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ABSTRACT

The self-concept construct has been used to explain behaviors across a diverse array of situations, and the attainment of a positive self-concept has been posited as a desirable goal in developmental psychology. The purposes of this study were to examine age and sex effects in multiple dimensions of self-concept during the preadolescence to early-adult period and alternative operationalizations of the orthogenic principle positing self-concept to become differentiated with age. The investigation used 12,266 responses comprising the normative data for the three Self Description Questionnaire (SDQ) instruments designed to measure multiple dimensions of self-concept in preadolescence in early-adolescence, and in late-adolescence and early adulthood. Results showed responses to all three SDQ instruments were reliable and resulted in well-defined factor structures. Age effects were U-shaped, self-concept declining from early preadolescence to middle adolescence, and then increasing from middle-adolescence through early adulthood. Sex differences in specific areas of self-concept, those favoring girls and those favoring boys, were generally consistent with sex stereotypes and were relatively stable from preadolescence to early adulthood. There was little support for the increased differentiation of the multiple dimensions of self-concept beyond early preadolescence. (Four tables, 7 figures, and 66 references are included.) (Author/ABL)

Age and Sex Effects in Multiple Dimensions of Self-Concept: Preadolescence to Early-adulthood

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ABSTRACT

This investigation is based on the 12,266 responses comprising the normative data for the three Self Description Questionnaire (SDQ) instruments designed to measure multiple dimensions of self-concept in preadolescence, in early-to-middle adolescence, and in late-adolescence and early adulthood. The purposes were to examine: (a) age and sex effects in multiple dimensions of self-concept during the preadolescence to early-adult period and (b) alternative operationalizations of the orthogenic principle positing self-concept to become more differentiated with age. Responses to all three SDQ instruments were reliable and resulted in well-defined factor structures. Age effects were U-shaped, self-concept declining from early preadolescence to middle adolescence, and then increasing from middle-adolescence through early adulthood. Sex differences in specific areas of self-concept, those favoring girls and those favoring boys, were generally consistent with sex stereotypes and were relatively stable from preadolescence to early adulthood. There was little support for the increased differentiation of the multiple dimensions of self-concept beyond early preadolescence.

Age and Sex Effects in Multiple Dimensions of Self-Concept: Preadolescence to Early-adulthood

The self-concept construct has been used to explain behaviors across a diverse array of situations, and the attainment of a positive self-concept has been posited as a desirable goal in developmental psychology, personality, education, and clinical treatments. Self-concept researchers frequently consider how self-concept varies with age and developmental level and with gender (Wylie, 1974; 1979). These concerns have diverse theoretical, practical, and methodological implications for researchers concerned with human development, gender differences, the study of self-concept, and the evaluation of programs designed to enhance self-concept.

The general purpose of the present investigation is to study sex and age effects in 12,266 responses comprising the normative data for the three Self Description Questionnaire (SDQ) instruments designed to measure multiple dimensions of self-concept in preadolescence (SDQ), in early-to-middle adolescence (SDQII), and in late-adolescence and early adulthood (SDQIII). [The multiple dimensions of self-concept measured by the SDQ, SDQII, and SDQIII are summarized in Table 1.] More specifically, the purposes are to examine: (a) age and sex effects in multiple dimensions of self-concept during the preadolescence to early-adult period and (b) alternative operationalizations of the orthogenic principle positing self-concept to become more differentiated with age. An initial review of self-concept research focuses on the multidimensionality of self-concept, how this multidimensional structure is related to age, and how the multiple dimensions of self-concept are related to age and sex.

A Review Of Self-concept Research

The Multidimensionality of Self-concept

Whereas the earliest theoretical accounts of self-concept often emphasized its multidimensional nature (e.g., James, 1890/1963), early empirical studies have emphasized a general, overall or total self-concept rather than more specific facets of self (e.g., Coopersmith, 1967; Marx & Winne, 1978; Wylie, 1974; 1979). Systematic reviews of this early research, however, have noted the poor quality of theoretical models, the unmanageable array of instruments used to measure the construct, the poor quality of these instruments, and methodological short-comings in self-concept research (e.g., Burns, 1979; Shavelson, Hubner & Stanton, 1976; Wells & Marwell, 1976; Wylie, 1974; 1979). In an attempt to remedy some of these problems, Shavelson et al. (1976) reviewed theoretical and empirical research, and developed a

theoretical model of self-concept. For purposes of the present investigation, three propositions from the Shavelson model are emphasized: self-concept (a) is multifaceted, (b) is hierarchically organized, and (c) becomes increasingly differentiated with age. In one possible representation of this model that resembled the British psychologists' hierarchical model of abilities (c.f., Vernon, 1950), Shavelson et al proposed a general self-concept at the apex that was divided into academic and nonacademic self-concepts; academic self-concept was further divided into subject specific facets of self (e.g., English and mathematics); nonacademic self-concept was divided into social, emotional and physical self-concepts that were further divided into more specific components (e.g., physical into physical ability and physical appearance).

At the time Shavelson et al. (1976) proposed their model there was little empirical support for the multidimensionality of self-concept or their posited facets. In dramatic contrast, more recent empirical research has provided strong support for a multidimensional self-concept (Byrne, 1984; Byrne & Shavelson, 1996; Dusek & Flaherty, 1981; Fleming & Courtney, 1984; Harter, 1982; 1984; Marsh, Barnes & Hocevar, 1985; Marsh & Hocevar, 1985; Marsh & Shavelson, 1985; Soares & Soares, 1982; Song & Hattie, 1985). The difference is apparently due to changes in the design of self-concept instruments. Early instruments typically consisted of an ill-defined assortment of self-related items and exploratory factor analysis was used to search for the salient factors with limited success. More recently developed instruments are typically designed to measure a priori factors that are at least implicitly based on models such as posited by Shavelson et al., and factor analysis is used to refine and confirm the a priori factors. In a review of this research Marsh and Shavelson (1985) concluded that self-concept cannot be adequately understood if this multidimensionality is ignored.

Shavelson et al. (1976) not only hypothesized the multidimensionality of self-concept, but further proposed that self-concept becomes more differentiated with age. This contention is consistent with Werner's (1957) general orthogenic principle which states that developmental changes proceed from a state of relative globality and a lack of differentiation to one of increasing differentiation. In what appears to be a contradiction to this orthogenic principal, Harter (1984, p. 331) suggested that young children below the age of about 8 "do not have a sense of self in general; that is, they can only evaluate specific behaviors." Harter also reported, however, that specific facets may become more differentiated with age. For example,

her findings suggested that children younger than 8 may not differentiate between cognitive and physical facets of self whereas older children do. In this respect it is not clear whether Harter's theoretical and empirical research is consistent with the orthogenic principle.

In order to test Shavelson et al.'s (1976) prediction of an increasingly differentiated self-concept, Marsh, Barnes, et al. (1984) factor analyzed SDQ responses by students in grades 2-5. They identified the 7 factors that the SDQ was designed to measure at each grade level. These findings are generally consistent with other research (e.g., Dusek & Flaherty, 1981; Monge, 1973) showing that if the factor structure underlying responses to a particular self-concept instrument is well defined, then the structure is consistent across age groups. Such findings might be used to argue against Shavelson et al.'s hypothesis that self-concept would become more differentiated with age. Marsh, Barnes, et al., however, reasoned that for instruments consisting of carefully constructed sets of items specifically designed to measure particular dimensions of self-concept, it is unlikely that new, unanticipated dimensions would be identified in responses by older children. Instead, they used the size of correlations among factors at each age level to test the hypothesis of increasing differentiation. They found a systematic decrease in the size of correlations among the factors -- particularly for grades 2-4 -- which they interpreted as support for the increasingly differentiation of self-concept.

Applying structural equation modeling to the Marsh, Barnes, et al. (1984) data, Marsh and Hocevar (1985) also found factor loadings to be relatively invariant across age whereas correlations among factors decreased with age. In examining various hierarchical models they found that neither a single higher-order factor (general self-concept) nor two higher-order factors (academic and nonacademic) were able to explain relations among the seven first-order factors, but that three higher-order factors (verbal/academic, math/academic and nonacademic) did provide an adequate fit at each of the four grade levels. Whereas the form of the hierarchical model was similar across age, the hierarchy became weaker with age (i.e, specific facets became more distinctive). The inability of the model positing just two higher-order factors to fit the data was due to the surprisingly low correlations between math and verbal self-concepts. In subsequent research near-zero correlations between math and verbal self-concepts have been found with preadolescent, adolescent and late-adolescent responses to the SDQ, SDQII and SDQIII (Marsh, 1986), and with responses to other self-concept instruments (Marsh, Byrne &

Shavelson, in press). The distinctiveness of the multiple dimensions of self-concept found in preadolescent responses to the SDQ was even more pronounced in late-adolescent and young-adult responses to the SDQIII. Marsh and O'Niell (1984), for example, reported that the average correlation between the 13 dimensions of self-concept measured by the SDQIII was only about .1. This relative independence of self-concept dimensions led Marsh and Shavelson (1985) to question the usefulness of a general self-concept construct.

In summary, results reviewed here supported the Shavelson model, in that self-concept was shown to be multifaceted, to be hierarchically ordered, and to become increasingly differentiated with age. The results also suggested, however, that self-concept dimensions were more distinct, that the hierarchy was much weaker, and that the hierarchical structure of self-concept differed -- particularly the need to separate math/academic and verbal/academic self-concepts -- than originally anticipated by Shavelson et al. (see Marsh & Shavelson, 1985). Because of this multidimensionality of self-concept, researchers seeking to relate self-concept to other constructs such as sex and age need to consider specific dimensions of self-concept in addition to -- or instead of -- general, overall self-concept.

Age Effects In Levels of Self-concept.

Wylie (1979) summarized research conducted prior to 1977 and concluded that there was no convincing evidence for any age effect, either positive or negative, in overall self-concept in the age range 6 to 50. Reports of age effects in specific dimensions of self-concept were too diverse and too infrequent to warrant any generalizations. More recent research that is reviewed here, however, suggests that there may be a curvilinear effect in which levels of self-concept decline during preadolescence and early adolescence, level out in middle adolescence, and then increase in late adolescence and early adulthood.

Preadolescent years. Soares and Soares (1977) examined self-concepts in grades 1-8 using two forms of their self-concept instrument that emphasized academic self-concept. For total scores in grades 1-3 (Form P) and in grades 4-8 (Form I) they found statistically significant declines in self-concept. Trowbridge (1972) reported significant age effects in total self-concept in grades 3-8; self-concepts declined in grades 3-6 and were stable in grades 6-8. Eshel & Klien (1981) found a sharp decline in general self-concept scores with age in grades 1 - 4. Dolan (1981) found systematic declines in both academic and non-academic self-concept scales in grades 1-6. Initial research with the Piers-Harris instrument indicated that self-concepts in Grade 6 were

lower than self-concepts in grade 3 (Piers & Harris, 1964) and in grade 4 (Piers, 1965, as cited in Piers, 1984) but this age effect was not replicated in the subsequent research (Piers, 1984). Simmons, Rosenberg & Rosenberg (1973; Rosenberg, 1985) reported a decline in esteem between the ages of 8 and 13. Harter (1982) found no significant age effects in self-concept in grades 3-6 for one sample, but results from a larger sample that included students in grades 3-9 suggested a decline in self-concept with age. Boersman and Chapman (1979) found no significant age effects in academic self-concept scales administered in grades 2-6. Other researchers have reported significant age effects in self-perceptions of ability in different areas. Nicholls (1979) asked children between ages of 6 and 12 to rank their own reading ability compared with others in their class, and found that these self-rankings declined with age. Stipek (1981) found that children's self-perceptions of their "smartness" dropped between kindergarten and third grade. Ruble, Boggiano, Feldman & Loebl (1980) reported that self-ratings in a physical ability task, shooting a basketball, were negatively correlated with age in grades 2 - 4.

