Multiple dimensions of self-concept, inferred self-concepts based upon responses by peers and by teachers, and academic achievement measures were collected in a sample of 559 fifth grade students. Exploratory/conventional factor analyses of responses to the Self Description Questionnaire (SDQ) clearly identified the eight facets of self-concept that the instrument was designed to measure and confirmatory factor analyses demonstrated the factor loadings to be reasonably invariant for self-report and peers' responses. Student/teacher/peer agreement was statistically significant for most self-concept dimensions, and agreement on any one dimension was relatively independent of agreement on other dimensions. Academic achievement scores (both objective test scores and teacher ratings) were significantly and positively correlated with self-concepts based upon self-reports in academic areas, but not in nonacademic areas. Students' own self-reports more clearly separated self-concepts in Reading and Math than did responses by peers or by teachers, or the actual achievement measures. The findings of this study demonstrate that the formation of self-concepts is affected by different processes than the self-concepts inferred by significant others, that academic self-concepts are affected by different processes than the academic achievements which they reflect, and that self-concept cannot be adequately understood if its multidimensionality is ignored. (Author)
Multidimensional Self-concepts: Relationships
With Inferred Self-concepts and Academic Achievement

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Multidimensional Self-concepts: Relationships With Inferred Self-concepts and Academic Achievement

ABSTRACT

Multiple dimensions of self-concept, inferred self-concepts based upon responses by peers and by teachers, and academic achievement measures were collected in a sample of 5550 fifth grade students.

Exploratory/conventional factor analyses of responses to the Self Description Questionnaire (SDQ) clearly identified the eight facets of self-concept that the instrument was designed to measure and confirmatory factor analyses demonstrated the factor loadings to be reasonably invariant for self-report and peers responses.

Student/teacher/peer agreement was statistically significant for most self-concept dimensions, and agreement on any one dimension was relatively independent of agreement on other dimensions. Academic achievement scores (both objective test scores and teacher ratings) were significantly and positively correlated with self-concepts based upon self-reports in academic areas, but not in nonacademic areas. However, students' own self-reports more clearly separated self-concepts in Reading and Math ($r = 0.01$) than did responses by peers ($r = 0.52$) or by teachers ($r = 0.70$), or the actual achievement measures ($r = 0.61$). The findings of this study demonstrate that the formation of self-concepts is affected by different processes than the self-concepts inferred by significant others, that academic self-concepts are affected by different processes than the academic achievements which they reflect, and that self-concept cannot be adequately understood if its multidimensionality is ignored.
Multidimensional Self-concepts: Relationships With Inferred Self-concepts and Academic Achievement

Positive self-concept is widely valued as a desirable outcome and as an intervening construct to explain other variables. Shavelson (Shavelson, Hubner & Stanton, 1976) posits self-concept to be a multifaceted, hierarchical construct, and empirical support for that model based upon the Self Description Questionnaire (SDQ) is summarized by Shavelson and Marsh (Marsh & Hocevar, 1984; Marsh & Shavelson, 1984; Shavelson & Marsh, in press). Marsh and Shavelson (1983) also emphasize the distinction between the general self-concept that is a higher-order factor inferred to be the apex of a hierarchy of more specific self-concept facets and a General-Self scale which is a separate, distinguishable facet that is sometimes called self-esteem.

As a consequence of this distinction, the SDQ was revised to include a General-Self scale that is based on the Rosenberg (1965) self-esteem scale (see Marsh, Smith & Barnes, 1984).

Self-concept Inferred By Significant Others.

Self-concept ratings by others are used to determine how accurately self-concept can be inferred by external observers, to validate interpretations of responses to self-concept instruments, and to test diverse theoretical predictions (see Marsh & Hocevar, in press; Marsh & O'Niell, in press; Welles & Marwell, 1976 for further discussion). Strauser and Schoeneman (1979) reviewed studies that correlated self-reports with judgments by others, and concluded that "there is no consistent agreement between people's self-perceptions and how they are actually viewed by others" (p. 549). However, a series of multitrait-multimethod studies by Marsh (Marsh, Parker & Smith, 1983; Marsh, Smith & Barnes, 1983; Marsh, Smith, Barnes & Butler, 1983) and by Soares and Soares (1977, 1982) showed significant agreement between self-concepts inferred by school teachers and student's self-reports on multidimensional self-concept scales. Support for the discriminant validity of self-concept facets in these studies was also demonstrated with MTMM analyses in that student-teacher agreement on each facet was specific to that facet.

The highest levels of self-other agreement were found in a study by Marsh (Marsh & O'Niell, in press) where university students judged their own self-concept on the SDQ III, a version of the SDQ designed for use by university-aged students, and asked the person in the world who knew them best to complete the same instrument as if they were the subject. Separate factor analyses of responses by the subjects and by the significant others each identified the facets of self-concept which
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the SDQ III was designed to measure. Self-other agreement on different scales varied from 0.41 to 0.70 (median r = 0.58), and MTMM analyses demonstrated that self-other agreement was specific to each facet of self-concept. The authors suggested that support for convergence and divergence were stronger than typically found because: 1) the subjects were older; 2) both subjects and significant others made judgments on the same well-developed instrument; 3) self-other agreement was on specific characteristics rather than on the broad, ambiguous variables employed in some studies; and 4) the significant others knew the subjects better than external observers in most other research.

Academic Self-concepts and Academic Achievements:

In support of the construct validity of self-concept, research has found achievement/ability measures to be more highly correlated with academic than with nonacademic self-concept, and achievement in particular content areas to be most highly correlated with self-concepts in the matching content areas. For example, Marsh, Relich & Smith (1983) showed that mathematics achievement was correlated substantially with Math self-concept (0.55), less correlated with self-concepts in other academic areas (Reading 0.21 and General-School 0.43), and uncorrelated with self-concepts in four nonacademic areas.

