# Open Access to Living Books on Internet: A New Chance to Bridge the Linguistic Gap for At-Risk Preschoolers?

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## ABSTRACT

The Dutch website Bereslim (www.bereslim.nl) provides digital picture storybooks for 3- to 7-year-olds for daily use. The present study investigates whether this new opportunity to enhance linguistic development actively assists preschool children from low- and high-educated families in an equal manner. We looked closely at the characteristics of the 1781 persons who visited the website *Bereslim* between March and October 2006, when the digital books were available free of charge. To get access visitors had to complete a brief questionnaire about characteristics of child (date of birth, gender, school, and grade) and parents (educational level, membership library, number of storybooks bought in last 6 months, and how they found the website), how the child spends his or her leisure time, whether he or she uses (new) media (i.e. amount of time and content of shows/ games/books and favorite websites, programs and books), whether parents participate in different activities of their children and if their children already are familiar with the five books on the site. We found that the bulk of low-educated families who most need this additional opportunity of literacy enhancement were absent. Attempts to create new chances for at-risk children from low-educated families have often failed, as it did this time in another natural experiment.


Key words: digitized picture storybooks, learning through the Internet, closing the language gap, low-income preschool children, preschoolers at risk, home literacy environment

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The home literacy environment in low-income families is less rich compared with families with a high-income (Bradley, Corwyn, Pipes-McAdoo, & Garcia-Coll, 2001; Smith & Dixon, 1995; Weigel, Martin, & Bennett, 2006) and therefore children in the low-income environment are assumed to run the risk of reading problems (Hecht, Burgess, Torgesen, Wagner, & Rashotte, 2000; Noble, Farah, & McCandliss, 2006; Snow, Burns, & Griffin, 1998). According to Stahl (1999), linguistically deprived 3-year-old children, (i.e., those eligible for state-funded Early and Pre-school Education) have 5 times fewer words at their disposal than their peers from higher SES families. On average they hear 615 words/hour, whereas a child from middle or high SES families hears 1251 or 2153 words/hour respectively. When entering school, the difference between linguistically deprived children and children with a rich vocabulary increases in the following years; they learn 750 versus 3000 new words per year (Baker, Simmons, & Kame'enui, 1998). This means that children from low SES families are not equally equipped to profit from education, putting them at risk for special education referral (Croll, 2002; Delgado & Scott, 2006; Van der Veen, Smeets, & Derriks, 2010). Especially when the focus in reading instruction changes from learning to read to reading to learn, language skills and background knowledge become limiting factors (Chall, 1983; Cunningham & Stanovich, 1998).

New electronic ways may provide young children with alternative language and literacy learning opportunities in preschool age. For instance, *Bereslim*, sponsored by a private company, constructed a Dutch website with high-quality picture storybooks for 3- to 7-year-olds in close collaboration with experts in the field of

education. By adding oral instead of written text, digital picture storybooks have the advantage that book reading is less dependent on an adult (Reinking, Labbo, & McKenna, 1997). Video replaces the illustrations in the print version of the picture storybook while retaining the literary and artistic quality of the original illustrations. Similar electronic books are available in other languages (e.g., the Scholastic Video Collection of award winning picture storybooks) on DVD as well as through Internet. The wealth of Living Books available on Internet includes high-quality (e.g., www.storylineonline.net) as well as low-quality books (e.g., http://tarheelreader.org/) without video or a speech to text option (e.g., http://www.bookbox.com; http://www.readinga-z.com/).

The research so far has demonstrated that video additions make digital stories more self-explanatory. Especially children at risk scoring at the lower end of standardized language tests benefited from independent encounters with this new generation of living books (Author, 2009a; Author, 2006; Author, 2009b). Experimental studies showed that it is not just their text comprehension that improved but their vocabulary as well and that improvements were stronger compared to groups who heard the same stories but saw static pictures.

The investigation of how evidence based interventions can find their way to children at risk is essential but neglected so far. In this article we report whether free access through the Internet promotes book exposure in young at-risk children. During a period of six months some of the electronic storybooks on the Internet site *Bereslim*, normally only available via subscription (www.Bereslim.nl), were made available free of charge to encourage parents to get to know the website. Visitors were attracted by linking *Bereslim* to free websites related to TV shows frequently visited by young children in the Netherlands (e.g., peuterplace.nl) and advertisements through schools,

libraries and magazines about education. Between March and October 2006 the site presented a series of five recently published and prize-winning picture storybooks appropriate for children in the age range of 3 to 7. The website thus unlocks living picture storybooks for daily use.

