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Resilient, Overcontrolled, and Undercontrolled Personality Prototypes in Childhood: Replicability, Predictive Power, and the Trait–Type Issue

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In a longitudinal study, Q-sort patterns of German preschool children were analyzed for personality prototypes and related to developmental outcomes up to age 12. Q-factor analyses confirmed 3 prototypic patterns that showed a high continuity and cross-judge consistency; were similar to those found for North American, Dutch, and Icelandic children; and can be interpreted as resilient, overcontrolled, and undercontrolled. Relations reported by R. W. Robins, O. P. John, A. Caspi, T. E. Moffitt, & M. Stouthamer-Loeber (1996) between these 3 patterns and the Big Five were fully replicated. Growth curve analyses showed that the 3 patterns predicted important developmental outcomes in both the social and the cognitive domains. Evidence was found for both traits and types: A continuous dimension of resiliency bifurcates in its lower part into two relatively discrete personality types, overcontrollers and undercontrollers.

Personality can be defined as "the dynamic organization *within the individual* of those psychophysical systems that determine his unique adjustments to his environment" (Allport, 1937, p. 48, italics added). Lay psychological concepts, textbook definitions, and theoretical reviews of personality agree with this person-centered view of personality. However, empirical research in this century has treated personality nearly exclusively from a variable-centered trait perspective. Psychologically meaningful characteristics on which individuals reliably differ (traits) are isolated, and their correlational structure is studied. This structure (a property of the population) has often been mislabeled "personality structure" (which is a property of the individual). Consequently, personality differences within a population have been studied only rarely in terms of differences in personality structure.

A more person-centered approach to personality was first proposed by the German psychologist William Stern (1911). An individual's personality is described by a pattern of traits (Stern called this first step "psychography"). Subsequently, the personality patterns of many individuals are compared for similarity (Stern called this second step "comparative research"). For example, the individuals can be classified into groups that consist of individuals with similar patterns. Thus, each group can be represented by a prototypic personality pattern.

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Two empirical person-centered pattern approaches to personality differences can be distinguished. One tradition starts with multiple variables (questionnaire scales, ratings, or test scores). Each individual is described by the profile of scores in these variables. These profiles are grouped by cluster analysis into relatively homogeneous clusters. Each cluster consists of individuals with similar profiles. The mean profile of the cluster members is the prototypical pattern that describes the cluster (see Caspi & Silva, 1995; Pulkkinen, 1996).

The present study followed another tradition. Each individual is described by a knowledgeable informant who sorts trait descriptions according to how well they fit the individual's personality. For example, the California Child Q-Set (J. H. Block & J. Block, 1980) can be used to describe children's personality by 100 traits. Subsequently, the Q-sort profiles can be classified for similarity through Q-factor analysis.

Q-Factor Analysis of Q-Sort Patterns

In Q-factor analysis (also called *inverse factor analysis*), Pearson product–moment correlations between individual patterns are factor analyzed. Each resulting Q factor represents similar patterns and is described by the factor scores of the variables on which the patterns are based (note that in inverse factor analysis, the roles of subjects and variables in ordinary R-factor analysis are reversed, so that there are factor scores for variables, not for subjects). Thus, the factor scores of Q factors of Q-sort profiles describe a prototypic personality profile.

Because Q-factor analysis is based on the Pearson correlation as a measure of profile similarity, it disregards interindividual differences in the individual means and variances. Therefore, it can be misleading to apply it to variable-centered assessments when the elevation of the profile or its scatter conveys meaning (Cronbach & Gleser, 1953; Waller & Meehl, 1998). However, Q-sort techniques such as the California Child Q-Set force the judges to produce Q sorts with a prescribed mean and variance. Thus, all Q sorts have the same mean and variance, and the Pearson correlation between them is an adequate measure of similarity.

When a minimal set of Q factors has been derived that explains a major portion of the variance of the individual profiles, the factor loading of an individual on a Q factor is a measure of the similarity between the individual's profile and the prototypic profile of the factor; it is identical with the Pearson correlation between the individual's profile and the prototypic profile of the factor. These individual Q-factor loadings are continuously distributed.

Two problems have to be solved in order to classify individual Q sorts through Q-factor analysis. First, as in ordinary R-factor analysis, there is the problem of how many factors should be considered. One solution to this problem is to consider only those Q factors that are highly similar between two random halves of the sample of participants (see Everett, 1983). The similarity of the Q factors between the two subsamples is assessed by the correlation between their factor scores. This criterion was first used by York and John (1992) in a study of adults. Robins, John, Caspi, Moffitt, and Stouthamer-Loeber (1996) applied it to 13-year old boys who were judged by a caregiver on the California Child Q-Set. They found three replicable Q factors (mean factor convergence was .84); solutions with more than three factors were not replicable. This finding was replicated in a study by Hart, Hofmann, Edelstein, and Keller (1997), who studied experts' judgments of 7-year-old Icelandic boys and girls on the same Q set. Furthermore, the three Q factors showed a decreasing similarity between the two studies (Factor 1, .90; Factor 2, .67; Factor 3, .32). Such a decrease is expected because later-appearing factors are less reliable. It is encouraging to note, however, that the same number of replicable Q factors was found in studies as diverse as Robins et al.'s and Hart et al.'s and that they showed a high to moderate degree of consistency.

The second problem concerns how individuals are assigned to the Q factors. Again, York and John (1992) suggested a procedure to resolve this problem. An individual is assigned to a Q factor if (a) the factor loading is high, (b) the next highest loading is clearly lower, and (c) there are not high loadings on two or more factors. Robins et al. (1996) used this procedure, but they could classify only 72% of the participants. Therefore, they in addition applied discriminant analysis to classify more children. This two-step procedure resulted in a classification of 97% of their participants.

In the present study we applied exactly the same procedure in order to replicate the findings by Robins et al. (1996) and Hart et al. (1997). We call the resulting groups of individuals personality *types,* but we do not assume that these empirically derived types represent necessarily discrete natural classes. Below we discuss this question in more detail. Before we do this, we describe the three personality types.

Three Major Personality Types in Childhood and Their Correlates

Robins et al. (1996) interpreted the three Q factors by considering their most and least prototypical Q-sort items (i.e., items with extreme factor scores). Most prototypical for Factor 1 were the items assertive, verbally expressive, energetic, and self-confident; least prototypical were insecure, anxious, and immature. Overall, Factor 1 can be interpreted as high competence in a broad range of domains. Factor 2 was characterized by the items interpersonally sensitive, shy, and dependent, but also by warm, cooperative, and considerate; least characteristic were the items verbally fluent and competitive. Overall, Factor 2 can be interpreted as a shy–agreeable pattern. Factor 3 showed a clear antisocial pattern: impulsive, self-centered, manipulative, confrontational, and outgoing.

Robins et al. (1996) related these three prototypes to the theory of ego-control and ego-resiliency by J. H. Block and J. Block (1980). In this dimensional model of personality in childhood, *ego-resiliency* refers to the tendency to respond flexibly rather than rigidly to changing situational demands, particularly stressful situations. *Ego-control* refers to the tendency to contain versus express emotional and motivational impulses (overcontrol vs. undercontrol). J. H. Block and J. Block operationalized ego-control and ego-resiliency by the similarity of children's Q-sort profile with two expert profiles of a prototypically ego-undercontrolled and a prototypically ego-resilient child. These continuous measures of ego-control and ego-resiliency are not based on Q-factor analysis but on theoretical considerations of what constitutes typical and atypical characteristics of these two personality patterns.

Although J. H. Block and J. Block (1980) assumed that both extremely high and low ego-control are related to low ego-resiliency, they distinguished four types of children: resilient overcontrollers, resilient undercontrollers, nonresilient overcontrollers, and nonresilient undercontrollers. However, in line with the Blocks' theoretical assumption, Robins et al. (1996) identified three rather than four Q types. As Figure 1 indicates, both overcontrollers and undercontrollers were nonresilient (undercontrollers tended to be particularly low in resiliency), and all resilient children were grouped into one type.[1] This pattern suggests that ego-resiliency shows an inverted U-shaped relation with ego-control rather than statistical independence because high resiliency is related to intermediate scores in control and both high and low control are related to low resiliency. We tested this hypothesis in the present study.

Robins et al. (1996) described the three personality types also in terms of the five-factor model of personality description (the Big Five; Digman, 1990; Halverson, Kohnstamm, & Martin, 1994). Following a procedure proposed by John et al. (1994), they defined Big Five scales on the basis of the items of the California Child Q-Set and studied the three personality types in terms of these five scales. They found a strong type by scale interaction that can be interpreted in terms of different rank orders of the three Q types for the Big Five scales.

Overcontrollers had lower extraversion scores than both resilient participants and undercontrollers; undercontrollers were lower in agreeableness than both resilient participants and overcontrollers; resilient participants were more conscientious, and undercontrollers were less conscientious, than overcontrollers; and resilient participants had higher scores in emotional stability and openness to new experience than both their overcontrolled and

[1] The means of the three Q types refer only to Caucasian boys in order to enable a good comparison with the present study. The means for African American boys were similar (see Robins et al., 1996).

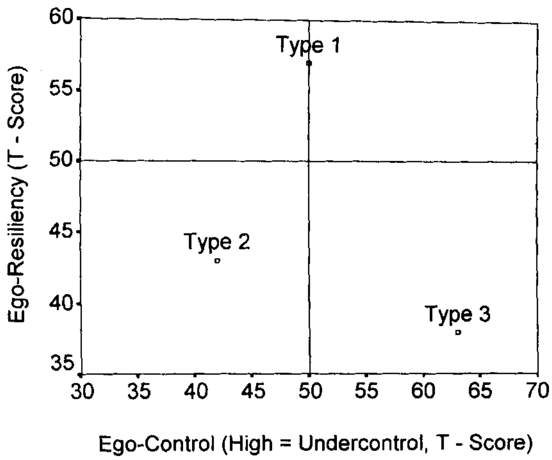

Figure 1. Three Q-types as a function of ego-control and ego-resiliency in the study by Robins et al. (1996).

their undercontrolled agemates. The present study attempted to confirm this pattern with Big Five measures that were not based on the Q-sort data but obtained from a Big Five questionnaire. Such a replication with independent Big Five measures would particularly strongly support the pattern found by Robins et al. (1996).

External correlates of the three Q types were reported by Robins et al. (1996), van Lieshout, Haselager, Riksen-Walraven, and van Aken (1995), and Hart et al. (1997). Robins et al. found lower IQ scores, lower teacher ratings of academic performance and school conduct, and a higher frequency of serious delinquency for undercontrolled boys as compared to both resilient and overcontrolled boys. van Lieshout et al. (1995) identified three personality types at the ages of 7, 10, and 12 years that were based on a cluster analysis of Big Five scales that were derived from a Dutch version of the California Child Q-Set. The three clusters could again be interpreted as resilient, overcontrolling, and undercontrolling children. The clusters showed similar Big Five profiles as in Robins et al.'s study. Furthermore, the clusters differed in cognitive competence and peer group status. Resilient children scored highest on IQ, school achievement, and peer acceptance. Undercontrollers showed the reversed pattern, and overcontrollers scored in between.