In an extensive review of the achievement/self-concept relationship, Hansford & Hattie (1982) found that measures of ability/performance correlated about 0.2 with measures of general self-concept, but about 0.4 with measures of academic self-concept.

Achievement/ability measures in verbal and mathematical areas typically correlate 0.5 to 0.8 with each other, so it is reasonable to expect that the self-concepts will also be substantially correlated. This expectation was incorporated into the Shavelson model, where academic self-concepts in particular subject areas are posited to form a general academic self-concept. Hence it is surprising that Math and Reading self-concepts have been found to be nearly uncorrelated with each other for responses by preadolescents (Marsh, Smith & Barnes, 1984), high school students (Marsh, Parker & Barnes, 1984), and university students (Marsh & O'Neill, in press). This finding led to a revision of the Shavelson model (see Marsh & Shavelson, 1983; Shavelson & Marsh, in press): in which self-concepts in particular academic subject areas are posited to form verbal/academic and mathematical/academic self-concepts. This near-zero correlation between Reading and Math self-concepts then, differs dramatically from the substantial correlations between math and reading achievement scores, and is an important focus of this study.
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Marsh (Marsh, Smith & Barnes, 1984) developed the internal/external frame of reference model to account for the paradoxical pattern of relationships among self-concept and achievement scores in reading and mathematics. According to this model, Reading and Math self-concepts are formed in relation to both external and internal comparisons, or frames of reference; external comparisons are based upon self-perceptions of one's own ability relative to the perceived ability of peers, and internal comparisons are based upon self-perceptions of how ability in one area compares with ability in other areas. Consider, for example, a student who accurately perceives himself/herself to be below average in both math and reading skills, but who is better at math than at reading and other academic subjects. This student's math skills are below average relative to other students (an external comparison) but higher than average relative to his/her skills in other academic areas (an internal comparison). The external comparison process, since reading and math abilities are substantially correlated, will lead to a positive correlation between Reading and Math self-concepts. However, the internal process will lead to a negative correlation between Reading and Math self-concepts, since math and reading ability/achievements are compared with each other. The joint operation of both processes will lead to the near-zero correlation between Reading and Math self-concept which has been observed in empirical research. This model also predicts a negative direct effect of mathematics achievement on Reading self-concept, and of reading achievement on Math self-concept. For example, a high Math self-concept will be more likely when math skills are good (the external comparison) and when math skills are better than reading skills (the internal comparison). Thus, once math skills are controlled for, it is the difference between math and reading skills which is predictive of math self-concept, and high reading skills will actually detract from a high Math self-concept. These predictions from this model, including the negative direct effects, are supported by findings from the three different age groups described above.

The Present Study

The present investigation has three primary purposes. The first is to investigate the factor structure of the revised version of the SDQ with both exploratory and confirmatory factor analyses, and to determine if the structure is invariant across self-report responses and responses inferred by peers. The second purpose is to determine the extent of agreement between self-concepts and self-concepts
inferred by significant others, and to establish if this self-other agreement is specific to particular facets of self-concept. The third purpose is to examine the pattern of correlations between self-concepts and academic achievement measures, and to compare this pattern to those found with self-concepts inferred by peers and by teachers, and to those predicted by the internal/external frame of reference model.

**METHOD**

**Sample and Procedures.**

Subjects were 559 fifth grade students (mostly 10 year olds) enrolled in 19 fifth grade classes in seven private Catholic schools in Sydney, Australia. Most of the students attended single-sex classes (18 of the 19 classes). Children in the sample came from families which varied in socioeconomic status from lower-middle to upper-middle class. Across all the children in the study, academic abilities were about average.

The Self Description Questionnaire (SDQ) was administered by one of the authors to intact classes of no more than 34 students according to standardized procedures described by Marsh, Smith & Barnes (1984). After students had completed the self-concept instrument, they were asked to write their name on a second copy of the SDQ and to exchange papers with a pupil sitting beside them. They were then asked to take the new survey to a different desk so that they were sitting beside a different pupil, and to complete the survey as if they were the pupil whose name was on the paper. Hence, the task of the peer was to predict or infer the responses made by the subject. Care was taken to ensure that the subject and the selected peer did not discuss their responses. While the various instruments were being completed by the students, the classroom teacher was asked to complete a rating sheet about each child which included: 1) eight summary ratings that were designed to represent the eight SDQ scales; and 2) ability ratings for reading, math, and school subjects in general. Teacher ratings were made with a nine-point response scale varying from "1 - very poor" to "9 - very good." Many teachers were unable to complete the ratings while the other materials were being administered but did so later, although one teacher declined to complete the forms at all.

The achievement tests were distributed to the schools by the researchers, but were actually administered by the classroom teachers during a regular class session the week before the administration of the SDQ. These tests were subsequently scored by the researchers with the understanding that feedback would be given to the schools. Two of the schools declined to participate in the achievement testing, though
they did agree to the administration of the self-report measures and to complete teacher ratings.

Testing Materials.

