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BY A MULTITRAIT–MULTIMETHOD ANALYSIS.

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CONSTRUCT VALIDITY OF SELF CONCEPT

BY A MULTITRAIT-MULTIMETHOD ANALYSIS

by

Calvin Olson Dyer

A dissertation submitted in partial fulfillment
of the requirements for the degree of
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CHAPTER I

THE PROBLEM OF VALIDITY OF SELF CONCEPT

One of the marked realities in research regarding the self concept is the large number of variables and the large number of psychometric instruments used in the research. Over a dozen theories propose that the self concept is a principal or most important aspect of personality. The attempt to evaluate the usefulness of the construct of self in these theories has produced a profusion of research in the last 15 years. As an independent variable the self concept has been related to many dependent variables, e.g., social interaction, adjustment, learning and school achievement, acceptance of others, authoritarianism, level of aspiration, etc. With self concept as a dependent variable, the influence of the following variables has been studied: counseling and psychotherapy, lobotomy, induced success and failure, adjustment, parent-child interaction, body characteristics, school achievement, etc.

Often the attention to numerous variables studied in relation to self concept has overshadowed concern for the problem of the assessment of the construct itself. For example, differing definitions of the construct have been used which make impossible any generalizations from one study to another. These definitions differ along the lines of some fairly clear distinctions. The self is generally referred to as "the individual who is known to himself" (English and English, 1958). But

in research the distinction has not always been drawn between the phenomenal self concept as an object of "direct awareness" and the non-phenomenal self concept which refers to the self as influenced by attitudes, motivations, and perceptions that are not subject to direct awareness. Various attitudes toward the self have been described that include self-satisfaction, self-acceptance, self-esteem, self-favorability, and congruence between the self and ideal-self; moreover, recent researchers have described a dimension of study which is a denotative semantic definition of self. A further distinction which has pertinence to the present study is that of a "global" or constant self concept as compared with a "differentiated" self concept; the latter varies according to environmental factors such as family, peers, and school, and with characteristics of the subject such as physical makeup.

In addition to the differing definitions, studies have used different instruments for assessment, again making generalizations difficult. Any one of these instruments may reflect a different definition of self concept from any other. Studies have been rare which have used the same instruments and the same definition.

One needed approach to improve the research is to determine the adequacy of one instrument as compared with another when they are both used to assess more than one definition of the self concept. A relatively recent methodological approach, called the multitrait-multimethod analysis, involves a set of procedures which helps determine this adequacy by bringing to focus (a) features of the test instrument that make an unclear assessment of what is defined, (b) the overlapping area of the definitions that make the test scores more difficult to interpret. Such procedures

help establish confidence in the instruments before they are actually used to predict relationships with other variables. The essence of the present study was to establish construct validity of four commonly used definitions of self concept as measured by two apparently successful assessment devices. The problem consisted first of using the multitrait-multimethod analysis technique with data obtained from school students of different grades, and secondly of using information gained to predict relationships of the construct with other variables in a formal theory.

Research on Self Concept

Out of the proliferating literature of a primary category that reports studies on self concept has come a secondary category of literature that attempts to describe, classify, and criticize pertinent information from primary studies. These reviews themselves have become diverse inasmuch as they approach the research from different facets. They have one meeting ground, however, in being relevant to the guidelines mentioned by Peak (1952) for objectivity of observations in behavioral research. They all review the literature from the point of view either of (a) delimiting and defining some schema to observe, (b) interpreting the meaning of these observations by their relevance to the defined schema, (c) analyzing the occasions for, and the stability of the observations. These points of view are further discussed as follows.

Defining the Schema

The concept of self holds a major place in some personality theories, and its definition attains somewhat explicit meaning according to the

dimension of function (cf., Freud, 1950; Snygg and Combs, 1949; Horney, 1937; Sullivan, 1947, etc.). A demurrer (Guilford, 1959) suggested that the notion of self concept does not have a legitimate place in a well-developed theory; it has no function and is foreign to science. This criticism is based upon the observation that often the definition of self is nothing more than a special case of perception and has no commonly agreed upon referent; thus it has no generality.

Aside from describing the functional role of self concept in particular theories, proposals have been made for definitions that align themselves with general systems or approaches such as the psychoanalytic, gestalt, sociological, biosocial, and socio-perceptual approach (Wrenn, 1958).

Crowne and Stephens (1961) referred to the issue of generality of the self concept defined and differentiated on the basis of content. The self, on the one hand, is indicated by such characteristics as temporal stability, different manifestations such as may be obtained with or without spontaneity of behavior, and the effects of changing contexts such as rewarding or unrewarding situations. The self on the other hand is referred to as a stable and general phenomenon commonly termed the "global self" which is likely to be relatively unaffected by different contexts or situations.

A further basis for defining self concept is the methodological approach adopted which may be either phenomenological or behavioral (Crowne and Stephens, 1961; Wiley, 1961). The phenomenological definition refers to an internal phenomenon that is never seen but is assumed to exist. This definition becomes an hypothetical construct,

and the reports of subjective experiences regarding the self are assumed to be valid. In the case of the behavioral definition the validity of the self reports is not assumed but is one of the aspects of the phenomenon that is under observation. Moreover, the definition has meaning which to some extent is merely an operational description of the phenomenon. Either of these alternative methodologies poses problems of interpretation of data inasmuch as the phenomenological definition often is abstract and "semantically loose" and does not articulate clearly with observable data. On the other hand, the behavioral definition often refers to a specific behavioral sample and no extrapolations to real life are possible. One desirable answer to this problem of interpretation is to use an intermediate step between an hypothetical construct and an operational definition such as suggested by Rotter (1954). Such a step is to use a working definition of a characteristic with some degree of generality, but at the same time a definition that communicates precisely with specific behavioral referents.

Interpreting Meaning of the Observations

The target of the instrument used in the research indicates the definition of self concept assumed. Strong and Feder's (1961) review reported targets for instruments that include perceived-self concept, ideal-self concept, self-acceptance, and perception of others. Some of the instruments included a discrepancy measure between two targets as an index of adjustment.

In addition to defining the target, a basic issue in interpreting the data is the degree to which the instrument measures the target as

well as the non-target. Crowne and Stevens (1961) raised the issue of equivalence of operations when more than one instrument is used to measure the target. They suggested that in order to incorporate into the larger body of research information from studies using different instruments, some empirical demonstration must be given of the logical relationship between the operations or procedures in the studies. The operations involved may vary depending upon item selection, item content, type of format, and type of response elicited. Underwood (1957) described the problem of making a meaningful connection from theoretical construct to operational definition; but Campbell and Fiske (1959) illustrated the equally important problem of making a meaningful connection from operation to theoretical construct. Results from a single operation have multiple interpretations, but if several operations include a common interpretation and the results are the same, then the common interpretation is valid. This procedure does not necessarily show an explicit connection from theory to operation, but it does help to discard alternate interpretations that are inconsistent.

Analyzing the Stability of the Observations

In the Strong and Feder (1961) review 15 different instruments were classed either as Q sorts, Likert rating scales, check lists, or free response questionnaires. It also included a critique of the methods of responding required by these instruments. Crowne, Stephens, and Kelly (1961) also reviewed the methodology in regard to type of response elicited. They classified several instruments into categories of self-ideal discrepancy, adjective check list, and self-rating scales; they

also contrasted these multimeasures and multimodels with social-desirability, adjustment, and dependency. This latter basis for analyzing stability of observations--the effects upon data of response styles or personality characteristics--is part of Wiley's (1961) category of irrelevant response determiners.

In summary, these reviews reflect the great diversity of approaches to self-concept research. But there is a commonality in these reviews that points to inadequacies in the research directly resulting from (a) lack of agreement on the basis for definitions, (b) inadequate validation of the procedures in regard to the definitions of the theoretical construct, (c) indeterminate reliability of observations. In addition to the above criticisms, these reviews have made particular suggestions which if they were collectively considered, would provide substantial gains in the research in self concept. The suggestions in many respects overlap into a central area of construct validity.

Type of Validity

Various kinds of validity are involved in personality assessment, and these in themselves demonstrate the need for construct validation in self-concept research. A statement by the committee on Technical Recommendations for Psychological Tests and Diagnostic Measures (1954) placed the concepts of validity in a four-fold parsimonious classification based on aims for testing which would provide information about an individual's performance in the present, in the future, on some external variable, and on some presumed trait or quality. The following four types of validity are described:

a. Content validity refers to the adequacy of sampling and the representativeness of the items in the universe to be measured.

b. Predictive validity refers to the correlation of test scores with criterion measures that are subsequently obtained.

c. Concurrent validity refers to the correlation of test scores with criterion measures that are concurrently available.

d. Construct validity refers to evaluation of a construct in the theory without using definitive measures. This procedure usually involves predicting variations of scores among subjects for the construct, and then gathering the data to confirm these predictions.

It may be observed that each of the four types of validity involves a different emphasis or agreement on the criterion. For content validity the criterion is the nature of the universe to be assessed; for concurrent and predictive validity the criteria are defined by measures that are either presently available or to be obtained in the future. In the case of construct validity the unique feature is that there is no satisfactory agreement upon a criterion.

Several other labels are used in the literature for different ways of determining validity, and while there is no complete agreement, they may be satisfactorily subsumed in the above categories. Traditional concepts of reliability may in some cases also be subsumed in this classification of validity. For example, test-retest reliability is a form of predictive validity inasmuch as the test is correlated at a subsequent time with a criterion which in this case is the same test.

Characteristically in the study of self concept the aim of research is to anchor the construct of self to observable antecedent and

consequent variables; but the inference of self requires that the subject define the self as he sees it. Thus the R-R (response-response) design is necessary to correlate inferred self concept with a criterion. Since both self concept and the criterion are obtained from the subject's own responses, the situation imposes ambiguity upon the criterion. The principal validating procedure thus becomes construct validity rather than content, predictive, or concurrent validity. This procedure is therefore elaborated in some detail.

Establishing Construct Validity

Establishing construct validity is not essentially different from the general procedures for developing and confirming any theory. It is not necessarily preferred to the other kinds of validities, and differs only in the orientation of the investigator in regard to the criterion of what is measured. Cronbach and Meehl (1955) used the term construct validity in an original paper and elaborated upon its implications. Criterion oriented validation requires accepting a set of operations as a definition of what is measured. However, when a set of operations itself is not accepted as a criterion, then construct validity becomes necessary. The experimental logic used in construct validation is briefed as follows: a construct may be some postulated trait or other attribute of people. To know what this construct is requires a set of laws in which it occurs. In a theory the set of laws interlocking in a system is called a nomological network. The laws in this network may relate (a) observable properties to each other, (b) theoretical constructs to observables, (c) different theoretical constructs to each other.

According to this statement of relationships it is thus possible that a construct may be admissible if it is connected to other constructs in the net in such a way as to make predictions about observables. Thus the construct is admissible even if it is not reduced to observable data. Making the claim of construct validity requires procedures to elaborate the nomological network. More components of the net must be defined, the inferential relationship between components must be made more explicit, and contact of the net must be made with observables.