Hart et al. (1997) identified the three Q types at age 7, and they predicted their future development with regard to academic and social competence up to age 15 in terms of individual growth functions. For each index of competence, a linear developmental function was fitted to each child's scores, and both its level and its slope were studied. Resilient children had a higher level in grade point average and a lower level in teacher-rated concentration problems than both undercontrollers and overcontrollers; overcontrollers had higher scores in teacher-rated social withdrawal and lower scores in self-esteem than the other two types; and undercontrollers had higher scores in teacher-rated aggressiveness than their overcontrolled and resilient agemates, but not below-average self-esteem.

Furthermore, the aggressiveness of the undercontrollers increased relative to the other children. This differential change indicated that the difference between the undercontrollers and the other two types increased over time. Similar increases of type differences were found for friendship reasoning and locus of control. Thus, there was evidence for an increase of type differences over time, which is an unusual finding in longitudinal studies where trait and type differences tend to wash out over development (see, e.g., Caspi, 1998).

Generality of the Three Types

Because the studies by Robins et al. (1996) and Hart et al. (1997) used the same descriptive system for personality (the California Child Q-Set), one might argue that the three personality types are specific to this particular descriptive system rather than to children's personality. However, as Caspi (1998) pointed out in his review of personality development, similar types were also found in studies of adults that used a different Q set (e.g., J. Block, 1971; York & John, 1992) and in studies with children and adults that used cluster analysis for deriving types from questionnaire or rating data (Caspi & Silva, 1995; Pulkkinen, 1996). It is encouraging to notice that these diverse studies converged in finding the same three major personality types: resilient, overcontrolling, and undercontrolling individuals.

The Present Study

The present study is a reanalysis of the Munich Longitudinal Study on the Genesis of Individual Competencies (LOGIC; Weinert & Schneider, 1999) from a person-centered perspective. Q-sort descriptions of German children's personality were provided by their preschool teachers when the children were 4, 5, and 6 years of age and by a parent when the children were 10 years of age. These descriptions were based on a German 54-item short version of the California Child Q-Set. These Q-sort data were related to multiple assessments of major developmental outcomes in the cognitive and the social domain between ages 4 and 12 as well as to parental judgments of the Big Five at age 12.

Therefore, the first aim of the present study was to replicate and further confirm the results achieved by Robins et al. (1996) and Hart et al. (1997). In particular, we expected to find similar Q factors that showed similar relations with ego-control, ego-resiliency, and the Big Five. Furthermore, we expected that resilient participants would show a higher IQ than undercontrollers whereas overcontrollers would show intermediate scores. This pattern was also expected for deviations from the age-appropriate school grade due to late schooling or repetition of grades. In addition, we expected that overcontrollers would score higher on inhibition than the other two types and that undercontrollers would score higher on aggressiveness. Finally, we expected that overcontrollers would score lower on self-esteem than the other two groups but that undercontrollers would not score lower than resilient participants because of their well-documented tendency to preserve average self-esteem even when they face rejection by others (see, e.g., Hymel, Bowker, & Woody, 1993).

The second aim of our study was to evaluate the continuity of the Q factors and the stability of the individual prototypicalities for the Q factors between 4–6 and 12 years of age. We expected a high continuity of the Q factors despite the different ages and judges because cross-sectional studies had found similar types at diverse ages and for diverse judges. In contrast, we expected only a moderate stability of the individual prototypicalities for the three prototypes because of differential developmental change in many children (variable-oriented analyses of trait stability show that stability is moderate at best over childhood except for a few unusually stable traits such as general intelligence; see, e.g., Caspi, 1998).

Third, we tested Robins et al.'s (1996) three-type model of ego-control and ego-resiliency. As pointed out above, a quadratic relationship in the form of an inverted U-shaped function is expected between ego-resiliency and ego-control if this model is true.

Last, but not least, we wanted to explore the thorny question of whether the empirical types that are derived by Q-factor analysis represent discrete natural classes that "carve nature at its joints" (see Gangestad & Snyder, 1985, and Meehl, 1992, for the concept of a discrete natural class). It is tempting to interpret Q types in this way, but a closer look shows that Q types are not necessarily discrete.

Q-factor analysis results in individual factor loadings for the Q factors (the individual prototypicalities for the Q types). These scores are continuously distributed. The Robins et al. (1996) procedure generates categorical variables from these continuous variables. This procedure is not very different from traditional variable-oriented extreme group classifications. In both cases, continuous variables are transformed into categories that are based on relatively arbitrary cutoff scores. Thus, empirical Q types are not necessarily more discrete than groups that are classified by extreme scores on a few trait dimensions. Additional criteria are needed to infer with some confidence that such groups are discrete.

The discreteness of a personality type has most often been discussed for the case of (a) multiple indicators for one or two types (the taxonometric procedures developed by Meehl and colleagues; see Waller & Meehl, 1998) or (b) multiple types underlying one continuous distribution (admixture analysis; see MacLean, Morton, Elston, & Yee, 1976). In both cases, it is explored whether two or more overlapping but different latent distributions underlie the observed empirical distribution(s). Haslam (1997) provided an example of how both procedures can be applied to the same psychological data set.

The present case is different in that there are three personality types and a continuously distributed prototypicality variable for each type that can be considered a latent distribution of the type because it was derived by factor analysis. In this case, the multivariate distribution of the three prototypicality variables can be directly explored for evidence that the types are discrete.

Consider first the simpler case in which each individual can be assigned to one of two prototypes. In this case, the prototypicality variables for the two prototypes are expected to be negatively correlated because a high prototypicality for one prototype implies a low prototypicality for the other prototype, and vice versa. In this sense, the two types are "opposite" to each other. Note that orthogonal solutions in Q-factor analysis imply uncorrelated Q-factor scores for items, but the Q-factor loadings for individuals (the prototypicalities) may correlate.

The two personality types are represented as clusters in the bivariate distribution of the two prototypicality variables. If the clusters do not overlap, the types are discrete; the more the clusters overlap, the less the types are discrete. Figure 2 illustrates the case

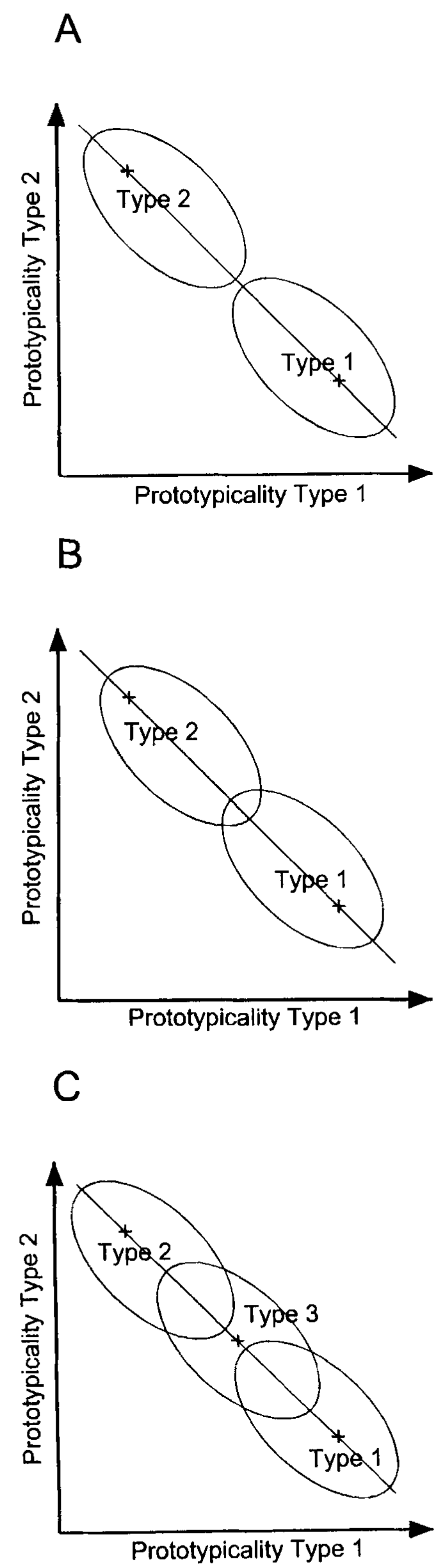

Figure 2. Types represented as clusters in multivariate space. A: Two discrete types. B: Two nondiscrete types. C: Two types that are discrete relative to each other in the case of three types.

of nonoverlapping clusters (Figure 2A) and overlapping clusters (Figure 2B). Note that in the case of Q factors, the clusters represent true types, not the empirically derived Q types.

If the types are discrete, the distributions of the two prototypicality variables are bimodal. One peak at high scores of the distribution indicates the type; the other peak at low scores indicates the opposite type. The less the types are discrete, the more the distributions of the two prototypicality variables tend to be unimodal because more and more individuals will be found in the overlapping region of the two clusters. Thus, the bimodality of the prototypicality distributions is a criterion for the discreteness of the types. Note that discreteness is a matter of degree rather than a matter of kind because the clusters may overlap more or less, and consequently the distributions may be more or less bimodal.

When this approach is extended to the case of three types, it is complicated by two facts. First, the correlation of the prototypicalities may be zero or even positive. Second, bimodality is not necessarily expected any more for discrete types. Figure 2C illustrates such a case. There are two opposite types, 1 and 2, and a third type with intermediate prototypicality scores for both Type 1 and Type 2. In this case, a unimodal, bimodal, or trimodal distribution can occur for Types 1 and 2 depending on how much the cluster for Type 3 overlaps with the clusters of the other two types. However, all three types may be discrete in this case because their clusters in the three-dimensional space generated by the three prototypicality variables may not overlap (in Figure 2C, we do not consider the prototypicality for Type 3 that may completely separate the cluster for Type 3 from the other two clusters).

However, the bimodality criterion can be used even in the case of three types if it is applied to pairs of types, not to the full sample of individuals. If one type is dropped from analysis, the bimodality of the prototypicalities for the two remaining types indicates how discrete these two remaining types are relative to each other. For example, in the case illustrated by Figure 2C, the prototypicalities for both Type 1 and Type 2 are bimodally distributed if Type 3 is dropped from analysis. Thus, Type 1 and Type 2 are discrete relative to each other.

In this pairwise approach, discreteness is a property of pairs of types, not of types. Therefore, it is possible that in the case of three types, two are discrete relative to each other but not relative to the third type. As we show below, this was the case in the present study.

