

1 **The relationship between socioeconomic status and narrative abilities in a group**
2 **of Italian normal developing children**

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1 **Abstract**

2 **Objective:** Only limited and conflicting information regarding the relationship SES
3 and narrative abilities are available. Besides, the role of fathers from different SES on
4 narrative abilities has never been investigated. The aim of this study is to analyse the
5 relationship between fathers' and mothers' SES and narrative abilities assessed
6 through the Italian version of the BST (I-BST).

7 **Patients and methods:** A total of 505 typical developing Italian children were
8 enrolled. Information regarding parent's educational level and employment were
9 collected for each of the enrolled child. The narrative abilities were evaluated using
10 the I-BST. The relationship among parent's employment, educational level and I-BST
11 scores were analysed through univariate e multivariate regression analysis.

12 **Results: In univariate analysis both father's and mother's education and**
13 **employment were associated with most I-BST subscales scores, especially when**
14 **higher educational and employment were contrasted with the lowest ones. In**
15 **multiple regression analysis significant associations were found only between the**
16 **fathers' working status and educational level and I-BST subscales scores.**

17 **Conclusions:** parental education and employment might impact on the narrative
18 abilities of children. **When both fathers' and mothers' SES variables are**
19 **considered together, only fathers' education and working status seemed to be**
20 **associated with I-BST scores.**

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1 **Introduction**

2 **Family socioeconomic status (SES) can be defined as a combined total measure**
3 **of a family's economic and social position, based on income, education, and**
4 **occupation. Family SES is a powerful predictor of many aspect of child**
5 **development; there is evidence that lower SES negatively impact on children's**
6 **health, cognitive and academic attainment and socio-emotional development [1].**
7 **Also children's language development seems to be related to family SES;**
8 **children from lower socioeconomic strata show slower rates of development than**
9 **do children from higher socioeconomic strata [2-4]. This relation could be the**
10 **result of several factors including (a) biologically based differences in children's**
11 **abilities, caused by genes or health; (b) global effects of differences in family**
12 **functioning and home environments; and (c) specific effects of differences in**
13 **language-learning experiences [5-6].**

14 **Previous research focused mainly on the effect of SES on child speech and**
15 **vocabulary via maternal speech, consistently showing that mothers from higher-**
16 **SES families talk and interact more with their children in ways that are related**
17 **to more advanced child language development as compared to mothers from**
18 **lower-SES families [3, 7-11]. On the contrary, only limited and conflicting**
19 **information regarding the association of SES with narrative abilities are available thus**
20 **far. These latters are crucial in carrying out everyday activities such as**
21 **communicating one's own personal experiences, being also a fundamental part of a**
22 **child's daily life both at home and in school [12]. In clinical practice, narrative**
23 **abilities have also been found to be a valid predictor of long-term language skills, as**
24 **well as to play an important role in academic achievement and social success [13].**
25 **Several studies found that narrative abilities predict later reading comprehension**

1 abilities, reading fluency, or written narrative skills in both typical developing and
2 learning disabled children [14]. Therefore, narrative abilities analysis is considered
3 one of the most interesting and contextually valid methods to measure communication
4 competence, both in healthy and pathological pediatric populations [13]. Besides, it
5 has also been recognized as diagnostic criterion for Language Disorder in the DSM-5
6 [15].

7 Van Kleeck et al [16] used the Bus Story Test (BST) [17] in order to evaluate the
8 relationship between SES and the development of narrative abilities in 172
9 kindergartners' children, and described a systematic pattern in children's BST
10 performance, which was showed to depend on maternal education and race. In
11 particular, African American (AA) children scored lower than their European
12 American (EA) peers. On the other hand, Reese et al [18] found no relationship
13 between maternal education and narrative abilities in a population of 61 six- and
14 seven-year-old children. **However, this study contained no mothers who had a
15 university degree, and this might have obscured any impact that education level
16 might have on children's narrative language abilities.** Also Kulkofsky et al [19]
17 found no association between maternal education and narrative quality in a group of
18 112 preschool-aged children. **It must be noted that in this study no wide spread
19 was observed in maternal education levels, since the large majority of mothers
20 had a college degree. In addition, in the studies mentioned above, only six- and
21 seven-year-olds [18] and preschool-aged children [19] were analyzed. More
22 recently Alt et al [20], analyzed the association of SES and narrative story retells
23 in 907 native Spanish-speaking bilingual (Spanish–English) kindergarten and
24 2nd grade students; narration in both English and Spanish samples were
25 analyzed. The authors found that SES did not predict narrative abilities in the**