The Self Description Questionnaire (SDQ): Earlier versions of the SDQ measure seven components of preadolescent self-concept derived from Shavelson's model (Shavelson, Hubner & Stanton, 1976; Marsh & Shavelson, 1983). These consist of self-concepts in four nonacademic areas (Physical Ability, Physical Appearance, Peer Relationships, and Parent Relationships) and three academic areas (Reading, Math and General-School). A description of the seven-scale instrument, its theoretical rationale, the wording of the items, reliabilities and six separate factor analyses are presented elsewhere (Marsh, Barnes, Cairns & Tidman, in press; Marsh, Parker & Smith, 1983; Marsh, Relich & Smith, 1983; Marsh, Smith & Barnes, 1983). This research has shown the seven SDQ scales to be reliable (coefficient alpha's in the 0.80's and 0.90's), moderately correlated with measures of corresponding academic abilities, and in agreement with self-concepts inferred by primary school teachers. The current version of the SDQ differs only in that an eighth component of General-Self (which is similar to the self-esteem scale described by Rosenberg, 1965) has been added.

In the present investigation, alpha coefficients for the eight SDQ scales varied between 0.79 and 0.91 (median = 0.87) for self-report responses, and between 0.83 and 0.91 (median = 0.88) for peer responses. Both conventional/exploratory and confirmatory factor analyses identified the eight SDQ scales and showed that the factors underlying the peer responses to the SDQ are similar to those for the self-reports (in results to be discussed later). Factor score coefficients (see Nie, et al., 1975) were determined as part of the factor analysis of self-report responses, and were used to compute factor scores to represent self-report and peer responses in subsequent analyses. Self-concepts inferred by teachers were based upon a single response for each of the eight SDQ scales, and so factor analyses and item analyses of their responses could not be performed. For self-report, peer, and teacher responses, Total Nonacademic and Total Academic self-concepts were determined by summing responses to the four nonacademic scales and to the three academic scales.

Achievement Measures. Reading achievement tests were the Comprehension and Word Knowledge sections of the Primary Reading Survey Tests (ACER, 1976). In this study, scores from the two sections had split-half reliabilities of 0.87 and 0.92 respectively, and correlated
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0.73 with each other. For purposes of this study scores from each of the two sections of the test were standardized (i.e., \( M_n = 0.0, SD = 1.0 \)) and then summed to form the reading test score. Teacher ratings of reading were also taken to be another indicator of reading achievement. In some analyses, a total reading achievement score was determined by taking the sum of the reading achievement test score and the teacher rating of reading ability after both were standardized.

The objective mathematics achievement test was the Class Achievement Test in Mathematics (CATIM 4/5; ACER, 1979). In this study the split-half reliability of the math score was 0.86. Teacher ratings of ability in mathematics were also taken to be an indicator of academic achievement, and the sum of these two indicators after each had been standardized was used in some analyses.

Statistical Analyses.

There were almost no missing values for either self-report or peer responses to the SD8 (less than 1/3 of 1%), and the median response was substituted for the few missing values which did occur. However, there were no teacher ratings for 36 students (6%), representing primarily students from one class where the teacher did not complete the ratings, and there were 142 missing values (25%) for the achievement tests, representing primarily students from two schools which did not administer the achievement tests. For purposes of this study pair-wise deletion of missing data for the ability/achievement measures was used in the determination of the correlations (see Nie, et al., 1975). However, similar correlations based upon only those cases which had no missing data were nearly the same as those actually reported for the whole group. Thus, while the large number of missing values for the achievement measures does require that the results be interpreted cautiously, it is unlikely to have had any substantial effect.

For purposes of this study the eight positively worded items from each of the 8 SD8 scales were grouped into four item-pairs such that the first two items were assigned to the first pair, the next two items to the next pair, and so forth. Factor analyses were performed on responses to these 32 item-pairs. This procedure has typically been used in recent factor analytic research with the SD8 and is preferable to factor analyzing responses to individual items in that: 1) the ratio of the number of subjects to variables is increased; 2) each measured variable is more reliable and has a smaller unique component; 3) factor loadings will be less affected by idiosyncratic wording of individual items; and 4) the cost of the factor analyses (particularly with confirmatory factor analysis) will be substantially reduced (see...
Factor Analyses of Responses to the SDQ.

Results of the conventional/exploratory factor analysis of the
self-report responses to the SDQ clearly identified the eight hypothesized factors (Table 1). Target loadings, the factor loadings for variables designed to measure each factor, were substantial; the median target loading was 0.77, none was less than 0.30, and 90% were greater than 0.50. The nontarget loadings were much smaller; the median was 0.03, none was greater than 0.30, and 98% were less than 0.20. A similar exploratory factor analysis, performed on the peer responses to the SDQ, also identified the eight SDQ scales. The target loadings were somewhat smaller, but still substantial; the median target loading was 0.55, none was less than 0.20, and 90% were greater than 0.40. The nontarget loadings were much smaller; the median was 0.04 and 97% were less than 0.30. The correlations among the peer factors were somewhat larger than observed with the self-report responses in Table 1, but the pattern was similar: the largest correlations were among the first three nonacademic factors, between General-School and the other two academic factors, and those involving the General-Self factor. There was, however, one dramatic exception to this similarity; while Reading and Math self-concepts based upon the self-reports were nearly uncorrelated, those inferred by peers were substantially correlated. This important exception will be the focus of later discussion.

The purposes of the confirmatory factor analyses (CFA) are to determine how well a model, based upon the design of the SDQ and the results described above, is able to fit the data, and whether this solution is invariant across self-report responses and peers' responses. In the first CFA model (model 1 in Table 2) it is hypothesized that each factor is defined only by the four item-pairs designed to measure it (i.e., target loadings are estimated, but nontarget factor loadings are fixed to be zero, footnote 1). In this model the pattern of parameter estimates is hypothesized to be the same for the self and peer responses, but there is no assumption that the actual values for any of the parameter estimates are the same across samples (i.e., there are no invariance constraints). Inspection of the parameter estimates and the goodness-of-fit indices for Model 1 (Table 2) each indicate that this model provides a good fit to the data.