Marsh, Barnes, Cairns and Tidman (1984) examined age and sex effects for 7 self-concept factors measured by the SDQ in a cross-sectional study of responses by students in grades 2-5. Based on previous research they hypothesized declines in self-concept with age. Because it is impossible to prove the equivalence of the different age groups on potentially confounding variables, they designed their cross-sectional study so that nonequivalence in age groups worked against their hypothesis of a linear age effect by selecting second and fifth grade student responses from one set of schools, and third and fourth grade responses from another set of schools. The youngest and oldest children in the study came from the same schools so that if these students differed systematically from the children from the other set of schools, then the effect would appear to be a nonlinear age effect with self-concepts in Grades 2 and 5 being systematically higher or lower. Except for Parent Relations, all the SDQ scales were significantly related to age. For most of the SDQ scales and the total score there was a moderate decline in self-concept, representing a drop of about one-third of a standard deviation between Grades 2 and 5. This decline was strikingly linear and was similar for males and females. Two characteristics of the study made the observed age effects more robust. First, the conservative design of the study provided a control against the age effects being a function of nonequivalent age groups. Second, the finding that the highest level of self-concept in

Grade 2 was reported for Parent Relations coupled with the lack of age effect for this facet of self-concept, suggested that the age effects in other areas of self-concept were not an artifact of an age-related response bias.

In summary, the studies considered here suggest a decline in self-concepts during preadolescent years. Whereas not all of the considered studies reported such a decline, none reported an increase in self-concept during preadolescent years.

Early to middle adolescent years. Dusek and Flaherty (1981) examined age effects in multiple dimensions of self-concept during adolescent years with both longitudinal and cross-sectional samples. For the longitudinal samples, they found little evidence of age effects in self-concept. Whereas there were significant age effects in their cross-sectional analyses, these tended to be inconsistent across the three age cohorts that they considered. McCarthy and Hoge (1982) also examined age effects in longitudinal and cross-sectional comparisons of students in grades 7-12. For both longitudinal and cross-sectional comparisons they reported significant increases in self-concept responses. Connell, Stroobant, Sinclair, Connell and Rogers (1975) examined changes in self-esteem during adolescent years for a large random sample of boys and girls. Boys showed a systematic, primarily linear improvement in self-concept between the ages of 12 to 18. There were, however, curvilinear effects for girls as evidenced by an initial decline between ages 12 and 13, followed by little change through about age 17, and then an increase in self-esteem. In a review of mathematical constructs, Meece, Parsons, Kaczala, Goff & Futterman (1982) reported a steady decline in math self-concept during junior high and high school years, but that the drop for girls began sooner and was larger.

As noted earlier, Piers and Harris (1964), Soares and Soares (1977), and Simmons et al. (1973; Rosenberg, 1985) all found significant declines in self-concept during preadolescent years; each of these studies also examined self-concepts for older children. Piers and Harris reported a subsequent increase in self-concept in grade 10 compared to grade 6 responses though no grade effects were found in subsequent research (Piers, 1984). Soares and Soares found no age effects in their grade 9-12 sample. Simmons, et al (also see Rosenberg, 1985) reported subsequent increases in self-concept after age 13. Blyth, Simmons and Bush (1978; also see Blyth, Simmons & Zakin, 1985) also noted that moving from sixth to seventh grade was more likely to be associated with a decline in self-concept when students also changed schools (i.e., moved from a k-6 school to a junior or senior high school) than when

students remained in the same school (i.e., attended a k-8 school).

Marsh, Parker and Barnes (1985), using responses by students in grades 7-11 to the SDQII, reported that self-concepts for most of the SDQII scales showed a decline in grades 7-9, leveled out and then increased in grades 9-11. This U-shaped, quadratic component was statistically significant for 8 of the 11 SDQII scales and for the two total scores. The nature and even the direction of the age effects, however, differed somewhat depending on the specific scale. For example, Opposite Sex Relations showed only a linear increase with age whereas Parent Relations showed primarily a linear decrease with age. This pattern was replicated in subsequent research reported by Marsh, Smith, Myers and Owens (in press).

In summary, there seems to be no consistent pattern of age effects in these studies of self-concept during early and middle adolescent years. Whereas some studies suggest curvilinear age effects in which self-concept plateaus at it lowest point during early adolescence, other studies have found systematic increases or systematic decreases in self-concept during this period.

Late adolescence and early adulthood. Bachman and O'Malley (1977) examined boy's self-esteem in an eight year longitudinal study based on the Youth and Transition data. Using this large, national probability sample, they assessed self-esteem for a single cohort of boys in 10th, 11th, and 12th grades, and 5 years after most respondents had graduated from high school. Over this 8 year period self-concepts consistently rose about one SD. O'Malley and Bachman (1983) found similar results with the National Longitudinal Study of the high school class of 1972 seniors and subsequent follow-ups in 1973, 1974, and 1976 that included responses by boys and girls. O'Malley and Bachman (1983) also analyzed data from the Monitoring the Future project in which large probability samples of high school seniors were tested 1976-1979 and followed-up either one or two years after initial testing. They again found systematic increases in self-esteem of close to .1 SD per year. In summary, the findings based on large nationally representative samples reviewed by O'Malley and Bachman (1983) provide convincing evidence that self-concept -- at least for responses to scales derived from the Rosenberg scale --increases steadily during this late-adolescent and early-adult period.

Summary of age effects. Despite Wylie's (1979) earlier conclusion to the contrary, subsequent research appears to provide ample evidence of age effects in self-concept responses. The most clearly documented effects are the systematic increases in self-concept during late-adolescent and early adult years. There is also good evidence for decreases in self-concept during

preadolescent years. These results imply a curvilinear age effect in which the decline in self-concept must reverse itself sometime during early or middle adolescence, but empirical support for this conclusion mixed. Four studies (Marsh, Smith, Myers & Owens, in press; Marsh, Parker & Barnes, 1985; Simmons, et al., 1973; Piers & Harris, 1964) reported curvilinear age functions in which self-concept reached its lowest point sometime during this period. Consistent with these conclusions, Rosenberg (1985, p. 241) concluded that "self-concept disturbances appear to be most acute during early adolescence, around the ages of 12-13. This is not true of all self-concept dimensions but it appears to be true of most of them." Nevertheless, because of the emphasis on overall self-concept and the ad hoc nature of specific dimensions that have been considered, the generality of findings based on overall self-concept to more specific facets has not been adequately tested.

Sex effects in self-concept

Wylie (1979), in her comprehensive review of research conducted prior to 1977, concluded that there was no evidence for sex differences in overall self-concept at any age level. She noted, however, that sex differences in specific components of self-concept may be lost when items are summed to obtain a total score. Wylie found, for example, that girls tended to have higher self-reported affiliation than boys which was consistent with Maccoby and Jacklin's (1974) study of social self-concept. Meece et al. (1982) have also documented that girls, at least by middle adolescent years, consistently have lower math self-concepts than do boys. Researchers (e.g., Dusek & Flaherty, 1981; Marsh, Barnes, et al., 1984) have further suggested that there are counter-balancing sex differences in many specific components -- some favoring boys some favoring girls -- that are consistent with traditional sex stereotypes.

Dusek and Flaherty (1981), in their longitudinal study of adolescent self-concept, reported sex differences in specific self-concepts that were consistent with sex stereotypes; boys had higher self-concepts in masculinity and achievement/leadership than girls, but lower self-concepts in congeniality/sociability. Harter (1982) found that preadolescent boys had higher physical self-concepts than girls but found no sex differences in social, cognitive or general scales. For preadolescent responses to an academic self-concept instrument, Boersma and Chapman (1979) found significant differences favoring girls in school satisfaction, reading/spelling, penmanship/neatness and a total score; there were no significant differences for general ability, confidence, and arithmetic.

Piers (1984) concluded that there is growing evidence of sex differences in self-concept that are specific in nature. Whereas she found no significant sex differences for total self-concept on her Piers-Harris instrument, there were significant sex differences on 33 of 80 items and on some of her item clusters that seemed consistent with sex stereotypes. Meece et al. suggested that girls have lower math self-concepts than do boys by junior high and high school years, but they found few reports of sex differences in math self-concept during primary school years. By 10th grade Stevenson and Newman (1986) found that boys had more positive math self-concepts and poorer reading self-concepts than girls, but that sex differences were not statistically significant in grades 1-5. Byrne and Shavelson (1986; Marsh, Byrne and Shavelson, in press) examined sex differences in responses by grade 11 and 12 students to different self-concept instruments. Across the three instruments boys had higher Math self-concepts, higher general self-concept, lower verbal self-concepts, and lower academic self-concept.

For preadolescent responses to the SDQ (e.g., Marsh, Barnes et al., 1984; Relich & Smith, 1983) girls had higher self-concepts in Reading and General School, and lower self-concepts in Physical Abilities, Math and Appearance. For responses by high school students to the SDQII, girls tended to have higher scores for the verbal, honesty/trustworthiness, same sex relationships and, perhaps, general-school scales, whereas boys tended to higher scores in physical ability, appearance, math, and, perhaps, general and emotional scales (Marsh, 1987b; Marsh, Parker and Barnes, 1985; Marsh, Smith, Owens and Smith,in press).

In a large random sample of adolescents, Connell, et al. (1975) found significant sex differences in responses to the Rosenberg esteem scale favoring boys for all adolescent ages, though the size of such differences were largest during the middle adolescent years (see earlier discussion of age effects in this study). O'Malley and Bachman (1979) reviewed and/or reanalyzed results from several large, nationally representative studies using variations of the Rosenberg scale. In these studies males consistently had slightly higher (i.e., .1 SD) esteem that reached statistical significance because of the very large sample sizes.

In summary, there are small sex effects in favor of males for measures of total self-concept and for measures of esteem derived from the Rosenberg scale. There also appear to be larger, counterbalancing sex differences in more specific facets of self that are generally consistent with sex stereotypes. Sex differences may also depend on age in that some differences

but support for this conclusion is weak.

Methods

An Overview Of the Present Investigation

The present investigation is based on the 12,266 sets of responses that comprise the normative archives of responses to the SDQ, the SDQII, and SDQIII. In preliminary analyses the factor structure and internal consistency estimates of reliability are summarized for each of the instruments. Then, the effect of age and sex on responses to each instrument is examined. Finally, the relation between age and the differentiation among the scales is examined.