Method

Participants

The participants were part of the LOGIC (Weinert & Schneider, 1999) sample. The LOGIC sample originally consisted of 204 children who started to attend 20 preschools in the Munich area in the fall of 1984 when they were 3–4 years old and whose first language was German; after 1 year, another 26 participants of the same birth cohort were added to the sample. This initial sample of 230 children (119 boys, 111 girls) was rather unbiased because the schools were selected from a broad spectrum of neighborhoods, and more than 90% of the parents who were asked for permission gave their consent for their child's participation.

Assessments and Measures

Assessments were scheduled three times a year over a period of 9 years. The present study refers to the following assessments: Teacher Q sorts at ages 4, 5, and 6 years; parental Q sort at age 10; parental assessment of the Big Five at age 12; IQ tests at ages 4, 6, 8, 10, and 12; school grade at ages 7 through 12; cognitive and social self-esteem at ages 8, 9, 10, and 12; parental scales for shyness toward strangers and aggressiveness at ages 4, 5, 6, 7, 8, 10, and 12; and observed behavioral inhibition at ages 4, 6, 8, and 10.

Teacher and parental Q sorts. The 54-item short version of the California Child Q-Set (J. H. Block & J. Block, 1980) was adapted to German by bilingual parents (Göttert & Asendorpf, 1989). This short form is representative of the full 100-item Q sort with regard to its two major dimensions: ego-control and ego-resiliency (see J. H. Block & J. Block, 1980). All LOGIC participants attended a preschool, or kindergarten, from ages 4 through 6. At the end of each school year, the child's main teacher provided a Q-sort description of the child. The teacher sorted the 54 items for their judged salience for the child according to a fixed, 9-point distribution (1 = *extremely uncharacteristic*, 9 = *extremely characteristic*). The teacher was instructed to sort exactly 6 items into each of the nine categories (forced equal distribution). Each teacher was assisted by a trained examiner who outlined the Q-sort procedure in detail and answered any questions about the procedure. At age 10, the children were judged by their main caregiver (nearly always the mother) with the same procedure except that the parents received a letter with the Q items, a detailed instruction for the Q-sort procedure, and the number of a telephone hotline for any questions about the procedure. Q sorts were available for the following number of participants: 193 (age 4), 209 (age 5), 183 (age 6), and 170 (age 10).

From a child's Q sort, scores for ego-control and ego-resiliency were computed by correlating the child's Q-sort profile with prototypic Q-sort profiles obtained from experts for ego-control and ego-resiliency (see J. H. Block & J. Block, 1980).

Parental Big Five questionnaire. At age 12, 155 participants were judged by their main caregiver (nearly always the mother) on bipolar adjectives that were obtained from a study by Ostendorf (1990). Ostendorf translated into German 179 bipolar adjective pairs obtained from North American studies on the Big Five factors of trait description. A factor analysis of self- and other judgments by adults confirmed in both cases a clear five-factorial structure that was interpreted as Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Culture. The 24 highest loading items on each factor of the self-ratings were pretested with 10 German children from Grades 5 and 6 who were asked to mark those adjectives that they did not fully understand in terms of their meaning as personality descriptors. Each adjective marked by any one child was deleted from the list, and the highest loading 12 bipolar items per factor were retained. The order of the adjectives within pairs was balanced with regard to the social desirability of the items. Finally, the order of the 60 bipolar items was randomized. Each bipolar item was answered on a 5-point scale (with labels *very, somewhat, neither/nor, somewhat, very*).

Exploratory factor analyses (forced five-factor solutions with subsequent varimax rotation) indicated many secondary loadings of the 60 items on nonassigned factors. These were reduced by item selection. An inspection of the factor loadings and item–total correlations for the resulting five scales suggested that retention of 8 items per factor was optimal because this criterion strongly reduced the secondary loadings but not the reliability of the resulting 8-item scales per factor. After item selection, 58% of the variance was explained by the five factors. All items that were chosen to represent one of the Big Five factors loaded above .47 on the corresponding factor and higher than on any other factor. The reliabilities for the five Big Five scales were satisfactory (median α = .86, range = .83–.91). The items with the highest corrected item–total correlation per scale were "sociable–withdrawn," Extraversion; "self-assured–helpless," Emotional Stability; "good-natured–touchy," Agreeableness; "thorough–careless," Conscientiousness; "knowledgeable–uneducated," Culture.

Intelligence tests. Verbal intelligence was assessed with the German versions of the Wechsler scales for preschool children at ages 4 and 5 years (HAWIVA; Eggert, 1978) or school-age children at ages 7, 9, and 12 years (HAWIK-R; Tewes, 1983). Nonverbal intelligence was assessed with the Columbia Mental Maturity Scale (Burgemeister, Blum, & Lorge, 1972) when the children were 4, 6, and 8 years old and with the German version of the Culture Fair Intelligence Test (CFT-20; Weiß & Osterland, 1979) at 10 and 12 years of age. The full LOGIC sample was tested at all ages (the number of participants varied between 179 and 211). Except for the first assessment, verbal and nonverbal IQ was obtained some months apart to avoid overtesting effects. Because the tests varied necessarily across assessments, and the available test norms referred to different birth cohorts and cultures, we computed IQ scores separately for the verbal and nonverbal IQ tests for each assessment, and the total IQ by averaging verbal and nonverbal IQ. Mean age for the total IQ scores was 4, 6, 8, 10, and 12 years. The reliabilities of the total IQ were high for all five assessments (Cronbach's alpha varied between .82 and .88).

Cognitive and social self-esteem. At 8, 9, 10, and 12 years of age, the full LOGIC sample was tested for cognitive and social self-esteem with age-appropriate German versions of the Harter scales (Asendorpf & van Aken, 1993; Harter, 1985; Harter & Pike, 1984). At age 8, the Pictorial Scales for Cognitive Compentence and Peer Acceptance were used, and at the later ages, the Scholastic Competence and Social Acceptance Scales were used (see Asendorpf & van Aken, 1994, for more detailed information, including reliabilities). Because of a strong reference group effect for cognitive self-esteem due to different school tracks at age 12, the age 12 data for cognitive self-esteem were corrected for this effect (see Asendorpf & van Aken, 1994).

Parental inhibition and aggressiveness scales. The main caregiver (nearly always the mother) answered a questionnaire when the child was age 4, 5, 6, 7, 8, 10, and 12. When the child was ages 4 through 10, the parent accompanied the child to the test session (the number of participants varied between 94 and 115), and the questionnaire contained an eight-item inhibition scale and a four-item aggressiveness scale, among other items. When the children were age 12, the questionnaire was mailed to the parents (n = 157) and contained a four-item inhibition scale and the same four-item aggressiveness scale. The four items of the inhibition scale were identical in all cases except that they asked separately for inhibition toward adults and children at ages 4–10, whereas only two of them asked for inhibition toward adults and another two for inhibition toward children at age 12 because all items were highly correlated at ages 4–10 (the inhibition scale at ages 4–10 is identical with the scale used by Asendorpf, 1990, 1991, and Asendorpf & van Aken, 1994). The reliabilities were high for both scales at all seven assessments; Cronbach's alpha was at least .85 in each case.

Behavioral inhibition toward strangers. At 4, 6, 8, and 10 years of age, the children were observed in the laboratory when they met with an adult stranger. The observational settings were described by Asendorpf (1994). We used in the present study the same measures of behavioral inhibition that Asendorpf used: the latency of the first spontaneous utterance of the child to the stranger at ages 4 and 6 and the percentage of silence during the conversations at ages 8 and 10 (see Asendorpf, 1994, for reliability and validity data).

At 5 and 7 years of age, the children were observed in the laboratory in a dyadic play session with an unfamiliar peer. The observational settings were described by Asendorpf (1990). We used in the present study a measure of behavioral inhibition that was highly similar to the inhibition measures for the early confrontations with adult strangers: the latency of the first request directed to the unfamiliar peer (see Asendorpf, 1990, 1991, for reliability and validity data). The number of children in these six assessments varied between 88 and 114.

Attrition and Definition of a Longitudinal Sample

Participants' attrition was relatively low and unsystematic (19% over 9 years, mostly due to a change in residence; less than 10% of the initial sample of children or their parents withdrew permission for testing). However, the sample size varied considerably across the assessments that included parental and teacher judgments because some of these informants did not want to cooperate in the study. Therefore, it was desirable to reduce sampling error in the data by studying one subsample. For only 102 of the 230 LOGIC children were parental and teacher judgments available in all five assessments; focusing only on these children would have resulted in a loss of a majority of the participants. Because it seemed advisable to increase the reliability of the early personality judgments by aggregation, a reasonable compromise was to focus on the 151 participants with nonmissing teacher Q sorts at ages 4 through 6. These 78 boys and 73 girls constituted the sample for the present study.

Results

Derivation of Q Factors for Early and Late Childhood

Q factors were derived exactly as described by Robins et al. (1996) by inverse factor analysis. This was done separately for early and late childhood, both for the full sample and separately for boys and girls. First, the teacher Q sorts at ages 4, 5, and 6 were averaged over the three assessments to increase their reliability. These 151 aggregated teacher Q sorts were then intercorrelated and factor analyzed. To replicate the types reported by Robins et al. (1996) and Hart et al. (1997), we derived a forced three-factor solution by principal-components analysis, followed by varimax rotation. The three factors explained 59% of the variance of the aggregated teacher Q-sort profiles (for the unrotated factors, Factor 1, 39%; Factor 2, 14%; Factor 3, 6%).

This procedure was repeated for the 124 parental Q sorts at age 10. The three factors explained 51% of the variance of the Q-sort profiles (Factor 1, 37%; Factor 2, 7%; Factor 3, 7%). The three parental factors explained somewhat less variance than the teacher factors, a result that may be due to the higher reliability of the aggregated teacher Q sorts.

These two analyses were repeated separately for boys and girls. The three factors explained a somewhat higher percentage of variance for girls than for boys (ages 4–6, 67% vs. 57%; age 10, 55% vs. 50%). This was due to a larger first factor for girls in both cases. The similarity of the three factors across sex was studied by correlating the factor scores of the 54 Q-sort items between boys and girls. The 2 (age) × 3 (factor) = 6 correlations varied between .57 and .88, with a median of .82. Thus, the factors were similar for male and female participants.