1 **Spanish sample, while there was a significant correlation between narrative**
2 **abilities and SES in the English sample.**

3 While previous studies focused on the association between maternal education and
4 children's narrative abilities, they did not take into consideration the possible role that
5 paternal education might play. **This omission is important because over the last**
6 **decades important social trends have fundamentally changed the social cultural**
7 **context in which children develop: women's increased labor force participation,**
8 **increased absence of nonresidential fathers in the lives of their children,**
9 **increased involvement of fathers in intact families [21]. This trend suggests an**
10 **important role of fathers on children language development. In particular,**
11 **previous studies suggest that fathers' language, specifically fathers' vocabulary,**
12 **is associated with language development for children from low-SES and mid-**
13 **SES families [22-24]. It seems therefore important to analyze the association**
14 **between narrative abilities and not only mother's SES but also father's SES.**

15 **In addition, there is general consensus that income, education, and occupation**
16 **together represent SES better than any of these alone. Previous studies on**
17 **association between SES and narrative abilities focused primarily on maternal**
18 **education. However, according to Bronfenbrenner [25] the interactions between**
19 **parents and their children are influenced by external systems including the**
20 **parents' work environments. In particular, parents' work environments impact**
21 **on child development through their influence on family processes including the**
22 **interactional contexts in which children learn much of their earliest language**
23 **[26]. A recent study by Pancsofar et al [27] found that father's employment**
24 **influence vocabulary input with their children. It seems therefore important to**

1 **take into consideration both years of education and parents employments when**
2 **analyzing factors associated with narrative abilities.**

3 The aim of this study is to evaluate the association between the families' SES and
4 narrative abilities in a large group of Italian typically developing children, using the
5 Italian version of the BST (I-BST) [28]. By "Family SES" we mean a measure that
6 takes into consideration both paternal and maternal education levels, as well as their
7 type of career [28]. To date, no data regarding the association between Family SES
8 and I-BST scores in Italian children exist. Gathering these data and providing further
9 relevant information on the topic could help researchers and clinicians in the
10 application of this test. **Moreover, knowledge on the association between both**
11 **parents' SES and narrative abilities could help interventions that eventually**
12 **should be broadened to include both parents, not just one.**

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1 **Materials and Methods**

2 *Participants*

3 A total of 505, typically developing, Italian children, 256 males and 249 females, aged
4 3 to 8 and 5 months, were enrolled for this study. For descriptive purposes, this cohort
5 of subjects was divided into 11 different age groups (Table 1). Each of the 11
6 subgroups encompassed a 6-month age range, just like in the validation study carried
7 out with both English and Italian versions of the BST [17, 28].

8 Exclusion criteria were: intellectual disability, deafness, bilingualism, cerebral palsy,
9 and any other motor impairment, speech-organ impairment of any origin (e.g. cleft
10 palate), or language impairment of any origin. Children were recruited from urban
11 public classrooms in 3 cities in Northern Italy, and information on exclusion criteria
12 were provided by parents/guardians or teachers. Written informed consent was
13 obtained by parents or guardians of enrolled subject. Recruited children, parents, and
14 guardians involved in the project were clearly informed and agreed to participate
15 without any compensation. The study was carried out according to the Declaration of
16 Helsinki, and was previously approved by the Institutional Review Board of our
17 hospital.