Procedures for determining construct validity were described by Cronbach and Meehl (1955) as various comparisons of intercorrelations of tests using concurrent and subsequent criteria as well as irrelevant criteria. Rigor is added to the validation by the concept of convergent operations which was proposed by Garner (1954) in studies in perception. Garner, Hake, & Eriksen (1956) described the importance of these operations in perception studies for being able to distinguish the effects resulting from the response system as separate from those of the perceptual system. Converging operations are sets of more than one operation that are not perfectly correlated but can give measures of one concept. They provide evidence both to select and eliminate alternative hypotheses regarding the concept.

The authors provided an example of convergent operations in a study designed to determine visual thresholds for words with different emotional content. Four alternative stimulus words were presented tachistoscopically, two of which were vulgar. The S was to respond by pronouncing the word he perceives. When the thresholds were determined,

the results indicated a higher threshold for the vulgar words than for the non-vulgar words. One conclusion possible is that the perceptual system discriminated on the basis of the emotional content of the perceived stimuli. An alternative conclusion possible, however, is that the results are explained by a characteristic of the response system which inhibits verbalizing vulgar words. A converging operation which would discriminate between these alternative conclusions is to pair a vulgar word with a non-vulgar word, and then have the S respond by pronouncing the vulgar word when he perceives a non-vulgar word, and vice versa. This procedure together with the first consists of two operations converging upon an acceptable result.

Jessor and Hammond (1957) described a form of discriminant operations which aims at disconfirming alternative conclusions by "...investigating diverse properties of the construct." Further rigor and even somewhat systematic procedures are enforced upon construct validation by Campbell and Fiske (1959), who proposed that in addition to convergent operations, discriminant operations be employed in determining the adequacy of measures of constructs. Accordingly, they defined convergent and discriminant validation as those procedures preliminary to construct validation that serve to show the adequacy of more than one measure in converging upon one construct in contrast to the adequacy of these measures in discriminating among different constructs. These validating procedures are epitomized by Mill's joint method of similarities and differences in clarifying concepts. The data from these operations are intercorrelations of scores obtained from more than one construct and

more than one method of assessment that are placed into a matrix and systematically examined. This is the multitrait-multimethod analysis and will be discussed in further detail in the chapter describing the procedures for the present study.

One further distinction is relevant. In response to critics of the concept of construct validity, Campbell (1960) suggested that two approaches to construct validity may be observed. One is to determine what in traditional terms may be called trait validity. In this approach the aim is to use only enough theory to define an hypothetical syndrome, trait, or personality dimension. Campbell (1960) pointed out that the majority of research at present is consistent with this approach. The multitrait-multimethod analysis proposed by Campbell and Fiske (1959) exemplifies this approach. The other approach is to determine what may be called nomological validity. The test scores themselves are accepted as interpretations of a certain term in a formal theoretical network and are used to generate predictions. For example, a score on the Taylor Manifest Anxiety Scale (Taylor, 1953) was inferred to be a measure of drive derived from Hull's theory. Also, Butler (1954) described psychometric items most likely to represent intervening variables in Tolman's theoretical model; Liverant (1956) derived a test from Rotter's social learning theory in order to measure the construct of need value. Peculiar to the nomological validity approach, moreover, is the implication of causality in the generated predictions. Although in both approaches only a functional relationship may be interpreted from the mathematics involved, there is a complexity of causal

relationships implicit in the nomological approach. An experimental procedure is used which analyzes the dependence of the traits upon the treatments or methods used, suggesting a causal relationship, while the interdependence of the traits in differing environments is considered irrelevant. On the other hand in the trait validity approach a correlational procedure is used which analyzes the interdependence of the traits as they may occur in different environments, suggesting merely a functional relationship, and the effects of differing treatments or methods of assessment are considered irrelevant. The nomological approach is rare in present research but is implied in Cronbach and Meehl's (1955) definition of construct validity and also in the procedures advocated by Jessor and Hammond (1957).

Construct Validity in Phenomonological Research

Wiley (1961) outlined systematic procedures for determining construct validity in phenomenal self theory. These include the following which will be discussed in further detail:

(a) investigate irrelevant response determiners.

(b) intercorrelate results obtained from different methods that purport to assess the same construct of self.

(c) intercorrelate results obtained from the same methods when used to measure different constructs of self.

(d) predict relations of self concept to other variables.

Investigating irrelevant response determiners. This procedure requires attention to the traditional problems of reliability, although some measures of content validation may also be necessary. Examples of irrelevant response determiners are response styles such as acquiescence, taking an extreme stand, tendency to attribute socially desirable attributes to oneself, distortion as a consequence of set or expectation, instrument form, and scoring procedures. When attention in the research has been given to these determiners, often they are either considered of little influence or merely typical of phenomenal self research and unfortunate, but unavoidable, assessment problems for large surveys. Such investigations were characterized by Wiley (1961) as "let the reader beware" studies.

Intercorrelating different constructs and different methods. By analyzing intercorrelations of measures among both constructs and methods, variance attributable to either the methods or the constructs is more easily isolated. Both factor analysis and the multitrait-multimethod analysis were recommended by Wiley (1961) for this purpose. There have been a few instances reported in which factor analyses of self concept instruments have been obtained, but there is no report in the literature of a multitrait-multimethod analysis following the specifications of Campbell and Fiske (1959). The significance of utilizing the multitrait-multimethod analysis is increased not only by its rarity, but also because even when using only gross approximative criteria, it may discriminate powerfully against methods and constructs long appearing in the literature to have very substantial validity (Milholland and Fricke, 1962).

Predicting relations to other variables. The great bulk of self concept research is in the category of measuring the relationship of the constructs to other variables. Usually the studies have not explicitly stated that the problem is one of determining construct validity, but instead the aim has been to show relationships in a theory while tacitly assuming construct validity. Except for the research of Rogers et al., nomological validity studies are uncommon. Satisfactory construct validation of self concept requires research meeting the criteria for each of Wiley's (1961) procedures mentioned above.

The purpose of the present study was to attempt to determine construct validity of self concept for one of the definitions reviewed earlier, i.e., that of self concept postulated to become differentiated through time and through social experiences, as contrasted with a global, unchanging self concept. The design was first to use the multitrait-multimethod analysis in determining the effectiveness of assessment of the postulated constructs, and then to show predictable relations of the postulated constructs with other variables in a theoretical system. The system adopted is reviewed below.

Review of the Theoretical System

Historically the concept of psychological differentiation was used by Werner (1948) as describing divergent directions in psychological development, and by Lewin (1935) as showing elements in the structure that make up the life space of individuals. More recently Witkin, Dyk, Faterson, Goodenough, & Karp (1962) proposed a perceptual theory stating that psychological differentiation is the complexity of structure of a

psychological system and varies as a function of developmental experiences. In general the system may be described as having either a homogeneous or heterogeneous structure. Three other characteristics describe this structure in more detail. Subsystems within the system have the characteristic of specialization so that they are capable of mediating specific functions; thus psychological areas can become separated such as feeling from perceiving, and thinking from acting. Another characteristic is that the system is open and has continuous interaction with the environment, but as a function of development of the system there become clear boundaries that separate the self from the environment. A third characteristic is that subsystems are integrated both in degree of effectiveness of function and complexity of structure. The maximal difference between low and highly differentiated systems is shown by the infant as compared with the adult, but there are also varying degrees of differentiation among individuals at each age level.

Witkin et al. (1962) stated that the level of psychological differentiation can be identified in individuals by the following "indicators": (a) mode of perceiving and degree of structuring of the experiences of the world, (b) development of internal standards and a sense of separate identity of the self from the environment, and (c) development of specialized, structured controls and defenses. A differentiation hypothesis was further proposed which states that there is a "communality" of behavior or association between these indicators.

Field-dependence-independence mode of perception. As one of the indicators listed above, perception is one aspect of development that varies with the degree of psychological differentiation in the system. According to the theory, a major organizing principle of perceptual development is the mode by which individuals perceive the relationship of figure to ground. A construct of field-dependence-independence was postualted which describes a tendency for persons to perceive external objects with or without the influence of the ground. A high degree of differentiation within the system is reflected in part by a field-independent mode of perception. Three assessment devices have been used in the authors' research to measure this mode. One was a rod and frame test in which Ss are asked to orient a luminous rod into an upright direction while a luminous frame is varied in position with the rod (Witkin and Asch, 1948). Another test was that of having Ss orient their own body to the upright while the surrounding room is tilted (Witkin, 1949). The third assessment device was to have Ss locate familiar geometric figures that are embedded in Gottschaldt designs (Witkin, 1950). In these three tests the interpretation was made that a field-dependent person tends to lose the body in the field or ground and also tends to lose neutral external objects in the field. Witkin et al. (1962) suggested that this basic perceptual mode has far reaching effects into other functions of the system such as in personality aspects of behavior.

Mode of perception as related to differentiation of self concept. It may be postulated as a corollary to the psychological differentiation theory that self concept in varying social contexts becomes more discrete and separable depending upon degree of psychological differentiation and as a function of development. The following reasoning is presented for this postulate. In very early development the individual is aware of himself together with the environment only as a global, continuous experience; then with a growing crystallization of experiences he develops an awareness of boundaries between the body and the outer world. Other kinds of experiences such as emotions, ideas, memories, etc., also begin to be perceived as emanating from within as distinct from experiences emanating without the self. In the course of the individual's development, perceptions of the experiences emanating from within permits this inner core of experience or "self" to become segregated from the field. At the same time, however, perceptions of experiences emanating from without also become structured. It is reasoned that as greater structuring of the parts in the external field occurs and since there is continuous interaction of the internal experience with the field, there is possible a more discrete perception of the influence of each social context upon the self. Central to the field-independent mode is the ability to overcome an "embedding" context and to experience figures as discrete from the field in which they are contained; in addition, this ability involves analyzing and structuring both the figure and field. Thus a field-independent mode of perceiving permits an individual to analyze and structure his concept of self more discretely as being influenced by the context of his family and other social groups.

A field-independence mode, as the perceptual component of the three indicators of psychological differentiation, may be considered one of the determinants of self-concept differentiation. Each of the indicators as a separate dimension of psychological behavior contributes to the others in an interrelated manner toward further psychological differentiation. For instance, perceptual development permits structuring of the figure and the ground to help establish the sense of separate identity; thus awareness increases in regard to whether the source of rewarding and punishing forces is inside or outside. Establishing internal standards and values is thus possible, and controls and defenses can become structured. At the same time, achieving a separate identity and adopting internal standards has an accompanying effect so that the individual perceives the world as a more autonomous agent. In addition, the pattern of controls tends to contribute to the perceptual mode and internal standards by regulating attention and impulses in the individual's experiences.

Statement of the Problem

The larger aim of the present study was to investigate the validity of the notion that self concept can be differentiated for school-age children between the various contexts of themselves in general and in their experiences with family, friends, and school. Part of the problem of determining validity of this notion requires attention both to more than one construct and more than one methodological procedure of assessment. The study focused upon validating four theoretical constructs of self concept as mentioned above, together with validating two instruments,

both of which measured the four constructs. Each instrument was postulated to represent a different method. Both instruments employed the phenomenological approach to assessment; in addition, both have been used in past research and have been assumed to be adequate without clear evidence of validity.