Sample

The present investigation is based on responses to the SDQ (n=4362 sets of responses by 3679 students in grades 2-9), the SDQII (n=5494 responses by 3073 students in grades 7-11) and the SDQIII (n=2410 responses by 1202 individuals aged 15 and older) that comprise the normative samples for these instruments. The samples and published studies based on each instrument are described in the respective test manuals (Marsh, in press-a, in press-b, in press-c). The normative data bases for the SDQ and for the SDQII (at least through tenth grade), though not collected according to a specific sampling design, appear to be broadly representative of school-aged children in greater metropolitan Sydney Australia (a large metropolitan city with a population of more than 3 million). Typically, these students attended primary schools through sixth grade (the age range suggested for the SDQ) and attended high schools starting in seventh grade (the age range suggested for the SDQII). Nearly all students attended high school at least through tenth grade. Schools considered in the various studies using the SDQ and SDQII were specifically chosen to include both the public and private schools and schools in communities varying widely in socioeconomic status. In contrast to normative data bases for the SDQ and SDQII instruments, the representativeness of the normative base for the SDQIII is more dubious. It was based largely on responses by Outward Bound participants (Marsh, Richards and Barnes, 1986), grade 11 and 12 students in a Catholic girls school (Marsh & O'Neill, 1984), and university students (Marsh, Barnes & Hocevar, 1985).

Subjects in some studies completed SDQ instruments on more than one occasion and so the number of completed instruments is substantially larger than the number of individuals completing the instruments. Two considerations complicated this situation. First, the time interval between testing occasions varied from as short as one month to as long as four years in

different studies. Second, anonymity requirements in some studies enabled matching according to groups within the study but not at the individual student level. For present purposes, individuals in each study was assigned a weight equal to one over the number of times individuals in that study completed an instrument. For example, Outward Bound participants (Marsh, Richards & Barnes, 1986) completed the SDQIII a total of four occasions, and responses from each occasion were given a weight of .25. In this way, all the data was used. The weighted N actually used in the analyses, however, equaled approximately the total number of different respondents rather than the number of instruments completed and responses by the same individual did not contribute more than one case to this weighted N. (For further discussion of this weighting see SPSS, 1986). The number of weighted and unweighted responses at each age level is summarized in Table 4 of the results section.

Instruments

A detailed discussion of the theoretical rationale and empirical analyses leading to the development of each of the SDQ instruments is presented in their respective manuals (Marsh, in press-a, in press-b, in press-c). Though each is based on the Shavelson et. al. (1976) model of self-concept, they differ in the number and content of the scales, the number and wording of the items, and the number of categories in the response scale. The different scales included on the SDQ, SDQII, and SDQIII are summarized in Table 1 along with the number of items used to infer each scale. The SDQ measures 8 areas of self-concept inferred from responses to 64 positively worded items on a 5-point response scale. (The General Esteem scale on the current SDQ did not appear on an earlier version and so this one scale is not considered in analyses of SDQ responses considered here). The SDQII measures 11 areas of self-concept inferred from responses to 102 items, half of which are positively worded, on a 6-point response scale. (These 102 items are a subset of the larger number of items appearing on earlier versions of the SDQII.) The SDQIII measures 13 areas of self-concept inferred from responses to 136 items, half of which are positively worded, on an 8-point response scale. The SDQII differs from the SDQ in that the SDQ Peers scale was divided in to Same Sex and Opposite Sex scales, and the Emotional Stability and Honesty/trustworthiness were added. The SDQIII differs from the SDQII in that the Religion and Problem Solving scales were added. Six scales considered here (Physical Ability, Appearance, Parent Relationships, Verbal/Reading, Math, and General School) are common to all three instruments.

Results

Preliminary analyses -- psychometric properties

Internal consistency estimates of reliability (Table 1) were computed for scales from the SDQ (median alpha = .87), the SDQII (median alpha= .87), and SDQIII (median alpha = .90). Except for the Honesty/Trustworthiness scale on the SDQIII (alpha = .74), all reliability estimates vary between .83 and .94. Coefficient alphas are based on the number of items in a scale as well as the average correlation among responses. Hence it is interesting to note that responses to the SDQ scales are nearly as reliable as responses to the SDQII and SDQIII scales even though the SDQ scales typically contain fewer items.

Factor analyses were conducted on responses to each of the SDQ instruments (Table 2). As is typical in SDQ research, the factor analyses were conducted on item-pair responses. That is, the first two items in each scale were averaged to form the first item pair, the next two items in each scale were averaged to form the second item-pair, and so forth (see Marsh & O'Neill, 1984; Marsh, Barnes, Cairns & Tidman, 1984; and respective test manuals for the rational of using item pairs). The results of these three factor analyses demonstrate that the factor structures for each of the three SDQ instruments are exceptionally well-defined. For purposes of summary, target loadings refer to factors loadings of item-pairs on the factor that it is designed to measure a priori whereas non-target loadings refer to all other factor loadings. The medians of target loadings, the factor loadings of item-pairs designed to measure each scale, are about .7 for all three instruments, and none of the 147 target loadings for any of the instruments is less than .44. The medians of the non-target loadings are close to zero for all three instruments, and none of the 1394 nontarget loadings for any of the instruments is greater than .27. Correlations among the factors derived from responses to each of the three instruments vary from close to zero to moderately positive; median correlations are .13 (SDQ), .15 (SDQII) and .10 (SDQIII). Factor scores derived from each of these factor analyses (SPSS, 1986) were used in subsequent analyses. Though not the major focus of the present investigation, these factor analytic results provide very strong support for the multidimensionality of self-concept, for the Shavelson, et al. model used to develop the SDQ instruments, and for the ability of the SDQ instruments to differentiate multiple dimensions of self-concept.

Sex and Age Effects

Separate sets of Anovas were conducted on responses to each of the SDQ instruments to determine the effects of sex and age. For the SDQ and SDQII responses, age was taken to be grade in school, whereas age for the SDQIII

responses was divided into three discrete categories (less than 18 years, 18-21.5 years, and greater than 21.5 years). In each set of analyses the main effect of sex, since it has only two levels, is a single degree-of-freedom (df) contrast. The main effect of age was summarized by three single-df contrasts consisting of the linear, quadratic and cubic effects of age for the SDQ and SDQII responses, and consisting of the linear and quadratic components for the SDQIII responses. The sex-by-age interaction was summarized by the interaction of sex and the single-df age contrasts (i.e., sex by linear-age effect, etc.). Statistical significance, because of the large number of tests and large sample sizes, was tested at the .01 level, but the variance explained by all effects is summarized in Table 3. Separate analyses are reported for scale and factor scores, but the results are so similar (Table 3) that this distinction is not emphasized in the following discussion.

Age effects. For the range of preadolescent ages of subjects responding to the SDQ, there is a clear linear decline in self-concept with age. For all SDQ scales and total score, this decline is statistically significant, primarily linear, and occurs for boys and girls (see Table 1 and figure 1).

For the range of early and middle adolescent ages of subjects responding to the SDQII, there is a reasonably consistent a U-shaped quadratic effect; self-concepts are relatively higher in grade 7, decline in grades 8 and 9, and then increase in grades 10 and 11 (Figure 1). This quadratic effect is statistically significant for 8 of the 11 SDQII scales and the total score, and occurs for boys and girls (Table 1 and Figure 1). In contrast to the consistency of the quadratic effects, the direction of the linear age effects on SDQII responses is not consistent across different scales. The linear effects are positive for some scales and negative for others, and there is no linear effect at all in the total score. The variance explained by age in the SDQII data tends to be much smaller than was the case with the SDQ data or for the SDQIII data.

Since seventh grade students in the present investigation have moved from elementary to high school, developmental changes may be confounded with school context effects (see Blyth, Simmons and Bush, 1978). If, however, self-concepts in seventh grade are artificially lowered by this change in school context, then the U-shaped relation between self-concept and age should be even stronger than observed here (i.e., the seventh grade self-concepts should be even higher). Also, because the end of tenth grade has been a traditional school leaving time for many students, the observed increase in self-concepts after tenth grade may reflect selection effects. It

should be noted, however, that self-concepts during this adolescent period have already reached their lowest point in eighth or ninth grade and have begun to increase by tenth grade before this potential selection bias occurs. Furthermore, results based on the late-adolescent data described below and other research (e.g., O'Malley & Bachman, 1983) is consistent with the observed increase in self-concept during the last two years of high school.

For the range of late adolescent and early adult ages of subjects responding to the SDQIII, there is a reasonably consistent increase in self-concepts with age. The linear age effect is statistically significant for 11 of the 13 SDQIII scales, and the direction of this effect is positive for 9 of these scales and for the total score (Table 1 and Figure 1).[1]

In summary, particularly for the total self-concept scores, there is a consistent picture of age effects across the three SDQ instruments. During preadolescence (SDQ data) there is a linear decline in self-concept. During the early and middle adolescence (SDQII data) self-concept continues to decline through about grade 8 or 9, levels out, and then increases in grades 10 and 11. During the late-adolescence and early-adulthood (SDQIII data) self-concept continue to increase. This overall trend occurs for both males and females, and is reasonably consistent across different dimensions of self-concept.

Sex Effects. For most of the SDQ, SDQII, and SDQIII scales there are statistically significant sex effects, some favoring girls but more favoring boys. Reflecting this tendency, total self-concept scores favor boys, though this sex difference consistently explains only about 1% of the variance in each of the three data sets. The direction of sex differences in specific scales tend to be consistent with traditional sex stereotypes.

For the 6 scales that are common to the three instruments (see Figure 1), stereotypic sex differences are reasonably consistent across the three data sets: (a) boys have higher Physical Ability, Appearance, and Math self-concepts for all three data sets; (b) there are no sex differences for the Parents scale in any of the three data sets; and (c) girls tend to have higher Verbal/Reading (for SDQ and SDQII data) and School (for SDQ and SDQIII) self-concepts.

For the scales that are not common to the three instruments differences also appear to be consistent with sex stereotypes. For the SDQII and/or SDQIII data, boys have higher Emotional Stability, Problem Solving and Esteem scores, whereas girls have higher Honesty/Trustworthiness and Religion/Spiritual Value scores. Sex differences on the social scales,

however, are mixed and not fully consistent with traditional sex stereotypes favoring girls. Boys have somewhat higher Peer scores on the SDQ and Opposite Sex scores on the SDQII (though this difference occurs only for the younger students in the SDQII data). Girls have higher Same Sex scores on the SDQII and slightly higher Opposite Sex scores on the SDQIII (though this difference occurs only for the oldest two groups in the SDQIII data). Thus, even for the social scales, there may be a trend favoring girls that would be consistent with traditional sex stereotypes.

It was anticipated that sex differences might vary with age. In these three data sets, however, few age-by-sex interactions are statistically significant (Table 3), and those that are typically account for less than 1% of the variance. In fact, across all three data sets, Appearance is the only scale in which sex differences vary substantially with age (see Figure 1). These findings suggest, perhaps, that sex stereotypes have already affected self-concepts by preadolescence, and that these effects are relatively stable from preadolescence to early-adulthood.