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19 *Data and Analysis*

20 Children's narrative abilities were assessed through the I-BST, which includes a story
21 about a bus that runs away from its driver, paired with twelve accompanying
22 illustrations. During the assessment, a rater tells the story, and then asks the child to
23 retell the same story using the given pictures as prompts. The child is then video- and
24 audio-recorded as he or she retells the story. These recordings later proceed to be
25 transcribed and scored on macro- and micro-level measurements, as described in the

1 test manual. Among these measurements, Information Subscale is the macro-level
2 measure, and indicates how many of the key information elements in the original
3 story were then mentioned by the child in his or her retell. Sentence Length and the
4 Complexity scales are micro-level measures, indicating morpho-syntactic complexity
5 and syntactic development, respectively. Sentence Length is calculated as the average
6 number of words in the five longest sentences generated by the child in the retell,
7 while Complexity is calculated as the number of utterances featuring a subordinate
8 clause. Cross-cultural adaptations and validation of this test into Italian have been
9 previously performed, and resulted in good reliability and validity [28].

10 Children were individually administered the I-BST by a total of 8 trained raters, who
11 completed a 2-hour specific training program about the I-BST. This training program
12 addressed both the administration of the test and the analysis of its results. All raters
13 were speech-language pathologists (SLP) with at least 5 years of experience in child
14 language assessment. Each SLP rated children from different age groups. Assessments
15 were video- and audio-recorded, in order to facilitate transcription. The transcription
16 process and the analysis of results were performed by the same SLP who carried out
17 the testing process within 12 hours from it. Raters were also responsible for
18 evaluating Information, Sentence Length, and Complexity at the same time during
19 transcription.

20 In order to explore the association between SES and narrative abilities of typically
21 developing Italian children, during the I-BST assessment, children's parents were
22 asked to complete a brief questionnaire regarding their current employment and
23 education level. Education level was operationalized as the number of years of study
24 one completed, while parents' employment status was classified into 4 different
25 groups: unemployed, manual workers, office workers, and intellectual workers.

1 **In order to evaluate I-BST inter-rater reliability, a random sample of 178**
2 **recordings was listened to and rated by two licensed SLPs from the same facility,**
3 **named rater 1 and 2. The two raters managed to complete this task twice, with a**
4 **week of interval in order to evaluate also the intra-rater reliability.**

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6 *Statistical Analysis*

7 **Student's t-test was used to compare years of education in fathers and mothers of**
8 **the enrolled children, while chi-square test was used to evaluate the differences**
9 **in maternal and paternal employment among the 505 enrolled children.**
10 **Association between mothers' and fathers' employment was analyzed calculating**
11 **the distribution of the 4 employments categories in parents and mothers in a 4x4**
12 **table.**

13 **Both intra- and inter-rater reliability were evaluated through two-way mixed-**
14 **effects model (consistency definition) intraclass correlation coefficients (ICCs),**
15 **both for the macro- and micro-level measures, as described in the test manual.**

16 Regression analysis was used to evaluate the association between parents' educational
17 level and employment status, and micro- and macro-level I-BST scores. Linear
18 regression was used to analyze Information and Sentence Length having an
19 approximately symmetric distribution. Residual analysis was used to check the
20 normality of the residuals. Poisson regression was used for the regression analysis of
21 Complexity. In fact, the analysis of this variable using linear regression was not
22 advisable, as the distribution was highly skewed. Considered the high number of
23 children with a 0 count on Complexity, an inflated Poisson regression was also used.

24 **Regression models were adjusted for children age, taking into account possible**
25 **mild non-linear effects using restricted cubic splines with 3 knots [29].**

1 **Educational levels and work-environment of the mother and of the father were**
2 **inserted in a multiple regression model. To this end the educational level was first**
3 **categorized in low (≤ 8 years), medium (9-13 years) and high (≥ 14); also the**
4 **work environment was categorized in low (manual workers), medium (office**
5 **workers) and high (intellectual workers). In order to evaluate the association**
6 **with the 4 variables considered (father education, mother education, father**
7 **work, mother work), stepwise selection was used together with bootstrap**
8 **resampling (sample with replacement the data). For each bootstrap sample the**
9 **selected variables were recorded. The percentage of bootstrap samples in which**
10 **each variable was selected was used as measure of variable importance.**