In Model 2 the invariance of the factor loadings is tested such that the final solutions for the two samples are required to have the same factor loadings, though other parameters (i.e., factor variance/covariances and error/unique-nesses) are allowed to vary. This
model is normally taken to be the minimum condition for factorial invariance, and inspection of the goodness-of-fit indices demonstrates that this solution also provides a good fit to the data. In Models 3 and 4, invariance is also tested for factor variances/covariances (Model 3), and error/uniquenesses (i.e., total invariance -- Model 4). Even the most restrictive model, where total invariance is tested, provides a reasonable fit to the data which differs only modestly from the model where no invariance is hypothesized. The chi-square/df ratios and coefficient for models 1 and 2 are virtually identical, demonstrating that the hypothesis of invariant factor loadings is reasonable. Goodness-of-fit statistics for the other models are nearly as good, though requiring the correlations among the factors to be invariant across the two samples in these models does produce a slightly poorer fit to the data. As observed earlier, the SDO factors in model 1 are somewhat less correlated for the self-report responses than for the inferred self-concepts based upon peer responses.

The results of the CFA show that responses to the SDO can be explained by the hypothesized factor structure, and that the factor loadings are reasonably invariant for the self-report responses and the peer responses. While this assumption is rarely tested in studies which look at the agreement between self-perceptions and the perceptions of significant others, its violation can render observed differences as uninterpretable. Hence, the finding that the factor loadings are invariant provides further support for the generality of the SDO factors, and also provides a justification for the comparison of self-concepts based upon self-report and peer responses.

Relationships Between Self-concepts and Inferred Self-concepts.

Correlations among self-concepts based upon self-reports, self-concepts inferred from peer responses, and self-concepts inferred from teacher responses are presented in the form of a multitrait-multimethod matrix (Table 3). Convergent validities, correlations between responses to the same self-concept facet by two different raters (the underlined values in Table 3), are generally significant. Of particular relevance here are the convergent validities which involve self-concepts based upon self-report responses. All eight convergent validities relating self-report and peer responses are statistically significant (median \( r = .24 \)), while six of the eight convergent validities relating self-report and teacher responses are statistically significant (median \( r = .19 \)). For both sets of correlations, convergent validities are smallest for Relations With Parents, and to a
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lesser extent for Physical Appearance and General-Self. Inspection of
the convergence for the total academic and total nonacademic scores
shows that self-other agreement is best for academic self-concept (r's
= 0.36 & 0.31 based upon peer and teacher responses respectively),
though agreement on nonacademic self-concept is better with self-
concept inferred by peers (0.23) than with that inferred by teachers
(0.10). The correlations between self-concepts inferred by teachers
and inferred by peers are less relevant (since neither is a direct
measure of self-concept), but the pattern of correlations is similar to
those relating the self-report responses and teacher responses.

A construct validation approach to the study of self-concept
emphasizes a pattern of correlations where it is important that
external criteria are more highly correlated with the facets of self-
concept to which they are more logically related. In MTMM analysis
this emphasis is embodied in the comparison of each convergent validity
with other correlations in the same row or column of the same square
(heterotrait-heteromethod) block. Ignoring the total scores, and
teacher/peer correlations, this involves a total of 224 comparisons;
for over 90% of these comparisons, the convergent validity is higher.
All of the failures for the self/peer correlations involve the General-
Self factor (which was intentionally designed to be broad, rather than
specific), while failures for the self/teacher correlations involve the
Parents and Physical Appearance scores (where the convergent validities
were not statistically significant, thus rendering tests of
discriminant validity as moot). In a similar set of eight comparisons
based upon just the total scores, the convergent validity is higher for
each of the eight comparisons, but discriminant validity is more
clearly demonstrated for Total Academic self-concept than for Total
Nonacademic self-concept. These findings illustrate that self-other
agreement on dimensions of self-concept is specific to particular areas
of self-concept, and provide further support for the construct validity
of self-concept and interpretations based upon the SDO.

Correlations among the self-report factors, which range from 0.57
to -0.02 (median r = 0.22) are smaller than those based upon peer
responses, which range between 0.71 and 0.11 (median r = 0.31), and in
particular are smaller than those based upon teacher responses which
range from 0.80 to 0.34 (median r = 0.50). Nevertheless, there is a
striking similarity in the pattern of correlations among the self-
concept facets for the different sets of responses. For each set of
responses the highest correlations typically involve the General-Self
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facets, occur among the first three nonacademic facets (Physical Appearance, Physical Ability, Peer Relations), or occur between the General-School and the other two academic facets. The pattern of correlations among the self-report facets is similar to that hypothesized in the revised Shavelson model and that observed in the inferred self-concepts, thus suggesting that the correlations among the facets is due to a hierarchical ordering of the facets rather than a method/halo effect. However, the more substantial correlations among self-concepts inferred by peers and particularly by teachers, suggests that method/halo effects may be operating in their ratings. An important and dramatic exception to this similarity involves the correlation between Reading and Math self-concepts. This correlation is among the highest for responses based upon peer responses (0.52) and teacher responses (0.70), but is nearly the lowest (0.01) for the self-report responses.

Correlations With Academic Achievement.

Achievement scores in reading and math are positively correlated with self-concepts (based on self-reports) in Reading and Math, but not with self-concepts in nonacademic areas (where correlations are either nonsignificant or significantly negative, see Table 3). Reading achievement, based upon either test scores or teacher ratings, is most highly correlated with Reading self-concept while math achievement is most highly correlated with Math self-concept. These findings demonstrate that academic achievement and academic self-concept are significantly correlated, and that the relationships are specific to particular subject areas.