Tests of Werner's orthogenic principle

Werner's (1957) general orthogenic principle states that developmental changes proceed from a state of relative globality and a lack of differentiation to one of increasing differentiation. Consistent with this principle, Shavelson, et. al. (1976) posited that self-concept becomes more differentiated with age. Marsh, Barnes, et al. (1984) found support for this predictions in that the average correlation among SDQ scales decreased dramatically with age during the early preadolescent ages (grades 2-5) that they considered. The purpose of analyses to be considered here is to test the generality of these findings across the preadolescent to early adult period and to consider alternative tests of the orthogenic principle.

The size of correlations among different scales. Marsh, Barnes, et al. proposed that correlations among SDQ scales should become smaller with age. For present purposes, this test was operationalized by determining at each age level the mean correlation among:

1) All scales measured by each SDQ instrument;

2) The 6 scales (Physical, Appearance, Parents, Math, Verbal, and School) common to the three SDQ instruments ; and

3) Seven correlations chosen a priori on the basis of theory and previous research to be the smallest (Physical with Verbal, Physical with Math, Physical with School, Appearance with Verbal, Appearance with Math, Appearance with School, and Math with Verbal -- see earlier discussion) among

those common to the three SDQ instruments.

Correlations based on both raw scale scores and factor analytically derived scores were examined.

The pattern of correlations at each age is consistent across the three sets of correlations and across the scale and factor scores (Table 4). For each of the SDQ instruments and corresponding age ranges: (a) the mean correlation among scale scores is higher than the mean correlation among factor scores; (b) the mean correlation among all scales is similar to the mean correlation among just the scales common to the three instruments; (c) the mean correlation among scales selected a priori to be lowest are substantially lower than the mean correlation among all scales or among scales common to the three SDQ instruments. This consistency facilitates the comparison of correlations across the different ages.

Consistent with Marsh, Barnes, et al. (1984), there is a substantial decrease in the size of correlations from grade 2 to grade 3, and smaller decreases between grades 3 and 4, and between grades 4 and 5. There is no support, however, for any further declines in the average correlation among scales for the rest of the preadolescent (SDQ) data nor for the adolescent (SDQII) and the late-adolescent (SDQIII) data. Across all the various comparisons, the mean correlation among SDQ scales is as high or higher in grades 6, 7, 8, and 9 as it is in grade 5. For the SDQII data, the size of correlations based on all the comparisons is reasonably similar for different ages (there is a weak tendency for correlations to be smaller for the youngest and the oldest subjects completing the SDQII). For the SDQIII data, correlations among scales are consistently smaller for the youngest age group. Thus, the data provide no support for this test of the orthogenic principle beyond early preadolescent ages.

Within-subject Standard deviations. Correlation provides a measure of the relative agreement among scores, but is insensitive to mean differences among scores. An alternative test of the orthogenic principle is that differences among the scale scores for the same person will become larger with age. That is, younger subjects are more likely to have uniformly high or uniformly low self-concepts across all areas, whereas older subjects are more likely to have relatively high self-concepts in some areas and relatively low self-concepts in other areas. In order to test this operationalization of the orthogenic principle, the standard deviation of scale scores for each subject (i.e., a within subject standard deviation) was computed for all scales and for the scales common to the three SDQ instruments. Separate within-subject

standard deviations were computed for raw scale scores and for factor scores (that were standardized to have a mean of 50 and a standard deviation of 10 across all respondents to each instrument).

For the SDQ data, within subject standard deviations increase between grades 2 and 3, and between grades 3 and 4, but do not appear to increase systematically for older subjects. For both the SDQII and SDQIII data, within-subject standard deviations decrease with age instead of increase with age as posited. Whereas caution must be exercised in comparing within-subject standard deviations at different ages, the present comparisons offer no support for the orthogenic principle beyond early preadolescence.

Summary and Implications

The purposes of the present investigation were to examine: (a) sex and age effects in multiple dimensions of self-concept in the preadolescent to early-adult period and (b) alternative operationalizations of the orthogenic principle that posits self-concept to become more differentiated with age. Responses to all three SDQ instruments were reliable and resulted in very well-defined factor structures. Because similar results based on subsets of the data considered here appear in many published studies, the importance of these findings will not be emphasized. Suffice to say that the findings provide strong support for the multidimensionality of self-concept, the Shavelson et al. model, and the ability of the SDQ instruments to differentiate multiple dimensions of self-concept. This is important because previous research of sex and age effects in self-concept have not been based on multidimensional instruments that were as psychometrically sound as the SDQ instruments, and so provide a weaker basis for the generality of findings across different self-concept dimensions.

Despite claims that self-concept does not vary with age (e.g., Wylie, 1979), more recent research reviewed earlier provides strong support for the increase of self-concept during late-adolescence and reasonably good support for its decline during preadolescence. This pattern logically necessitates a quadratic, U-shaped effect during adolescence, but there is only weak support for this effect. The problem appears to be that most researchers have considered only a limited age range or did not consider nonlinear effects, as well as the many other methodological problems that have plagued self-concept research. The present investigation is important because it provides clear support for the posited age effects on self-concept that were pieced together from a collage of different studies, because it shows this effect to be reasonably consistent across well-differentiated self-concept scales and

across responses by boys and by girls, and because it is based on responses to well-standardized multidimensional instruments.

For the total self-concept scores, the results of the present investigation show that boys have modestly higher self-concepts. Marsh and Shavelson (1985) argue, however, that self-concept cannot be adequately understood if only a global component is considered. Consistent with this claim, Wylie (1979) and others have suggested that the relatively weak sex effects in global self-concept may be a composite of counterbalancing sex differences in more specific areas, some favoring boys and some favoring girls. Because self-concept researchers have typically considered only a global self-concept, or measured multiple dimensions of self with ad hoc instruments, there has not been a good empirical basis for testing this suggestion. Common sense, and a limited amount of empirical research, suggests that sex differences in specific areas of self-concept are consistent with traditional sex stereotypes. The results of the present investigation provide strong support for this contention and demonstrate that the posited sex effects are reasonably consistent across the preadolescent to early adult period considered here.

Despite its strengths, the present investigation has important limitations that require further consideration. The most important, perhaps, is that comparisons are based on cross-sectional data comprised of responses from many different studies. At least for the preadolescent (SDQ) and adolescent (SDQII) data the subjects were broadly representative of students in metropolitan Sydney Australia. The declin. in self-concepts during preadolescence has also been demonstrated in other SDQ research in which data for different age groups were selected so as to work against the posited results (Marsh, Barnes, et al., 1984) and so, coupled with the results presented here, provide a much strong basis of inference. The quadratic age effect during adolescence has also been demonstrated in two SDQII studies (Marsh, Parker & Barnes, 1985; Marsh, Smith, Myers & Owens, in press) in which comparisons were made among students from the same high school. Claims for the increase in self-concept during late-adolescence and early-adulthood in the present investigation and other SDQIII research are probably the most difficult to defend. This increase in self-concept, however, is the component of the age effect that has been best established by other research (e.g., O'Malley & Bachman, 1983). Hence, the generality of inferences offered here is supported by previous SDQ research and research with other instruments.

The lack of support for the increased differentiation of self-concept

with age beyond that previously found during early preadolescent years (Marsh, Barnes, et al., 1984; Marsh & Hocevar, 1985) was surprising. Indeed, the separation of the single Peer Relations scale on the SDQ into the Same-Sex and Opposite-Sex scales on the SDQII and SDQIII, and the addition of new scales on the SDQII and SDQIII instruments, was based in part on premise that self-concept does become more differentiated with age. Qualifications, however, both of the limited support that was found in the early preadolescent period and of the lack of support for older subjects require further consideration. Whereas Werner (1957) and Shavelson et al. (1976) both proposed that there should be increased differentiation with age, neither operationalized a test of this proposal. Some researchers have argued that it is difficult to test this hypothesis with fixed-format items like those used on the SDQ instruments (e.g., Montemayor and Eisen, 1977), whereas others have used the comparability of factor structures across age to test the hypothesis. So far as I know, the operationalizations proposed here have not been used other than in my own research, and so they may require further scrutiny. Whereas the hypothesis was supported for responses by early preadolescent children, this support also warrants further consideration. Because responses by these young children are so skewed and because some of these young children may have difficulty responding appropriately on a 5-point response scale (but see Marsh, in press-a) counter explanations of the findings are plausible. Thus, it may be premature to conclude either that there is increased differentiation in self-concept during the early preadolescent years or that there is no increased differentiation beyond the early preadolescence.

It is also relevant to examine the implications of the decline in self-concepts that occurs in preadolescence and early adolescence. Whereas it is tempting to put value judgments on this finding and look for culprits (schools, parents, society) this decline should not be seen as "bad" or unfortunate. Indeed, it appears that the very high self-concepts of the youngest children are unrealistically high, and, perhaps, it would be unfortunate if their self-concepts did not become more realistic on the basis of additional life experience. For example, Stipek (1981; Stipek & Tannatt, 1984) described interviews of 96 children at the start of first grade where all claimed to be among the smartest in their class, and in the present study total score means were well above the midpoint of the response scale at every age level. Even if the self-concepts of the youngest children are "unrealistic", however, this does not mean that their self-concepts, or

responses to the SDQ, are biased. To the contrary, so long as their responses accurately reflect their self-perceptions, whether or not these self-perceptions are realistic when judged by external standards, the interpretations based on the self-concept responses are valid. Instead, the bias lies in the inferred self-concepts based on the observations of external observers or other indicators that do not reflect this age effect. Future research is needed to identify what characteristics validly affect self-concept, to develop theoretical perspectives consistent with these effects, and to explore the implications of these theoretical and empirical findings.

In one such developmental proposal (Marsh, in press-a; also see Harter, 1984; Nicholls, 1979; Ruble, et al., 1980; Stipek, 1981; 1984; Stipek & Tannatt, 1984; Werner, 1957 for related theoretical positions) I posited that very young children are egocentric and have consistently high, less differentiated self-concepts in all areas; these self-concepts may be unrealistic and relatively independent of any external criteria. As children become older they incorporate more external information into their self-concepts so that their self-concepts become more correlated with external criteria. For most individual children this implies that self-concepts will decline with age in most areas, and that across a broad selection of children self-concepts will decline in all areas. Marsh (1986) also demonstrated that children form self-concepts in specific areas by comparing own their abilities in the different areas as well as comparing their abilities with those of others. Thus, for example, children who are above average in all school subjects may have a below-average self-concept in the subject in which they perform least well. As children incorporate more information about their actual skills and abilities, and perhaps feedback from others, into the formation of their self-concepts in different areas, their self-concepts will also become more differentiated as posited in the Shavelson model and observed with SDQ responses. Thus, this proposal is consistent with: a) the decline in preadolescent self-concepts with age; b) the increased differentiation of self-facets with age at least during early preadolescence; c) the finding that as children become older their self-perceptions become more highly correlated with performance, performance feedback, and other external criteria; and d) the finding that specific dimensions of academic self-concept (e.g., Verbal/reading and Math) are much more distinct than corresponding achievement in these academic subjects.

