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Measuring the quality of the sibling relationship during middle childhood: The psychometric properties of the Sibling Relationship Inventory

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To address a significant gap in the literature on sibling relationships, the present study examined the psychometric properties of the Sibling Relationship Inventory (SRI) in an Italian sample. The study had three main aims: (i) to investigate the factorial structure of the SRI; (ii) to evaluate the invariance of the SRI's factorial structure across birth order; and (iii) to test the SRI's validity. To this end 385 children, 213 first-borns and 172 second-borns (aged 6 to 12) were recruited. Confirmatory factor analyses showed a three-factor structure identical to that reported by the authors of the SRI. Critically, the SRI structure was stable when first- and second-borns were considered separately. Overall, the Italian version of the SRI showed good psychometric properties.

Keywords: Sibling relationship; Birth order; Sibling Relationship Inventory.

In the last two decades, the study of sibling relationship has received growing attention. From an early age (Dunn, 1983), and later during adolescence and adulthood (Cicirelli, 1996), siblings represent a crucial emotive support and constitute an important component of children's social life (Bank & Kahn, 1982; Dunn, 2002). In addition, the sibling relationship influences the development of personality (Sulloway, 1996), gender identity (McHale, Updegraff, Helms-Erickson, & Crouter, 2001),

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and social-cognitive understanding (Howe, Petrakos, & Rinaldi, 1998; McAlister & Peterson, 2007; Ruffman, Perner, Naito, Parkin, & Clements, 1998). Several studies have recently argued that these effects largely depend on the quality of the relationship (Lockwood, Kitzmann, & Cohen, 2001) and on the way that siblings judge their relationship (Stormshack, Bellanti, & Bierman, 1996; Woolfe, Want, & Siegal, 2003). That is, those children who have a positive relationship with their sibling show greater understanding of other people's feelings and beliefs (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Howe & Ross, 1990) and higher social adjustment (de Bernart & Pinto, 2005; Updegraff, McHale, & Crouter, 2002). By contrast, a conflictual sibling relationship seems to foster aggressive behaviour (Garcia, Shaw, Winslow, & Yaggi, 2000).

For the purpose of the present study it is import to note that the meaning attributed to the relationship, not to mention the quality of that relationship, might vary according to the children's birth order. Second-borns are strongly influenced by their older sibling (Whiteman, McHale, & Crouter, 2007) who acts as a model for the development of gender identity (McHale et al., 2001), personality (Sulloway, 1996), and both cognitive (McAlister & Peterson, 2007; Ruffman et al., 1998) and emotive skills (Sawyer et al., 2002). Birth order also influences the status held by siblings: usually second-borns are nursed and ruled by their older siblings (Brody, Stoneman, MacKinnon, & MacKinnon, 1985), and express feelings of admiration and intimacy toward their older brother or sister (Buhrmester & Furman, 1990; Widmer & Weiss, 2000).

From a methodological point of view, the acknowledgment of the role of the quality of the sibling relationship in children's development implies recognition of children's evaluative competences (as they constitute a primary source of information), and requires the use of tools that get to grips with a child's representation of the relationship. Individual perspectives on sibling relationship (as well as on other social relationships) have been studied through interviews or questionnaires (Furman, 1996). Studies in this research area have shown a satisfactory convergence in identifying the central aspects of the quality of the sibling relationship, namely the macro-dimensions of Warmth, Hostility and Rivalry (Dunn, 1993; Furman & Buhrmester, 1985). However, despite substantial agreement on the dimensions on which sibling-relationship quality hinges, studies have not been able to delineate a univocal descriptive picture of the phenomenon, mainly because of their limited comparability. Instruments used in previous studies are locked, in fact, into narrow intervals of age: so early childhood has the Sibling Behaviour and Feelings Questionnaire (Mendelson, Aboud, & Lanthier, 1994), early adolescence the Sibling Relationship Questionnaire (Furman & Buhrmester, 1985), and middle adolescence the Brother–Sister Questionnaire (Graham-Bermann & Cutler, 1994).