Continuity and Cross-Judge Consistency of the Q Factors

The continuity of the three Q factors was studied by correlating the factor scores of the 54 Q-sort items between the ages of 4–6 and 10 years. The expected high continuity was found despite the fact that the early factors were based on teacher judgments whereas the late factors were based on parental judgments. The

Table 1
Consistency of the Q Factors Across Different Studies

		Germany					
		Ages 4–6, teachers			Age 10, parents		
Population	Judges	Resilient	Overcontrolled	Undercontrolled	Resilient	Overcontrolled	Undercontrolled
Dutch, ages 2–3	Teachers	.97	.73	.65			
Dutch, ages 7–12	Parents				.89	.69	.69
Icelandic, age 7	Experts	.90	.63	.43			
U.S. boys, age 13	Parents				.82	.66	.53
U.S. boys, age 13	Parents				.89[a]	.65[a]	.58[a]

Note. Values reported are Pearson product–moment correlations between prototypic Q-sort profiles obtained for similar ages.
[a] Consistency with German male factors.

continuities were .88 for Factor 1, .82 for Factor 2, and .78 for factor 3.[2]

Similarity of the Q Factors Across Studies

To study the similarity of our Q factors with those reported by Robins et al. (1996), Hart et al. (1997), and Haselager, van Lieshout, and van Aken (1997), we correlated our factor scores with theirs (R. Robins, D. Hart, & G. Haselager, personal communication, July 1997).[3] In addition, we correlated the factors for our male sample with those of Robins et al. because these authors had studied only boys. Our factors could be unambiguously interpreted as Resilient, Overcontrolled, and Undercontrolled. The similarity coefficients between our factors and those found in the other three studies are presented in Table 1.

The similarities are satisfactory, given the differences between the studies in terms of culture, the Q set, age, and sometimes also type of judge. Closer inspection shows that our factors tended to be more closely related to the Dutch factors than to the U.S. or the Icelandic factors. Furthermore, our male factors showed no clear incremental validity over the factors derived from the full sample with regard to Robins et al.'s (1996) factors for boys, probably because they were based on fewer children. Also, our sex-specific factors were similar between boys and girls (the median similarity was .82 as reported above). Therefore, in the following analyses we related both boys and girls to the same overall Q factors.

Classification of Children

Following the procedure described by Robins et al. (1996), children were initially assigned to a type on the basis of their factor loadings on the three Q factors (separately for ages 4–6 and 10). A child was assigned to one of the three personality types if (a) the factor loading of the child's profile was at least .40 for the Q factor, (b) the second highest loading was at least .20 lower, and (c) the child did not have loadings above .40 on all three Q factors (only one parental Q sort showed such a pattern). Through these criteria, 69% of the children could be classified at ages 4–6 on the basis of the aggregated teaçher Q sorts, and 50% of the children could be classified at age 10 on the basis of the parental Q sorts.

Subsequently, the remaining children were assigned to the three types by discriminant analysis as described by Robins et al. (1996). Thus, these children were assigned to the most similar type by two discriminant functions (weighted combinations of Q-sort items) that optimally discriminated among the three already classified groups. Children whose probability of correct classification was below 75% were not classified. At ages 4–6, 93% of the children could be assigned to one of the three types, and at age 10, 88% of the children could be so assigned. Thus, nearly all children could be assigned to a best-matching personality type. At ages 4–6, 49% were resilient, 21% were overcontrollers, and 31% were undercontrollers; at age 10, 52% were resilient, 28% were overcontrollers, and 19% were undercontrollers. The difference between these proportions was not significant, $\chi^2(2, N = 244) = 4.42, p > .10$.

Sex differences were analyzed using chi-square tests that compared the relative frequency of boys and girls across the three types. Significant differences were found for both ages: ages 4–6, $\chi^2(2, N = 141) = 18.5, p < .001$; age 10, $\chi^2(2, N = 109) = 8.5, p < .02$. Post hoc chi-square tests that compared the relative frequency of boys and girls within a type with their relative frequency outside this type indicated at both ages significant differences for the resilient type ($p < .01$) and the undercontrolled type ($p < .02$), but not for the overcontrolled type. At both ages, girls were overrepresented among the resilient children (approximately 60% of the girls were resilient, but only 40% of the boys were resilient) and underrepresented among the undercontrolled children (approximately 40% of the boys but only 15% of the girls were undercontrolled).

[2] The factors were matched across time with regard to their highest correlations. When they were matched with regard to the order in which they emerged in the factor analyses, Factor 2 at ages 4–6 showed a high continuity with Factor 3 at age 10, and Factor 3 at ages 4–6 showed a high continuity with Factor 2 at age 10. This reversal should not be taken too seriously because Factors 2 and 3 explained a highly similar amount of variance at age 10; a slight variation in the sample of children or judges might have produced a different order.

[3] We correlated the factor scores of our 54 Q-sort items with the corresponding items of the 100-item Q sorts.

Table 2
California Child Q-Set (CCQ) Items Most and Least Descriptive of the Three German Factors at Ages 4–6

Type 1: Resilient		Type 2: Overcontrolled		Type 3: Undercontrolled	
z score	CCQ item (number)	*z* score	CCQ item (number)	*z* score	CCQ item (number)
1.63	Attentive, able to concentrate (66)[a]	1.90	Gets along well with other children (4)	2.54	Vital, energetic, lively (28)
1.50	Competent, skillful (89)	1.59	Considerate of others (2)[a]	1.71	Restless and fidgety (34)
1.46	Self-reliant, confident (88)[a]	1.54	Helpful and cooperative (6)	1.57	Pushes and stretches limits (13)[a]
1.40	Becomes strongly involved (74)	1.50	Obedient and compliant (62)	1.38	Expresses negative feelings directly (18)[a]
1.36	Curious and exploring (40)	1.43	Uses and responds to reason (25)	1.17	Transfers blame to others (11)[a]
1.23	Persistent in activities (41)[a]	1.35	Neat and orderly (59)	1.12	Stubborn (90)[a]
1.20	Self-assertive (82)[a]	1.16	Sought out by other children (5)	1.09	Curious and exploring (40)
1.18	Planful, thinks ahead (67)	1.16	Arouses liking in adults (30)[a]	1.04	Seeks for assurance from others (48)
1.13	Resourceful in activities (36)	0.99	Gives, lends, and shares (32)	1.00	Verbally fluent (69)
1.11	Creative (96)	0.92	Develops close relationships (9)	0.96	Sought out by other children (5)
−1.15	Restless and fidgety (34)	−1.20	Jealous and envious of others (56)[a]	−1.02	Obedient and compliant (62)[a]
−1.23	Fearful and anxious (23)	−1.26	Afraid of being deprived (55)	−1.29	Persistent in activities (41)
−1.31	Anxious in unpredictable settings (60)	−1.31	High standards of performance (47)	−1.32	Becomes strongly involved (74)
−1.32	Indecisive and vacillating (53)	−1.31	Likes to compete (37)[a]	−1.37	Planful, thinks ahead (67)[a]
−1.34	Inhibited and constricted (35)[a]	−1.33	Seeks to be independent (83)	−1.38	Attentive, able to concentrate (66)[a]
−1.36	Rapid shifts in mood (54)[a]	−1.48	Self-reliant, confident (88)	−1.56	Fearful and anxious (23)[a]
−1.41	Immature behavior under stress (12)[a]	−1.48	Pushes and stretches limits (13)	−1.71	Gives in in conflict (44)[a]
−1.44	Disorganized under stress (46)[a]	−1.85	Self-assertive (82)	−1.82	High standards for self (47)
−1.49	Sulky or whiny (94)	−2.01	Teases other children (80)	−1.90	Inhibited and constricted (35)
−1.54	Cries easily (33)[a]	−2.04	Aggressive (85)[a]	−2.26	Ruminates and worries (24)

Note. Abbreviated item descriptions are given. Factor scores (*z* scores) indicate the degree to which an item is characteristic of each Q factor.
[a] Items were also among the 10 most or least characteristic items of the factors reported by Robins et al. (1996).

Description of the Three Personality Prototypes

Like Robins et al. (1996), we described the three personality prototypes by listing the 10 most descriptive and the 10 least descriptive California Child Q-Set items for each prototypic profile (see Table 2) and by locating the three Q types in a two-dimensional space formed by ego-resiliency on the vertical axis and ego-control on the horizontal axis (see Figure 3). Figure 3 can be directly compared to Robins et al.'s data (see Figure 1) because we used the same definition of ego-control and ego-resiliency and expressed them in terms of scores that have a mean of 50 and a standard deviation of 10 (*T* scores). Because of the high continuity of the types, we report only the results for the more reliable types at ages 4–6.

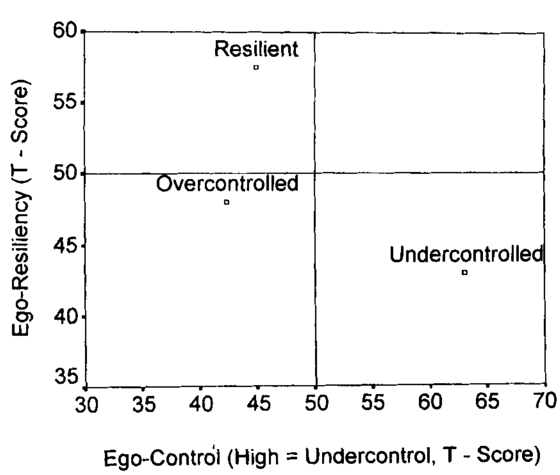

Figure 3. Three Q types as a function of ego-control and ego-resiliency at ages 4–6.

Table 2 indicates that resilient children were described by their teachers as competent and confident and not as insecure, immature, and fearful. A comparison with the description provided by Robins et al. (1996) shows nearly perfect agreement (it should be noted that many of the items of the Q sort used by Robins et al., 1996, were not included in our 54-item short version and hence cannot appear in our list). The overcontrolled children were described by their teachers as prosocial, well-liked by children and adults, and obedient and not as aggressive, self-assertive, and competitive. This picture of somewhat passive, prosocial children is slightly different from the overcontrolled type found by Robins et al. that was described as sensitive to criticism, well-liked, shy, and prosocial. Finally, the undercontrolled children were described by their teachers as energetic, restless, and antisocial and not as inhibited and able to concentrate.

Together, these comparisons between our three types and Robins et al.'s (1996) types suggest a high degree of agreement in the definition of all three types. Slight differences existed in a lower emphasis on shy–sensitive behavior in our overcontrolled type. Thus, both the overcontrollers and the undercontrollers in our study were expected to be somewhat more resilient than the Caucasian subsample of Robins et al. (1996). Indeed, all three German types were 2–5 *T* points higher in ego-resiliency (cf. Figures 1 and 2).

A possible reason for this difference is that our longitudinal sample was somewhat biased toward high ego-resiliency. We tested this hypothesis by comparing children's ego-resiliency scores at the second assessment between the longitudinal sample

Table 3
Stability Between Ages 4–6 and 10

Measure	Resilient	Overcontrolled	Undercontrolled
Continuous (Q-factor loadings)	.44***	.22*	.23*
Categorical (dummy-coded type)	.30**	.30**	.30**

Note. n = 103 children who were classifiable at both ages. Values reported are Pearson product–moment correlations.
* $p < .05$. ** $p < .01$. *** $p < .001$.