The present study investigates to what extent free of charge computer programs available through the Internet may offer a new opportunity to enhance the linguistic development of at-risk children from the lowest-educated families eligible for state-funded Early and Pre-school Education (Voor- en Vroegschoolse Educatie). *Bereslim* is accessible to most children as computers are found in 92% of the households with children between 0-12 years old in the Netherlands and most families (81%) also have Internet access (CBS, 2008). Calvert, Rideout, Woolard, Barr, and Strouse (2005) reported that children as early as 2 years old use the computer with the help of their parent and 3-year-olds already manage to control some functions on their own, like manipulating the mouse. Anand and Krosnick (2005) found that the usage of the computer increases until children are 6 years old. These authors did not find a difference in media use between low- or high-income families or between boys and girls.

This is the first natural experiment to test whether free access Internet programs with animated storybooks for young children can reduce the pedagogical divide between groups varying in educational background. By comparison with high-educated parents, low-educated parents may be less inclined to share books with their children or to initiate other literacy promoting activities (e.g. Bradley et al., 2001). However, even when parents do not expose their children to books they may enable their children to “read” storybooks through the Internet especially when authorities - libraries, schools, and magazines for parents - advertise visits to *Bereslim* in

preparation for learning to read in first grade. In line with this argument, the visitors of *Bereslim* may show a distribution of educational levels that mirrors the distribution in Dutch society. Even children from the lowest-educated families eligible for state-funded Early and Pre-school Education (VVE) may visit websites like *Bereslim*. Many *Bereslim* visitors may be deprived of traditional literacy activities like book sharing but educational programs through TV and Internet may be within reach of this group.

If visits to educational websites like *Bereslim* parallel children's television watching patterns, *Bereslim* visitors might originate more from higher- than lower-educated families. The literature shows that higher-educated parents not only undertake more traditional literacy-promoting activities with their children but their children also watch relatively more educational programs that are more supportive of literacy than entertainment programs (Anand & Krosnick, 2005; Ennemoser & Schneider, 2007). According to this view, we may expect that visitors from lower-educated families, and especially from the VVE group, form not more than a small minority among *Bereslim* visitors.

Such differences in Internet use refer to the so-called *digital divide*: low-educated families have *access* to computer programs but have fewer benefits *derived from* access. For instance, *Sesame Street*, which was previously started to bridge the gap between young children growing up in a stimulating home environment and children growing up in a less stimulating environment, did not have the expected effects because high-educated parents exposed their children more to the program than the low-educated (Cook, Appleton, Conner, Shaffer, Tamkin et al., 1975). More recently, Neuman and Celano (2006) considered the impact of converting neighborhood branch libraries into technologized modern urban library systems to

improve the lives of disadvantaged children and their families. Despite heavy library use by both low-income and middle-income children, quality differences in the way resources were used appeared to actually widen the knowledge gap between these groups.

So far there is no understanding of how lower- and higher-educated families use educational software available through Internet. To investigate the characteristics of those children who visited the website *Bereslim* we asked each child's caregiver to complete a questionnaire when they first visited in the period that the digital books were available free of charge. The questions concerned child's age, parental education, home literacy activities, television viewing behavior and computer activities. Based on this questionnaire, we intended to answer the following research questions.

1. Does the group visiting *Bereslim* show a distribution of educational levels that matches the distribution in Dutch society?
2. Do visitors of *Bereslim* undertake literacy-promoting activities with their children like sharing books above chance level and do they have a preference for educational programs on TV and for educational computer games?
3. Is there evidence for a positive relationship between literacy activities and educational level of the parents and likewise between the use of new media for educational purpose and the educational level of the parents?