In order to study the sibling relationship, while avoiding the risks connected to the application of different measures, we focused on the Sibling Relationship Inventory (SRI), developed by Stocker and McHale in 1992. The SRI is a standardized instrument, developed to assess 6- to 12-year-old children and their perception of their own behaviour and their own feelings towards their sibling. It can be used for studies on both typical (Boer, Westenberg, McHale, Updegraff, & Stocker, 1997; Stocker & McHale, 1992) and atypical populations (Stormshack et al., 1996). Moreover, the SRI has been successfully applied not only to American children, for which it was developed, but also to children from Britain (Dunn, Slomkowski, & Beardsall, 1994) and the Netherlands (Boer et al., 1997).

The final version of the SRI is made up of 17 items, loading on three scales relating to the dimensions of Warmth, Conflict and Rivalry (Boer et al., 1997). The first dimension comprises items related to behaviours of support, help, sharing and admiration between siblings. The Conflict scale is a measure of the frequency of episodes of disagreement, in which siblings quarrel, tease and provoke each other. Finally, the third dimension, Rivalry, measures the perception that children have of differential treatment from their parents, particularly in terms of affection and attention received in comparison to their sibling. The SRI is a 5-point Likert scale, ranging from 1, indicating that the target behaviour "*never*" happens, to 5, indicating that the target behaviour "*always*" happens. Total scores for the three factors are obtained by summing the scores. Overall, the questionnaire's administration requires between fifteen and twenty minutes. It is also worth noting that the format of the items encourages participants to feel free to give natural rather than socially desirable answers. Every question is, in fact, preceded by an opening statement, with a generalization of the behaviour to which the question refers. This approach underlines the dimension of sharing both the positive and the negative aspects of the relationship, so that all the answers are equally acceptable.

These characteristics, together with the lack of a standardized questionnaire in Italian, led us to test the SRI's adequacy for the social and cultural context of our country. Results of a previous study showed good psychometric properties for the Italian version of the SRI both in explorative and confirmative analyses. The three-factor structure reported by Stocker and McHale (1992) was confirmed and was found to explain 51% of variance in the data (Lecce, Primi, Pinto, & de Bernart, 2005). In the present study we aimed to examine the reliability of these results and to extend them by evaluating the invariance of the SRI's factorial structure across birth order. More precisely, in the light of the literature stressing the role played by birth order in the sibling relationship (Dunn, 2002), we were interested in investigating whether first- and second-borns share the

psychological meanings attributed to forms of behaviour characterizing relationships between siblings.

Finally, the current study assessed the internal consistency and validity of the SRI by examining the correlations between the SRI and a measure of the quality of children's friendship. We chose to analyse children's friendships as previous studies have shown significant correlations between the quality of children's relationships with their friends and with their siblings (Pike & Atzaba-Poria, 2003; Stocker, 1994; Sturgess, Dunn, & Davies, 2001; Updegraff & Obeidallah, 1999; Updegraff et al., 2002). Such results support a carry-over model for children's social relationships. According to this model, the quality of children's social relationships with different social partners (i.e., siblings and friends) is significantly stable. This was not the focus of the present study, but it is worth noting that different mechanisms can account for this continuity across social relationships. These include: children's social cognitive abilities (Stocker, 1994); their temperamental characteristics (Plomin & Dunn, 1986; Volling, Herrera, & Poris, 2004); and their internal working models (Furman, Simon, Shaffer, & Bouchey, 2002). Therefore, we hypothesized there would be significant positive correlations between the grade of Conflict and Warmth reported in sibling and friend relationships.