(N = 151) and the dropouts (n = 58); we chose the second rather than the first assessment for this comparison because some children were added to the LOGIC sample after the first assessment. The longitudinal sample's ego-resiliency was 4.4 T scores higher than the dropouts' scores, $t(207) = 2.84$, $p < .005$. Thus, the higher ego-resiliency scores of our types were mainly due to a sampling problem, not to age, judge, or cultural differences. Also, our resilient group had somewhat higher scores in ego-control. This difference seems to be due to the fact that Robins et al. (1996) studied only boys. In our longitudinal sample, girls' ego-control scores were 7.1 T scores higher than boys' scores, $t(149) = 4.73$, $p < .001$.

Together, these analyses indicate that the differences between our types and those found by Robins et al. (1996) can by and large be explained by sampling differences. The overall pattern, however, was identical across both studies: high ego-resiliency for the resilient type, high ego-control and moderately low ego-resiliency for the overcontrolled type, and low scores for both ego-resiliency and ego-control for the undercontrolled type.

Stability of the Individual Membership for the Three Q Types

Two indexes for a child's personality type were available for each assessment (if the child was classifiable): the prototype to which the child was assigned (a categorical variable) and the child's Q-factor loading on this type (a continuous variable that represents the child's prototypicality for the type). Thus, we could study the stability of children's membership for a type both from a categorical and from a continuous perspective.

To assure a fair comparison between the stabilities for the continuous and the categorical variables, we considered only those 103 children who were classifiable at both ages 4–6 and 10. The Pearson product–moment correlation was used as a measure of stability. Because the proportions of the three types were highly similar at both ages, the Pearson correlations for the categorical variables were virtually identical with Cohen's κ. As Table 3 indicates, the stability of the type membership was moderate to low. Except for resiliency, the stabilities for the continuous measures were not higher than the stabilities for the categorical measures. Thus, the types were highly continuous over childhood, but many children changed their membership for the types.

Prediction of the Big Five From the Three Q Types

The three Q types at ages 4–6 and 10 were related to the parental ratings on the Big Five scales at age 12. To facilitate comparison with the results of Robins et al. (1996), we expressed the Big Five means of the three types as T scores that were computed for the full sample at age 12 (n = 155). As Figure 4 shows, the rank order of the types for the Big Five factors was highly similar for both predictions.

Comparison with the rank order reported by Robins et al. (1996) also indicated a high similarity. Therefore, we tested whether the rank order of the types for our two predictions was the same as the rank order reported by Robins et al. We did this by testing appropriate contrasts within repeated measures analyses of vari-

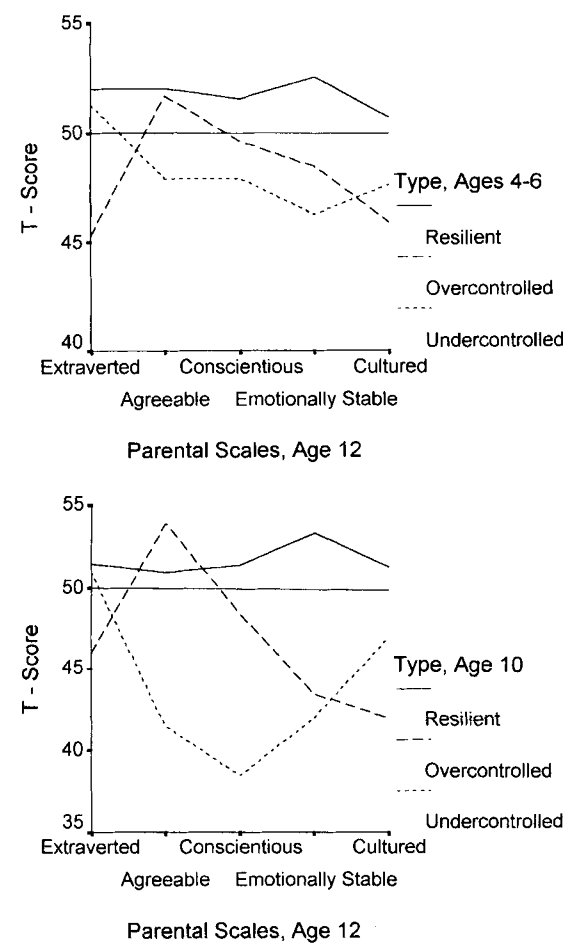

Figure 4. Big Five profiles at 12 years of age for the Q types at ages 4–6 (top panel) and 10 (bottom panel).

ance (ANOVAs) for each Big Five factor (one-tailed t tests are appropriate in this case). All predictions were significantly confirmed for both ages.

For Extraversion, the rank order "resilient, undercontrolled > overcontrolled" was confirmed: For ages 4–6, $t(101) = 2.64, p < .01$; for age 10, $t(85) = 1.85, p < .04$. For Agreeableness, the rank order "resilient, overcontrolled > undercontrolled" was confirmed: For ages 4–6, $t(101) = 1.82$, $p < .05$; for age 10, $t(85) = 2.49$, $p < .01$. For Conscientiousness, the rank order "resilient > overcontrolled > undercontrolled" was confirmed: for ages 4–6, $t(101) = 1.75, p < .05$; for age 10, $t(85) = 4.41, p < .001$. For Emotional Stability, the rank order "resilient > overcontrolled, undercontrolled" was confirmed: For ages 4–6, $t(101) = 2.53, p < .01$; for age 10, $t(85) = 3.22, p < .001$. Finally, for Culture (which corresponds to Robins et al.'s, 1996 openness scale), the rank-order "resilient > overcontrolled, undercontrolled" was confirmed: For ages 4–6, $t(101) = 1.99, p < .03$; for age 10, $t(85) = 3.33, p < .001$.

Prediction of Personality Development From the Early Q Types

The three teacher-based Q types at ages 4–6 were related both to the mean level and to the linear change in the following variables: IQ, deviation from the age-appropriate school grade, cognitive and social self-esteem, parental judgments of aggressiveness and inhibition, and behavioral observations of inhibition toward strangers. For each variable, three to seven assessments were available. Except for school grade, which was measured on an absolute scale, all other variables were standardized for the full sample in terms of IQ or T scores.

Instead of the traditional multivariate analysis of variance (MANOVA) approach to the measurement of change, growth curve modeling was used (HLM; Bryk & Raudenbush, 1992). In HLM, a linear individual developmental function can be estimated for each child. Each function is characterized by two parameters that are simultaneously estimated: level (the estimated score at the midpoint of the observation interval) and slope (the slope of the straight line representing the developmental function). One major advantage of this approach is that level and slope can be estimated even if there are missing values between the first and the last nonmissing assessment. To make sure that the developmental functions were based on a sufficiently long prediction interval, we included in these analyses only children with a nonmissing score at one of the first two and at one of the last two assessments.

As suggested by Bryk and Raudenbush (1992), a Bayesian approach was used to estimate the developmental function for each child. This approach reduces measurement error in the individual change function by estimating both level and slope by a weighted combination of the individual data and the average level and slope in the sample. The more the individual data deviate from the estimated straight line, the stronger is the line pulled toward the average line in the sample.[4]

Originally we tested all a priori hypotheses by appropriate contrasts within one-way ANOVAs in which type was the between-subjects factor. Because all expected type differences that were significantly confirmed were also significant in the following more conservative explorative procedures, we report only the results of these procedures.

First, the variables were grouped into (a) the three cognitive variables—IQ, grade deviation, and cognitive self-esteem; (b) behavioral inhibition and parental judgments of inhibition; (c) parental judgments of aggressiveness; and (d) social self-esteem. This grouping made sense not only theoretically but also empirically because the level of these variables showed significant positive correlations within groups. Social self-esteem was not grouped with cognitive self-esteem despite a moderate correlation of .37 because it was unrelated to the level of IQ and grade, and it was not grouped with inhibition or aggressiveness because it was not correlated with these variables. Second, the variables of each group were tested for type differences by a MANOVA separately for level and slope. If the overall type effect was significant, post hoc Bonferroni-corrected tests explored which pairs of types were different (thus, the significance level was set to .016 for these three contrasts). Finally, if multiple variables showed a significant type difference, t tests explored which variable caused this difference.

Cognitive competence. The means of the three types for the assessments of IQ, deviation from the age-appropriate grade, and cognitive self-esteem are presented in Figure 5. Figure 5 indicates a stable above-average cognitive competence for the resilient children, a stable below-average cognitive competence for the undercontrollers, and a decreasing cognitive competence for the overcontrollers. This pattern was supported by the statistical tests. The overall MANOVA was significant for both level, $F(6, 242) = 3.83$, $p < .001$, and slope, $F(6, 242) = 2.21$, $p < .05$. Subsequent Bonferroni-corrected tests showed significant differences in the level of cognitive competence between resilient participants and undercontrollers, $F(3, 98) = 6.88$, $p < .001$, and in the slope of cognitive competence between resilient participants and overcontrollers, $F(3, 83) = 3.69$, $p < .015$. Finally, t tests showed that resilient participants had higher levels than undercontrollers in IQ, $t(101) = 4.32, p < .001$, and in their deviation from the age-appropriate grade, $t(101) = 2.99$, $p < .005$, but not in cognitive self-esteem ($t < 1$). For slope, the decreasing cognitive competence of the overcontrollers relative to the resilient participants was significantly confirmed for all three variables; in each case, $t(87) > 2.00$, $p < .05$. Thus, all hypotheses for cognitive competence were confirmed, and the unexpected relative decrease in the cognitive competence of the overcontrollers was replicated for all three aspects of cognitive competence. In particular, overcontrollers reflected their decreasing competence in their self-esteem scores, whereas the undercontrollers, as expected, maintained an average self-esteem in the cognitive domain despite their clearly lower competence.

Inhibition. The means of the three types for the behavioral and parental assessments are presented in Figure 6. Figure 6 indicates that, as expected, overcontrollers had higher inhibition scores than both resilient participants and undercontrollers; in addition, under-

[4] In addition, ordinary least squares estimates were also computed. Comparison with the Bayes estimates showed that, as predicted by Bryk and Raudenbush (1992), the interindividual variance of the Bayes estimates was smaller, and the effect sizes for significant differences were larger in most cases. Therefore, we report only the results for the Bayes estimates.