Age and sex effects observed here were generally consistent with predictions, but it was surprising to find that sex differences did not vary

more with age. This suggests, perhaps, that traditional sex stereotypes have already affected the self-concepts by early preadolescence and that these effects remain relatively stable through at least early adulthood. Self-concept of Appearance, however, was a notable exception to this pattern. Whereas the youngest girls (grade 2) had higher self-concepts of Appearance than boys, the decline in their scores was particularly dramatic so that by the end of preadolescence girls had substantially lower scores than did boys. This substantial sex difference remained stable across adolescent years, but grew smaller during late-adolescence and early adulthood. Whereas other researchers have speculated about such differences, some instruments confound physical attractiveness and physical/athletic ability. Recent research (Marsh, 1987a; Marsh & Jackson, 1986) has shown that these components are quite distinct, particularly for girls, and should not be incorporated into a single physical scale. In the present investigation, even the youngest girls have substantially lower Physical self-concepts than boys, whereas sex differences favoring boys are much larger for Appearance than for Physical self-concept during adolescence. The intriguing question requiring further research is: why do very young girls think of themselves as more attractive than do boys whereas girls in the middle preadolescent to early-adult period think of themselves as much less attractive than do boys? Perhaps, for this one area, the effect of sex stereotypes may vary with age, or the nature of sex stereotypes may differ with age (e.g., all little girls are pretty, but starting at an early age girls must compare themselves with unrealistic standards of physical attractiveness).

FOOTNOTES

1 -- The negative effect of age on Religion and the age-by-sex interaction for the SDQIII data should be interpreted cautiously since a majority of the female respondents in the youngest age group were students in a Catholic girls high school. It seems likely that their higher Religion self-concepts has more to do with their being in a Catholic school than their age or sex.

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Table 1

Coefficient Alpha Estimates of Reliability and the Number of Items (in parentheses) For Scales From Each of the SDQ Instruments

Scales	SDQ Instruments		
	SDQ	SDQII	SDQIII
Physical Abilities	.85 (8)	.85 (8)	.94 (10)
Physical Appearance	.90 (8)	.90 (8)	.90 (10)
Peer Relationships	.86 (8)	---[a]	---
Opposite Sex Relationships	---	.90 (8)	.92 (10)
Same Sex Relationships	---	.86 (10)	.87 (10)
Honesty/Trustworthiness	---	.84 (10)	.74 (12)
Parent Relationships	.86 (8)	.87 (8)	.89 (10)
Spiritual Values/Religion	---	---	.95 (12)
Emotional Stability	---	.83 (10)	.89 (10)
General	.83 (8)[b]	.88 (10)	.93 (12)
Read/Verbal	.92 (8)	.86 (10)	.86 (10)
Math	.92 (8)	.90 (10)	.94 (10)
School	.88 (8)	.87 (10)	.92 (10)
Problem Solving	---	---	.84 (10)

a -- the "---" indicates that the scale was not included on this instrument.

b -- The General scale on just the SDQ was only included on the most recent revision and so responses to it are only available for a subset of the total number of respondents. For this reason, it is not included in subsequent analyses.

Table 2

Summary of Factor Analyses For Each of the SDQ Instruments

	SDQ Instruments		
	SDQ	SDQII	SDQIII
A Priori No. of Factors	7	11	13
Target Loadings			
Number of Coeff.	28	51	68
Lowest	.46	.48	.44
Highest	.86	.80	.94
Median	.73	.68	.71
Nontarget Loadings			
Number of coeffic.	168	510	716
Lowest	-.03	-.12	-.17
Highest	.20	.27	.25
Median	.03	.03	.02
Factor Correlations			
Number of Coeffic.	21	55	78
Lowest	.04	-.03	-.06
Highest	.47	.39	.36
Median	.13	.15	.10

Note. Results are based on separate factor analyses of responses to each of the three instruments. Target loadings are the factor loadings for the measured variables designed to measure each factor, whereas all other factor loadings are nontarget loadings. For each measured variable there is one and only one target loading (i.e., each variable is designed to measure only one factor). Factor correlations refer to correlations among the oblique factors and will typically differ somewhat from the correlations among computed factor scores used to represent each of the factors.

Table 3

Summary of Sex and Age Effects (% Variance Explained) on Raw Scale Scores (Raw) and Factor Scores (Fact) For Each of the SDQ Instruments

Scale		Main Effects				Interaction Effects		
		Sex	Age-linear	Age-quad	Age-cubic	Sex x Age-linear	Sex x Age-quad	Sex x Age-cubic
SDQ								
Physical	Raw	8.89**	4.66**	0.12	0.01	0.17*	0.17*	0.01
	Fact	7.82**	4.09**	0.10	0.01	0.17*	0.16	0.02
Appear	Raw	2.63**	3.00**	1.14**	0.25*	1.40**	0.03	0.01
	Fact	2.76**	2.02**	1.36**	0.25*	1.54**	0.03	0.00
Peers	Raw	0.83**	1.40**	0.14	0.00	0.05	0.00	0.00
	Fact	0.58**	1.00**	0.15	0.00	0.02	0.00	0.00
Parents	Raw	0.03	2.97**	0.63**[c]	0.02	0.04	0.00	0.01
	Fact	0.01	2.40**	0.78**	0.01	0.02	0.01	0.01
Read	Raw	1.40**[a]	3.30**	0.04	0.01	0.12	0.03	0.00
	Fact	1.75**	2.35**	0.04	0.00	0.10	0.02	0.01
Math	Raw	0.99**	3.99**	0.00	0.00	0.03	0.00	0.06
	Fact	1.10**	2.70**	0.00	0.00	0.02	0.00	0.07
School	Raw	0.09[a]	6.70**	0.04	0.01	0.13	0.05	0.03
	Fact	0.30*	6.20**	0.04	0.01	0.09	0.04	0.05
Total	Raw	0.92**	8.61**	0.05	0.01	0.40**	0.05	0.01
SDQII								
Physical	Raw	2.16**	0.58**	0.89**	0.13	0.06	0.03	0.01
	Fact	1.92**	0.75**	0.85**	0.11	0.11	0.02	0.01
Appear	Raw	7.81**	0.30[b]*	0.19*	0.10	0.17	0.05	0.00
	Fact	8.58**	0.46**	0.11	0.05	0.14	0.05	0.00
Opp. Sex	Raw	1.15**	1.83**	0.00	0.05	0.26*[d]	0.13	0.03
	Fact	0.71**	2.16**	0.01	0.03	0.25*	0.13	0.01
Same Sex	Raw	2.76**[a]	0.29**	0.62**	0.73**	0.16	0.33*	0.02
	Fact	4.56**	0.36*	0.49**	0.71**	0.11	0.44**	0.00
Honesty	Raw	3.61**[a]	0.06	1.45**	0.04	0.17	0.01	0.00
	Fact	4.77**	0.18	1.38**	0.03	0.13	0.01	0.00
Parents	Raw	0.20	1.28**	0.67**	0.04	0.18	0.10	0.06
	Fact	0.11	1.24**	0.56**	0.03	0.16	0.11	0.05
Emotional	Raw	2.35**	0.00	0.04	0.00	0.00	0.07	0.38*
	Fact	2.26**	0.01	0.00	0.02	0.01	0.07	0.39*
General	Raw	1.05**	0.12	0.59**	0.26*	0.19	0.05	0.02
	Fact	0.71**	0.23*	0.60**	0.32*	0.21	0.06	0.01
Verbal	Raw	0.77**[a]	0.00	0.04	0.15	0.06	0.14	0.26*
	Fact	1.29**	0.03	0.01	0.13	0.03	0.16	0.29*
Math	Raw	1.58**	0.13	0.54**	0.05	0.01	0.01	0.05
	Fact	1.59**	0.22*	0.43**	0.02	0.00	0.06	0.08
School	Raw	0.09	0.29*	0.42**	0.33*	0.06	0.01	0.02
	Fact	0.05	0.29*	0.10	0.25*	0.04	0.01	0.01
Total	Raw	1.04**	0.00	1.00**	0.31*	0.19	0.00	0.07

Table 3 Continued on next page

Table 3 continued

Scale		Main Effects: Sex	Age-linear	Age-quad	Age-cubic	Interaction Effects: Sex x Age-linear	Sex x Age-quad	Sex x Age-cubic
SDQIII								
Physical	Raw	4.90**	1.55**[b]	0.02	--	0.83**[d]	0.14	--
	Fact	4.17**	0.91**	0.00	--	0.58*	0.24	--
Appear	Raw	7.64**	12.0**[b]	1.35**[c]	--	2.12**[d]	0.24	--
	Fact	8.08**	13.1**	1.58**	--	2.28**	0.25	--
Opp. Sex	Raw	0.20[a]	0.16	0.15	--	1.32**[d]	0.13	--
	Fact	0.74*	0.01	0.09	--	1.13**	0.10	--
Same Sex	Raw	0.01	0.90**	0.00	--	0.22	0.03	--
	Fact	0.14	2.34**	0.00	--	0.17	0.05	--
Honesty	Raw	0.44*[a]	2.14**[b]	0.02	--	0.07	0.20	--
	Fact	1.31**	1.46**	0.08	--	0.02	0.15	--
Parents	Raw	0.12	0.17	0.05	--	0.00	0.02	--
	Fact	0.01	0.00	0.04	--	0.01	0.01	--
Spiritual	Raw	4.42**[a]	1.14**	0.25	--	1.30**	0.16	--
	Fact	4.05**	1.00**	0.23	--	1.15**	0.12	--
Emotional	Raw	2.04**	2.85**[b]	0.01	--	0.50	0.30	--
	Fact	2.10**	2.36**	0.00	--	0.45	0.30	--
General	Raw	2.35**	2.11**[b]	0.21	--	0.45	0.13	--
	Fact	1.64**	1.18**	0.14	--	0.18	0.09	--
Verbal	Raw	0.01	1.77**[b]	0.00	--	0.00	0.79*	--
	Fact	0.15	1.46**	0.01	--	0.00	0.72*	--
Math	Raw	2.21**	1.61**[b]	0.07	--	0.57*	0.00	--
	Fact	2.13**	0.91**	0.05	--	0.67*	0.00	--
School	Raw	0.02[a]	2.98**[b]	0.00	--	0.00	0.28	--
	Fact	0.57*	2.38**	0.02	--	0.00	0.19	--
Prob Solv	Raw	5.12**	3.23**[b]	0.27	--	0.04	0.06	--
	Fact	6.14**	2.47**	0.23	--	0.09	0.05	--
Total	Raw	1.07**	3.62**[b]	0.10	--	0.13	0.14	--

Note. A series of two-way ANOVAs was conducted in which the separate contrasts were used to test the effects of sex, the linear, quadratic and cubic components of age and the sex-by-age interaction. For the SDQ and SDQII data age was taken to be year in school whereas for the SDQIII data age was divided into three categories. Effect sizes, the percentage of variance explained (i.e. eta squared x 100%), are all based on single-degree-of-freedom contrasts. Graphs of scores common to the three instruments (Physical, Appearance, Parents, Verbal/reading, Math, School and Total) appear in Figure 1.

* $p < .01$, ** $p < .001$.

a -- Girls have significantly higher self-concepts than boys; other significant sex effects are in favor of boys.

b -- The linear effect of age is positive; other significant linear age effects are negative.

c -- The quadratic effects of age are negative (i.e., the slope becomes more negative or less positive with age as in an "inverted U" shaped effect); other significant quadratic age effects are positive (i.e., the slope becomes more positive or less negative with age as in a "U" shaped effect).

d -- The significant linear-age x sex interactions indicate that sex differences shift in the favor of girls with age (i.e., larger differences in favor of girls or smaller differences in favor of boys)r; other significant linear-age x sex interactions indicate a shift in favor of boys with age.

