Yapanel, & Gray, 2009) to estimate the number of words spoken by the adults, child vocalization count, number of conversational turns (back and forth communication within five seconds), other child fragments (word count of other children in the environment of the baby), overlap (several individuals speaking at the same time), television, noise, silence, and fuzz (all noises that LENA could not identify).

In order to check the validity of LENA scores in a Dutch sample, we randomly filtered out one five-minute fragment with baby noises per hour, for all eight hours of recording, and counted the number of baby vocalizations during these fragments. Intercoder reliability for baby vocalizations showed reasonable overlap between

LENA software and the coder (r = .69). We did not validate the adult word count, as we did not receive permission from parents to listen to and code the content of adult language.

Results

In total, 30% of the families participating in the study collected the BookStart case. Only 4.1% of the parents, who had not collected the BookStart case, visited the library at least once a month, whereas 42.9% of the BookStart parents visited the library once a month ($t(68) = 4.61$, $p < .001$). Participation in workshops was rare; only two parents visited the parent-child workshop offered in the library during the research period.

Educational level and reactivity as predictors of participation in BookStart

A sequential logistic regression analysis was accomplished to determine how families that participated in the BookStart project differed from families that did not participate. In the model, we entered background variables including educational level of the parents, number of children in the family, library membership of the parent, and BookStart library in the municipality as covariates. After including the four covariates as a first step, we included negative emotionality in a second step and determined whether the log-likelihood increased significantly with the inclusion of this independent variable.

There was a good model fit (discrimination among groups) on the basis of the four background variables alone, χ^2 (7) = 9.30, p = .23, using a deviance criterion. After addition of the independent variable negative emotionality, χ^2 (8) = 10.81, p = .21, Nagelkerke R^2 = .50. However, with negative emotionality as the only predictor, there was not a good model fit, indicating that including all background variables was necessary to achieve a good model fit. Comparison of log-likelihood ratios for models with and without the negative emotionality showed reliable improvement with the addition of this variable, χ^2 (1) = 4.94, $p < .05$. That means that negative emotionality significantly improved the model that included all necessary background variables.

Overall classification was quite impressive. On the basis of four covariates, classification rates were 61.9% for the BookStart group and 93.9% for the non-BookStart group; the overall correct classification was 84.3%. After addition of negative emotionality the overall classification rate of the model remained the same. However, classification within the BookStart group improved to 89.8%.

Table 2 shows the contribution of the individual predictors to the model by comparing models with and without each predictor. All four covariates and negative

emotionality enhanced prediction. Odds ratios greater than 1 show the increase in odds of an outcome of 1 (the "response" category) with a one-unit increase in the predictor. All predictors had an odds ratio greater than 1. The relative risk of participating when the child has a reactive temperament was slightly greater than 5. This indicates that parents of children with high levels of temperamental reactivity were 5.37 times more likely to participate in the BookStart project than parents of children scoring low on temperamental reactivity ($OR = 5.37$, $95\%\ CI = [1.13 – 25.50]$, $p < .05$).

Verbal interaction as predictor of participation in BookStart

In a subsample of 38 children (26% BookStart) verbal interaction was registered during one day. Factor analysis was carried out to find the best predictor for verbal interaction. Next, a logistic regression analysis was performed to assess whether intensity of verbal interaction predicts participation in BookStart.

Verbal interaction. All data collected between 10 a.m. and 5 p.m. were corrected for sleeping time of the child and a principal factors extraction with varimax rotation was performed on eight outcome variables: adult word count (number of words spoken by the adults), child vocalization count, number of conversational turns (back and forth communication within five seconds), other child fragments (word count of other children in the environment of the baby), overlap (several individuals speaking at the same time), television, noise, silence, and fuzz (e.g., all noises that LENA could not identify). One of the three extracted factors was a strong indicator of verbal interaction with the child. Adult word count, child vocalization count, and conversational turns had high loadings on this factor explaining 22.96% of the variance in LENA scores. The other two factors were not indicators of verbal interaction with the child and therefore not further analyzed. Those were indicators for background noises and electronic sounds, explaining 32.61% and 13.76% of the variance in LENA scores, respectively.