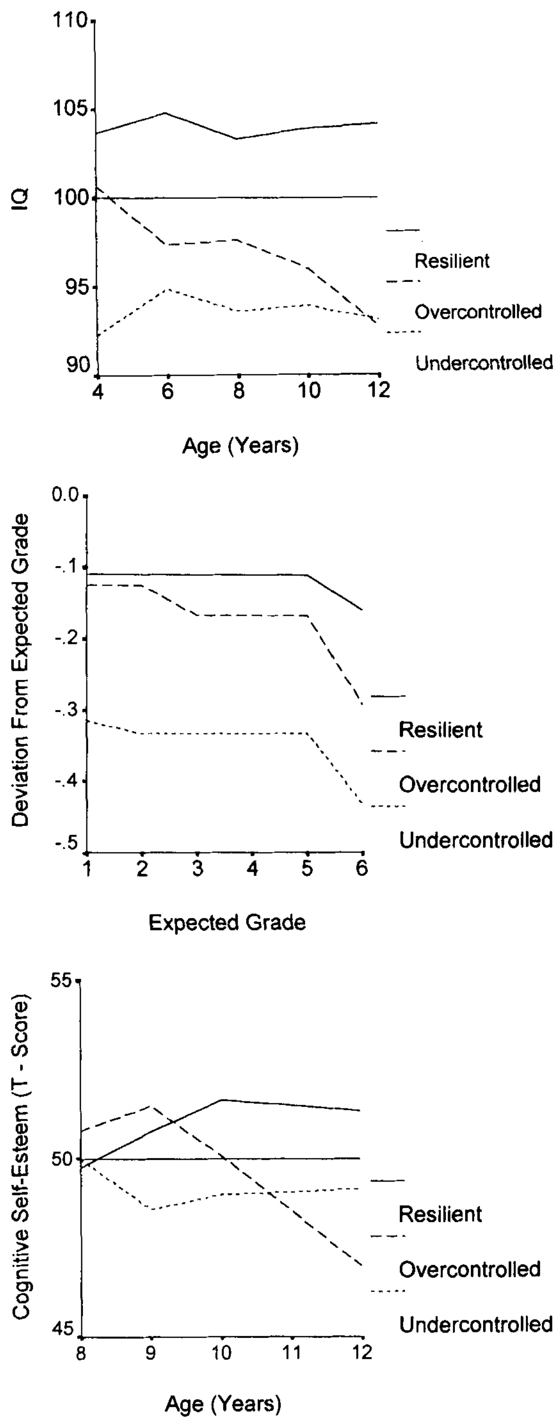

Figure 5. Cognitive competence of the Q types identified at ages 4–6.

controllers had lower scores than resilient participants for behavioral inhibition.

The overall MANOVA was significant for the level, $F(4, 144) = 6.46, p < .001$, but not for the slope ($F < 1$). Subsequent Bonferroni-corrected tests showed significant differences in the level of inhibition between overcontrollers and both resilient participants, $F(2, 53) = 6.13, p < .01$, and undercontrollers, $F(2, 34) = 7.96, p < .001$; the difference between resilient participants and undercontrollers was also significant, $F(2, 56) = 6.05, p < .01$. Finally, t tests showed that these differences were significant for both the behavioral and the parental-judgment measures of inhibition (in each case, $t > 2.63, p < .02$) except for the difference between resilient participants and undercontrollers that was significant only for the behavioral measure, $t(58) = 2.15, p < .04$, not for the parental judgments ($t < 1$). Thus, the expectation that overcontrollers were particularly inhibited was confirmed. Also, undercontrollers were behaviorally less inhibited than resilient participants (see Figure 6).

Parental judgments of aggressiveness. Figure 7 suggests that, as expected, aggressiveness was particularly high in undercontrollers and that this difference increased.

The ANOVA was significant for both level, $F(2, 76) = 12.28, p < .001$, and slope, $F(2, 76) = 4.01, p < .03$. For level, undercontrollers were judged higher in aggressiveness than both resilient participants, $F(1, 59) = 16.78, p < .001$, and overcontrollers, $F(1, 37) = 18.80, p < .001$, whereas resilient participants and overcontrollers were not judged differently ($F < 1$). For slope,

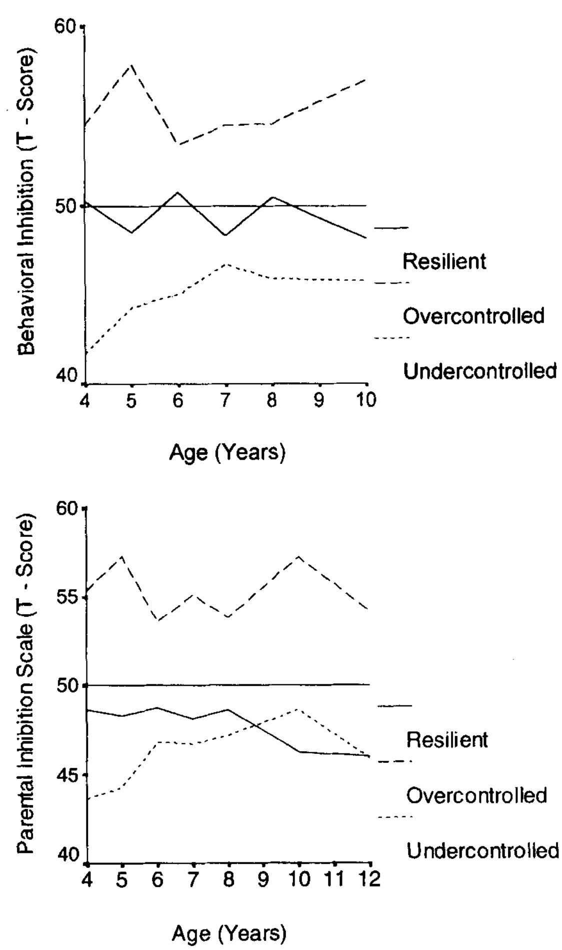

Figure 6. Inhibition of the Q types identified at ages 4–6.

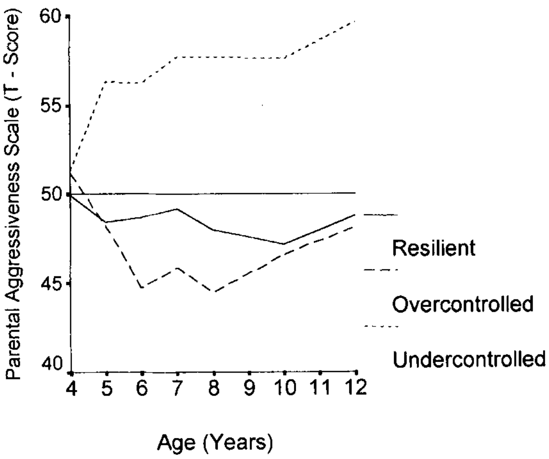

Figure 7. Aggressiveness of the Q types identified at ages 4–6.

undercontrollers were increasingly seen as more aggressive than the resilient participants, $F(1, 59) = 6.31, p < .015$, whereas the difference with the overcontrollers failed to reach the Bonferroni-corrected significance level of .016, $F(1, 37) = 5.24, p = .028$. Also, inspection of Figure 7 clearly indicates that the slope differences were mainly due to the first parental judgment. When the slopes were computed only for age 5 through 12, the type differences for the slopes were not significant anymore. That the three types were not distinguished by the parents at a time when the children had just started preschool may be due to an invalidity of these early parental judgments. Thus, the expectation that undercontrollers are more aggressive than other children was confirmed, but Hart et al.'s (1997) finding that this difference increases after 7 years of age was not supported.

Social self-esteem. The ANOVAs were not significant, either for level ($F < 1$), or for slope, $F(2, 128) = 2.53, p = .08$. Also, the a priori hypothesis that overcontrollers have lower social self-esteem than the other two groups was not confirmed (for the a priori contrast within an ANOVA, $t < 1$).

All in all, most hypotheses concerning the three types were confirmed. Not confirmed were an increasing aggressiveness of the undercontrollers after age 4 and a lower social self-esteem of the overcontrollers. However, the cognitive competence of the overcontrollers (including their cognitive self-esteem) decreased continuously between 4 and 12 years of age.

Quadratic Relation Between Ego-Control and Ego-Resiliency

In order to test the three-type model of ego-control and ego-resiliency, we regressed ego-resiliency first on ego-control and then on ego-control squared in a hierarchical regression for both ages 4–6 and 10. At both ages, the quadratic component added significantly to the linear component: ages 4–6, $R^2_{change} = .040$, $F_{change}(1, 148) = 9.20, p < .01$; age 10, $R^2_{change} = .046$, $F_{change}(1, 121) = 7.36, p < .01$. Thus, the three-type model that assumes low resiliency scores for both high and low control and intermediate control scores for high resiliency was supported.

Do the Q Types Reflect Discrete Types?

Relations between the Q-factor loadings. As expected, the Q-factor loadings for overcontrol and undercontrol were negatively correlated at both ages (for ages 4–6, $r = -.71$; for age 10, $r = -.40$). That the correlation was stronger at ages 4–6 may be attributed to the more reliable aggregated Q-sort patterns. Thus, overcontrollers and undercontrollers were opposite types of each other. In contrast, the correlations between the prototypicalities for the resilient type and the opposite types were less negative at both ages (at ages 4–6, −.38 for undercontrol and .30 for overcontrol; at age 10, −.20 for undercontrol and −.09 for overcontrol).

Furthermore, in line with the quadratic relation between ego-resiliency and ego-control, the Q-factor loadings for resiliency showed a negative quadratic relation with the Q-factor loadings for overcontrol and undercontrol at both ages (in all four cases, $p < .003$). In contrast, overcontrol was not quadratically related to undercontrol nor vice versa (in all four cases, $p > .10$).

The relations between the factor loadings at ages 4–6 are presented in Figure 8. All in all, these results suggest that overcontrollers and undercontrollers are opposite types whereas resilient children are unrelated to them in terms of prototypicalities.

Bimodality of the prototypicality distributions. For each age and pair of types, the third type was dropped from analysis, and the remaining distribution of the prototypicalities for the two types was plotted. Thus, 2 (age) × 3 (pairs of types) × 2 (prototypicalities) = 12 distributions were studied. The 6 distributions for the more reliable data at ages 4–6 are presented in Figure 9. The variables were divided into 10 equal intervals ranging from the lowest to the highest score. When the data were divided into 8–12 intervals, the patterns were very similar. Finer discriminations led to unstable results because there were not enough children for each interval; coarser discriminations obscured peaks or valleys that were visible in the finer discriminations. Thus, 10 intervals seemed to be optimal.

Figure 9 indicates no bimodality for resiliency. Instead, a smooth skewed distribution was found when overcontrollers or undercontrollers were dropped from the analysis. In contrast, the distributions for both overcontrol and undercontrol were clearly bimodal when resilient participants were dropped from analysis. The two peaks were equally high for overcontrol, whereas for undercontrol the peak for high scores was higher than the peak for low scores. This difference can be readily explained by the fact that there were more undercontrollers than overcontrollers (43 vs. 29). Finally, the distributions for overcontrol and for undercontrol showed no clear bimodal distribution when undercontrol or overcontrol were dropped from analysis.

That clear bimodal distributions were found only when resilient participants were dropped from analysis cannot be attributed simply to the fact that this group was larger than the overcontrollers or the undercontrollers. When the equally large group of nonresilient participants was dropped from analysis, the distributions for both overcontrol and undercontrol were nearly perfectly normal (Kolmogorov–Smirnov test for deviation from normality, $Z < 1$, $p > .66$, in both cases).