METHOD

Participants

This study involved 213 first-borns (104 girls and 109 boys) with a mean age of 9.08 years ($SD = 0.78$) and 172 second-borns (89 girls and 83 boys) with a mean age of 8.97 years ($SD = 0.79$). The participants were recruited from state schools located in northern Italy attended by children from middle-class families. The criteria for inclusion were: informed consent from parents; belonging to a maritally intact family; and a full sibling living at home with an age gap of not more than six years. Siblings for this target sample included 195 boys and 190 girls with a mean age of 8.75 years ($SD = 2.83$). There was a mean age gap of 2.5 years ($SD = 1.1$) in the sibling dyads, which varied in terms of gender pairings: 98 male–male, 92 female–female and 188 male–female/female–male.

Measures and procedures

The English version of the SRI was translated into Italian by two researchers who worked independently. Except for a few stylistic differences, the two translated versions were essentially the same and the two researchers agreed on a final version. The Italian version of the SRI was then

back-translated into the original language by an English mother-tongue speaker and sent back to the authors, who gave their approval.

The SRI was then individually administered during school time in small rooms. The experimenter read each item on the questionnaire to the children and wrote down their answers.

In addition to the SRI, a subsample of 220 children were also asked to complete the Friendship Quality Scale (FQS; Bukowski, Hoza, & Boivin, 1994) in order to test the validity of the SRI. More precisely, we asked children to complete the FQS referring to their best reciprocal friend previously identified using the friendship-nomination procedure (Bukowski et al., 1994). The FQS is a self-reported questionnaire that assesses the quality of children's relationship with their best friend on a 5-point Likert scale ranging from 1 = "*not true*" to 5 = "*really true*". The 22 items of the questionnaire can be aggregated on two scales: Warmth and Conflict (Alles-Jardel, Fourdrinier, Roux, & Schneider, 2002). The FQS has been previously used with Italian children of similar age and has showed good psychometric properties (Lecce, Pagnin, & Pinto, 2009).

Data analysis

Confirmatory factor analysis (CFA) was used to investigate the internal structure of the SRI. First, we performed a single group CFA of the 17 × 17 item covariance matrix to test the fit of the original three-factor structure of the SRI reported by Stocker and McHale (1992).

Next, we tested the invariance of the factor model's parameters across birth order using a multi-group confirmatory factor analysis (MGCFA). We compared the structure of two covariance matrices in first-borns and second-borns (Bagozzi & Foxall, 1995; Reise, Widman, & Pugh,1993) using a hierarchical sequence of increasingly constrained models. The MGCFA is characterized by a sequence of nested tests that start from an initial base model and then analyse and compare several alternative models with progressively tighter levels of invariance (Meredith, 1993; Steenkamp & Baumgartner, 1998). As in Steenkamp and Baumgartner (1998), we used the following sequence of nested models:

1. The first model (M1) is the "baseline model" in which only configural invariance is tested, i.e., the equality of the number of factors and the pattern of factorial loadings, fixed and free, between groups. No restriction on the parameters (variances, covariances, loadings, and the like) is imposed.
2. The second model (M2) verifies the metric invariance, i.e., the correspondence of the values of the factorial loadings between the samples.

3. The third model (M3) requires the invariance of the factorial covariances.

The fit indexes of these three nested models are compared. If the imposition of constraints implies an important decrement in fit, then the hypotheses of invariance cannot be maintained.

Single and multi-group CFAs were performed with Mplus Version 5.0 (Muthén & Muthén, 1998–2007) using robust maximum likelihood estimation methods (Satorra & Bentler, 1994).

Criteria for assessing overall model fit were mainly based on fit measures: the comparative fit index (*CFI*) and the root mean square error of approximation (*RMSEA*). We considered *CFI* value of .90 to reflect a fair fit (Bentler, 1990). For the *RMSEA*, value of .08 or less were considered to reflect an adequate fit (Browne & Cudeck, 1993). Differences in the model fit between competing models that are nested were tested employing the scaled difference chi-square test (Bentler & Satorra, 2001).

Finally, we examined the internal consistency of SRI using Cronbach's alpha coefficients. We also computed a measure of the instrument consistency using CFA estimated values for factor loadings and error terms (Bagozzi, 1994). Analysis of Pearson correlations with the FQS were used to investigate the validity of the SRI.