Logistic regression. The data enabled us to test whether the intensity of the actual parent-child interactions predicted participation in BookStart. A logistic regression that included all covariates produced extremely large parameter estimates and standard errors indicating that there were too few cases relative to the number of predictor variables. The sequential logistic regression analysis was therefore performed on the basis of two background variables entered in the first step and verbal interaction entered in a second step. Background variables were whether or not the family lived in a BookStart area and educational level of the main caregiver.

Table 2 Logistic regression analysis with four covariates entered in the first step and reactivity level as predictor of participation in BookStart entered in a second step

					95% Confidence Interval for Odds Ratio		Chi-square change between full model and model when predictor is deleted
	Variables	*B* (SE)	Wald test (*z*-ratio)	Odds Ratio	Lower	Upper	χ^2 (1)
First Step	BookStart area	2.20 (.79)	7.74**	9.06	1.92	42.77	9.67**
	Number of children	2.46 (.93)	7.05**	11.72	1.91	72.05	9.22**
	Library membership	2.55 (.96)	7.05**	12.78	1.95	83.75	8.86**
	Education level	2.34 (.89)	6.85**	10.38	1.80	59.85	8.99**
Full model: Step one	Constant	-5.03 (1.22)	17.07**	.00			
Second Step	Reactivity level	1.68 (.80)	4.48*	5.37	1.13	25.50	4.94*
Full model: Step two	Constant	-6.40 (1.55)	16.98***	.00			

Note. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

There was a good model fit on the basis of the two background predictors alone, χ^2 (2) = .15, p = .93, using deviance criterion. As depicted in Figure 1, the relation between the intensity of actual verbal interactions and participation in BookStart was quadratic, meaning that two subsamples, the least intensive and most intensive interacting families, were more likely to participate in BookStart than families scoring in the middle on verbal interactions. After addition of the verbal interaction variable and the quadratic function of this variable, in the second step of the logistic regression analysis, the model still fitted the data, χ^2 (4) = 4.99, p = .76, Nagelkerke R^2 = .41. Comparison of log-likelihood ratios for models with and without quadratic function of verbal interaction showed reliable improvement with the addition of verbal interaction, χ^2 (4) = 6.14, $p < .05$. That means that, in addition to BookStart area and parental education level, verbal interaction is an important predictor of participation in BookStart. There was not a good model fit when leaving out the background variables, indicating that control for background variables is a necessary step. The overall classification was significantly better in the model when verbal interaction was included (84.2%) as compared to the model that only included covariates (73.7%). On the basis of two covariates classification rates were 60.0% for the BookStart group and 78.6% for the non-BookStart group. After addition of verbal interaction the classification changed to 50.0% for the BookStart group and 96.4% for the non-BookStart group.

Parental Reports versus LENA observations. Is the reactivity level of the child as measured with IBQ related to verbal interaction as assessed with the LENA device, meaning that scores on IBQ reflect problematic interactions in the family? A quadratic curve best described the association between these reactivity level and actual verbal interaction (F(2, 35) = 4.68, $p < .05$, R^2 = .21). Temperamentally reactive children either revealed low or high scores on verbal interaction. This indicates that parents either ignored the negative behavior of the child resulting in low levels of verbal interaction or scores on verbal interaction were high due to comforting or soothing the child. Results indicate that scores on the questionnaire (IBQ) agree with intensity of verbal interaction as registered with the LENA device.

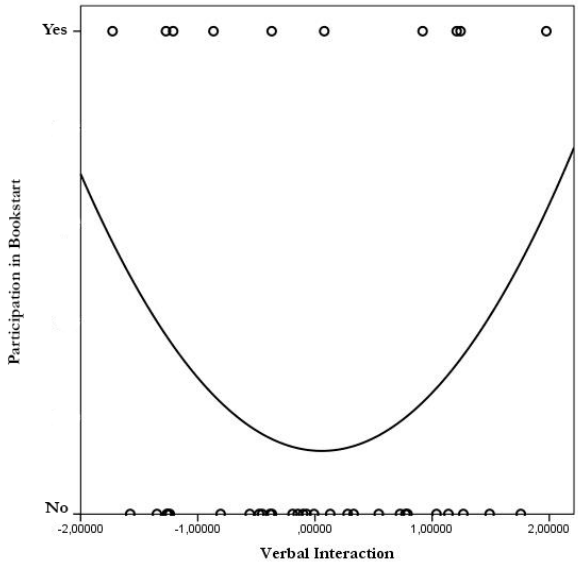

Figure 1. Association between verbal interactions as registered with the LENA device and participation in BookStart