Inferred academic self-concepts, based upon both peer and teacher responses, are more positively correlated with achievement scores than are inferred nonacademic self-concepts. For peer responses, as was observed with self-report responses, achievement scores are uncorrelated or negatively correlated with nonacademic self-concepts. For teacher ratings these correlations are positive, and illustrate that academic and nonacademic areas of self-concept are not so clearly separated in self-concepts inferred by teachers.

Inferred Reading self-concepts, based upon both peer and teacher responses, are more highly correlated with Reading achievement; and inferred math self-concepts are more highly correlated with math achievement. However, the specificity of the relationships is not as clear as observed with the self-report data. This reflects the earlier observation that self-report factors representing reading and math are
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nearly uncorrelated, while the corresponding inferred factors are
substantially correlated for both peer and teacher responses.

Insert Fig. 1 About Here

The relationships among reading and math achievement, and Reading
and Math self-concepts are further examined in a series of path
analyses (Figure 1). In each of these models, academic achievement is
hypothesized to be one causal determinant of academic self-concept.
While such a model is useful for our purposes in this study, we do not
argue against a more dynamic model where subsequent levels of academic
achievement are determined by both prior levels of academic self-concept
and academic achievement. Nevertheless, the results of the
path models confirm the paradoxical set of relationships among the
achievement and self-concept (based upon self-report data) variables
which has been found with responses by older children and was predicted
by the internal/external model described earlier. Achievements in
reading and mathematics are substantially correlated with each other
and self-concepts in reading and mathematics, but Reading and Math
self-concepts are nearly uncorrelated with each other. The direct
effect of reading achievement on Reading self-concept is positive and
substantial, but the direct effect of math achievement on Reading self-
concept is significant and negative; higher math achievement leads to
lower self-concepts in Reading. Similarly, the direct effect of math
achievement on Math self-concept is substantial and positive, but the
direct effect of reading achievement is significant and negative. The
path model used here for self-concepts based upon self-report responses
(Model 1) employs achievement measures representing the sum of the test
scores and teacher ratings, but similar results occur for analyses of
either the test scores or the teacher ratings separately (these are not
shown here but are presented by Marsh, Smith and Barnes, 1984).

In dramatic contrast to the self-report data, inferred self-
concepts based upon peer responses (model 2) and teacher responses
(models 3 & 4) show a different pattern of correlations with the
achievement scores. In every instance the direct effect of reading
achievement on inferred reading self-concept, and of math achievement
on inferred math self-concept, is significant and positive. However,
the substantial negative effect of reading achievement on math self-
concept, and of math achievement on reading self-concept (model 1 in
fig. 1), is not seen in models 2 to 4. Instead each of these effects
is either positive, or is not statistically significant. After
partially out the effects of academic achievement, Reading and Math
self-concepts based upon self-report data remain nearly uncorrelated
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(model 1), while the inferred self-concepts are substantially correlated (models 2 to 4). Hence, while model 1 demonstrates strong support for the internal/external frame of reference model, models 2 to 4 illustrate that a different process underlies the formation of Reading and Math self-concepts inferred by others. Inferred self-concepts either based upon peer responses or on teacher responses are inconsistent with the internal comparison process. Thus, while the difference between abilities in reading and math is predictive of Reading and Math self-concepts which are based upon self-report data, this difference is not predictive of these self-concepts when they are inferred by significant others.

DISCUSSION

Exploratory and confirmatory factor analyses of responses by preadolescent students identified the eight factors which the SDQ was designed to measure and demonstrated that the factor loadings were reasonably invariant across self-report responses and those inferred by peers. Self-concepts based upon self-report data were significantly correlated with self-concepts inferred by peers and by teachers, and agreement on any one dimension was relatively independent of agreement in other dimensions. However, facets of self-concept were much more distinct (i.e., less correlated) for the self-reports than for self-concepts inferred by teachers or by peers. In all comparisons academic achievement indicators were positively correlated with academic self-concepts, but less positively or negatively correlated with self-concepts in nonacademic areas. Particularly for the self-report data, the academic achievement/academic self-concept relationship was quite specific to particular academic content areas.

In factor analyses of self-report responses to the SDQ, the clear identification of the seven SDQ factors considered previously replicates findings of other studies with preadolescents described earlier. The pattern of correlations among these factors supports the revision of the Shavelson model which hypothesizes three higher-order factors representing nonacademic, verbal/academic, and math/academic self-concepts instead of just academic and nonacademic self-concepts. The General-Self factor was not measured on earlier versions of the SDQ, but it also is clearly identified by results of the factor analysis and is moderately correlated with self-concepts in other areas. Factor analyses of the peer responses to the SDQ also identified the eight SDQ factors, but the pattern of correlations among these factors differed somewhat from those based upon self-reports.
Peer facets were more highly correlated, indicating less separation among the self-concept facets. Also, the substantial correlation among the academic self-concepts suggests only two higher-order factors representing academic and nonacademic self-concepts, rather than the three suggested by the self-report data and hypothesized in the revised Shavelson model.

Two of the most commonly used criteria for validating measures of self-concept are measures of academic performance and the observations of an external observer. Literature reviews described earlier (i.e., Hansford & Hattie, 1982; Shrauger & Schoeneman, 1979) have suggested that each of these external criteria has little relationship to self-concept. In contrast to those conclusions, research with the SDQ instruments described here and elsewhere provide stronger support for the construct validity of self-concept (see Marsh & Shavelson, 1983). We suspect that the clear definition of the multiple dimensions of self-concept used in the design of the SDQ instruments is the primary reason for this difference. Other research often relies upon an overall or general measure of self-concept which resembles the General-Self scale on the SDQ instruments. In this study the General-Self scale was not substantially correlated with any of the academic achievement indicators, and self/other agreement was weak on this scale. Similar findings were also observed in the Marsh & O’Neill study with older subjects. We contend that the relationship between self-concept and other constructs cannot be adequately understood if the multidimensionality of self-concept is ignored.