RESULTS

Confirmatory factor analysis

The 17 items of the Italian version of the SRI were subjected to a single-group CFA to test the three-factor structure proposed by Stocker and McHale (1992). As a simple structure, each item loaded on its respective factor and no cross-loading was postulated. The model included the estimate of the covariances between factors except the covariance between Warmth and Rivalry factors, which were equal to zero, consistent with a previous study (Lecce et al., 2005).

Analysis of the goodness of fit indexes revealed that, despite chi-square being significant, $\chi^2(117) = 200.87$, $p < .001$, the other indices had satisfactory values: $CFI = .93$ and $RMSEA = .06$ (90% CI: .05; .07).

The standardized estimates of the model are presented in Figure 1. Standardized factor loading ranged from .42 to .77; they were all significant at the .001 level. In the structural part of the model all estimated correlations among the latent variables were also found to be significant: Conflict was significantly associated with both Warmth, $r = -.50$; $p < .01$, and Rivalry, $r = .29$; $p < .01$.

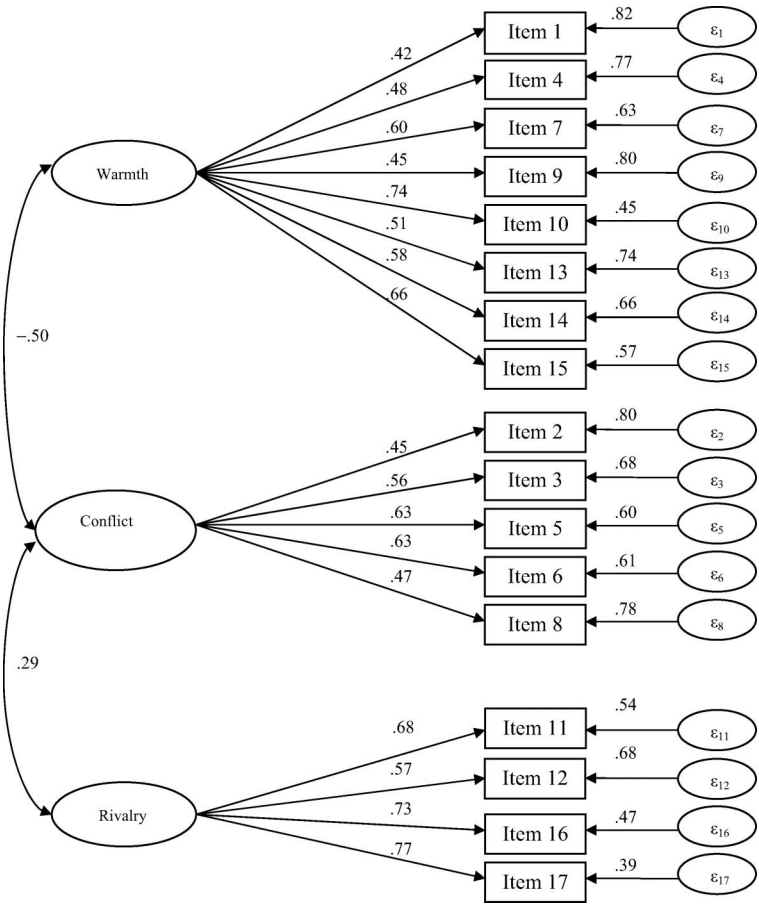

Figure 1. Three-factor model of SRI with standardized parameters: Estimated factor loadings, factor correlations and measurement residuals.

Factorial invariance across birth order

As anticipated we tested the factorial invariance of the SRI across birth order using a MGCFA.

As a prerequisite to testing for factorial invariance, we first considered a baseline model that was estimated for each group separately (Byrne & Watkins, 2003). We then assessed the fit of the three-factor model in each group, first-born ($n = 213$) and second-born ($n = 172$), considered separately. The simple three-factor structure model showed a good fit in each sample (First-born: $SB\chi^2 = 159.25$, $df = 117$, $p < .01$, $CFI = .94$, $RMSEA = .04$; Second-born: $SB\chi^2 = 150.68$, $df = 117$, $p < .05$, $CFI = .94$, $RMSEA = .04$).