Table 3 Logistic regression analysis with verbal interaction as predictor of participation in BookStart

					95% Confidence Interval for Odds Ratio	
	Variables	*B* (SE)	Wald test (*z*-ratio)	Odds Ratio	Lower	Upper
First Step	BookStart area	1.52 (.97)	2.45	4.58†	.682	30.71
	Education Level	2.98 (1.36)	4.78	19.67†	1.36	284.26
Full model: first step	Constant	-3.48 (1.29)	7.32	.03**		
Second Step	Verbal interaction					
	Factor score	.01 (.46)	.00	1.01	.41	2.48
	Quadratic function	1.14 (.55)	4.30	3.11*	1.06	9.12
Full model: second step	Constant	-5.40 (1.75)	9.51	.01*		

[a] Tested against average verbal interaction category
Note. †$p \leq .10$ *$p \leq .05$, **$p \leq .01$

Discussion

Parents are free to participate in BookStart - a nation-wide project - that aims to stimulate shared book reading starting in the first year of life. Apart from obvious background variables that affected the participation rate in BookStart (i.e., library membership of the parent, number of children in the family, education level of the parent caring most for the child), this study offers unique evidence that parents participate more when the interaction with the baby is unsatisfactory. Interestingly, parents are more receptive to participation in BookStart when the child has a negative temperament. Parents who characterize their children as highly reactive, according to scores on the Infant Behavior Questionnaire, were more than five times more likely to collect the BookStart case from the library than parents of less reactive children. We also found that the actual quality of verbal interaction between parent and child predicts participation in BookStart. When verbal interaction is limited in intensity or on the contrary is extremely intense, parents are more inclined to participate in BookStart. We found a correlation between parental reports on the IBQ and LENA scores and impact of both variables on participation in BookStart. Parents are apparently aware of problems in interaction with their baby and they seize the opportunity to participate in BookStart as a way of receiving advice on how to improve an unsatisfactory situation. Very limited verbal interaction or intense verbal interaction with the baby may result from a reactive temperament and be the reason for participation in BookStart. Parents use BookStart in their search for solutions to improve an unsatisfactory situation. These results are promising because they show that it is not only parents who would, in any case, succeed in initiating verbal interaction with the baby that participate but parents also participate because they regard the interaction with the baby as unsatisfactory. This finding also opens up new possibilities for motivating parents to participate in BookStart. All parents want the best for their young child and, if they have the idea that the verbal interaction with their child needs improvement, their interest in projects like BookStart increases.

Only 13% of the less educated parents chose to participate in BookStart while in the highly educated group about 38.3% picked up a BookStart case. As the number of children with a difficult temperament was about the same in both groups - about one third of the children in less- and highly educated families - this suggests that, in particular, highly educated parents show interest in the BookStart materials when interactions with their child are not optimal. Although parents with a low educational background notice the problematic nature of interaction with a highly reactive child, the BookStart project fails to attract less educated parents to the same extent as highly

educated parents. Highly educated parents are aware of the need of verbal input and value help to improve verbal interaction with their baby. Less educated parents, by contrast, may not be aware of the importance of verbal interaction in the family for the language development of their young child. Parents with a low educational background might therefore be less motivated in their search for support, even if they are discontented with the interaction with the baby. The lower participation rate of parents from a low educational level in the BookStart project is alarming as, especially for these parents, BookStart can make a difference in preventing children from a word gap when entering school. Previous research in families with a low educational background shows that parents tend to interact less frequently with their children (e.g., Hart & Risley, 2003). The current results indicate that BookStart does not contribute to narrowing the word gap at school entrance between children from less and highly educated families. The project may support "the rich" instead of "the poor", which may strengthen the Matthew effect: "the rich get richer and the poor poorer".