Table 4

Summary of Scale Distinctiveness Analyses of Three SDQ Instruments

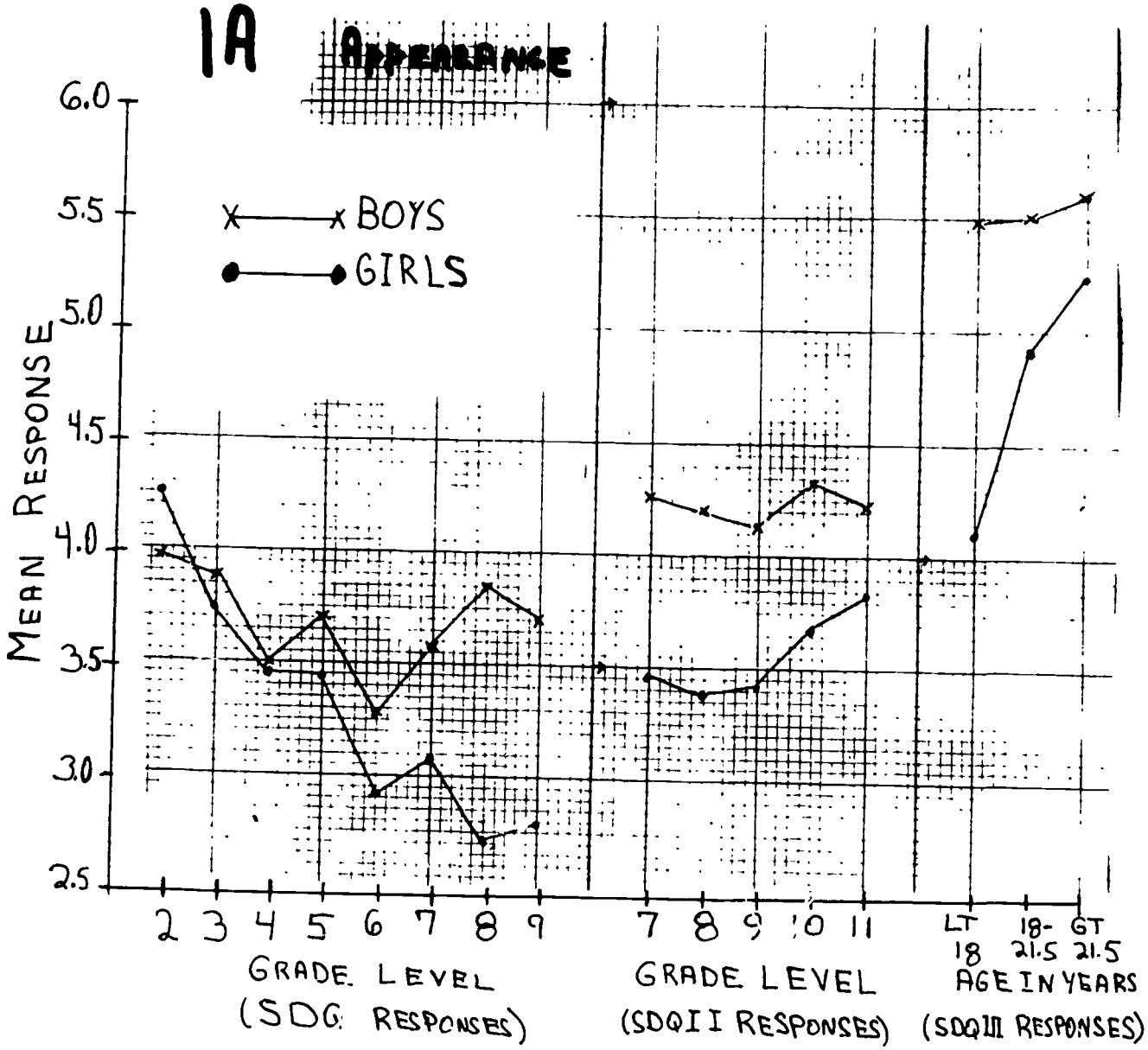
Instrument and Age Level	Sample Size[a] wted	Sample Size[a] unwted	Mean Correlation Among: All Scales Raw	Mean Correlation Among: All Scales Fact	Mean Correlation Among: Common Scales Raw	Mean Correlation Among: Common Scales Fact	Mean Correlation Among: Selected Scales Raw	Mean Correlation Among: Selected Scales Fact	Standard Deviation of: All Scales Raw	Standard Deviation of: All Scales Fact	Standard Deviation of: Common Scales Raw	Standard Deviation of: Common Scales Fact
SDQ												
Grade 2	176	176	.55	.43	.55	.43	.49	.37	0.52	6.50	0.52	6.36
Grade 3	107	107	.37	.27	.39	.29	.30	.20	0.62	6.91	0.61	6.59
Grade 4	360	513	.34	.24	.31	.20	.23	.12	0.75	8.07	0.78	8.09
Grade 5	1428	1697	.27	.18	.25	.15	.18	.08	0.75	8.02	0.78	8.07
Grade 6	1111	1378	.28	.18	.25	.16	.17	.07	0.81	8.42	0.84	8.53
Grade 7	151	151	.39	.28	.38	.27	.31	.19	0.74	7.70	0.76	7.76
Grade 8	161	161	.33	.22	.31	.21	.29	.17	0.80	8.82	0.83	8.93
Grade 9	179	179	.28	.19	.27	.18	.23	.13	0.78	8.62	0.81	8.89
Total	3679	4362	.33	.22	.31	.20	.24	.13	0.76	8.11	0.79	8.17
SDQII												
Grade 7	929	1374	.30	.18	.29	.17	.21	.09	0.98	8.55	1.04	8.28
Grade 8	630	1323	.32	.19	.31	.19	.24	.12	0.96	8.49	1.03	8.29
Grade 9	528	1116	.32	.19	.29	.16	.24	.11	0.92	8.39	0.99	8.38
Grade 10	705	1187	.31	.18	.28	.16	.21	.09	0.90	8.05	0.96	8.10
Grade 11	281	494	.28	.16	.24	.12	.19	.07	0.87	7.99	0.95	8.18
Total	3073	5494	.31	.18	.29	.17	.23	.10	0.94	8.34	1.00	8.25
SDQIII												
LT 18 yrs	377	531	.21	.10	.20	.10	.10	.00	1.16	8.93	1.17	9.12
18-21.5 yrs	407	919	.28	.16	.27	.14	.21	.08	1.07	8.18	1.00	7.96
GT 21.5 yrs	418	960	.27	.16	.26	.13	.22	.10	1.07	8.04	0.96	7.65
Total	1202	2410	.25	.14	.26	.14	.20	.08	1.10	8.37	1.04	8.22

Note. The mean correlation was computed separately for each of three sets of scale scores: all correlations among the scales measured by a particular instrument (All), all correlations among the set of five scales common to all three instruments (Common), and correlations selected a priori to be the lowest (Selected). The standard deviation of responses by each respondent was also computed for all scales and for the set of common scales (i.e., a respondent who had the same score for all scales would have an SD of 0). Separate analyses were conducted for raw scale scores (Raw) and factor scores (Fact).

a -- unweighted (unwted) sample sizes refer to the number of instruments completed and weighted (wted) sample sizes refer to the number of different respondents (i.e., many respondents who completed an instrument more than once). Analyses presented here are based on the weighted samples (i.e., the weight assigned to each respondent was 1 divided by the number of instruments completed by that respondent).