TABLE 1
Goodness of fit indexes for tests of invariance across group (first- and second-born samples)

Model	$SB\chi^2$	*CFI*	*RMSEA*	$\Delta SB\chi^2$
M1 (configural invariance)	$\chi^2(248) = 406.88$; $p < .001$	.88	.06	–
M2 (metric invariance)	$\chi^2(262) = 429.63$; $pi < .001$	.87	.06	M2 – M1$\chi^2(14) = 18.61$; $p = .18$
M3 (factor covariance invariance)	$\chi^2(264) = 431.80$; $p < .001$	.87	.06	M3 – M1$\chi^2(16) = 20.77$; $p = .19$

When the baseline model with no cross-sample constraints was estimated in both samples simultaneously, the fit indices suggested reasonable evidence in support of the configural invariance hypothesis (Table 1). Moreover, scaled difference chi-square tests supported the hypothesis of invariance of factor loadings (M2 vs. M1) and of factor variances and covariances (M3 vs. M1). Thus, M3, which considers the invariance of the factorial covariances, proved itself the most parsimonious model in explaining the empirical data (Bentler & Satorra, 2001).

Reliability and validity

The internal consistency was good for the scale of Warmth, $\alpha = .77$, and Rivalry, $\alpha = .78$, and satisfactory for the scale of Conflict, $\alpha = .68$. Overall, these values were unchanged when internal consistency was measured through CFA estimated values (Warmth = .78, Rivalry = .78, and Conflict = .68).

As far as the validity of the Italian version of the SRI is concerned, analyses showed significant and positive correlations between the dimensions of Warmth and Conflict in sibling and friend relationships. More precisely, the levels of Warmth and Conflict reported in the SRI were positively and significantly associated with those reported on the FQS ($r = .32$, $p < .01$ and $r = .31$, $p < .01$, respectively).

DISCUSSION

The aim of this study was to assess the psychometric properties of the SRI with a sample of first-born and second-born Italian children using a confirmatory factor analysis. Generally speaking our results fit well with those already published (Boer et al., 1997; Lecce et al., 2005; Stocker & McHale, 1992) and showed that the Italian version of the SRI has good psychometric properties. At the same time this study adds to this literature

by showing that the structure of the SRI has a satisfactory degree of generalization across birth order.

Our data confirm the original three-factor structure referring to the emotional dimensions of affectivity, hostility and rivalry/jealousy (Lecce et al., 2005; Stocker & McHale, 1992). These three factors reflect core dimensions of the siblings' relationship (Dunn, 2002). Indeed, the sibling relationship is characterized by mixed emotional features and by high levels of both co-operation and conflict (Cutting & Dunn, 2006). A good percentage of the interactions between siblings is characterized by negative emotions (Dunn, Creps, & Brown, 1996), frequent conflict (Dunn & Herrera, 1997) and jealousy (Volling, McElwain, & Miller, 2002). However, at the same time, the sibling relationship is a very intimate relationship (Cutting & Dunn, 2006): siblings talk a lot to each other (Hughes, Lecce, & Wilson, 2007) and most children spend more time interacting with each other than with their parents (McHale & Crouter, 1996).

Factor loadings also support the validity of the SRI structure. Indeed, each item loaded on the factor to which it belongs, with values that were often higher than those reported in the American and Dutch samples (Boer et al., 1997). As far as the mutual associations among dimensions were concerned, Rivalry and Conflict were found to be significantly associated. This result, can be interpreted in light of the effects of differential treatment (Daniels & Plomin, 1985), i.e., the impression of being treated unfairly by parents would feed feelings of antagonism between siblings. Instead, the occurrence of a negative bond between conflict and affection shows that in the Italian sample they do not constitute independent dimensions, but opposite poles of a continuum, the gradation of which qualitatively contributes to determining the relationship itself. This model replaces the frequent independence observed between the two factors, according to which the entity of the disagreement would have no influence on the intensity of affection felt between partners. The specificity of this result could be explained through the distinction made by Rinaldi and Howe (1998) between destructive and constructive conflict.