The study was divided into two parts, the first of which put the constructs and the two instruments to the test of a multitrait-multimethod analysis in order to determine the effectiveness of the assessment procedures and the nature of what was measured. This part of the study involved the first three procedures outlined by Wiley (1961) for phenomenological research. Hypothesis I then was as follows: satisfactory construct validity is demonstrated for the constructs as defined by showing that both the instruments give the same results in measuring a single construct and also give results that are different in measuring different constructs. A corollary to Hypothesis I was that by the same criteria, construct validity is demonstrated in ten different samples of individuals that vary in school grade and sex. Although construct validity was the ultimate aim of the present study, an integral part of the validation procedures was to observe the converging results of different methods and also the discriminating results of each method for different constructs. These convergent and discriminant operations are crucial to the multitrait-multimethod analysis and for convenience are described hereafter as determining convergent and discriminant validity, respectively. These latter terms are not meant to replace the concept of construct validity, but rather they are subsumed under it as special operations in a multitrait-multimethod analysis.

In the second part of the study the design was to use the constructs and instruments successfully validated in order to predict relationships of the constructs with other variables in a theoretical system. This part of the study involved the fourth category of procedures outlined by Wiley (1961) for construct validation. The theoretical system of psychological differentiation reviewed before was used to generate the hypotheses.

Hypothesis II was stated thus: differentiation of self concept in the various contexts of self, family, friends, and school is greater among individuals in the higher grade levels as a function of development.

A corollary to Hypothesis II was that differentiation of self concept occurs earlier and with a more clear manifestation in boys than in girls. According to the differentiation theory the sex-role stereotype in our culture for boys is that they show greater self-reliance and achievement than for girls. Although girls express themselves with words more skillfully than boys, this verbal facility is interpreted to be an overinvestiment of those skills that increase communication and dependence upon others. This view is consistent with the findings reported by Witkin et al. (1962) of greater field-dependence among females in perceptual mode studies. These differences were slight but extended over other psychological areas in the individuals. It was reported that females more than males tended to be more dependent upon others, more sensitive to impressions they make upon others, and tended more to use external standards and to conform to group pressures.

Hypothesis III stated that individuals who tend to use a field-independent mode of perception also show greater self-concept differentiation than those who are field-dependent.

Since the perceptual mode, as stated earlier, presumably has pervasive influences upon other psychological areas, it was also the design of the study to test the relationship of both perceptual mode and self-concept differentiation with other variables as predicted by the differentiation theory. In the following section there are descriptions of behavior that to some extent may be measured among school students. It is possible to make inferences from the theory to predict relationships of these observable behaviors with differentiation of self concept and field independence. This procedure amounts to filling in the nomological network of the theory with connections as described earlier in this chapter in the section introducing construct validity. These connections involve (a) two theoretical constructs with each other, as in field-independence and differentiation of self concept, and (b) theoretical constructs with observable properties as shown by postulating a field-independence mode of perception as a determiner of these observables, and also by postulating the functional relationships between differentiation of self concept and these observables.

Remote associations, ideational fluency, and originality. One of the findings regarding field-independent persons was that they show what is called an analytical problem-solving approach and adaptive flexibility. These behaviors characteristically require breaking up and overcoming the "natural" organization of the material presented and to maneuver the

material in new ways. Another finding was that these persons also tend to be able to respond to peripheral aspects of an immediate task and, therefore, show more incidental learning than field-dependent persons. Both of these abilities of maneuvering material in new ways and incidental learning are to some extent involved in tests of remote associations, ideational fluency, and originality. It is postulated that persons with high self-concept differentiation and thus showing high abilities to structure figure and ground are able to perform well on these tests. It is also postulated that field independence is related to performance on these tests.

Achievement, affiliation, and influence incentives. The characteristic of field-independent persons of being able to separate the figure from the ground represents a more active approach than acceptance or submission to the dominant organization of the ground in the field-dependent mode. It is postulated that there is thus more active and striving behavior among persons with high self-concept differentiation and field independence. This may be observed in their responses to high achievement incentives in school activities.

It is postulated further that the students with differentiated self show a low relationship with affiliation incentives in school activities. Witkin et al. (1962) reported findings that persons with the field-independent mode tend to show a more autonomous inner frame of reference and to maintain their direction more firmly in the face of contradictory attitudes and judgments. These persons are less dependent upon influences from others.

It is postulated that responses to influence incentives in school activities also show a low relationship with self-concept differentiation. The rationale for this view is from the findings that field-independent persons are less gregarious, less responsive to cues for making good impressions, tend more to be cold or distant, and are oriented to master the environment rather than mastering interactions with people.

Expansiveness and popularity. On the basis of the rationale stated above it is predicted that differentiation of self concept shows a low relationship to expansiveness or amount of liking for others. Popularity is predicted to show a positive relationship with differentiation of self concept, however, on the basis that high-achievement oriented and less dependent persons tend to be seen in a more ascendent role and thus are more popular.

Perception of classroom conditions. Witkin et al. (1962) reported findings that when field-independent persons were presented with various tasks they tended to show less seeking for guidance, feelings of competence in the activities, and less anxiety and tension toward the tasks. Two aspects of the mental health atmosphere of the classroom are relevant to these findings. It is postulated that students with high differentiation perceive the learning conditions positively in regard to these classroom activities. On the other hand, it is predicted that they show more inacceptance of the social milieu. This prediction is explained by the findings that field-independent persons tend to use intellectualization and isolation as defenses rather than more primitive means of control. It was reported that they were more distant from others and showed a

lack of interest and empathy for others. It is also postulated that since they are task-oriented in these activities, they perceive the social climate of the classroom as competitive rather than cooperative and less involving of the class as a whole.

In regard to the social structure of the classroom it is predicted that persons with high self-concept differentiation perceive a more concentrated rather than dispersed locus of responsibility in the classroom, and a more narrow rather than broad contact pattern for communication. This prediction is made on the basis of the rationale stated above that they tend to be less sensitive to the social cues of interaction with their peers and leaders other than their teacher.

Consistency of the Embedded Figures Test. One further prediction is made in order to gain confidence in the use of the Embedded Figures Test (EFT) as a measure of field independence. Findings were reported by Witkin et al. (1962) that the WISC subtests, Block Design, Object Assembly, and Picture Completion, all require facility in overcoming the "embedded context" in the task. The correlation of EFT performance with the sum of standard scores on these subtests was .66. It is predicted that the same substantial relationship is shown for the EFT in the sample used in the present study.

CHAPTER II

PROCEDURES FOR OBTAINING CONSTRUCT VALIDITY OF SELF CONCEPT

The instruments used were labeled the Self Esteem Inventory (SEI) and the Attitude Questionnaire (AQ) and were selected for use in a normative study of sponsored research entitled Dimensions of Children's Social and Psychological Development as Related to School Achievement (1962). The population consisted of public school students of Flint, Michigan. Samples in groups of 50 were selected to be representative of this school system. There were ten separate groups consisting of male and female students in 3rd, 5th, 7th, 9th, and 11th grades. The data can be conceived as forming a three dimensional figure combining the influence of construct definition, methods of measurement, and age and sex samples. The data were analyzed to satisfy the procedures outlined by Wiley (1961) as reviewed in the first chapter for determining construct validity in phenomenal self research.

Description of Instruments

Self Esteem Inventory

The SEI as devised by Coopersmith (1959) was composed of 58 brief statements to which the Ss respond in categories of "like me" and "unlike

me." An example of one statement is, "I am a hard worker." Twenty-six items assess the area of self, and eight items each relate to the areas of family, social contacts, and schoolwork. A Lie Scale was included in the inventory composed of eight items and which was intended to assess a response style of the Ss. The scores for each scale were obtained by summing the weights for responses keyed to indicate high self concept. The inventory was developed by compiling an item pool from questions on the Rogers and Dymond (1954) self-concept scale together with items selected by a group of clinical psychologists. Item statistics were obtained and analyses made from pretesting the items in the pool. The final selection of items made from these analyses constituted the 58 items of the SEI.

Attitude Questionnaire

The AQ followed the methodological approach to attitude testing by Osgood, Suci, and Tannenbaum (1957). An individual characteristically has a semantic awareness of experiences and objects in life. The authors proposed that this semantic awareness can be assessed by a particular methodology called the semantic differential. First they postulated a multidimensional structure that represents the semantic space of an individual, and then they proposed to fill in this space with statistical terms obtained by objective measures of the individual's behavior. Meaningfulness of these terms is interpreted by their relationship to one another in regard to distance and direction in this semantic space. For example, an individual may be asked to fix his attention upon the given

verbal concept "justice." Then adjectives are presented in paired form as applied to "justice," each representing the opposite pole of the other, e.g. "strong-weak." The S is then asked to react to the given concept by checking the adjective which most closely applies. Each pair is termed a bipolar scale, and a score is obtained for each scale by assigning a weight that is determined by which polar adjective receives the check and how far the check is from the midpoint in either direction.

On preliminary investigations the authors obtained factor analyses of the reactions of a large number of individuals to numerous concepts from scores on numerous bipolar scales. They concluded that people predispose toward an evaluative response to concepts in general, and that evaluation may be considered one of the dimensions of meaning in the semantic space. They defined the meaning of any concept as an allocation of a point in the semantic space. An attitude toward any concept, then, is the projection of the allocated point onto the evaluative dimension of that space.

In order to index any attitude, a questionnaire is used that introduces the concept to be assessed and that also includes a format of bipolar scales to be checked by the S. The bipolar scales are selected by having high loadings on the evaluative factor and low loadings on any other factors.

Attitudes may be referred to as tendencies to approach or avoid and can be indexed on these bipolar continua in both direction and intensity from a neutral reference point that may be empirically determined. Direction is indicated by a S's selection of either one of the polar adjectives.

Intensity is indicated by how far from the neutral point in either direction the S's score lies on the bipolar continuum.

In the present study the questionnaire consisted of the verbal concept to be assessed printed at the top of the paper and a list of eight bipolar scales printed below the concept and intermixed with irrelevant scales. Seven intervals or spaces occurred between the pair of terms, any of which might be checked by the S. Four such questionnaires were used, each with one of the following concepts: Myself, With My Family, With My Friends, With My Schoolwork. The same bipolar scales were used to index attitudes toward each of the concepts inasmuch as they were selected for their high loadings on the evaluative factor. A score was obtained by assigning a weight of one to seven on each scale as determined by the location of the check in the alternative intervals, and then summing these weights for the eight scales. A high score represented a positive evaluation of self concept. The data for both instruments were recorded on three IBM cards for each S, punched to correspond to the checks on the questionnaires, and programmed for computer scoring.