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1 **Results**

2 I-BST was administered to all the 505 children enrolled in the study. Administration
3 time never exceeded 10 minutes. The mean maternal educational level in the cohort of
4 505 typically developing children was 14.3 ± 3.7 years (range 5-26 years), while the
5 mean paternal educational level was 13.1 ± 3.9 years (range 5-24 years) (Table 1). **No**
6 **difference between mean maternal and paternal educational levels was found on**
7 **Student t test ($p = 0.209$).**

8 Parents' employment status was distributed in the 4 different groups (unemployed,
9 manual workers, office workers, and intellectual workers) as reported in Table 2. **The**
10 **distribution of the 4 employments categories in parents and mothers are**
11 **reported as raw scores and percentages in a 4x4 table; an association between**
12 **father and mother employment was found: in 68% of the children with a manual**
13 **worker mother, the father was also a manual worker; in 46% of the children**
14 **with an office worker mother, the father was also an office worker; in 43% of the**
15 **children with an intellectual worker mother, the father was also an intellectual**
16 **worker.** The differences between fathers' and mothers' employment in the group of
17 505 children were found to be significant on Chi-Square test (p-value of Chi-Square
18 test computed using simulations = 0.001). In particular, manual work was the most
19 common employment among the fathers (199/505, 39%), while office work was the
20 most common employment among the mothers (171/505, 34%).

21 **As far as the reliability analysis of the I-BST is concerned, the intra-rater and**
22 **inter-rater reliabilities for each of the 3 scales of the I-BST were satisfactory for**
23 **all 3 subscales ($r > 0.90$).**

24 **The estimated regression coefficients between fathers and mothers' SES and**
25 **children I-BST subscales scores are reported in table 3. Results for univariate**

1 (regression with age and the factor of interest one at a time) and multiple
2 regression are reported. Positive coefficients indicate a positive association for
3 the contrast of interest, while confidence interval including 0 indicate non
4 statistically significant associations. Regression analysis was performed
5 excluding families with unemployed parents (57 families), as this was considered
6 a potential temporary situation.

7 Considering univariate analysis (adjusted by age) all factors had a statistically
8 significant association with all subscales in the contrast high versus low, with the
9 exception of the mother working status with Sentence Length. The association
10 strength appeared stronger for macro-level measures than for micro-level
11 measures. As far as it is concerned the parents' working status, statistically
12 significant association with Information and Complexity subscales of I-BST in
13 the contrast high versus low and intermediate versus low were found, thus
14 suggesting that children of both intermediate and high working status parents
15 scored higher on Information and Complexity subscales than children of low
16 working status parents. On the other hand, as far as it is concerned the parents'
17 educational level, statistically significant associations with the 3 I-BST subscales
18 were found only if the contrast high versus low was considered.

19 When considering a regression model with all the factors together (multiple
20 regression analysis), statistically significant associations were found only between
21 the fathers' working status and the Complexity subscale of I-BST ($p < 0.001$) and
22 between the fathers' educational level and the Information subscale of I-BST
23 ($p = 0.005$). Also in this case, the association strength appeared stronger for
24 macro-level measures than for micro-level measures.

1 As expected, age was selected in all bootstrap samples for all end-points
2 considered (Information, Sentence Length and Complexity). The percentage of
3 selection of each variable over the bootstrap samples (1000) is reported in table 4.
4 Considering Information and Sentence length, education and working status of
5 the father are selected more often with respect to the corresponding variables of
6 the mother. Considering Complexity also mother education appears as an
7 independently associated variable.
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1 **Discussion**