## METHOD

### *Participants*

Participants included 1512 children and their parents who unprompted visited the website *Bereslim* in 2006 between March 1 and September 15 once or several

times and completed the questionnaire to obtain free access to the electronic books for the period during which the website was accessible. Originally, 1781 respondents filled in the questionnaire, but 269 were excluded from analyses for one of the following reasons:

1. Child more than 7 years old
2. Users other than parents (e.g. teachers, libraries)
3. Respondents who participated for the second or third time and had forgotten their password
4. Respondents who did not fill in the questionnaire seriously, e.g. giving answers like: sfsffdsfdsdfd

*Measures*

In the current study we analyzed answers to 23 questions in the questionnaire that were stored in the *Bereslim* database. The questions concerned characteristics of child (date of birth, gender, school, and grade) and parents (educational level, membership library, amount of storybooks bought in the last 6 months, and how they found the website), how the child spends his or her leisure time, whether he or she uses (new) media (amount of time and content of shows/ games/books, favorite websites, programs and books), whether parents participate in different activities of their children and whether their children already were familiar with the five books on the *Bereslim* site. As an indicator of media use, parents were asked to name favorite shows, games, websites, programs and books. This was inspired by the finding that the parents' ability to list one or more favorite books is the best indicator of actual book sharing (Author, 1995). An earlier draft of the questionnaire was piloted to trace ambiguous questions and to check that completion of the questionnaire takes 5-10 minutes at most.

*Statistical Procedure*

The distribution of educational level of parents was compared with the distribution in the Netherlands in general (CBS, 2006) and chi-square tested. Literacy activities and the (educational) use of new media were correlated with demographic characteristics. Participants eligible for stimulation programs (VVE) and considered to be at-risk for learning problems were compared with other participants.

*Added or adjusted variables*

Some variables from the questionnaire were recoded before analyses.

1. The age of the child was calculated by subtracting the date of birth from the mean date participants visited the website (June 8, 2006) and reported in round half-year figures.
2. For children younger than 3 year we created grade 0 since this young group does not yet go to school in the Netherlands.
3. The educational level of the participants used in the analyses is identical to the classification made up by CBS [the Dutch department for statistics] in 2006 and consists of 3 groups, i.e., low, middle, high.
4. A second variable was constructed to distinguish at-risk children eligible for a stimulation program (VVE) from the rest. When both parents have a low educational level children are eligible for a stimulation program.
5. Broadcasting channels were divided into programs that stimulate cognitive skills and knowledge, hereinafter known as *educational* (Z@ppelin, channels 1&2, Belgium 1, BVN, Animal Planet and National Geographic) and

*entertaining* programs (cartoons and similar channels). A new variable was added to indicate if the channel most often viewed was educational or not.

6. TV programs were also divided into *educational* (i.e., promoting cognitive skills and environmental knowledge) and *entertainment* (cartoons and similar programs). Often mentioned educational programs were Blue's Clues (in Dutch), Bruine Beer in het Blauwe Huis, De wereld is mooi, Dora, Flip de beer, Huisje, boompje, beestje, Jeugdjournaal, Journaal, Klokhuis, Koekeloere, Lingo, Puk en ko, Sesamstraat, Teletubbies, Tiktak, Tweenies, Wawa's, Willem Wever, Zandkasteel. A new variable was added to indicate whether the favorite program of the child mentioned first was educational or not and another variable indicating whether the first mentioned program watched by the child together with a parent was educational or not.

## RESULTS

### *Demographic Characteristics of the Participants*

The target audience of the Internet site *Bereslim* was children between 3- and 7-year-old. In total 1512 respondents were included in the analysis. The number of boys and girls were the same (50.5% boys) and most children were between 3.5 and 5 years old (49.9%). The age was normally distributed with a mean of 4.5. Most parents found the *Bereslim* site through links on free websites related to entertainment on TV (42.3%). Other had read about it in magazines about education (24.1%). The remaining parents visited the site through school, personal contacts, TV, the newspaper, colleagues or library. The parents' educational level is shown in Table 1. More than 50% of them have received a high education (higher secondary

professional education or scientific) and only 12-15% were low educated (lower vocational education).

Insert Table 1 about here

*Spending Leisure Time*

Most parents undertook literacy-related activities: they were members of the library (75.4%) and had bought 1-3 (46.1%) or even more than 3 (33.7%) picture storybooks or other books for their children in the last 6 months.