Figure Captions

Figure 1A - 1G. Age and sex effects for the six self-concept scales common to the three SDQ instruments (A -- Appearance; B -- Physical; C -- Parents; D -- Verbal/Reading; E -- Math; and F -- School) and for total scores (G) for the three instruments. Note that responses from the three SDQ instruments are not directly comparable because the response scales differ: the SDQ has a 1-5 scale, the SDQII has a 1-6 scale, and the SDQIII has a 1-8 scale. Statistical tests of the effects illustrated here are presented in Table 3. (Note: Please excuse the crudeness of these hand-drawn figures. They are only meant to be used for purposes of review and subsequently they will be professionally drawn.)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GIRLS
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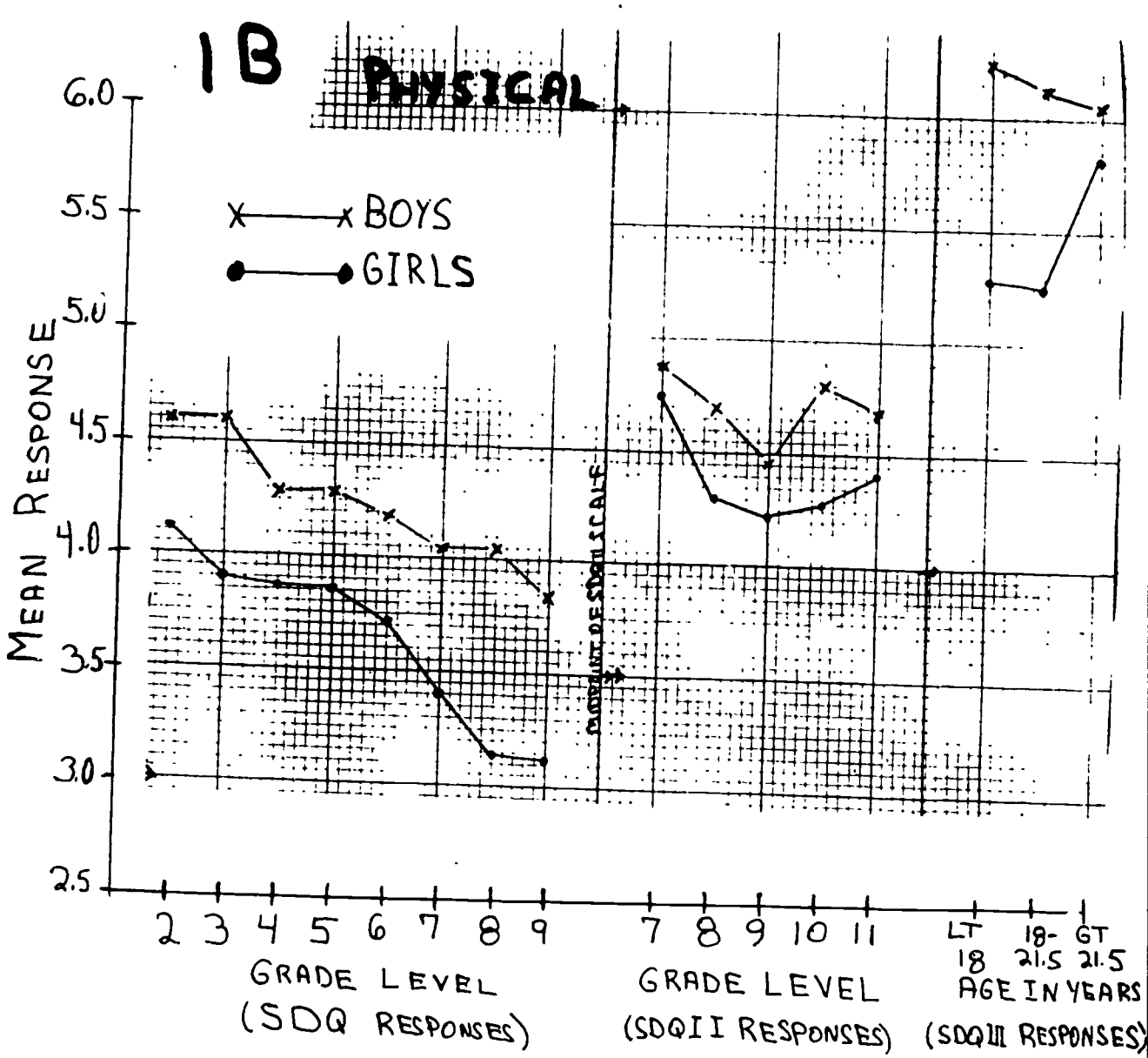
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
7 8 9 10 11
LT 18
18-21.5
GT 21.5
GRADE LEVEL (SDQ RESPONSES)
GRADE LEVEL (SDQII RESPONSES)
AGE IN YEARS (SDQIII RESPONSES)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BOYS
GIRLS
MEAN RESPONSE
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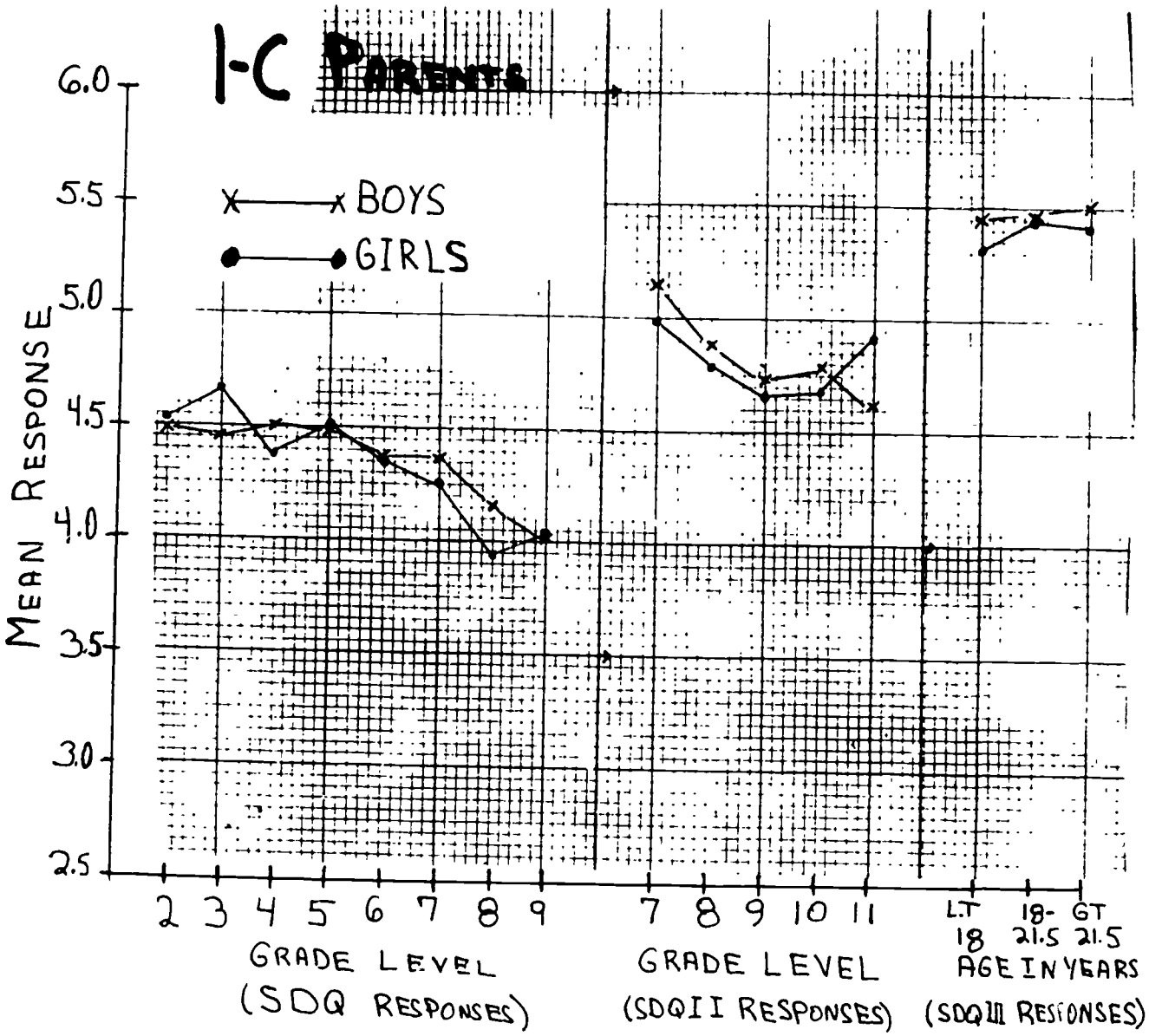
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
GRADE LEVEL
(SDQ RESPONSES)
7 8 9 10 11
GRADE LEVEL
(SDQII RESPONSES)
LT 18
18-21.5
GT 21.5
AGE IN YEARS
(SDQIII RESPONSES)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BOYS
GIRLS
MEAN RESPONSE