Parents may be more motivated to make an early start with book sharing when they realize how vital verbal interaction is. The parents may possibly need more coaching when it is apparent that their verbal interaction can be improved, and this in turn would improve the baby's language skills. Participation in BookStart by low-educated parents might be stimulated by showing those parents that the actual language input in their family is not sufficient for the language development of their child. In the United States, programs are in the making that use the LENA device to collect data about language input during the day and these LENA results are being used to make parents aware of shortcomings in verbal input. First results of coaching based on LENA observations are just coming out and seem promising (Dana Suskind at www.tmw.org). Engaging low-income parents more frequently in parent-child interactions during a six-week intervention with the LENA device resulted in a higher word exposure, that is, children heard 32% more words per hour. In addition to these findings, our current study suggests that direct feedback based on LENA assessments can reduce differences between children from highly and less educated families and can be especially useful in making parents with a low educational background more aware of the lack in verbal parent-child interaction.

In sum, an extensive program such as BookStart is effective for parents with a high educational background. When these parents regard interactions with their baby as unsatisfactory, they are motivated to participate in BookStart. However we need to put more effort in giving parents with a low educational background insight into the lack of interaction with reactive children. By making these parents aware of the importance of the quality of verbal interaction within their family, they might be more willing to participate in BookStart and make an early start with book sharing.

Limitations

Due to the small sample size and the fact that parents had just started with BookStart, we could not draw clear cause-and-effect conclusions about the association between participation in BookStart and language development of the child. Although we found effects of BookStart in previous studies on language skills of children at 15 and 22 months (van den Berg & Bus, submitted) and moderate effects on the language development of children with a reactive temperament (van den Berg & Bus, 2014), most parents in the current study received the BookStart case only a couple of months before we started testing. During that period BookStart could barely affect differences in language scores.

We assume that low-educated parents are less aware of the importance of verbal input in the family and are therefore less inclined to participate in BookStart, even though they notice that interactions are unsatisfactory. We were, however, unable to test this presumption by examining the effect of an interaction between educational level of the parent and reactivity of the child on participation in BookStart. In the current study only 13% of less educated parents decided to participate in BookStart and, given the overall low number of participants it was impossible to test this relation.

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Chapter 5

General Discussion

BookStart has been developed to enhance parent-child verbal interactions in early childhood. Since the start of BookStart in 1992 in Birmingham (UK), the intervention has been implemented in the US, Australia, Japan and South Korea, as well as many European countries. Generally parents receive a BookStart package at home (e.g., BuchStart Sweiz) or from nurses at the child health care center (e.g., BuchStart Hamburg, Lesestart Germany) (Burnett, Daniels, & Bailey, 2014). In the Netherlands, parents receive a voucher from the local government for a sample baby book and a flyer with information about the importance of an early start with books at the local library. In addition, parents get a free library membership for their baby. BookStart libraries have rich collections of baby books and librarians can give advice about books and book sharing with very young children.

Previous studies explored effects of BookStart on frequency of book sharing (Tsuji, 2013; Wade & Moore, 1993; Wade & Moore, 1996), the attitude of parents towards reading with babies (Vanobbergen, Daems, & Tilburg, 2009), the child's interest in books (e.g., Demack & Stevens, 2013), parent-child library visits (e.g., Wade & Moore, 1993; Wade & Moore, 1996), and, most importantly, later academic knowledge (Wade & Moore, 1998). However, the methodology is often poor. Studies miss a control group (e.g., Hall, 2001; Hardman & Jones, 1999), are based on very small sample sizes (e.g., Hardman & Jones, 1999; Wade & Moore, 1993), and do not use standardized measures of language development and reading frequency (e.g., Wade & Moore, 1993; Wade & Moore, 1998). Even though there is an abundance of research proving that book sharing with young children is important for the promotion of language development, many people would, for various reasons, not make a bet on the efficacy of BookStart (Hofstee, 1980). Firstly, unlike most book reading interventions BookStart targets a very young age group and many parents do not believe that book sharing is possible at this early age. As a result, BookStart may not change book reading habits in the target group of families and may therefore fail to boost early language development. Secondly, it is questionable whether it makes sense to focus on all new-born parents as BookStart does. Many parents are known to be aware of the importance of verbal input for their baby's development and they may, therefore, share books with their baby. Thirdly, less educated parents may, in particular, be rather skeptical about sharing books and this raises the question of whether a low-dosage intervention without any personal coaching such as BookStart would appeal to these parents. Parents only receive sample materials and information leaflets, but no personal coaching to convince them of the need of an early start with book sharing.