The Postulate of Independence of Methods

Crucial to the use of the multitrait-multimethod analysis is that the methods, as well as the constructs selected, are postulated to be independent. This condition was satisfied for the constructs because according to the rationale of the differentiation theory, each of the constructs denotes an independent view of self concept as the object differentiated from the ground in each social context. In the case of the methods, however, the postulate of independence was not as completely

satisfied. Each of the instruments used was postulated to be a different method of assessment, but actually both were questionnaires requiring written responses from the S, and as such both were susceptible to the inherent difficulties of questionnaires administered to school students. Important methodological differences between the instruments, however, justified the postulate of independence. The SEI employs a Likert type attitude questionnaire which assesses the S's direct awareness of the content presented. The S has the task of endorsing the attitude content along one continuum that has been determined a priori. The AQ is closer to an alternative assessment approach which does not necessarily determine the content a priori, but which permits the S to delimit his own perceptions and within a broader range to construct his own answers. This latter approach is exemplified by the technique described by Kelly (1955) in his Personal Constructs theory, and also by an unpublished technique of Cronbach. The semantic differential, and thus the AQ used herein, are similar to the latter approach for the following reason. A basic assumption necessary to the semantic differential technique is that behavior is determined by the meaning of events rather than by intrinsic properties of the events. Since meaning is multidimensional, moreover, it is necessary to assess a number of facets of meaning rather than endorsement along only one continuum. Thus a S's attitude toward a concept may be charted by his agreement or lack of agreement with other Ss on each of the multidimensions. In brief, the SEI attempts to measure the S's direct awareness of attitude content determined a priori along one continuum, while the AQ attempts to measure the S's broad connotative associations to a concept.

Because of the broader possible range of responses and since the semantic differential deals with connotations, the more metaphorical the associations are of each scale to a given concept, the less of a tendency there is expected for the answers to be invalidated by response sets of faking, etc. For example, a S's response to the scale "cold-hot" is more likely to be influenced by response sets when the concept is "weather" than when the concept is "person." On the other hand, it is likely that as the associations become increasingly metaphorical, the S understands the task less, becomes less attentive, or alters the concept to fit the association. For the SEI the task is more understandable and is likely to be influenced in the same manner as the least metaphorical associations in the semantic differential.

First Procedure: Analysis of Reliability

Internal consistency reliability was determined for each of the instruments in each of the groups by a Kuder-Richardson formula (cf., Walker and Lev, 1953). Internal consistency reliability was used rather than test-retest reliability because the former procedure is kept distinct from the validity procedures, while the latter may be interpreted on the reliability-validity continuum as a procedure of predictive validity. Moreover, the task of retesting in each of the groups, even if it were feasible, would most probably result in a long interval between testing and retesting which would permit the undesired interpretation that predictive validity was being determined.

The application of a Kuder-Richardson reliability coefficient to the AQ data made it necessary to rescore the Ss' responses and constitutes somewhat of a hazard in the interpretation of the coefficient. Each item response was grouped in one of seven discrete categories, but the Kuder-Richardson formula requires only pass-fail categories. It was possible to interpret the items in the AQ as passing or failing on the basis of their being above the median or below the median of the frequency distribution for each item in a sample. This, however, raised the question as to how to score the responses occurring in the median category. Of two alternative procedures, the one selected was to score the responses in the median category by assigning them at random to the pass or fail categories. In this case attenuation of reliability occurs by contributing to random error. This procedure fixes the item difficulty level at .5 for every item and thus becomes a special case of the Kuder-Richardson formula used. A program was written for the IBM 7090 computer to include the processes of scoring the responses for each instrument, rescoring the responses on the AQ into pass or fail categories, and calculating the reliability coefficients.

Second and Third Procedures: Intercorrelations of Construct and Methods

The ten sample groups each received a separate or within-sample analysis using the multitrait-multimethod procedures recommended by Campbell and Fiske (1959), and then a further investigation was made by contrasts between the groups.

Procedures for the Multitrait-Multimethod Analysis

For each sample group computer facilities were used to calculate product-moment correlation coefficients between scores from each instrument and each construct. The correlation coefficients together with the reliability coefficients for each construct and method were combined into a matrix. Geometric regions of this matrix that were compared with one another are depicted in Table 1 and are defined below. Each assessment of a construct may be conceived as a trait-method unit reflecting systematic variance due both to features of the measurement instrument and the content of the construct. There are eight trait-method units depicted in Table 1 by the subscripted letters, and each may be considered a variable for analysis.

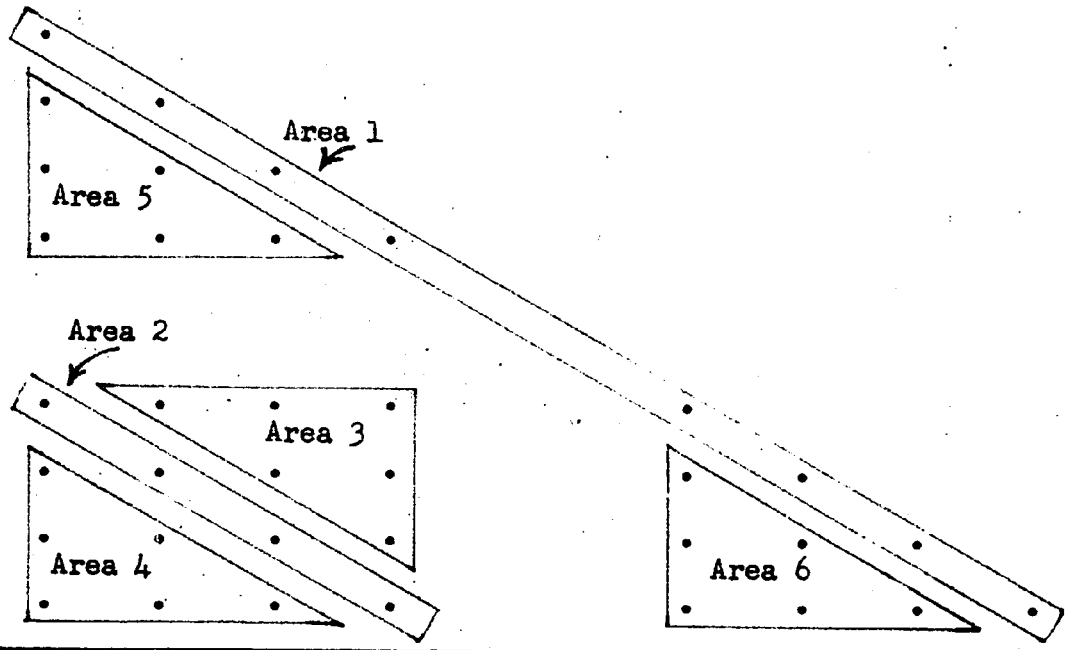
The following procedures for a multitrait-multimethod analysis were followed in order to demonstrate the relative influence either of construct or method variance on the obtained scores and to determine convergent and discriminant validity.

1. Area 1 in Table 1 depicts the reliability diagonal and consists of the eight entries which are internal consistency coefficients for scores on each of the constructs by each of the instruments. Since these entries represent intercorrelations of each of the eight trait-method units with itself, they make up the monotrait-monomethod diagonal. The criterion for analysis is that these entries should be higher than any other region in the matrix. The entries reflect the consistency with which the instruments obtain data so that interpretations can be made regarding the nature of what the data measure.

Table 1

Correlation Matrix Areas For a
Multitrait-Multimethod Analysis

	Attitude Questionnaire				Self Esteem Inventory			
	A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire								
Self A_1								
Family B_1								
Friends C_1								
School D_1								
Self Esteem Inventory								
Self A_2								
Family B_2								
Friends C_2								
School D_2								



Note.—Area 1=monotrait-monomethod diagonal (reliability values); Area 2=monotrait-heteromethod diagonal (validity values); Areas 3 and 4=heterotrait-heteromethod triangles; Areas 5 and 6=heterotrait-monomethod triangles.

2. Area 2 is the monotrait-heteromethod diagonal depicting intercorrelations of the two separate instruments measuring the same construct. This region represents operations that converge to obtain measures of the same construct by relatively independent sources of information; entries in this region thus represent degree of convergent validity. For ease of reference this area is referred to simply as the validity diagonal hereafter, since it is so close to traditional procedures in reporting validity. Entries in this diagonal that are significantly greater than zero support the hypothesis that each of the constructs has functional unity. The rationale for this criterion is that as independent operations in obtaining data about an event agree with one another, there is greater weight for accepting the event. This rationale is analogous to a statement by Feigl (1958) regarding a scientific concept being "fixed" by "triangulation in logical space." Nonsignificant entries in the validity diagonal discourages further use of the trait-method unit. The magnitude of coefficients in this diagonal is an index of construct variance, but the coefficients also may be the result of invalidating method variance.

3. The remaining procedures reflect discriminant operations. Areas 3 and 4, adjacent to the validity diagonals, are triangles depicting intercorrelations of the different constructs with the two methods. These regions are the heterotrait-heteromethod triangles. Based on the rationale that completely independent sources of information regarding independent events give data that are unrelated, the criteria specify that these entries should approach zero and should be lower than the validity diagonal entries.

The aim in interpreting the values in the heterotrait-heteromethod triangles is to distinguish the relative contribution of shared method variance from that of basic construct similarity. If it were assumed that the construct definitions are independent, in which case construct variance does not contribute to the entries, then the minimum entry in the heteromethod triangles reflects the lower bound of overlap of methods. As the method covariance becomes larger, all of the heteromethod entries and the validity diagonal entries become elevated. Discriminant validity can still be interpreted, however, by the relative difference between the validity diagonal values and the heteromethod values.

In further interpreting the dominance of method covariance, one strong factor to consider is response set. Social desirability is one of the clearly recognized response sets shared by self concept assessment methods. The social desirability set is the tendency for Ss to endorse the particular content of questionnaires that is considered to be desirable in our culture. Crowne, Stephens, and Kelly (1961) assessed the relationship of social desirability with several methods of measuring self-acceptance and obtained correlations ranging from .45 to .58. Other studies have also reported substantial correlations (cf., Cowan and Tongas, 1959; Edwards and Horst, 1953; Kenny, 1956).

Another factor relating to response set is deliberate distortion of responses. The Lie Scale was devised for the SEI as a suppressor scale to measure this set. The rationale for a suppressor scale is that information regarding the tendency for each S to distort responses to the items on the scale can be used as part of the total score to suppress

the effects of this irrelevant response behavior and increase the accuracy of the self concept score.

It is possible also to consider the Lie Scale as a detection scale, in which case the score on this scale alone may be interpreted to be a tendency for Ss to endorse the questionnaire statements appearing on face validity to be socially desirable but which actually show low endorsement by normative samples. An example of one of these items is the following, "I never get mad at my parents." As a detection scale, its score is used merely to indicate which self concept scores are less valid and would not be used in an arithmetic derivation of the latter score.

A difficulty exists in interpreting the nature of what the Lie Scale measures. The items are not necessarily homogeneous and were merely selected by empirical means from item analyses. The scale does not necessarily measure a unitary response style as if it were a stable personality trait of the subject. What is assessed may be analogous to the social desirability response set; it may be a momentary tendency for the S to put himself in the best light, or it may be a deliberate tendency on particular items for the subject to distort his answers.