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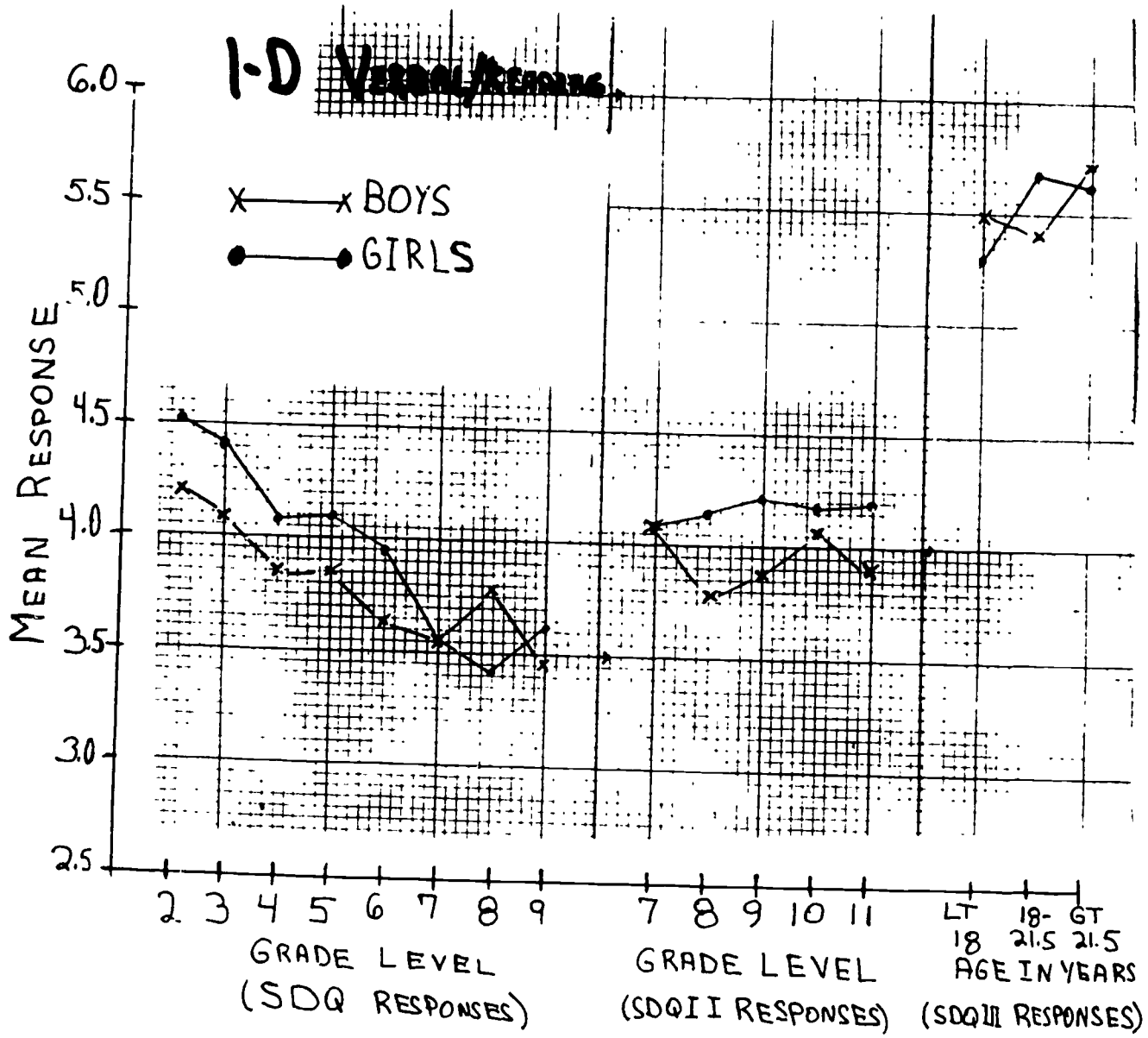
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
GRADE LEVEL
(SDQ RESPONSES)
7 8 9 10 11
GRADE LEVEL
(SDQII RESPONSES)
LT 18
18-21.5
GT 21.5
AGE IN YEARS
(SDQIII RESPONSES)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GIRLS
MEAN RESPONSE
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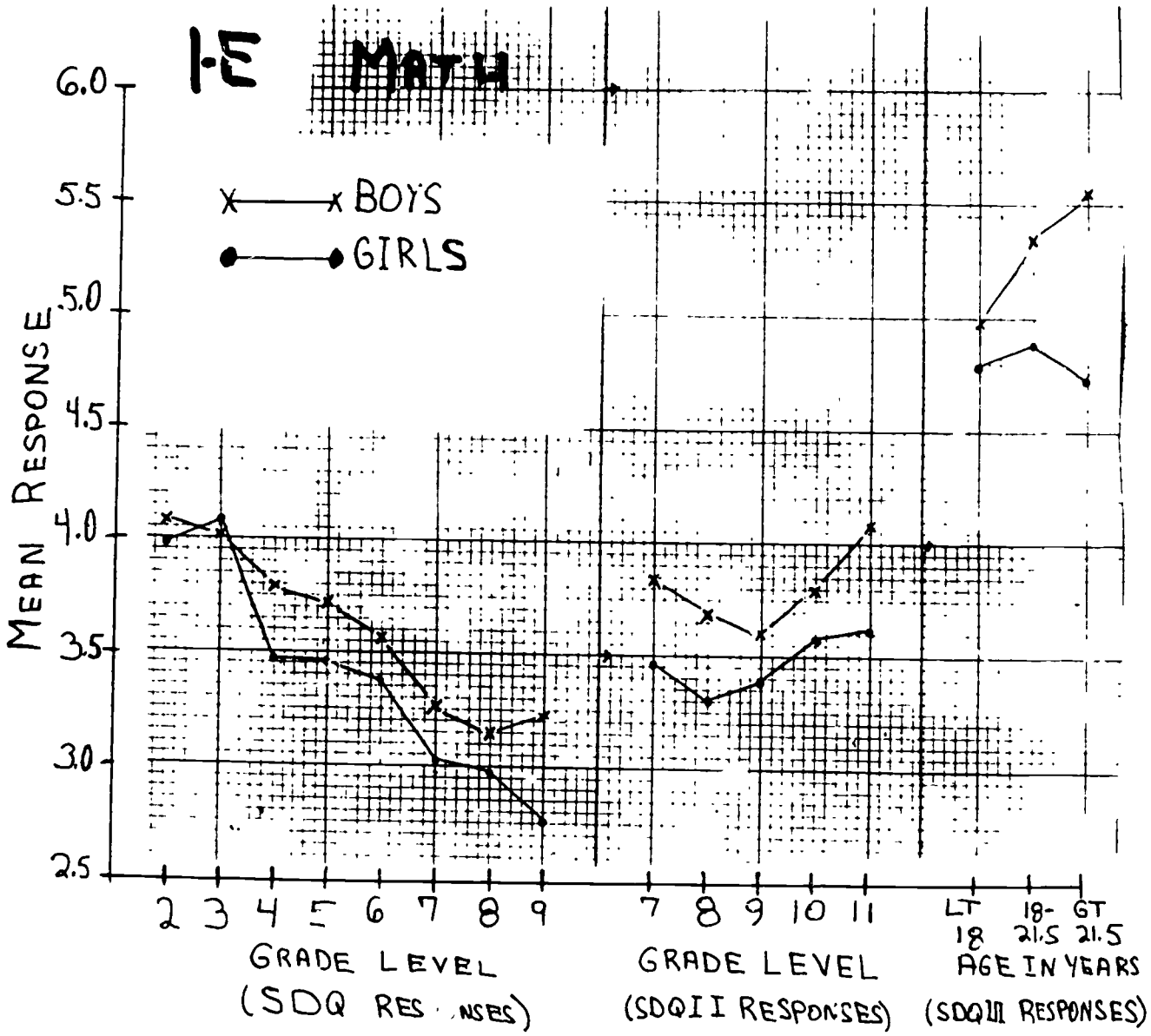
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
GRADE LEVEL
(SDQ RESPONSES)
7 8 9 10 11
GRADE LEVEL
(SDQII RESPONSES)
LT 18
18-21.5
GT 21.5
AGE IN YEARS
(SDQIII RESPONSES)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BOYS
GIRLS
MEAN RESPONSE
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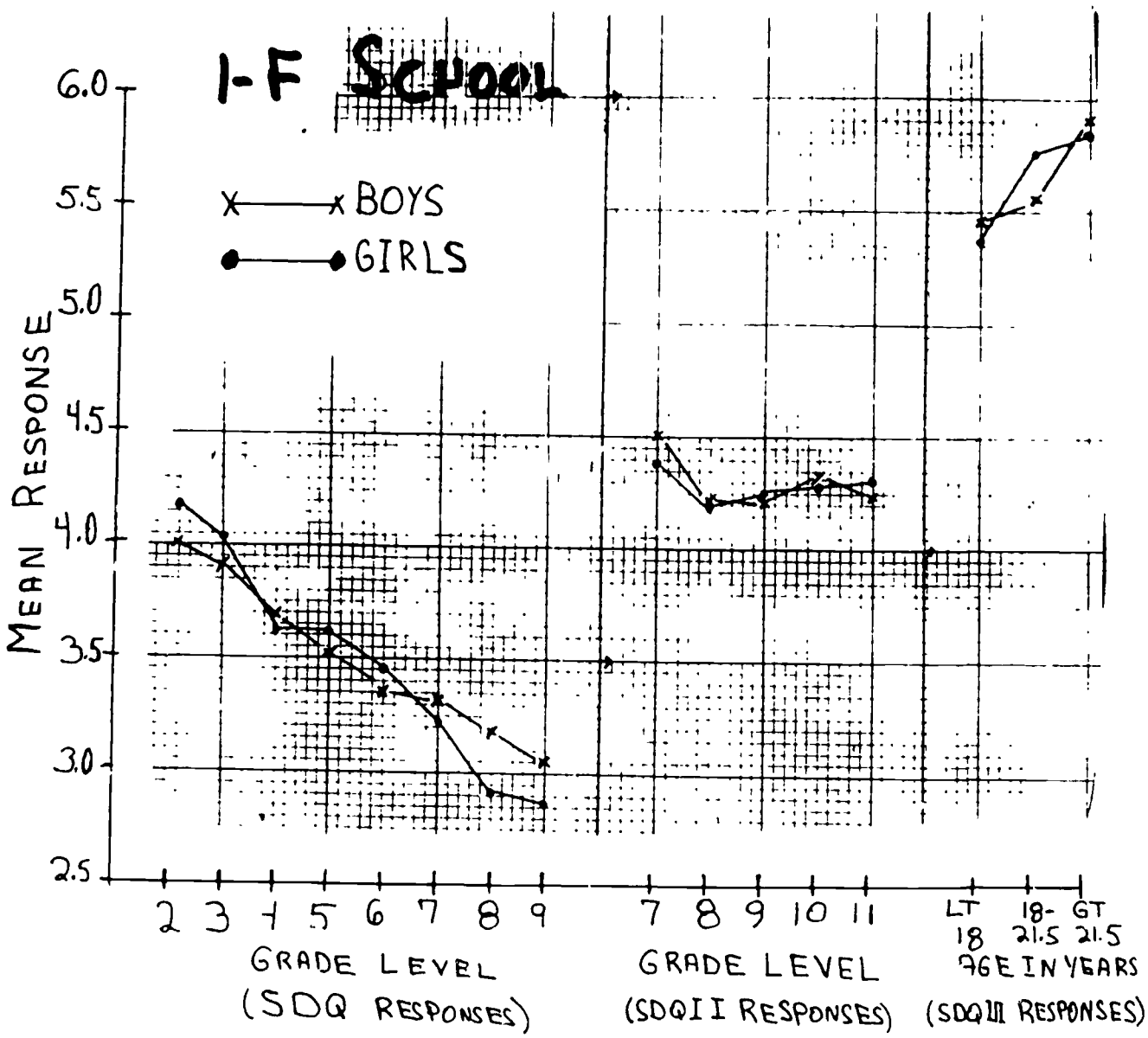
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
GRADE LEVEL
(SDQ RESPONSES)
7 8 9 10 11
GRADE LEVEL
(SDQII RESPONSES)
LT 18
18-21.5
GT 21.5
AGE IN YEARS
(SDQIII RESPONSES)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BOYS
GIRLS
MEAN RESPONSE
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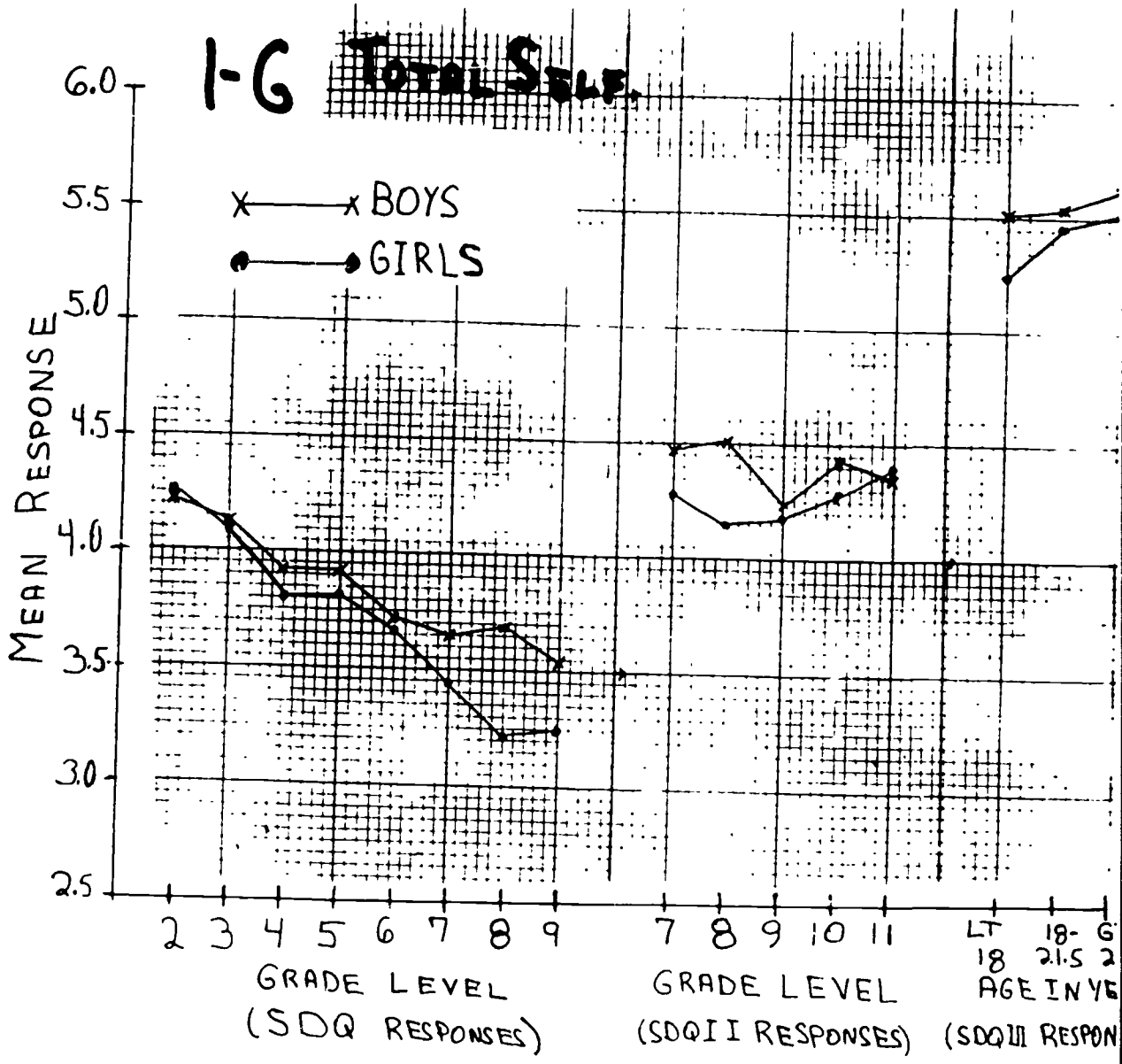
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
GRADE LEVEL
(SDQ RESPONSES)
7 8 9 10 11
GRADE LEVEL
(SDQII RESPONSES)
LT 18
18-21.5
GT 21.5
AGE IN YEARS
(SDQIII RESPONSES)


I-G TOTAL SELF
BOYS
GIRLS
MEAN RESPONSE
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2 3 4 5 6 7 8 9
GRADE LEVEL
(SDQ RESPONSES)
7 8 9 10 11
GRADE LEVEL
(SDQII RESPONSES)
LT 18
18- 21.5
AGE IN YE
(SDQIII RESPON