*Favorite activities.* Respondents indicated two of their child's most favorite activities from a choice of 9 possibilities (playing outside, playing with toys, reading (being read to), watching TV, playing on the computer, watching DVD/video, sports, listening to music, creative activities). Among activities that visitors of *Bereslim* liked best in their leisure time were playing outside (60.4%), playing with their toys (34.9%) and being read to (32.7%). They less frequently preferred playing on the computer, watching TV or watching DVD/video (17.4, 15.7 and 14.5% respectively). The least favorite activities were creative, music and sports activities. The chance that an activity was randomly chosen was 22%. On average reading (to) was chosen in 32.7%, a score that was significantly more than at chance level (binomial test, $p < .001$).

*Computer.* All children made use of the computer and most of them (59.1%) more than once a week. Parents reported that only 20.6% sits alone at the computer, the others are joined by their parents (67.4%), brother or sister (10.6%) or friends (1.5%). Most children (79.4%) are allowed to play games on the computer and some (27.1%) are even allowed to surf on the Internet. Also, most children have access to

educational computer software (69.0%). Most respondents (58.5%) have one or more favorite computer games and two of the three most favorite computer games mentioned are educational. Most respondents (58.7%) also have one or more favorite websites, all containing educational elements.

*Television.* A small minority (5.9%) reported that their child did not watch television. When watching television, the most favorite channel mentioned was educational for 65.5% of the children. Also, 69.2% had one or more favorite programs and 45.8% of these were educational. Most parents reported that they watch one or more television programs with their child (54.0%), which are mostly (8 out of 10 times) educational.

*Reading behavior*. About 54% of the respondents mentioned one or more favorite books of the child. The books available on the website *Bereslim* were all familiar to some extent: *Beer is op vlinder* (13.1%), *Bolder en de boot* (3.5%), *Met opa op de fiets* (10.5%), *Rokko krokodil* (8.8%) and *Tim op de tegels* (79.3%). Almost all parents expected that their child would like the books.

*Educational Level of Respondents Compared to the Distribution in Dutch Society*

The percentage of low and moderately educated people who visited *Bereslim* was lower than might be expected on the basis of the distribution of educational levels in Dutch society (CBS, 2006). As can be seen in Table 1, the higher-educated people were overrepresented in our sample survey. The frequency distribution differed significantly from the expected distribution ($\chi^2$ =19.25, $df$ = 2, $p$ <.001). Parents visiting *Bereslim* mainly belonged to the highest educated group in the Netherlands.

*Relationship between Demographic, Literacy and New Media Variables*

The correlations between parents' educational level, literacy, and new media variables are summarized in Table 2. Educational level of both parents was positively related to literacy variables and negatively to the use of new media. It appears that highly educated parents, especially mothers, stimulated or undertook more book-related activities, but were less inclined to stimulate the use of new media (computer activities) than lower educated mothers. For the highest education of the father the same pattern was found, albeit that few correlations were significant, indicating that mothers have more influence on the activities of young children.

Insert Table 2 about here

*Children Eligible for Stimulation Programs*

If both parents received the lowest level of schooling (primary education, lower and middle vocational education) their children were considered at risk for learning problems and eligible for state-funded Early and Pre-school Education (VVE). The current respondent group consisted of significantly fewer VVE participants (7.9%) than may be expected (33.6%; $\chi^2 = 18.84$, $df = 1$, $p < .001$). As is shown hereafter, they differed in several ways from the remaining non-VVE respondents.

*Parental literacy.* Most parents had a library membership and we found no difference between the (non) VVE groups. Most parents bought some storybooks for their children, but compared to the VVE group, more parents in the non-VVE group had purchased 4 or more books in the last 6 months (24.2 versus 34.5%), $\chi^2 = 5.27$, $df = 1$, $p = .022$ and fewer parents in non-VVE group bought no books at all (33.3 versus 19.1%), $\chi^2 = 13.85$, $df = 1$, $p < .001$.

*Leisure time expenditure.* Just like non-VVE children, VVE children liked being read to in their leisure time ($\chi^2 = 0.44$, $df = 1$, *n.s.*). On average reading (being read to) was indicated as a favorite activity in 33.0 and 30.0% respectively, which is significantly higher than at chance level in both groups (binomial test, $p < .001$ and $p = .025$, respectively).