2 **In the present study, the association between families' SES and narrative**
3 **abilities in a large group of Italian typically developing children was evaluated.**
4 **The results here reported suggest a significant relationship between family SES**
5 **and children's I-BST performance. In particular, educational level and working**
6 **status of both parents are associated with children's I-BST performance but only**
7 **when considered alone and not in combination. On the other hand, when**
8 **considering all factors together, only the fathers' educational level and working**
9 **status appear associated with the children's I-BST performance. This datum is**
10 **noteworthy and further support previous reports on the effect of fathers'**
11 **vocabulary and employment on language development of their children [22-24,**
12 **27]. In addition, this datum also suggests that fathers' educational level and**
13 **working status might play a role in the development of children's narrative**
14 **abilities. To the best of our knowledge, in none of the previous studies the unique**
15 **contribution of paternal SES on children's narrative abilities has been evaluated.**
16 **As far as the effect of maternal SES on children's narrative abilities are**
17 **concerned, the results of the present study appear to be similar to those reported in**
18 **Van Kleeck et al's study [16], but are in contrast with those reported in other studies.**
19 **In particular, Reese et al [18] found no relationship between maternal education and**
20 **three aspects of the storybook retelling narratives in six- and seven-year-olds.**
21 **However, this study contained no mothers who had a university degree, and this**
22 **might have obscured any impact that education level might have on children's**
23 **narrative language abilities. Also Kulkofsky et al [19] did not find any main effect or**
24 **interaction for maternal education, nor did maternal education correlate with narrative**
25 **quality. It must be noted that in this study no wide spread was observed in maternal**

1 education levels, since the large majority of mothers this time had a college degree.
2 Therefore, it is possible that the greater spread in maternal education levels featured in
3 our study may explain the differences in findings in comparison with previous reports.
4 **In fact, in our study the strongest association between education and I-BST**
5 **scores were found when low and high education were contrasted.** In addition, the
6 effect of maternal education on children's I-BST scores appears to be in line with
7 research on standardized language tests and spontaneous language samples produced
8 by three-year-olds, even when these were not narratives [30].
9 When considering parental employment, children from lower working status parents
10 scored lower on I-BST. These results are similar to previous reports. In particular,
11 several authors noted that children from low-income, minority backgrounds tend to
12 score lower on standardized language tests than normative samples do [31, 32].
13 The strengths of the present study rely on the fact that both parents' education and
14 type of work were considered in the analysis; therefore, a finer description of the
15 family SES was possible, with possible implications on the results found. The parental
16 education and type of work was very similar across the age groups, thus suggesting a
17 homogeneity of the sample. Some differences were found in the mater/father
18 comparison as fathers were more likely manual workers and mothers were more likely
19 office workers. Education level was also slightly higher in mothers even if the
20 difference was not significant on Student's t test. These differences should not be
21 considered as a bias in the sample, rather they represent the differences found in our
22 country. The available information on a national level (ISTAT, Istituto Nazionale di
23 Statistica), in fact, demonstrated that the majority of the men are manual workers,
24 while the majority of women are office workers.
25 The major limitation of the present study is that all enrolled children were from urban

1 classrooms of 3 cities in Northern Italy. Greater geographic diversity would be
2 preferable. Another limitation depends on the absence of any information regarding
3 family annual income; the measurement of children's SES background was based
4 uniquely on parental education and employment. However, measures of household
5 income appear to be imprecise especially for low-income families whose income may
6 be variable. In contrast, mothers' education level is often more stable to measure than
7 family income is [16]. Finally, only Italian children were enrolled in the current study,
8 and no information regarding Italian-speaking children of different ethnicities other
9 than Caucasian were collected. It is possible that, as previously suggested [16], the
10 SES of immigrant families as well as bilingualism might play a role in Italian-
11 speaking children, and therefore in their performance on I-BSTs.

12 **In conclusion a positive association between family SES and oral narratives,**
13 **assessed through I-BST, was found. The association strength appeared stronger**
14 **for macro-level measures than for micro-level measures. Both education and**
15 **working status of both father and mother seemed to be associated with I-BST**
16 **scores in children with typical language development; however, when all factors**
17 **are considered together, only fathers' education and working status seemed to be**
18 **associated with I-BST scores. Fathers involvement in interventions might be**
19 **considered as an important additional strength in the future.**

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25 Conflict of Interest: The authors declare that they have no conflict of interest

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