Self/peer and self/teacher agreement on multidimensional self-concepts provide support for the convergent and discriminant validity of interpretations based upon the SDQ scales. Nevertheless, the size of the convergent validity coefficients was modest, and much smaller than observed by Marsh and O’Neill (in press) in their MTMM analysis of self/other agreement. However, the magnitude and pattern of agreement observed here is similar to other MTMM studies with preadolescent students (e.g., Marsh, Smith, Barnes & Butler, in press). The Marsh & O’Neill study, besides using a different self-concept instrument, differed from other research in that the subjects were older (late-adolescents and adults) and the significant others (the person in the world who knew the subject best) probably knew the subjects better. Both of these features probably contributed to the higher levels of self/other agreement observed in that study.

Here and in other MTMM studies based upon the SDQ, self/teacher agreement has consistently been strongest in academic areas where
Self-concept 15

Teachers have the most information about their students. The weakest self/teacher agreement, and self/peer agreement in this study, has been for Relations With Parents where teachers and peers are least likely to observe relevant interactions. Only in the Marsh & O'Neill study, where a majority of the significant others were parents, was self/other agreement strong (r = 0.76) on Relations With Parents. Perhaps more surprising is the consistent lack of self/teacher agreement on Physical Appearance found here and in previous SDG research, since physical appearance is a most easily observed characteristic. We suspected that teachers were using different criteria than were their students, and results in the present study demonstrated that both self/teacher and peer/teacher agreement was weak on this scale. However, self/peer agreement was also weak on Physical Appearance, suggesting that self-reports are based upon different criteria than those used by peers to judge others. Even in the Marsh & O'Neill study, self/other agreement on this scale, though substantial (r = 0.50), was smaller than on most other scales. We still suspect that individuals, particularly adolescents, use idiosyncratic standards of physical attractiveness which are quite different from those used by their teachers, somewhat different from those used by their peers, and perhaps even different from the ones they themselves use in evaluating others. However, these speculations require further research.

The pattern of relationships between achievement in reading and mathematics and the corresponding measures of self-concept are dramatic, surprising, and paradoxical. Despite the high correlations between reading and math achievement indicators, self-concepts in these two academic areas are nearly uncorrelated when based upon self-report data. Furthermore, for self-report data, the direct effect of reading achievement on math self-concept, and the direct effect of math achievement on reading self-concept, are each significant and negative. This pattern of results is consistent, however, with the predictions from the internal/external frame of reference model. According to this model a high self-concept in reading will be more likely when reading achievement is high (the external comparison process) and when reading achievement is higher than math achievement (the internal comparison process). Hence, once the effect of reading achievement is controlled for, it is the difference between reading and math achievements which determines reading self-concept, and the direct effect of math achievement is predicted to be negative. These findings not only illustrate the clear separation of self-concepts in different academic
In marked contrast to the self-report data, inferred self-concepts based upon peer and teacher responses did not follow the pattern of results predicted by the internal/external model, and there was no evidence that the internal comparison process was operating. Particularly for teachers, who made separate judgments of ability/achievement and self-concepts, it appears that inferred academic self-concepts reflect little more than their perceptions of objectively defined achievement. These findings certainly demonstrate that the formation of one's own self-concepts is affected by different processes than are the self-concepts inferred by significant other...

In other research with the SDQ (Marsh & Parker, in press; Marsh, in press-a; Marsh, in press-b), academic self-concepts inferred by teachers in high-SES/ability schools were substantially higher than those inferred by teachers in low-SES/ability schools, as were objectively measured achievement levels. However, for student self-report data, academic self-concepts were similar in the different schools — actually slightly higher in the low-SES/ability schools. Thus an average-ability student would tend to have a higher academic self-concept in a low-SES/ability school (where other students are less able) than a high-SES/ability school (where other students are more able), but would be judged to have an average academic self-concept by teachers in both types of school. Hence, academic self-concepts which are inferred by teachers are more highly correlated with objective achievement measures, but do not accurately reflect the relativistic nature of self-concepts which is embodied in the external comparison process. This suggests that even the external comparison process may not operate in the formation of self-concepts inferred by teachers. While it was not tested here, and we know of no other research which tests the hypothesis, we suspect that the external comparison process does operate with self-concepts inferred by other students.
Four path diagrams relating Math and Reading achievement with reading and Math self-concepts. (Paths that did not reach statistical significance were less than 0.10 and are excluded).
Footnotes

1 - For purposes of this study, each of the confirmatory factor models in Table 2 was defined with reference indicators where the factor loading for one of the measured variables (item-pairs) designed to measure each factor was set to 1.0, and the diagonal of the factor variance/covariance matrix was free to be estimated. Each model in Table 2 was tested with covariance matrices, rather than correlation matrices. For model I, where there were no invariance constraints, the observed chi-square values would be the same for either metric, but for each of the other models the observed chi-squares and goodness-of-fit indicators would probably indicate a better fit if the models had been tested with the correlation metric. Marsh, Smith & Barnes (1984) used a similar approach to demonstrate that the factor structure underlying self-reports was invariant for responses by males and females.