*Computer*. Among the VVE group the every day use was more frequent than among the non-VVE group (18.3 versus 11.6%), $\chi^2 = 4.76$, $df = 1$, $p = .029$,. Also, children in the VVE group played more often with a peer rather than with a parent or older brother or sister (4.5 versus 1.6%), $\chi^2 = 3.79$, $df = 1$, $p = .052$ but were as often on their own compared to the non-VVE group (25.8 versus 20.1%). Both groups played games on the computer and both had educative CD-ROMs and the top 3 of favorite computer games contained 2 educational games in both groups.

*Television.* Children in the non-VVE group more often mentioned the educative channel as their favorite than children in the VVE group (69.8 vs. 53.6%; $\chi^2 = 12.65$, $df = 1$, $p < .001$). No differences were found between children in the non-VVE group and children in the VVE group in how often they mentioned an educational program as their favorite. The percentages of children who watched television programs together with their parents were similar in both groups. The type of programs children watched with their parents was mainly educative in both groups.

*Reading behavior.* Compared to the VVE group, more parents in the non-VVE group mentioned at least 2 favorite books ($\chi^2 = 5.37$, $df = 1$, $p = .021$). The books available on the website *Bereslim* were equally familiar to both groups, but more parents in the non-VVE group thought that their children would like them (92.6 versus 87.5%), $\chi^2 = 4.00$, $df = 1$, $p = .046$).

*New media activities and literacy activities*. Both groups undertook similar numbers of new media activities, 5-6 (out of 9), but the non-VVE group undertook more literacy activities than the VVE group, $\chi^2 = 4.00$, $df = 1$, $p = .046$. Of the parents in the non- VVE group, 84.5% undertook at least 2 (out of 4) literacy activities with their children compared to 70.8% of the parents in the VVE group.

## DISCUSSION

Living books on Internet does not create a new opportunity to close the gap between normally developing and linguistically deprived VVE children who are considered to be at risk for learning problems. In agreement with the general finding that higher-educated families usually create a richer literacy environment for their children (Bradley et al., 2001; Smith & Dixon, 1995; Weigel et al., 2006), *Bereslim* was mainly visited by children from higher-educated families. Indeed, buying and reading books are favorite literacy activities among *Bereslim* visitors and in addition 75.4% has a library membership, whereas only 16.0% of the 25-34-year-olds in the Netherlands are active members of a library (CBS, 2008). Also, watching TV and being at the computer are less favorite activities for the *Bereslim* group, but the way they use these new media is educative for the greater part.

Online storybook reading is not the panacea to increase access to books in lower-educated families. Visitors running the risk of a linguistically delayed development, the VVE group, were underrepresented in the group of *Bereslim* visitors. Overall, the minority of VVE visitors differs from the non-VVE visitors in the usual way (e.g., Ennemoser & Schneider, 2007; Smith & Dixon, 1995; Weigel et al., 2006), thus validating the self-reported data about literacy learning opportunities:

The VVE group buys fewer books, parents are less able to mention favorite books, and undertake less literacy activities and this group encourages watching entertainment programs rather than the educative channel. On the other hand, the visitors of *Bereslim* that belong to the VVE group are also special. Reading is one of the three most favorite activities mentioned by non-VVE as well as VVE visitors of *Bereslim*. This indicates that in some respects the limited number of children from lower-educated families visiting *Bereslim* was a special group with a comparatively high interest in literacy-related activities.

Anyhow, we missed the majority of low-educated families who most needed this new opportunity of literacy enhancement. Although these families usually have access to the Internet (SCP, 2007), and despite the fact that *Bereslim* is linked to popular sites related to entertainment on TV and the website is advertised through schools, libraries and magazines for parents, this new way of book service is not used to the same extent by low- and high-educated families. In line with other research (e.g., Cook et al., 1975; Neuman & Celano, 2006), we found that equal access to resources for educationally unequal groups does not automatically create new learning opportunities.

The results of this natural intervention thus provide another example of the *digital divide*: Children from low-educated families have equal access to Internet but benefits derived from access to Internet programs lag far behind. New storytelling media on Internet are rarely visited by children from lower-educated families, thus not enhancing the opportunities for reducing the pedagogical divide between groups varying in educational background. The results are analogous to experiments with books (e.g., Raikes, Pan, Luze, Tamis-LeMonde, Brooks-Gunn, et al., 2006). Merely increasing availability of books does not result in more book sharing. Likewise free

access to new storytelling media on Internet does not improve story exposure opportunities in groups that most miss book-reading experiences.