Does BookStart stimulate the language development of babies?

Does BookStart cause changes in book sharing habits in families and do changes improve language development? To answer this question, parents were invited to complete questionnaires about parent-child reading frequency when the child was about eight months old. As we wanted to avoid socially desirable answers on questionnaires targeting reading frequency, we used a baby book exposure list modeled after the title or author recognition lists that Cunningham and Stanovich (1990) developed as an indicator of reading frequency. At 15 and 22 months parents completed a Dutch version of the McArthur-Bates Communicative Development Inventory (CDI) as an indicator of the child's language development. The results revealed strong evidence for a causal relationship between BookStart and language development in 15- and 22-month-old children. BookStart did increase early starts with book sharing, as was indicated by higher scores on the book exposure list at 8 months in the BookStart group. As a consequence of children being read to more often under the influence of BookStart, their scores on language development outperformed those of their peers in the control group. Book reading was a better predictor of language skills at 22 months than at 15 months, which may indicate a *snowball effect* (Raikes et al., 2006). That means, an early start with book sharing at eight months sets in motion a spiral of reciprocal influences that, taken together, affect the language and cognitive development of young children. Although previous studies have suggested that BookStart stimulates the development of language skills (Baily, Harrison, & Brooks, 2002; Hall, 2001; Moore & Wade, 2003; Wade & Moore, 1998), this study is the first quasi-experimental study from which appears that an early start with book sharing stimulated by BookStart affected children's language development when they were only 15 months old. Despite the fact that BookStart is a low-dosage intervention that does not include any direct guidance or coaching of parents, it is an effective intervention. Effect sizes were small probably due to the sample being rather homogenous in some respects: variation in educational background of parents was limited and, as language development was just starting, the range of CDI scores was, by definition, small.

Is it useful to offer BookStart to all families?

Most early interventions target families with a low socioeconomic status because these families are known to be less supportive of children's language development (e.g., Boekenpret [Book Fun], Reach out and Read). In contrast to these interventions, BookStart targets all Dutch families. This may be a rational decision when other factors, independent of socio-economic status, affect the frequency of book sharing

from an early age, for example, some highly educated parents may postpone an early start with book sharing because of their temperamentally reactive child. We hypothesized that in particular temperamentally reactive children - children who are more prone to anger and frustration during daily activities like feeding, bathing, and when being put to bed – may not be read to by their parents even though parents are aware of the importance of verbal input from an early age. Due to the negative responses of temperamentally reactive children, parents may postpone book sharing until a later age. In such cases, BookStart could be particularly effective because the program reminds parents of the importance of reading to a young child despite the negative responses of the child. BookStart might help in that these parents would be less inclined to postpone book sharing. To test this hypothesis, we asked parents to complete several items of the Infant Behavior Questionnaire (Rothbart, 1981) that are supposed to indicate temperamental reactivity. This was done when the child was about eight months old. The outcomes of the analyses support the hypothesis that temperamentally reactive children are particularly receptive to BookStart. Reactive children in the control group lagged behind in their language skills. But with BookStart, temperamentally reactive children even scored higher on the language measure than their easy-going peers. Within the group with a reactive temperament, BookStart children scored, on average, half a standard deviation higher than the control group on the language measure. In contrast, the group with less temperamentally reactive children showed no difference between BookStart and non-BookStart children. In other words, in a group with mainly moderately and highly educated parents, about 70-80% of the reactive children in the BookStart group benefited from the intervention whereas less reactive children did not benefit (Carr, 2000). In Chapter 3 we reported differences with language scores at 15 months as an outcome measure but the results were similar when we measured the language scores at 22 months. In other words, the findings indicated that BookStart could also be used to benefit the language development of reactive children where the parents are already aware of the need for stimulation. These parents need an incentive to make an early start with book sharing when their child is inclined to respond negatively. The most surprising outcome was that temperamentally reactive children even outperformed their less reactive peers with BookStart due to a verbally more stimulating environment. The temperamentally reactive children seem to be the more talented children who, with the aid of BookStart, perform more in accordance with their abilities.