Similar distributional patterns were found at age 10, although the bimodality patterns for overcontrollers versus undercontrollers were somewhat less marked, which can be attributed to the less

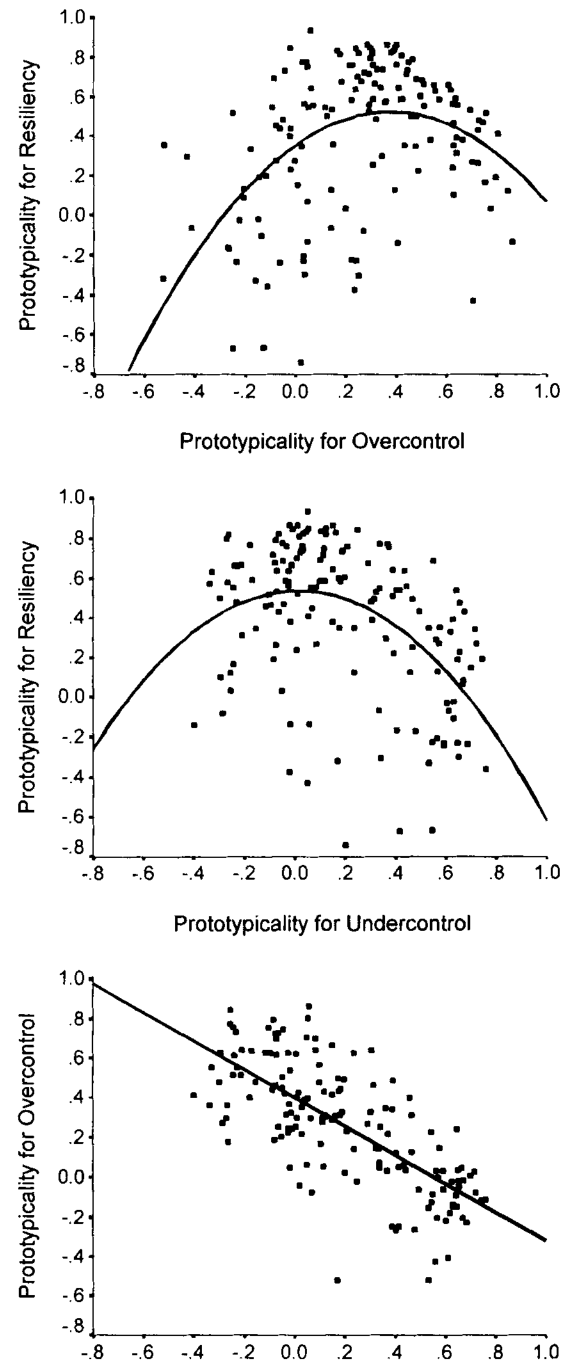

Figure 8. Relations between the prototypicalities (Q-factor loadings) for the three Q types identified at ages 4–6.

reliable data. Together, these distributional analyses suggest that overcontrollers and undercontrollers are discrete types relative to each other whereas resilient children are not discrete relative to overcontrollers or undercontrollers.

Discussion

This longitudinal study replicated most of the findings of Robins et al. (1996) and Hart et al. (1997) on three personality types in childhood in a different culture. It also provided for the first time information on the continuity and stability of the three types, provided more information on the developmental outcomes of the three types, and confirmed quadratic relations between ego-resiliency and ego-control that were expected from Robins et al.'s three-type model but not from J. H. Block and J. Block's (1980) independence model of ego-control and ego-resiliency.

Furthermore, the detailed analysis of relational and distributional characteristics of children's prototypicality for the three empirically derived personality prototypes suggested that resiliency is best conceptualized as a continuous trait whereas overcontrol and undercontrol are best conceptualized as discrete, opposite types relative to each other. This mixture of continuous and categorical aspects of the same multivariate distribution is discussed below, but first we discuss the replications and other new findings of the present study.

Replications

Consistency across studies. Using exactly the same methodology of deriving types from Q-sort patterns as Robins et al. (1996), we found highly similar Q factors and Q types that can be interpreted as resilient, overcontrolled, and undercontrolled. All three types had somewhat higher ego-resiliency scores than Robins et al.'s types, which could be explained by the higher dropout rate of the nonresilient children in our longitudinal study. Also, our resilient children had slightly higher ego-control scores than those in the Robins et al. study, which could be explained by our inclusion of girls in the sample. Except for these deviations that were due to sampling differences, the consistency with the Robins et al. types was impressive despite the differences in population (Caucasian boys and girls vs. a racially mixed U.S. sample of boys), age (4–6 vs. 13 years), judge (teachers vs. parents), and sample of Q-sort items (a 54-item subsample vs. the full 100-item California Child Q-Set).

Furthermore, similarly high consistencies were found with all three Dutch and two of the Icelandic personality types; only the consistency with the undercontrolled Icelandic type was merely modest. Because this third Icelandic type showed an even lower consistency with the Robins et al. (1996) type, the Icelandic type rather than our third type seems problematic.

Together, these results indicate a satisfactory replicability of the three personality types across cultures, judges, and ages. This finding confirms the general conclusion drawn by Caspi (1998) that three major personality types can be distinguished: resilient individuals, overcontrollers, and undercontrollers. Starting from this first level of differentiation, further distinctions can be made by differentiating subtypes of these three major types (see Robins, John, & Caspi, 1998). However, such an analysis of subtypes requires a sample of variables or children that is much larger than in our study.

Relations with the Big Five. We could also fully replicate the relations between the three Q types and the Big Five factors of trait description that were reported by Robins et al. (1996). For every

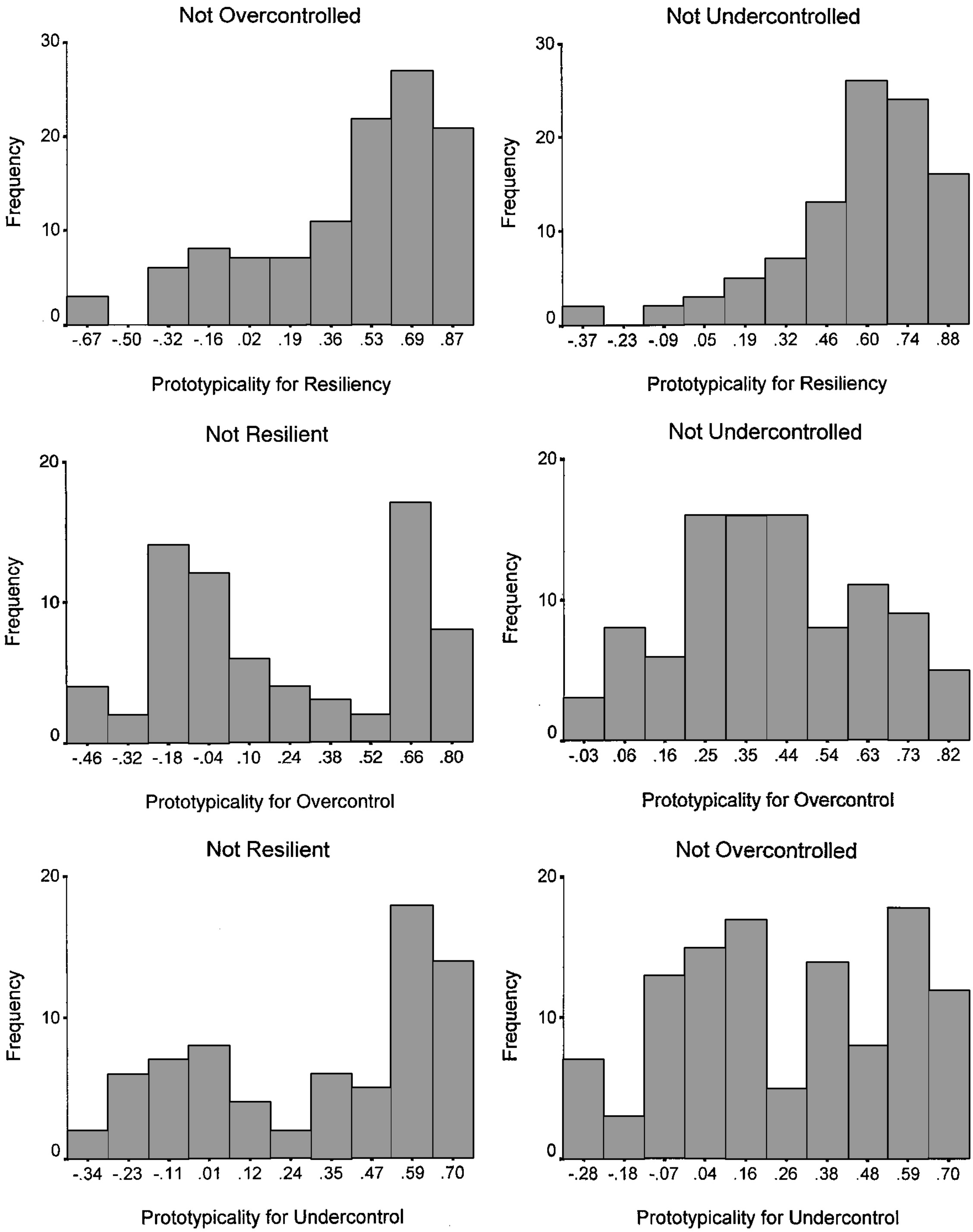

Figure 9. Distributions of the prototypicalities (Q-factor loadings at ages 4–6) for resilient participants (top panel), overcontrollers (middle panel), and undercontrollers (bottom panel) when one of the two remaining types is excluded from analysis.

single Big Five factor, we significantly confirmed the same rank order for the three types. This is a particularly strong result for two reasons. First, our Big Five scales were not based on the California Child Q-Set but on independent bipolar trait ratings that were derived from a lexical analysis of German trait adjectives. Second, we could replicate the relations both for type definitions that were based on the same parental judges at a similar age of the children (10 years as compared with 12 years for the Big Five ratings) and for type definitions that were based on different judges (teachers) at a much earlier age (4–6 years). This finding establishes a strong link between the Q-sort-based type approach and the lexically based five-factor model of trait description.

Other correlates of the three types. Furthermore, most correlates of the three personality types that were reported by Robins et al. (1996), van Lieshout et al. (1995), and Hart et al. (1997) were confirmed if these correlates were assessed in our study. Undercontrolled children had a consistently lower IQ and school grade than resilient children; approximately one third of the undercontrollers were late schoolers. As expected, they were judged by their parents as consistently more aggressive with peers except for the first assessment at age 4 when the parents were less informed about the behavior of their child in peer groups. The relative increase in their aggressiveness after age 7 that was reported by Hart et al. was not confirmed, however. In line with the literature on aggressive children's self-esteem, undercontrollers had neither low cognitive nor social self-esteem (see, e.g., Hymel et al., 1993).