More parental guidance may explain the heightened chance that children from higher-educated families visit *Bereslim*. VVE children play more often with the computer, and more often joined by peers than supervised by a family member. As young children show an almost universal preference for the exciting commercial programs on television and on the computer, parental involvement and determination to make choices for educational websites may be the determining factor (Author, 2008a). It is a somewhat contradictory result that the VVE group reports playing educational games. Two of the top three of favorite computer games are educational games in both the VVE and non-VVE groups. One explanation could be that the VVE group prefers skill learning games (letters, numbers) to book reading programs as presented by *Bereslim*, in common with traditional literacy activities (Sonnenschein, Baker, Serpell, Scher,Turitt, & Munsterman, 1997).

*Practical Implications*

Free access through Internet to storybooks does not reduce the pedagogical divide between groups varying in educational background. Children from lower-educated families benefit from new opportunities offered by high quality free of charge programs on Internet to a lesser degree than their peers from higher-educated families. Parent education seems critically important for selecting educational Internet programs. Without active attempts to narrow differences in activities of children from lower- and higher-educated families, media influences may further widen the digital divide between children and differences in language and literacy skills will increase rather than decrease. The present results indicate that children from lower-educated

families miss adult guidance when they visit Internet. We speculate that lower-educated parents may be less inclined to actively search for educational programs because they are less aware of the beneficial effects of these programs. They rarely come across good examples of media use for educational purpose in their environment, including their children's nursery classrooms. Most teachers ban or ignore popular culture because they assume that traditional literacy activities are preferable to media use (Robinson & Mackey, 2003).

Improvement of VVE programs is a spearhead of Dutch policy. VVE started officially in 2000 and since then a growing number of eligible children follows a special program in preschool and kindergarten (Sardes, 2007). Since 2002 a special component for language development has been built into the VVE programs supported by educational TV programs. We recommend that within this linguistic program special attention is called for the utilization of new media for educational purpose especially for the use of electronic books.

### *Limitations and Future Directions*

Even though the questionnaire was brief and easy to complete, lower-educated parents may not have been available to complete the questionnaire. Completion was a condition to enter the *Bereslim* site and may thus have caused a negative impact on the distribution of educational levels.

Further research is warranted to test the hypothesis that many lower-educated parents do not get help in finding their way in an increasingly complex world of new media to support their children's literacy. In follow-up research we need to explore this hypothesis by including questions about parental views of the additional value of Internet programs.

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Table 1

*Distribution (frequency and percentages) of parents' educational level in the sample (N=3024) compared to the distribution in Dutch society (CBS, 2006)*

| Education | Frequency (sample) | % of sample | % of Dutch society[a] |
|---|---|---|---|
| **Low (father /mother)** (Elementary, primary education, lower and middle vocational education) | 433 (238/195) | 14.3 | 33.6 |
| **Middle (father/mother)** (higher general secondary education, lower secondary professional education) | 988 (474/514) | 32.6 | 41.2 |
| **High (father / mother)** (higher secondary professional education, college, university) | 1603 (800/803) | 53.0 | 25.2 |

*Note*. [a] The distribution in the sample differed significantly from that in Dutch society ($\chi^2 = 19.25$, $df = 2$, $p < .001$).

Table 2

*Correlation between parents' educational level, literacy and new media variables*

| | Educational level father | Educational level mother |
|---|---|---|
| **Literacy** | | |
| Membership of the library? | .04 | .07* |
| How many storybooks did you buy last 6 month? | .08** | .15** |
| What does child likes best: reading (to)? | .04 | .11** |
| How many titles of favorite books are mentioned? | .03 | .08** |
| **New Media** | | |
| What does child likes best: watching TV? | -.03 | -.04 |
| What does child likes best: playing games on computer? | -.03 | -.06* |
| Does the child often use the computer? | -.09** | -.10** |
| Does the child play games on the computer? | -.03 | -.06* |
| Does the child surf on the Internet? | -.07** | -.09** |
| Does the child have educational cd-roms? | -.05 | -.03 |
| How many favorite websites of the child are mentioned? | -.05 | -.02 |
| How many favorite TV programs of the child are mentioned? | -.06* | .01 |
| How many favorite TV programs of the child | -.02 | .01 |

mentioned are viewed with parent?

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*Note.* $N = 1512$; * $p < .05$; ** $p < .01$