In line with the second study, we found in a third study that, when parents describe their child as being more difficult due to their baby's reactive behavior,

they are more likely to participate in BookStart. This suggests that parents, who are aware of less optimal interactions with their child, look for educational advice by participating in BookStart. They may expect to receive tips and tricks for solving problems that they experience during daily interactions with the child. In line with the finding that parents of temperamentally reactive children participated more in BookStart, we found in a subsample of 38 parent-child pairs that the actual quality of verbal interaction with the child predicted participation in BookStart. When scores on verbal interaction were extremely high or low as is typical for temperamentally reactive children, parents were more motivated to participate in BookStart. In families with highly reactive children, we found that scores on verbal interaction were either low because parents ignored the child or high because they tried to comfort their child, often without success. In all, these findings suggest that parents notice that the nature of the interaction with the child is not optimal and they are then more likely to make use of programs that can offer advice and help.

Do less educated parents participate in BookStart?

The results of this third study confirm that parents from a low educational background are less inclined to accept the invitation to participate in BookStart. Highly educated parents were ten times more likely to pick up a BookStart case at the library than less educated parents. Although BookStart appeals to parents of middle-/high- educational levels when their interactions with the baby are unsatisfactory, parents with a low educational background were not attracted by the intervention even when their interaction with their child was problematic. Parents with a low education level may generally be less aware of the need for verbal interaction with babies and not feel an urgent need to look for tips and tricks to increase interaction via participation in BookStart.

Recommendations

1. **Optimizing advices to parents**. Parents are particularly motivated to participate in BookStart when they experience problems in daily interactions with their baby. In particular parents of temperamentally highly reactive children look for advice and these parents participate more than other parents in BookStart. It is important that librarians anticipate requests for support in handling negative responses of the child. Only 5% of the parents participated in the workshops offered by the library. The attractiveness of these meetings may be enhanced when the content anticipates the needs of parents of temperamentally reactive children.

2. **Motivating less educated parents to participate in BookStart**. Parents with a low educational background appeared to be less attracted to the BookStart project, probably because they do not realize the importance of an early start with book sharing. The outcomes of the third study indicate that less educated parents participate less in BookStart compared with highly educated parents even when they notice that the verbal interaction with their child is not optimal. Less educated parents may not realize the importance of an early start with activities like book sharing. We need to explore new ways to make parents aware of the importance of reading to their young child. In a project in Chicago, Providence Talks, the LENA device (described in Chapter 4) has been used to make parents aware of poor verbal input at home. Children wear the device during a whole day, once a week, and the outcomes are discussed with the parents in respect of whether the language input in the family is sufficient or not and whether there is a serious risk for a disrupted or delayed language development. Engaging low-income parents more frequently in parent-child interactions during a six-week intervention following this procedure with the LENA device can result in a 32% increase in word exposure (www.tmw.org). Summing up, we can conclude that providing parents with information about the language input in their home may be an incentive for them to enhance verbal interaction with the baby. Insight into the verbal input in their family compared with other families may motivate parents to participate in BookStart and spend more time with sharing books with babies.
3. **Intensity of BookStart**. In the Netherlands, parents are only invited once to pick up the BookStart case at the library. In the United Kingdom parents receive the BookStart package at two points in time before the child's fourth birthday (Wade & Moore, 1998). The advantage of this approach may be that parents receive a reminder about the importance of reading for the development and that they see which materials are suitable for different ages. When offering a package multiple times, we can increase the chance that parents respond to one of the calls and receiving multiple packages might strengthen the effects of BookStart on language development over time.