2 - In this study, all students completed the SDO by responding about themselves (self-by-self) and by responding about a peer (peer-by-self). If students were responding appropriately there should be little correlation between responses in the self-by-self and peer-by-self tasks (i.e., how I rate myself and how I rate the person sitting next to me should be nearly uncorrelated). Some small amount of correlation might be expected since the student and their peer were nearly always of the same sex, and would probably be more similar to each other in other ways than two students selected at random. However, if students had large systematic response biases in their responses which carried over from one task to the next, or if students' responses about the peers really reflected the projected feelings about themselves, then large correlations might be expected. The 64 correlations between the eight SDO scales in the self-by-self task and the corresponding scales in the peer-by-self task were modest (-0.10 to 0.36, median r = 0.08) and perhaps could be explained by the naturally occurring similarity between students and their selected peers. This assumption was tested by comparing what peers said about the subjects (self-by-peer) with what subjects said about their peers (peer-by-self). These correlations should still reflect the similarity between subjects and their peers, but would not be affected by method/halo effects or projected self-perceptions since the correlations are based upon the responses by two different individuals. Correlations between responses in the peer-by-self task and the self-by-peer task (i.e., how I rate my peer and how my peer rates me) were also modest (ranging from -0.09 to 0.20, median r = 0.07). Thus, since these correlations are
nearly the same size as the correlations observed in the self-by-
self/peer-by-self comparisons, the results argue that responses are not
affected by method/halo effects or projected self-perceptions. These
findings have important implications for this study, and also for the
study of how response biases affect self-report ratings. If response
biases do exist and are of the type which should affect ratings in the
self-by-self and peer-by-self tasks in a similar manner, then the size
of correlations in the two sets of comparisons presented here sould
differ substantially. Since this was not the case, it argues that this
type of response bias was not operating. There are other types of
response bias, social desirability for example, which might be
hypothesized to affect only the self-by-self ratings, so that this
procedure does not provide a test of that type of response bias.

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### TABLE 1

Summary of Conventional/Exploratory Factor Analysis of Responses to the SDO

<table>
<thead>
<tr>
<th>Variables</th>
<th>PHYS</th>
<th>APPR</th>
<th>PEER</th>
<th>PRNT</th>
<th>READ</th>
<th>MATH</th>
<th>SCHL</th>
<th>GENL</th>
</tr>
</thead>
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<tr>
<td>PHYS</td>
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<td></td>
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<td>0.0</td>
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<tr>
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<td>Gen4</td>
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</table>

Note: The four measured variables designed to measure each factor are the sum of responses to pairs of items. All parameters are presented without decimal points. Factor loadings in boxes are the loadings of item-pairs designed to measure each factor (target loadings).
## TABLE 2

<table>
<thead>
<tr>
<th>Model Description</th>
<th>Chi-Square</th>
<th>df</th>
<th>Chi-Square/df</th>
<th>Std. Error</th>
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<td>0) Null Model</td>
<td>23,751</td>
<td>992</td>
<td>23.91</td>
<td>.000</td>
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<td>1) No Invariance</td>
<td>2,304</td>
<td>372</td>
<td>2.32</td>
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<td>2) Factor Loadings Invariant</td>
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<td>372</td>
<td>2.36</td>
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<tr>
<td>3) Factor Loadings &amp; Factor</td>
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<td>372</td>
<td>2.34</td>
<td>.000</td>
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<td>Variance/Covariances Invariant</td>
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<td></td>
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<tr>
<td>4) Factor Loadings, Variances/Covarian</td>
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<td>372</td>
<td>2.27</td>
<td>.000</td>
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<tr>
<td>error/Uniqueness Invariant</td>
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</table>

**Note:** The Null model hypothesizes complete independence of all measured variables and provides a measure of the total covariance in the data which is used in computing coefficient $\alpha$. Since models 1-4 represent a series of nested models, it is possible to use the difference between the chi-square values to test the equality of sets of parameters. If this is done, for example, between Models 1 and 2, the difference in chi-square values is .13 which is statistically significant for df = 24 at about $p=.000$. Differences between Models 1 and 4 are also significant. Nevertheless, particularly when sample sizes are so large, goodness-of-fit is generally evaluated with subjective indicators such as the chi-square/df ratio and coefficient $\alpha$. 

---

---

26
SELF DESCRIPTION QUESTIONNAIRE

Name.......................................................................................................................
Boy........Girl

Grade/Year

Age..................School...............................................................Teacher............................

This is a chance to look at yourself. It is not a test. There are no right answers and everyone will have different answers. Be sure that your answers show how you feel about yourself. PLEASE DO NOT TALK ABOUT YOUR ANSWERS WITH ANYONE ELSE. We will keep your answers private and not show them to anyone.

When you are ready to begin, please read each sentence and decide your answer. (You may read quietly to yourself as I read aloud.) There are five possible answers for each question — "True", "False", and three answers in between. There are five boxes next to each sentence, one for each of the answers. The answers are written at the top of the boxes. Choose your answer to a sentence and put a tick (✓) in the box under the answer you choose. DO NOT say your answer out loud or talk about it with anyone else.

Before you start there are three examples below. Somebody named Bob has already answered two of these sentences to show you how to do it. In the third one you must choose your own answer and put in your own tick (√).

EXAMPLES

1. I like to read comic books................................................. 1 (Bob put a tick in the box under the answer "TRUE". This means that he really likes to read comic books. If Bob did not like to read comic books very much, he would have answered "FALSE" or "MOSTLY FALSE".)

2. In general, I am neat and tidy........................................... 2 (Bob answered "SOMETIMES FALSE; SOMETIMES TRUE" because he is not very neat, but he is not very messy either.)