The assumption was stated before for an explanatory purpose that the construct definitions are completely independent; this assumption is dubious, however, because constructs that are completely unitary are not often found in personality research. Thus according to Campbell and Fiske (1959) it is improbable that the data in the heterotrait-heteromethod triangles are absolutely unrelated and that the entries will be zero. Taking into consideration independence of constructs as a matter

of degree, construct variance or overlap occurring between construct definitions may be expected to contribute to the heterotrait-heteromethod values. In the present study and from the rationale proposed herein that differentiation occurs with development, it is predicted that this common variance contributes less to the heterotrait-heteromethod triangle entries as the samples increase in grade.

4. Areas 5 and 6, adjacent to the reliability diagonal, are labeled the heterotrait-monomethod triangles and include entries of intercorrelations of different constructs using the same instrument. These entries reflect method variance inasmuch as data assumed to measure relatively independent events correlate to the degree that their single source of information influences the data. The criterion is that these values are lower than the entries in the validity diagonal. According to Campbell and Fiske (1959) this criterion is often not satisfied in personality research, and individual differences typically influence the test taking results. Method variance may be indexed by comparing the entire region labeled the monomethod block with the heteromethod block. Assuming comparable reliabilities among the test, the index is the difference in level of the heteromethod values subtracted from the parallel monomethod values.

5. A final procedure for discriminant validity is a comparison of the interrelationships of entries for the heterotrait triangles with the other heterotrait triangles in both the monomethod and heteromethod blocks. The criterion specifies that the same pattern of correlation exists in spite of the general differences in level of correlation between the various

triangles. A pattern of entries for one construct that differs from the others in the same magnitude and direction in each of the hetero-method and monomethod triangles demonstrates that this construct has greater conceptual usefulness. A similar contrast of patterns for the two methods permits an analogous interpretation for one method over another.

In summary, these five procedures that have been enumerated require for sufficient validation that correlations exist greater than zero for each construct measured by different methods, and also that by comparison, the intercorrelations across methods and across constructs are low if the sources of information are maximally different and are measuring maximally different events. Thus, construct validity requires the successful demonstration of convergent validity in the first comparisons together with discriminant validity in the remaining three procedures for comparisons. Table 2 gives a brief of these procedures and also includes examples of the trait-method units that are intercorrelated, observed, and compared for each procedure. The examples use the labels of the trait-method units in Table 1.

Fourth Procedure: Predicting Relations to Other Variables

Information may be obtained in a unique manner regarding self concept by contrasting the results from the multitrait-multimethod analyses across grade and sex. This methodological procedure may help clarify the notion of differentiation of self concept by comparing contributions of construct

Table 2

Multitrait-Multimethod Analysis Procedures and Examples of Comparisons

Procedure	Example
1. Magnitude of reliability diagonal values	A_1A_1, B_1B_1, C_1C_1, D_1D_1
2. Magnitude of validity diagonal values (convergent validity)	A_1A_2, B_1B_2, C_1C_2, D_1D_2
3. Validity diagonal values vs. heteromethod values (discriminant validity)	A_1A_2 vs. A_1B_2, A_1C_2, A_1D_2, B_1A_2, C_1A_2, D_1A_2; B_1B_2 vs. B_1A_2, etc.
4. Validity diagonal values vs. monomethod values (discriminant validity)	A_1A_2 vs. A_1B_1, A_1C_1, A_1D_1, A_2B_2, A_2C_2, A_2D_2, etc.
5. Pattern of entries compared between heteromethod and monomethod triangles; magnitude difference between monomethod and heteromethod values (discriminant validity)	A_1B_1 vs. A_2B_2 vs. B_1A_2 vs. A_1B_2, etc.

Note.--Pairs of subscripted letters have the same labels as the entries in the matrix of Table 1. The pairs above refer to intercorrelations of particular constructs and methods, e.g. construct A, method 1 with construct A, method 2.

variance to each grade level. The following criteria were stated as evidence in support of Hypothesis II:

(a) Convergent and discriminant validity for constructs other than Self becomes greater as a function of higher grade level.

(b) Construct variance contributes less to the heterotrait-heteromethod triangle entries as a function of higher grade level.

(c) Intercorrelations between pairs of constructs show a pattern such that the ratio increases with grade level between pairs including the construct of Self and the pairs including constructs other than Self. The six pairs of constructs are as follows:

Self	x	Family
Self	x	Friends
Self	x	School
Family	x	Friends
Family	x	School
Friends	x	School

Data used in testing Hypothesis III were obtained from the following sources:

(a) Self concept differentiation may be indexed by observing the variability of a S's scores obtained from the trait-method units. The index was the variance for each S obtained from the particular trait-method units that were shown to satisfy the multitrait-multimethod criteria.

(b) Field-dependence-independence was interpreted from scores on a short form (Jackson, 1956) of the Embedded Figures Test (EFT).

(c) The Remote Associates Test and Barron Tests of Creativity were assumed to measure remote associations, ideational fluency, and originality.

(d) Response to incentives in school activities for achievement, affiliation, and influence were measured by the My Opinions Card Sort.

(e) Sociometrics measured popularity and expansiveness or degree of liking for others.

(f) Measures of the mental health atmosphere, social climate, and social structure were obtained from instruments used in the sponsored research project named at the first of this chapter.

CHAPTER III

RESULTS AND DISCUSSION

In the following analyses of data the four constructs are identified as Self, Family, Friends, and School. The eight variables or trait-method units refer to each of the four constructs as assessed by each of the instruments, viz., Self-AQ, Family-AQ, Friends-AQ, School-AQ, Self-SEI, Family-SEI, Friends-SEI, School-SEI. The correlation coefficients were tested for significance at the .05 level which for N=50 is .23, for N=45 is .24, and for N=35 is .28. The plan used for reporting the results is that first the reliability data are presented for all of the samples. An overall view then follows in a summary table which indicates the criteria that were satisfied for all of the samples. The summary table is then elaborated upon by presenting results separately for each of the convergent and discriminant procedures. In each presentation a within-sample analysis is reported in detail for the eleventh-grade boys, and is used as a model showing how the data were interpreted in all of the remaining samples. Each presentation then concludes with analyses of the data between samples. Since the sample of eleventh-grade boys is used as a model, the correlation matrix for this sample is reported in Table 3, and the matrices for the remaining samples are included for possible reference in the appendixes.

Table 3

Correlation Matrix for Eleventh-Grade Boys

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.82							
Family	B_1	.58	.86						
Friends	C_1	.74	.40	.82					
School	D_1	.65	.35	.53	.83				
Self Esteem Inventory									
Self	A_2	.42	.37	.35	.55	.77			
Family	B_2	.34	.62	.22	.30	.55	.78		
Friends	C_2	.32	.28	.44	.20	.40	.22	.68	
School	D_2	.32	.16	.28	.60	.63	.35	.09	.35

Reliability

Sample of Eleventh-Grade Boys

The coefficients of internal consistency are indicated in the reliability diagonal of Table 3. The region of the matrix that was defined as the reliability diagonal was illustrated in Table 1 in the last chapter. The reliability coefficients shown in Table 3 were all significantly above zero and ranged from .36 to .86.

The mean was calculated from the four coefficients for both the AQ and SEI instruments. In the present sample the mean was .82 for the AQ and .65 for the SEI. These means are reported in Table 4 for all of the samples. It was also noted for the present sample how well the criterion was satisfied that the reliability values for a method exceed all other values in the respective monomethod block. In the present sample the criterion was satisfied for the AQ but not for the SEI. The AQ had none, while the SEI had three monomethod values higher than the lowest reliability value. This information is indicated by "0" and "3" in the "No. Higher" column of Table 4. The lower the number in this column the more the criterion was satisfied. According to a Sign test a "0" or "1" is significant at less than the .10 level. In the present sample although three entries exceeded the lowest reliability value, information from the matrix of Table 3 shows that School-SEI was the single variable not meeting this criterion. The reliability coefficient for this variable was substantially lower than the others, and its effect is manifested in the wide range of heterotrait entries of .09 to .63. The data from the matrices for the remaining samples are also summarized in Table 4.

Table 4

Comparison of Reliability Values
With Monomethod Values

Grade	Boys				Girls			
	AQ		SEI		AQ		SEI	
	Mean	No. Higher	Mean	No. Higher	Mean	No. Higher	Mean	No. Higher
11	.82	0	.65	3	.77	2	.67	1
9	.78	0	.64	0	.80	2	.60	3
7	.77	0	.67	0	.79	1	.72	0
5	.75	5	.68	4	.71	3	.68	1
3	.71	3	.63	1	.82	0	.52	6

Note.—Mean=mean of the reliability values for the four constructs using one instrument; No. Higher=number of heterotrait-monomethod values exceeding the lowest reliability value.

In reference to the No. Higher column, by a one-tailed Sign test for six possible pairs, 0 higher=.02 level and 1 higher=.10 level of significance.

Analysis Between Samples

For construct and methods. For each sample group it was noted whether a reliability diagonal value for each variable was above or below the median of the reliability values. On this basis the Self-SEI trait-method unit maintained excellent reliability, and the Self-AQ maintained fairly good reliability across all of the grades and across each sex. Poor reliabilities were consistently obtained across both grade and sex for School-SEI.

The superiority of the Self-SEI as a measurement device may be explained by the fact that the number of items in this scale was almost three times that of the other SEI scales and, thus, permits a much wider range of scores. The poor reliabilities for the School-SEI scale are most probably explained by the restricted range of scores, together with the possibility that the items dealing with the construct of School are heterogeneous.

A comparison of methods was made by determining the median value for each method on each sample group. In every sample group the median for the AQ was substantially higher than that of the SEI. Internal consistency is expected to be higher for the AQ, since the range of scores is greater than for the SEI, and in addition, the bipolar scale items were selected on the basis that they were homogeneous items with high loadings on the evaluative factor.

For grade and sex. When each reliability value was compared with the median value of the corresponding values across all ten sample groups, the reliabilities of the eleventh-grade boys and seventh-grade girls were most consistently above the median.

Overall View of Convergent and Discriminant Validity

Construct validity is expressed to a relative degree in a multitrait-multimethod analysis by the combined procedures demonstrating convergent and discriminant validity, assuming adequate reliabilities for the assessment. Table 5 gives an overview of the results by showing

Table 5

Constructs Showing Construct Validity

Sample	Validity Criteria			
	Convergent	Heteromethod Comparison	Monomethod Comparison	Monomethod Comparison (SEI alone)
Eleventh-grade Boys	Self Family Friends School	Self Family Friends School	— Family — —	— — Friends —
Eleventh-grade Girls	Self Family Friends School	Self Family — School	— — — School	— Family — —
Ninth-grade Boys	Self Family — —	Self Family — —	Criteria Not Met ↓	Self Family — —
Ninth-grade Girls	Self Family Friends School	— Family — School		— — — School
Seventh-grade Boys	Self — — School	Self — — —		— — — —
Seventh-grade Girls	Self Family Friends School	Self — Friends —		— — Friends —
Fifth-grade Boys	Self — — School	Self — — School		Criteria Not Met ↓
Fifth-grade Girls	Self Family Friends School	Self Family — School		
Third-grade Boys	Self — — School	Self — — —		
Third-grade Girls	Self — Friends School	— — — —		

which constructs satisfied the criteria for convergent validity and for two of the three procedures for discriminant validity. The third procedure for discriminant validity is not represented because the data are not interpreted in terms of separate constructs. For each sample in Table 5 there are separate cells referring to each procedure. The name of a construct is included in a cell when the criterion for that respective procedure was satisfied. The criterion for the convergent validity procedure requires the validity diagonal value to be significantly greater than zero.