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Summary in Dutch (samenvatting)

'Loont' het om kinderen al in hun eerste levensjaar voor te lezen? Meer dan de interactie tussen ouder en kind tijdens het eten, spelen en naar bed brengen, kan voorlezen een stimulans zijn voor de taalontwikkeling. Tijdens het voorlezen blijken volwassenen veel complexere taal te gebruiken dan bijvoorbeeld tijdens spel. In de studies die in het kader van deze dissertatie zijn uitgevoerd, is onderzocht of BoekStart, een project dat ouders aanbeveelt al in de loop van het eerste levensjaar met voorlezen te starten, effect heeft op de taalontwikkeling in het tweede levensjaar. BoekStart is oorspronkelijk ontwikkeld in Groot-Brittannië en varianten op het oorspronkelijke project zijn momenteel in verschillende Europese landen ingevoerd (naast Nederland, België, Denemarken, Duitsland, Ierland, Italië, Malta, Portugal, Spanje, Servië en Zwitserland) en in een groot aantal landen buiten Europa, waaronder Canada, Nieuw-Zeeland, Japan en Jamaica. In Nederland ontvangen ouders ongeveer drie maanden na de geboorte van hun kind een waardebon voor een BoekStart-koffertje met daarin, naast een boekje en een cd met kinderliedjes, een gratis babylidmaatschap van de bibliotheek. Hoofddoel van mijn onderzoek was te testen of een extensief project als BoekStart voorlezen stimuleert en een stimulans is voor de vroege taalontwikkeling. Een tweede doel was te onderzoeken of de doelgroep - ouders die uit zichzelf weinig voorlezen - bereikt wordt.

Effecten op taalontwikkeling

Ouders die onder invloed van BoekStart vaker voorlezen als de baby 8 maanden oud is, hebben kinderen die hoger scoren op taal. Al na 15 maanden zijn de effecten van een vroege start met voorlezen meetbaar. Hun score op het CDI – een woordenschattest voor baby's – is hoger. Op de langere termijn (na 22 maanden) onderscheiden de al vroeg voorgelezen baby's zich, wellicht als gevolg van het sneeuwbaleffect, nog meer. Als kinderen door een vroege start met voorlezen beter worden in taal, neemt hun interesse in verhaaltjes, liedjes en rijmpjes toe. Als onder invloed daarvan vaker wordt voorgelezen, blijft hun woordenschat relatief snel groeien.

Deze studie laat ook zien dat temperamentvolle kinderen extra gevoelig zijn zowel voor de positieve als negatieve kanten van de omgeving. In tegenstelling tot hun minder temperamentvolle leeftijdgenoten profiteren zij het meest van BoekStart maar vallen hun prestaties sterk terug als voorlezen geen deel uitmaakt van hun dagelijks dieet. Deze bevinding bevestigt hoe belangrijk het is bij evaluatie

van interventies rekening te houden met de mate waarin kinderen gevoelig zijn voor omgevingskenmerken. In de groep als geheel zijn de gemiddelde effecten van de interventie weliswaar significant maar laag. In de meest gevoelige groep, daarentegen, zijn de effecten van BoekStart op taalontwikkeling vrij sterk (0.5 *sd*).

Worden doelgroep ouders bereikt?

Ouders van temperamentvolle kinderen blijken ook vaker mee te doen met BoekStart. De kans dat deze ouders reageren op de uitnodiging en het BoekStart-koffertje ophalen is vijf keer groter dan de kans dat ouders van minder moeilijke kinderen meedoen. Wellicht zoeken deze ouders via deelname aan het BoekStart-project oplossingen voor de problemen die ze in de dagelijkse omgang met hun kind ervaren.