3. I like to watch T.V. ......................................................... 3 (For this sentence you have to choose the answer that is best for you. First you must decide if the sentence is "TRUE" or "FALSE" or somewhere in between. If you really like to watch T.V. a lot you would answer "TRUE" by putting a tick in the last box. If you hate watching T.V. you would answer "FALSE" by putting a tick in the first box. If your answer is somewhere in between then you would choose one of the other three boxes.)

If you want to change an answer you have marked you should cross out the tick and put a new tick in another box on the same line. For all the sentences be sure that your tick is on the same line as the sentence you are answering. You should have one answer and only one answer for each sentence. Do not leave out any of the sentences.

If you have any questions put up your hand. Turn over the page and begin. Once you have started, PLEASE DO NOT TALK.

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The University of Sydney
1981

29
<table>
<thead>
<tr>
<th>Statement</th>
<th>False</th>
<th>Mostly False</th>
<th>Sometimes True</th>
<th>Mostly True</th>
<th>True</th>
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<tbody>
<tr>
<td>1. I am good looking</td>
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<tr>
<td>2. I'm good at all SCHOOL SUBJECTS</td>
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<td></td>
</tr>
<tr>
<td>3. I can run fast</td>
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<td>4. I get good marks in READING</td>
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<tr>
<td>5. My parents understand me</td>
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<tr>
<td>6. I hate MATHEMATICS</td>
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<td></td>
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<td>7. I have lots of friends</td>
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<tr>
<td>8. I like the way I look</td>
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<tr>
<td>9. I enjoy doing work in all SCHOOL SUBJECTS</td>
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<tr>
<td>10. I like to run and play hard</td>
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<tr>
<td>11. I like READING</td>
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<tr>
<td>12. My parents are usually unhappy or disappointed with what I do</td>
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<tr>
<td>13. Work in MATHEMATICS is easy for me</td>
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<tr>
<td>14. I make friends easily</td>
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<td>15. I have a pleasant looking face</td>
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<td>16. I get good marks in all SCHOOL SUBJECTS</td>
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<td>17. I hate sports and games</td>
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<tr>
<td>18. I'm good at READING</td>
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<td>19. I like my parents</td>
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<td>20. I look forward to MATHEMATICS</td>
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<tr>
<td>21. Most kids have more friends than I do</td>
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<td>22. I am a nice looking person</td>
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<td>23. I hate all SCHOOL SUBJECTS</td>
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<td>24. I enjoy sports and games</td>
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<td>25. I am interested in READING</td>
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<tr>
<td>26. My parents like me</td>
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</table>
27. I get good marks in MATHEMATICS .................. 27
28. I get along with other kids easily .................. 28
29. I do lots of Important things .................. 29
30. I am ugly ........................................... 30
31. I learn things quickly in all SCHOOL SUBJECTS 31
32. I have good muscles ................................. 32
33. I am dumb at READING ............................... 33
34. If I have children of my own I want to bring them up like my parents raised me .......................... 34
35. I am interested in MATHEMATICS .................. 35
36. I am easy to like ...................................... 36
37. Overall I am no good ................................. 37
38. Other kids think I am good looking ............... 38
39. I am interested in all SCHOOL SUBJECTS .......... 39
40. I am good at sports .................................... 40
41. I enjoy doing work in READING .................... 41
42. My parents and I spend a lot of time together ..... 42
43. I learn things quickly in MATHEMATICS .......... 43
44. Other kids want me to be their friend ............... 44
45. In general I like being the way I am ................ 45
46. I have a good looking body ........................... 46
47. I am dumb in all SCHOOL SUBJECTS .............. 47
48. I can run a long way without stopping .............. 48
49. Work in READING is easy for me ................... 49
50. My parents are easy to talk to ........................ 50
51. I like MATHEMATICS ................................. 51
52. I have more friends than most other kids ........... 52
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<tbody>
<tr>
<td>53.</td>
<td>Overall I have a lot to be proud of</td>
<td>53</td>
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<tr>
<td>54.</td>
<td>I'm better looking than most of my friends</td>
<td>54</td>
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<td>55.</td>
<td>I look forward to all SCHOOL SUBJECTS</td>
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<td>56.</td>
<td>I am a good athlete</td>
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<td>57.</td>
<td>I look forward to READING</td>
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<tr>
<td>58.</td>
<td>I get along well with my parents</td>
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<td>59.</td>
<td>I'm good at MATHEMATICS</td>
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<tr>
<td>60.</td>
<td>I am popular with kids of my own age</td>
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<tr>
<td>61.</td>
<td>I can't do anything right</td>
<td>61</td>
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<tr>
<td>62.</td>
<td>I have nice features like nose, and eyes, and hair</td>
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<tr>
<td>63.</td>
<td>Work in all SCHOOL SUBJECTS is easy for me</td>
<td>63</td>
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<tr>
<td>64.</td>
<td>I'm good at throwing a ball</td>
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<tr>
<td>65.</td>
<td>I hate READING</td>
<td>65</td>
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<td>66.</td>
<td>My parents and I have a lot of fun together</td>
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<td>67.</td>
<td>I can do things as well as most other people</td>
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<td>68.</td>
<td>I enjoy doing work in MATHEMATICS</td>
<td>68</td>
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<tr>
<td>69.</td>
<td>Most other kids like me</td>
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<td>70.</td>
<td>Other people think I am a good person</td>
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<tr>
<td>71.</td>
<td>I like all SCHOOL SUBJECTS</td>
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<td>72.</td>
<td>A lot of things about me are good</td>
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<td>73.</td>
<td>I learn things quickly in READING</td>
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<td>74.</td>
<td>I'm as good as most other people</td>
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<td>75.</td>
<td>I am dumb at MATHEMATICS</td>
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<tr>
<td>76.</td>
<td>When I do something, I do it well</td>
<td>76</td>
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