The columns labeled "Heteromethod Comparison" and "Monomethod Comparison" refer to the procedures in which validity diagonal values were compared with the respective heterotrait-heteromethod values and heterotrait-monomethod values. The latter column is subdivided to include comparisons of validity values with the combined AQ and SEI monomethod blocks and also with the SEI monomethod block alone. The reason for this subdivision was that the SEI showed superior discriminant validity over the AQ enough to warrant a separate consideration. The criteria for these procedures were satisfied according to a Sign test if no more than one heterotrait value exceeded the corresponding validity diagonal value. The relative degree of construct validity for a construct is interpreted by the number of criteria satisfied for the convergent and discriminant procedures.

The evidence in Table 5 indicates that among all the samples construct validity was relatively high for the Family construct among the eleventh-grade boys and also high for the School construct among the eleventh-grade girls. Although convergent validity and discriminant

validity by the heteromethod comparison were demonstrated throughout the samples, when the monomethod comparisons were considered, construct validity was lessened. On the other hand, when only the monomethod comparisons for the SEI instrument were considered, then construct validity became more evident for the following in addition: Friends among the eleventh-grade boys, Family among the eleventh-grade girls, Self and Family among the ninth-grade boys, and School among the ninth-grade girls. Interpretation of the data for each of these procedures will be presented in more detail in the next sections.

Convergent Validity

Sample of Eleventh-Grade Boys

Convergent validity is demonstrated for each of the constructs in the present sample by referring to Table 3 in which all of the coefficients in the validity diagonal of the correlation matrix were significant. Two of the constructs, Family and School, had coefficients that would be considered to have substantial magnitude if they were included in an isolated report of validity. Ordinarily coefficients of this magnitude give strong confidence in the measure of a particular construct, but when the validity coefficients are contrasted with a whole matrix of intercorrelations, the validity may be shown to be spurious. For ease of reference the convergent validity values are reported for all of the samples in Table 6.

Table 6

Summary Table Showing Convergent Validity Values

Grade	Boys				Girls			
	Self	Family	Friends	School	Self	Family	Friends	School
11	.42	.62	.44	.60	.61	.56	.54	.64
9	.50	.47	.05	.19	.28	.37	.25	.53
7	.42	.07	.19	.26	.56	.32	.45	.42
5	.54	.21	.22	.46	.35	.34	.27	.34
3	.51	.22	.02	.25	.23	.12	.28	.24

Note.--N=50 with the following exceptions: Third-grade boys, N=47; eleventh and ninth-grade girls, N=38.

Analysis Between Samples

Among the 5 samples of boys, 12 of the 20 total entries in the validity diagonals showed convergent validity, and 3 were close to the level of significance. Among the girls, 19 of the 20 entries showed convergent validity.

For construct and grade across sexes. The mean was calculated for each construct and grade across the validity diagonal entries of the combined sexes. The report of these means in Table 7 shows that convergent validity for Self increased slightly with an increase of grade, with one exception. The increase was more marked for the constructs of Family and Friends, with one exception for each. For the School construct an increase was noted only in the 11th grade over the 3rd grade.

Table 7

Mean Convergent Validity Coefficients for Construct and Grade Across Sexes

Construct	Grade				
	11	9	7	5	3
Self	.50	.39	.49	.45	.37
Family	.49	.42	.20	.28	.17
Friends	.49	.15	.32	.25	.15
School	.62	.36	.34	.40	.25

For construct and sex across grades. When the values for every grade were combined, the mean validity coefficients of Friends and School were higher for the girls than for the boys. (See Table 8.)

Table 8

Mean Convergent Validity Coefficients for Construct and Sex Across Grades

Construct	Boys	Girls
Self	.48	.41
Family	.32	.34
Friends	.18	.36
School	.35	.43

For sex and grade across constructs. The mean of the four validity coefficients for each sample group showed higher values for the girls of the 7th, 9th, and 11th grades than for the boys. (See Table 9.)

Table 9

Mean Convergent Validity Coefficients for Sex and Grade Across Constructs

Sex	Grade				
	11	9	7	5	3
Boys	.52	.30	.24	.36	.25
Girls	.59	.36	.44	.32	.22

These observations to some degree support Hypothesis II that greater differentiation of self concept occurs as a function of grade level. The postulate that differentiation occurs earlier and more clearly for boys appears not to be supported from the evidence beginning with the 7th grade and for the construct of Friends and School. Further support for these views is needed from the discriminant validity analyses.

Discriminant Validity

Heteromethod Comparisons

The rationale for the heteromethod comparisons is that discriminant validity is indicated when the correlation of two measures of the same variable is higher than correlations obtained between that variable and any other variable having neither construct nor method in common.

Sample of eleventh-grade boys. As noted in the correlation matrix of Table 3, the validity diagonal value for Self was higher than five of the six values lying in its column and row in the two heterotrait-heteromethod triangles. The single value higher was the School-AQ x Self-SEI coefficient. The validity diagonal values for Family were substantially higher than their column and row values. The values for Friends and School also exceeded the corresponding heteromethod triangle values, but in each case there was one heteromethod value that closely approached the magnitude of the validity value. The number of heteromethod values exceeding the respective validity diagonal value for each of these constructs is reported in Table 10; thus a "1" is reported for Friends, and "0" for the remaining constructs for the present sample. By the rationale of the heteromethod comparisons, discriminant validity was positively indicated for the constructs in the present sample since they met the minimal requirements of one or less heteromethod values exceeding the validity values. By a Sign test the level of significance for 1 heteromethod value exceeding the validity value is .10, and for 0 heteromethod values the level is .02. Although only the minimal criterion was met in the present sample, if magnitude of the convergent validity values over the heterotrait-heteromethod values is considered, the construct of Family shows a more impressive degree of discriminant validity than the other constructs.

A further indication of discriminant validity may be obtained by observing the general level of validity diagonal values above the heteromethod values. The difference in level shows the amount of construct

Table 10

Discriminant Validity As Judged by Number of Heteromethod Values Exceeding Convergent Validity Values

Grade	Boys				Girls			
	Self	Family	Friends	School	Self	Family	Friends	School
11	1	0	0	0	1	0	1	0
9	0	0	6	3	2	0	2	0
7	1	3	0	2	0	4	0	2
5	1	5	5	1	0	0	5	0
3	0	3	5	4	6	4	2	3

Note.—For 6 possible pairs by a one-tailed Sign test, 0 higher=.02 level, 1 higher=.10 level of significance.

variance that is present above the level of method covariance, and this difference is interpreted as an estimate of discriminant validity. In the present sample, the 12 heterotrait-heteromethod triangle values ranged from .16 to .55, with a mean of .31. The mean of the validity diagonal values was .52, and the difference between the means was .21, as reported in Table 11. The higher the difference, the higher is the estimate of discriminant validity for the sample.

It is likely that response set, and most conceivably social-desirability set, contributed in large part to the method variance shared by both the AQ and SEI instruments because the items in both have high face validity for the content of self concept.

Table 11

Estimate of Discriminant Validity as Judged by Difference in Level of Convergent Validity Values over Heteromethod Values

Grade	Boys			Girls		
	Mean Convergent Validity Values	Mean Hetero. Values	Estimate of Discrim. Validity	Mean Convergent Validity Values	Mean Hetero. Values	Estimate of Discrim. Validity
11	.52	.31	.21	.59	.35	.24
9	.30	.23	.07	.36	.24	.12
7	.24	.16	.08	.44	.37	.07
5	.36	.39	-.03	.32	.28	.04
3	.25	.27	-.02	.22	.27	-.05

The Lie Scale from the SEI was administered to all of the samples in the study, and Table 12 indicates the mean correlation of this scale with the constructs for each instrument and sample. Although the correlations for the present sample were not significant, ranging from -.02 to .21, they probably contributed up to a third of the method covariance indicated by the heterotrait-heteromethod correlations. The heterogeneity of items in the Lie Scale is best demonstrated by the low internal consistency coefficient of the scale, which for the present sample was .46.

Analysis between samples. Among the samples of boys discriminant validity was indicated for 11 of the 20 heteromethod comparisons. Among the girls also, 11 of the 20 comparisons showed discriminant validity (see Table 10). The construct of Self was successful in showing discriminant

Table 12

Mean Intercorrelations of the Lie Scale with Attitude Questionnaire and Self Esteem Inventory

Grade	Boys		Girls	
	AQ	SEI	AQ	SEI
11	.07	.11	.14	.25*
9	.19	.19	.20	.16
7	.36*	.12	.32*	.05
5	.18	.11	.14	.10
3	.13	.07	.20	.14

*Significant at .05 level.

validity throughout the grades with the exception of the third-grade girls. The construct of Family showed an increase in discriminant validity for the 9th and 11th grades, but an increase as a function of grade level was not seen otherwise.

Monomethod Comparisons

The rationale for the monomethod comparisons is that discriminant validity is indicated when a variable correlates higher with an independent attempt to measure the same construct than with measures of different constructs that happen to employ the same method.

Sample of eleventh-grade boys. Table 3 shows that the value for Self in the validity diagonal was not higher than five of the corresponding Self values in the heterotrait-monomethod triangles, but did exceed

the single Self-SEI x Friends-SEI value. The value for Family in the validity diagonal was higher than all six corresponding monomethod values. For Friends the validity value was higher than all three corresponding values in the SEI monomethod triangle but higher than only one value in the AQ monomethod triangle. The validity value for School was higher than the monomethod values in each triangle corresponding to the Family x School and Friends x School coefficients but lower than the two values for Self x School. A summary of this information is given in Table 13 which reports how many monomethod values exceeded the validity diagonal value. Discriminant validity becomes relatively higher as the number of monomethod values becomes lower. The minimal requirement for discriminant validity, therefore, was met only for the construct of Family in the present sample. The same information may be obtained in Table 13 for the remaining samples for boys, and in Table 14 for the samples of girls.

Assuming comparable reliabilities, it is possible to make an estimate of method variance attributable to each instrument as distinct from method covariance by obtaining the difference in level of correlation between values in the monomethod blocks and values in the heteromethod block. For the eleventh-grade boys from the information given in Table 3, a mean of .31 was obtained from the combined values of the two heterotrait-heteromethod triangles. A mean of .54 was obtained from the AQ monomethod values, and .37 from the SEI monomethod values. Method variance for the AQ was indicated roughly by the difference between .54 and .31, or a difference of .23. Method variance for the SEI was .06. The smaller the difference the less one can attribute the method variance of that

Table 13

Discriminant Validity for Boys as Judged by Number of Monomethod Values Exceeding Convergent Validity Values

Grade	Self		Family		Friends		School	
	AQ	SEI	AQ	SEI	AQ	SEI	AQ	SEI
11	3	2	0	0	2	0	1	1
9	3	0	2	0	3	3	3	3
7	2	1	3	3	3	2	3	2
5	3	2	3	3	3	3	3	2
3	0	1	3	3	3	3	3	3

Note.--Totaling both instruments for each construct, by a Sign test with 6 possible pairs, 0 higher=.02 level, 1 higher = .10 level of significance.