Overcontrolled children were characterized by a high level of observed behavioral inhibition to adult and peer strangers in the laboratory and high parental judgements of inhibition, but not by low social self-esteem. This pattern was also found from a trait perspective when early inhibition to strangers was correlated with later social self-esteem (see Asendorpf & van Aken, 1994).

New Findings

Continuity and stability. A first set of new findings concerned the continuity and stability of the three personality types. In our terminology, *continuity* refers to the constancy of the Q factors as evidenced by between-ages correlations of the factor scores of the Q-sort items, whereas *stability* refers to the constancy of children's type membership as evidenced by a cross-classification of the three personality types between different ages. This is a conceptually important distinction. *Continuity* refers to changes in type characteristics, whereas *stability* refers to shifts of children from one type to another. Stability may be high despite low continuity because most members of a type show the same developmental changes, and stability may be low despite high continuity because many members of a type diverge in their development from the type and end up in another type.

We found clear evidence for this second possibility. The continuity was high between ages 4–6 and 10 for all three types, ranging from .78 to .88. This high continuity is particularly remarkable because different kinds of judges were used at the different ages (teachers vs. parents). Also, the relative frequencies of the three Q types changed only marginally. In contrast, the stability of the type membership was moderate to low, ranging from .22 to .44, both for a continuous measure (the child's prototypicality for a type) and for a categorical measure (whether a child belonged to a type or not).

That stability is lower than continuity is consistent with the findings for traits. Concerning continuity, Asendorpf (1992) found a continuity of .84 for behavioral correlates of judged shyness (a central aspect of overcontrol) between 4 and 23 years of age, and van Aken and Asendorpf (1996) reported continuities of .77 and .87 for teacher-rated prototypic Q-sort profiles for shyness and social competence (a central aspect of resiliency) between 3 and 15 years of age. In contrast, the stability of trait judgments across such large age intervals is moderate to low. For example, in the present study the stability of the parental judgments of inhibition was .40 between ages 4 and 12, and the stabilities of ego-control and ego-resiliency between ages 4 and 10 were .29 and .25. That the stabilities for ego-control and ego-resiliency were somewhat lower despite the shorter time interval can be attributed to the different kinds of Q-sort judges at the different ages. Thus, it can be concluded from this longitudinal study of Q types that, by and large, the continuity and the stability of personality types are not different from the continuity and the stability of personality traits.

Cognitive decline of the overcontrolled type. A second set of new findings concerned the cognitive correlates of the overcontrolled children. They started with a similarly high IQ, school performance, and cognitive self-esteem as their resilient agemates but subsequently lagged behind them in all three domains. In line with this decline are Hart et al.'s (1997) result that the overcontrollers had a lower grade point average at age 15 than the resilient participants and van Lieshout et al.'s (1995) finding that the overcontrollers' IQ and school achievement lay between that of the resilient participants and the undercontrollers. The consistency of this differential change of the overcontrollers across three very different measures of cognitive competence suggests that this may not be a chance finding. However, replication in another sample is needed because the result may be due to a sampling error for overcontrollers.

One possible explanation for the cognitive decline of the overcontrollers relates to the low-ranking Q-sort items in the prototypic description of an overcontrolled preschool-age child (see Table 2): unassertive, does not try to push and stretch limits, is not self-reliant or confident, does not seek to be independent, does not like to compete, has low standards of performance. This early identified pattern may have undermined the overcontrollers' self-confidence in the academic domain, including IQ tests, in the long run. This interpretation assumes average cognitive competence but decreasing academic performance.

A second, very different interpretation assumes low cognitive competence, which, however, was initially overestimated by teachers and the IQ tests because of the high compliance of these children with adults' demands for attention (the prototypic preschool-aged overcontroller was judged as highly obedient and compliant and as strongly responding to reason; see Table 2). This high compliance may be advantageous at an early age, but not later on when resilient children (though not undercontrollers) become as able as overcontrollers to comply with teachers' or IQ testers' demands for attention. Our data are not sufficient to distinguish between these two alternative interpretations, and because the alternatives are not incompatible, both may apply.

Lack of inhibition in young undercontrollers. A third new finding was that the undercontrollers were less behaviorally inhibited with strangers in the laboratory than the resilient children. Their particularly low inhibition was replicated for confrontations with unfamiliar adults and peers. This is an interesting result in light of the fact that Kagan and colleagues operationalized behavioral inhibition toward the unfamiliar mainly by contrasting groups of extremely inhibited and extremely uninhibited children at a young age (see, e.g., Kagan, Reznick, Snidman, Gibbons, & Johnson, 1988). Viewed from our perspective, they contrasted overcontrolled with undercontrolled children but did not study a comparison group of adjusted children. Thus, the results of their studies may confound effects of overcontrol and undercontrol. The full three-type model is needed to disentangle these effects.

Relations between resiliency and control. At both ages, a negative quadratic relation between ego-resiliency and ego-control was found for the theoretically derived variables ego-control and ego-resiliency. Thus, resilient children tended to have intermediate scores in ego-control, and nonresilient children tended to have either high or low scores in ego-control. This pattern is consistent with J. H. Block and J. Block's (1980) assumption that both extremely high and low ego-control are related to low ego-resiliency, and it supports the three-type model of Robins et al. (1996).

Evidence for discrete types. At the end of the introductory section, we suggested that in the case of three types, their discreteness can be studied by the bimodality of the distributions of their prototypicalities if one type is dropped from analysis. This concept of discreteness applies to pairs of types. The results suggested that overcontrollers and undercontrollers are best conceptualized as discrete, opposite types relative to each other because their prototypicalities were negatively correlated, and when resilient participants were dropped from analysis, the prototypicalities for overcontrol and undercontrol were bimodally distributed. In contrast, resiliency seems to be best conceptualized as a continuous dimension because no bimodality was observed when overcontrollers or undercontrollers were dropped from analysis. The discrepancy between the results for bimodality could not be explained by the fact that the resilient type was larger, because when the equally large group of nonresilient participants was dropped from analysis, the prototypicalities for overcontrol and undercontrol were normally distributed. This pattern was found both for the teacher judgments at ages 4–6 and for the parental judgments at age 10 (as one might expect, the pattern was clearer for the aggregated and therefore more reliable teacher judgments).

As Meehl (1992) and many others have pointed out, spurious bimodality may emerge if the participants or the items are sampled unevenly. There is no reason to assume an uneven sampling of children in the present study. However, as one reviewer pointed out, the items of the California Child Q-Set were selected by the Blocks to represent resilient, overcontrolled, and undercontrolled children well, and it is difficult to rule out the possibility that this selection may have resulted in an overrepresentation of attributes of extremely high and low ego-controlled children. Although we agree that this possibility may exist, we are not really convinced by this line of reasoning because one should then also expect that resilient children were discrete relative to both over- and undercontrolled children, which they were not. Thus, the discreteness of overcontrollers and undercontrollers relative to each other is not likely to be due to uneven sampling. However, replication of the present findings with other samples of children and other measures of ego-control and ego-resiliency is surely needed to exclude the uneven sampling interpretation.

As Meehl (1992) and many others have also pointed out, a bimodal distribution is not expected even for discrete underlying types if (a) the empirical variable has a low construct validity, (b) the means of the types do not differ strongly on the empirical variable, or (c) the types differ strongly in size. One approach to reduce problems (a) and (b) is to use R-factor scores or Q-factor loadings instead of observed type indicators (see Waller & Meehl's, 1998, L-mode factor analysis). This was also the approach of the present study. Furthermore, in the present study bimodality failed to show up for the most reliable and valid first Q factor, resiliency, whereas bimodality was observed for the two later-appearing factors, overcontrol and undercontrol. Therefore, (a) and (b) do not seem to be viable interpretations of the findings for resiliency. Also, the uneven size of the types does not seem to be a serious problem because even the smallest type, overcontrollers, accounted for 21% of the sample.

Instead, the key to understanding the discrepancy between the results for resiliency and the other two prototypes seems to be the quadratic rather than the negative relation between the prototypicality for resiliency and the two other prototypicality continua. This quadratic relation indicates that resilient individuals have intermediate rather than low prototypicalities for both overcontrol and undercontrol. Their moderate similarity with overcontrollers and undercontrollers is consistent with J. H. Block and J. Block's (1980) assumption that resilient individuals are able to modify their modal level of control according to situational demands. Thus, resilient individuals are expected to be closer to overcontrollers on the overcontrol continuum than undercontrollers and hence less discrete relative to overcontrollers; the same argument applies to resilient individuals versus undercontrollers.

Bifurcation of Resiliency

From the perspective of the trait–type debate, the finding that the same multivariate distribution has both continuous and categorical aspects seems surprising, at least if one assumes that personality patterns are distributed either continuously or categorically. We suggest a parsimonious interpretation of the findings that explains not only both the continuous and the categorical aspect of the personality patterns but also the relations among their prototypicalities.

This interpretation starts with the observation that the prototypicalities for overcontrol and undercontrol are strongly negatively correlated (see Figure 7). Thus, the two-dimensional space generated by these two prototypicality variables can be reduced to a bipolar dimension of overcontrol versus undercontrol. This dimension conforms well to J. H. Block and J. Block's (1980) ego-control dimension. The second observation is that highly resilient children are without exception neither strongly overcontrolled nor strongly undercontrolled (see Figure 7). As one moves down the prototypicality continuum for resiliency, however, there is an increasing tendency that children become either highly overcontrolled or highly undercontrolled (see, again, Figure 7). Thus, overcontrol–undercontrol is not independent of resiliency. Instead, as one moves down the resiliency continuum, this dimension bifurcates into two branches that become more and more discrete relative to each other.

From this view, the transition from high resiliency to low resiliency is smooth; resilient individuals are not discrete relative to overcontrollers and undercontrollers. However, there is an increasing gap between overcontrollers and undercontrollers as one moves down the resiliency continuum; overcontrollers become increasingly discrete from undercontrollers and vice versa. In a way, resiliency is a moderator variable for the discreteness of overcontrol–undercontrol.

Conclusion

The present study has shown that a pattern approach to personality development is an interesting alternative to traditional trait approaches. The three prototypes of resilient, overcontrolled, and undercontrolled children are replicable across sex, cultures, and ages within childhood; continuous over development; and predictive of important developmental outcomes in both the cognitive and the social domain. At the same time, the present study has posed anomalies for pure continuous and for pure categorical approaches to personality patterns. These anomalies were parsimoniously resolved by the view that a continuous trait bifurcates into two relatively discrete types. Future studies are needed to explore the full implications of this view, particularly with regard to personality change. In any case, the present study shows that the trait–type dichotomy and the concept that discreteness is a property of a type may be misleading. The human brain may have a tendency to explain a given range of phenomena either in a continuous mode or in a categorical mode, but nature can have it both ways at the same time.

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