De problemen in de omgang met het kind bestaan niet alleen in de perceptie van ouders maar blijken eveneens als we kijken naar het feitelijk taalgebruik. Met een apparaatje (Language Environment Analysis - LENA) zijn kenmerken van de taalomgeving van het kind geregistreerd. De uitkomsten bleken sterk gerelateerd te zijn aan de score op de temperamentlijst en even als de temperamentlijst deelname aan BoekStart te voorspellen. Ouders zijn eerder geneigd het BoekStart-koffertje af te halen wanneer de verbale interactie volgens de LENA-registraties extreem hoog of laag is: ouders met een extreme score halen het koffertje drie keer vaker op dan ouders met een gemiddelde score.

Ouders met een mbo-opleiding of lager signaleren even vaak problemen in de dagelijkse omgang met hun kind als hogeropgeleiden als ze een vragenlijst over het temperament van hun kind invullen, maar verbinden daar minder vaak consequenties aan door BoekStart aan te grijpen om de verbale interactie met hun kind te verbeteren. Slechts 13% van de laagopgeleide ouders haalt het BoekStart-koffertje af bij de bibliotheek, terwijl dit percentage bijna drie keer hoger is onder hoogopgeleide ouders. Ouders met een laag opleidingsniveau gaan dus veel minder vaak op zoek naar tips en trucs dan ouders uit hoogopgeleide gezinnen wanneer ze de omgang met hun kind als moeilijk ervaren. Laagopgeleide ouders constateren wel dàt er problemen zijn in de omgang met hun kind, maar zij voelen minder urgentie om de interactie te verbeteren. Wellicht zijn deze ouders minder goed geïnformeerd over de consequenties van deze problemen voor de taalontwikkeling van hun kind.

Aanbevelingen

De studie toont het grote belang van projecten als BoekStart aan. Vooral ouders die de omgang met hun baby als moeilijk ervaren, zijn geneigd om voorlezen uit

te stellen naar later als hun kind gemakkelijker in de omgang is. Uit dit onderzoek blijkt dat kinderen daardoor al na 15 maanden een achterstand hebben opgelopen die in de periode daarna alleen maar groter wordt. Projecten als BoekStart zijn nodig om de omgeving voor temperamentvolle kinderen te optimaliseren. De effecten van BoekStart zijn in deze groep opmerkelijk hoog ondanks het extensieve karakter van de interventie.

De bevinding dat BoekStart vooral een bron van inspiratie is als ouders de interacties met hun kind als problematisch ervaren, heeft echter wel consequenties voor BoekStart. Er moet rekening mee gehouden worden dat veel ouders die advies vragen aan bibliotheekmedewerkers of die meedoen aan workshops, de verbale interactie met hun kind als problematisch ervaren. Adviezen moeten op deze groep ouders worden afgestemd.

Ouders met een mbo-opleiding of lager onderkennen weliswaar even vaak als hoger opgeleide ouders dat hun kind moeilijk in de omgang is, maar deze ouders doen desondanks niet mee met BoekStart. Misschien zijn deze ouders minder overtuigd van de noodzaak van verbale interactie met hun kind. Medewerkers van consultatiebureaus zouden deze risico-ouders nog meer moeten aanmoedigen tot deelname aan BoekStart dan nu al gebeurt. En wellicht is voor risicogroepen een actiever beleid aan te bevelen, waarbij ouders ervan overtuigd worden dat de kwaliteit en kwantiteit van verbale interactie binnen hun gezin tekortschiet en daardoor het risico op taalachterstanden wordt vergroot.

Het verdient ook aanbeveling om op meerdere momenten een BoekStart-koffertje aan te bieden om de kans te vergroten dat ouders op een van de oproepen reageren. Op termijn kunnen zo (nog) grotere effecten op taalontwikkeling bereikt worden.

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Curriculum Vitae

Heleen van den Berg was born on October 21, 1986 in Assen, the Netherlands. After completion of her secondary education (Atheneum) in 2005 she studied at the Institute of Education and Child studies, Leiden University, with the specialization Learning Problems and Impairments. She did her internship in the clinic (Ambulatorium) of Leiden University. In 2010 she finished the research master, Developmental Psychopathology from a Cultural and Educational Perspective, and started her PhD research under supervision of prof. dr. A. G. Bus.

List of publications

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