Table 14

Discriminant Validity for Girls as Judged by Number of Monomethod Values Exceeding Convergent Validity Values

Grade	Self		Family		Friends		School	
	AQ	SEI	AQ	SEI	AQ	SEI	AQ	SEI
11	2	1	2	0	2	0	0	0
9	3	3	3	1	3	2	2	0
7	3	1	3	1	3	0	3	1
5	3	3	3	3	3	3	3	3
3	3	3	3	3	3	3	3	3

Note.--Totaling both instruments for each construct, by a Sign test with 6 possible pairs, 0 higher=.02 level, 1 higher= .10 level of significance.

particular instrument to invalidity. This information is reported in Table 15 for the remaining samples as well as for the eleventh-grade boys.

Analysis between samples. The estimate of method variance reported in Table 15 illustrates the greater invalidating influence of method variance for the AQ than for the SEI instrument. The SEI shows a definite advantage by a Sign test at the .02 level of significance.

The general level of validity found by the convergent procedure did not hold up as well according to the discriminant procedures, and in fact the dominance of method factors in the AQ almost completely invalidated discrimination of the four constructs. Of the 40 comparisons of monomethod with convergent validity values, only two met the requirement that the validity diagonal entry exceed all other corresponding entries in the monomethod blocks. This result was due mainly to the entries in the AQ block, however, because in seven other instances the validity values exceeded their corresponding values in the SEI block.

One feature of the AQ anticipated in the last chapter that explains high method variance in the samples is that the responses do not necessarily reflect the accuracy of the Ss in the following of the directions. The Ss are to fix their attention on the given concept, and this concept changes four times. If the Ss do not follow these instructions, they may either fix their attention on one concept and respond four different times, or they may fix their attention on four concepts different from those given. The former alternative would tend to increase the intercorrelations of constructs using the same method and, thus, increase

Table 15

Estimate of Method Variance for Each Instrument Above Method Covariance

Grade	Boys					Girls				
	Hetero Mean	AQ		SEI		Hetero Mean	AQ		SEI	
		Mean	Diff.	Mean	Diff.		Mean	Diff.	Mean	Diff.
11	.31	.54	.23	.37	.06	.35	.56	.21	.36	.01
9	.23	.54	.31	.36	.13	.24	.66	.42	.37	.13
7	.16	.58	.42	.35	.19	.37	.71	.34	.39	.02
5	.39	.72	.33	.57	.18	.28	.70	.42	.49	.21
3	.27	.56	.29	.46	.19	.27	.56	.29	.51	.24

Note.—Hetero Mean=mean of the 12 values in the heterotrait-heteromethod triangles; AQ Mean=mean of the 6 values in the AQ heterotrait-monomethod triangle; AQ Diff.=difference between AQ or SEI monomethod mean and heteromethod mean.

methods variance. An example of the latter alternative is that the Ss might fix their attention on "Schoolwork" rather than "the way I see myself in my schoolwork." This alternative would have a tendency to lower convergent validity for the four constructs.

Pattern of Interrelationships

Sample of eleventh-grade boys. One method that was used for observing pattern in order to indicate discriminant validity was to rank the values in each of the triangles of the monomethod and heteromethod blocks and then compare these ranks among the four triangles. These values were obtained from Table 3 and three rank-order correlations were calculated, the first comparing the AQ and SEI monomethod triangles, the second comparing the two heteromethod triangles, and the third comparing the SEI monomethod triangle with one heteromethod triangle. The latter comparison was made to utilize the information regarding the SEI, since it showed a definite advantage over the AQ of having lower method variance. For the eleventh-grade boys the rank-order correlation was .60 between the monomethod triangles, .72 between the heteromethod triangles, and .99 between the monomethod and heteromethod triangles. Although two of these are not high values for rank-order correlation, they do show that there is much the same pattern of relationship between pairs of constructs over and above the influence of method variance. Table 16 shows the rank-order correlation coefficients for all the samples.

A further observation of pattern indicating discriminant validity was made by noting the magnitude of intercorrelations for the various combinations of constructs. Six combinations of intercorrelations of

Table 16

Discriminant Validity in Pattern of Relationships as Judged by Correlation of Heteromethod and Monomethod Values

Grade	Boys			Girls		
	AQ x SEI Mono	Hetero x Hetero	SEI Mono x Hetero	AQ x SEI Mono	Hetero x Hetero	SEI Mono x Hetero
11	.60	.72	.99	.49	.49	.94
9	.32	.26	.14	.29	-.54	.32
7	-.23	.60	.26	.32	.77	.78
5	-.03	.26	.09	.72	.03	.03
3	-.26	-.43	-.31	.43	.46	.66

Note.—Entries are rank-order correlation coefficients; AQ x SEI Mono=correlation of heterotrait-monomethod triangles for AQ and SEI; Hetero x Hetero=correlation of one heterotrait-heteromethod triangle with the other; SEI Mono x Hetero=correlation of heterotrait-monomethod triangle in SEI block with one heterotrait-heteromethod triangle.

constructs are possible and are represented in the six values of each of the four heterotrait triangles. These combinations are as follows:

Self x Family
Self x Friends
Self x School
Family x Friends
Family x School
Friends x School

Each of these pairs has four values from the combined heterotrait triangles. The mean of these four parallel values was obtained for each pair and is reported in Tables 17 and 18 for the samples. It is interpreted from these tables that discriminant validity is best indicated by low values.

Table 17

Mean Heteromethod and Monomethod Values for Six Pairs of Construct Combinations Among Boys

Combination	Grade				
	11	9	7	5	3
Self x Family	.46	.33	.29	.54	.38
Self x Friends	.45	.41	.26	.53	.37
Self x School	.54	.41	.53	.59	.47
Family x Friends	.28	.32	.25	.47	.31
Family x School	.29	.27	.31	.48	.38
Friends x School	.27	.29	.28	.45	.39

Table 18

Mean Heteromethod and Monomethod Values for Six Pairs of Construct Combinations Among Girls

Combinations	Grade				
	11	9	7	5	3
Self x Family	.42	.38	.46	.38	.38
Self x Friends	.57	.45	.49	.48	.49
Self x School	.53	.41	.59	.49	.47
Family x Friends	.47	.35	.41	.40	.34
Family x School	.26	.27	.44	.39	.32
Friends x School	.18	.38	.36	.45	.42

for a particular pair as compared with the other pairs. The results for the eleventh-grade boys show that discriminant validity is considerably better for the three pairs excluding Self than those which include Self.

In summary, to interpret construct validity from the multitrait-multimethod analysis it is necessary to observe the data as it accumulates over each of the procedures. Ideally the criteria are met for all five procedures, but the literature shows that often only convergent validity and heteromethod discriminant validity criteria are satisfied.

For the eleventh-grade boys convergent validity was demonstrated for each of the constructs in this sample except that reliability of the School-SEI variable was rather low and attenuated the validity of the School construct. Discriminant validity was also fairly well demonstrated for all of the constructs for the heteromethod comparison, but only the Family construct met the criteria for the monomethod comparison. The pattern of interrelationships slightly supported discriminant validity of the constructs. Response set determined by the Lie Scale probably contributed substantially to the method covariance.

Analysis between samples. According to Table 16 only the 11th grade for both sexes showed evidence of a consistent pattern of values for the trait-method units. The rank-order correlations of combinations of the four heterotrait triangles were all above .49 and reached a high of .99.

Among the six pairs of construct comparisons, the greatest differentiation occurred among the boys for Friends x School, i.e. the intercorrelations for these constructs most frequently received the lowest value (see Table 17). Among the girls, Friends x School and Family x

School received the lowest values most frequently (see Table 18). A strong sex difference was noted in which the comparison of Self x School among boys received the highest value in the most frequent number of cases. In 17 of the 20 cases the value was either the highest or the second in rank. This is consistent with a view that boys' evaluation of themselves is strongly influenced by their school milieu. An analogous sex difference was noted for the girls, but in this case the comparison was Self x Friends and did not show the same strong consistency. The comparison of Self x School also had frequent high values for the girls.

Pattern of method variance was also indicated for each trait-method unit by the difference between one value in one monomethod block and the mean of the two corresponding values in the heteromethod block. Tables 19 and 20 report a rough estimate of method variance for the total samples. The lower the estimate of method variance the less invalidating is that particular instrument alone. The mean of the estimates of variance was calculated across the construct combinations for each instrument and grade. The mean, as recorded also in Tables 19 and 20, was consistently greater for the AQ than for the SEI instrument across all grades. Among the boys the range of differences was .06 to .20 for the SEI and .26 through .42 for the AQ instrument. Among the girls the differences ranged from .01 to .30 for the SEI and .28 to .48 for the AQ. Method variance above method covariance was lowest for both the AQ and SEI among the boys in the Self x School comparison. This observation lends further support to the view of school influence upon boys' self concept, since

the results tend to eliminate the possibility that the high Self x School intercorrelations for boys is due mainly to invalidating method variance.

One criterion in support of Hypothesis II was that the ratio of non-Self to Self pairs of construct combinations increases with grade level, since the overlap of constructs would tend to decrease for the Self combinations. This criterion was minimally met for the boys. The method covariance was determined from the heteromethod triangles for the triad of Family x Friends, Family x School, and Friends x School for each grade and sex in relation to that of the triad of Self x Family, Self x Friends, and Self x School. The ratio of the first triad to the latter triad increased from 2/5ths, through 1/2, to 3/4ths for the 7th, 9th, and 11th grades, respectively. An interpretation of the result in support of the hypothesis is difficult, however, because the method covariance for non-Self triad increased in relation to the Self triad; i.e. instead of the numerator decreasing, the denominator merely increased.

Summary of Multitrait-Multimethod Analyses

Evidence of Construct Validity

The results bearing directly on Hypothesis I indicate that construct validity was evident only for the Family construct among the eleventh-grade boys and for School among the eleventh-grade girls. Although convergent validity and discriminant validity were demonstrated throughout the samples according to the heteromethod comparisons, the monomethod comparisons tended to attenuate construct validity. Taking into consideration the

Table 19

Pattern of Method Variance Among the Construct Combinations for Boys

Construct Combination	Grade									
	11		9		7		5		3	
	AQ	SEI	AQ	SEI	AQ	SEI	AQ	SEI	AQ	SEI
Self x Family	.05	.19	.30	.25	.24	.25	.28	.05	.22	.19
Self x Friends	.24	.18	.41	.10	.50	.01	.40	.17	.40	.06
Self x School	.04	.15	.24	.11	.23	.20	.19	.08	.21	.19
Family x Friends	.51	.08	.46	.33	.54	.31	.42	.10	.15	-.03
Family x School	.38	.23	.27	.27	.50	.34	.10	.16	.30	.12
Friends x Family	.52	.34	.31	.12	.54	.10	.49	.28	.29	-.15
Mean of Combinations	.26	.06	.38	.14	.42	.20	.33	.20	.29	.20

Note.--Each entry represents the difference between the trait-method unit value in the AQ or SEI monomethod block from the mean of the two corresponding values in the heteromethod block.