As to birth order, results showed that each item saturates on the factor to which it belongs with an analogous trend in first- and second-borns. Furthermore, the structural invariance test implemented through a multi-group model indicates the stability of the three factors in the dyad concerning the factor covariance invariance. Within the context of MGCFA, testing for parameter invariance involves a hierarchical sequence of increasingly constrained models. In our work we referred to the scalar invariance level. This choice could be considered a weakness in the study since, according to some authors (for example DeShon, 2004), invariance can be attested only if, in addition to the loading structure, the residuals are also identical. However, the definition of invariance and the ordering of

models in the sequence depends on the goal of each study (Vanderberg & Lance, 2000). Since the present study involved children from the same country and its aim was to investigate if the means of the observed items were due to differences in the means of the underlying construct, invariance of factor variances, of factor covariances and error variances was not necessary (Horn & McArdle, 1992; Meredith, 1993).

Together, these results seem to suggest that the events and life episodes on which the siblings were questioned are interpreted by first- and second-borns as expressions of the same psychological meaning: Warmth, Conflict and Rivalry. Thus, the three dimensions are sufficiently stable among first- and second-borns and do not seem to be influenced by the position the individual sibling holds within the relationship. In addition, the patterns of correlations among factors seem to follow the same trend in first- and second-borns. That is, Warmth and Conflict constitute interdependent dimensions determining the quality of the sibling relationship: elder and younger siblings both agree in attributing a negative connotation to the presence of conflict within the relationships, given that Conflict has a negative correlation with Warmth.

The Cronbach alphas found in our study are very similar to those reported in the American sample by Stocker and McHale (1992), Chronbach's alphas: Warmth = .77, Conflict = .71 and Rivalry = .86, and in the Dutch sample by Boer and colleagues (1997), Chronbach's alphas: Warmth = .69, Conflict = .71 and Rivalry = .71. Therefore, we can conclude that the internal consistency of the three factorial dimensions is relatively stable across different cultures.

Finally, it is worth noting that the Italian version of the SRI showed good validity as demonstrated by the positive significant correlations with the conflict and affection scales of the Friendship Quality Questionnaire reported in the present study. This result also fits with that reported by de Bernart and Pinto (2005) who found positive correlations between children's scores on the SRI and teachers' evaluation of their prosocial behaviour.

Conclusions

This study is the first to apply a multi-group confirmatory factor analysis in examining the structure of the SRI across birth order. Further research using larger samples and stricter definitions for factorial invariance would be warranted.

On the whole, the Italian version of the SRI showed itself to be effective in measuring the quality of sibling relationship. The SRI confirms that Italian children are also careful observers of their own social environment, sensitive to the characteristics of the siblings and their relationship with siblings, matching research performed on children from other sociocultural

contexts (Epkins & Dedmon, 1999; Ross, Woody, & Smith, 2000). The large age spectrum for which the SRI was constructed and the stability of its structure in older and younger siblings makes this questionnaire an interesting tool from a psychological point of view. In fact, it permits us to compare the perceptions of the sibling relationship in children of different ages as well as the representation of the sibling relationship between two members of the same dyad (Lecce et al., 2009). Finally, it is worth noting that the SRI is fundamental in studying the sibling relationship. First of all, since it is necessary to insert the sibling's name in each item, the researcher directly measures the child's perception of his or her own relationship, rather than a generic and abstract idea of the sibling relationship. By forcing children to remain within the bounds of the specific relationship, the SRI reduces the risk of stereotyped answers. This allows researchers to integrate behavioural data with affective and cognitive aspects, and opens up the study of sibling relationships to different methods, something that is valuable for the study of interpersonal relationships among children (Bombi & Pinto, 2000; Schneider, 2000).

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