Table 20

Pattern of Method Variance Among the Construct Combinations for Girls

Construct Combination	Grade									
	11		9		7		5		3	
	AQ	SEI	AQ	SEI	AQ	SEI	AQ	SEI	AQ	SEI
Self x Family	.32	.14	.48	.26	.30	.17	.39	.11	.25	.14
Self x Friends	.25	-.09	.53	.18	.37	-.02	.44	.13	.40	.31
Self x School	.11	.17	.34	.19	.27	.15	.49	.53	.06	.22
Family x Friends	.30	-.02	.58	-.06	.39	-.12	.39	.15	.31	.21
Family x School	.19	.08	.29	.19	.32	-.04	.35	.12	.42	.31
Friends x Family	.08	-.22	.27	.03	.35	-.03	.44	.19	.28	.19
Mean of Combinations	.28	.01	.48	.13	.37	.02	.48	.24	.29	.30

Note.--Each entry represents the difference between the trait-method unit value in the AQ or SEI monomethod block from the mean of the two corresponding values in the heteromethod block.

monomethod comparisons for the SEI instrument alone, construct validity in addition became evident for the following: Friends in the eleventh-grade boys, Family in the eleventh-grade girls, Self and Family in the ninth-grade boys, and School in the ninth-grade girls.

These results indicate with overwhelming clarity the power of the multitrait-multimethod methodology in isolating the various factors that detract from the validity of a construct and its measurement. Strong method variance that was both shared, as indicated in the heteromethod triangles, and specific to each instrument, as indicated in the monomethod triangles, contributed to the scores in most of the samples below the 11th grade, and thus resulted in lack of construct validity. The variance shared by both methods probably inflated the validity values somewhat in all of the samples, and was undoubtedly attributable to a form of response set such as social desirability or distortion of answers to the questionnaires. Method variance in the SEI was much lower and thus more favorable than in the AQ, but still strong in some of the samples. This variance was most probably attributable to low internal consistency of the items and to sampling errors resulting from the restricted range of responses. The method variance in the AQ was possibly an inability for the Ss to fix their attention on each of the four distinct concepts as they responded. This inability may be interpreted either as deliberate inattention characteristic of the Ss' response system, or a lack of differentiation characteristic of the Ss' perceptual system.

In the case of constructs in samples where convergent validity was fairly well demonstrated, an explanation remains equivocal. There are three possible interpretations:

(a) Methods variance specific to each instrument are by definition uncorrelated and tend to show an underestimate of convergent validity.

(b) Methods covariance such as response set, putting oneself in the best light, faking, lack of test sophistication, etc., tend to inflate convergent validity. Since these influences are shared, they are correlated measurement error and thus exaggerate the validity values.

(c) The "true" level of construct intercorrelation is high if there is a lack of perceptual differentiation. Under these conditions the correlated construct variance or measurement errors can depress the values in the validity diagonal while raising the other values, thus underestimating convergent validity.

The crucial problem for interpretation of the data is to distinguish between the effects due to the response system, as in (b), and to the perceptual system, as in (c). This distinction cannot be made for the present data because the instruments obviously were not entirely independent measures. It is desirable in future research to select instruments that are more completely independent in their source of information regarding the Ss so that the method covariance would tend to be reduced. This procedure would make more clear the distinction between response system and perceptual system, even though method variance specific to each source of information would still exist.

Evidence of Differentiation of Self Concept

The procedures in the multitrait-multimethod analysis have been conceived as an hierarchy of criteria for construct validation. In general, below the 11th and 9th grades it was not possible to find satisfaction

of criteria in the hierarchy above the convergent and heteromethod comparisons. The halo effect of a single method upon the constructs, together with the unclear pattern of interrelationships of the trait-method units, has imposed limits that permit only gross interpretations. Thus some of the most useful information regarding overlap of constructs was not able to be obtained to support Hypothesis II.

An interpretation regarding self-concept differentiation is equivocal for another reason. In explaining the low convergent validity of constructs in some of the samples, the same three interpretations are possible that were mentioned in the last section. Positive evidence of validity for several constructs is admissable support for the differentiation hypothesis. But negative evidence does not bear directly upon the hypothesis because the data may be the result either of the response system or the lack of self-concept differentiation. Stated in other words, among the samples in which there is true lack of self-concept differentiation as a function of development, there is evidence of a lack of convergent validity. Thus again if the distinction were possible between the response system and perceptual system, negative evidence from the perceptual system is able to index the grade level and sex differences at which differentiation begins to occur. Meagre evidence in making this distinction and in support of Hypothesis II was obtained by the between-samples analyses. The evidence is summarized as follows:

(a) Regarding convergent validity, a slight increase was noted for Self as contrasted with a marked increase for Family and Friends for both sexes across the grades. Regarding the monomethod comparisons,

discriminant validity for Self was favorable throughout most of the grades, but discriminant validity increased for at least the Family construct in the 9th and 11th grades. Regarding the pattern of construct interrelationships, the discriminant validity pattern became more clear in the 11th grade, and for the boys the pairs of constructs excluding Self became slightly more differentiated in contrast with the pairs including Self.

(b) Regarding convergent validity for the girls as compared with the boys, the validity coefficients were significant more frequently for all constructs, were higher for Friends and School, and were generally higher in 7th, 9th, and 11th grades.

The Field-Dependence-Independence Study

Procedure

A sample of ninth-grade boys was selected for this study on the following basis: (a) the findings in the field-dependence-independence theory are relevant in large part only to boys; (b) construct validity was less favorable from the present results below the 9th grade; (c) additional data for this study were not available for the 11th grade; (d) it was assumed that differentiation as measured gained the greatest variability among the 9th graders, since they were on the lower bound of the grade level at which there was a fairly clear evidence of self-concept differentiation. The differentiation index was obtained from the variance of each S's SEI scores on the Self and Family constructs since these trait-method units were shown by the previous analyses to have most favorable convergent and discriminant validity for the sample. Scores were obtained from these

Ss for the EFT as the measure of the field-dependence-independence dimension and for the additional tests that were enumerated in the previous chapter. Table 21 reports the correlation coefficients of the differentiation index and EFT performance with performance on the additional tests. The sample was reduced in size in order to permit a more discriminating study. The problem arose that when particular Ss showed high field independence and a low index of self-concept differentiation there were two opposing alternatives for interpreting the low index. The first alternative is that the discrepancy is simply evidence to contradict the hypothesized relationship between the two. The second alternative is that these Ss may in fact be capable of perceiving self concept in a highly differentiated manner but actually have a low discrepancy of self concept in any of the social contexts. Data for these Ss would neither support nor negate the corollary postulates to Hypothesis III so the data were eliminated from the study.

Summary of Results

Hypothesis III was not confirmed by the results inasmuch as there was not a significant relationship between field independence and the index of self-concept differentiation; the non-significant correlation was in the negative direction. The results for the corollary postulates were much more favorable. Of the 13 postulates, the results for 8 were in the predicted direction for self-concept differentiation, and the results for 12 were in the predicted direction for field independence. The single negative correlation for field independence and the one which was most

Table 21

Correlation of Self-Concept Differentiation and Field-Independence with Classroom Behavior (N=15)

Independent Variables	Dependent Variables	
	Self-Concept Differentiation	Field Independence
Remote Associations (RAT)	.15	.58*
Ideational fluency	.12	.58*
Originality	.07	.49*
Incentives for:		
(a) achievement high	.34	.36
(b) affiliation low	.27	.03
(c) influence low	.16	.31
Popularity	-.19	.11
Low expansiveness	-.16	.02
Social structure perceived as:		
(a) concentrated rather than dispersed	.24	.25
(b) under adequate control, clear tasks	-.12	.16
Social climate competitive, dissatisfaction	-.08	.01
Mental health atmosphere:		
(a) low anxiety, low fear of adequacy	-.68*	-.18
(b) inacceptance of social milieu	.19	.21
Field-Independence (EFT, N=22)	-.12	---
WISC subtests (BD+OA+PC, N=22)	---	.52*

*Significant at .05 level

disconfirming for self-concept differentiation was the perception of learning conditions in regard to mental health atmosphere.

Of the verbal measures, remote associations and ideational fluency showed a substantial relationship with field independence and a low positive relationship with self-concept differentiation. Findings reported by Witkin et al. (1962) showed negative as well as positive relationships of verbal skills with field independence since field-dependent persons have been observed in some cases to show increasing verbal facility which apparently serves as a vehicle to enhance their communicability and dependence upon other persons. The measures used here, however, are more in the area of creative and independent uses of verbal skills rather than as defenses for interpersonal use.

Both dependent variables showed a fairly positive relationship with choosing school activities that have high incentive value for Need Achievement. Popularity and a low degree of expansiveness did not show a favorable relationship for either of the variables. The direction and difference in levels of the two correlations for field independence are consistent with the postulate, however, in which expansiveness was predicted to be lower than popularity. Even though degree of liking for others is low for field-independent persons, this does not necessarily dictate that others will dislike them.

A fairly positive relationship was noted for both dependent variables with the perception of the locus of communication in regard to the classroom social structure. The class was perceived as having the teacher rather than peers, and also a few peers rather than many, as responsible

for decision making; the communication network was seen as having narrow rather than broad contact patterns.

The postulate that was disconfirmed regarding the mental health atmosphere poses a problem for interpretation. The Ss showed an attitude of disliking the schoolwork in general, inadequacy and disappointment in their expectations to do well, and having high anxiety toward tests and school. These results are directly opposed to the findings reported by Witkin, et al. (1962) in which specific problematic tasks were approached by field-independent persons with ease, confidence, and enthusiasm. The low positive relationship, however, of the dependent variables with inacceptance of the social milieu suggests a possible interpretation of the inconsistent results. The classroom showed low attractiveness as a whole, and there was some degree of inacceptance of both teacher and peers. Witkin's findings refer to discrete problem-solving tasks administered in an experimental setting. The learning condition index refers to the Ss' perception of the broad, long-range activities in the schoolroom setting which perhaps only rarely and incidentally may include stimulating tasks for field-independent students. High anxiety and disappointment may simply be a reflection of their inacceptance of the social milieu.

Although the results of this study were to some extent supportive of the postulates, some note should be made of the fallibility of both the predictor and criterion measures. The criterion measures, with the exception of the standardized tests, were questionnaires eliciting written responses from the Ss. The same problem of interpretation exists for these measures as mentioned previously which is to distinguish the Ss' actual

perceptions from their observed responses. The measures are susceptible to the same influences as the self concept instruments of restricted ranges of scores, invalidating response set, etc. In the case of the predictor measures the use of the variance as an index of self-concept differentiation is of dubious value particularly when there is so small a number of test scores to contribute to this index. The measure of field independence may be interpreted with more confidence since, as indicated in Table 21, the EFT correlated .52 with the sum of scores on the WISC subtests PC, BD, and OA. Witkin et al. (1962) reported a correlation of .66 between the EFT and performance on these subtests.

Implications From the Research

Self concept in the literature has been considered a stabilizer or mediator between students' actual behavior in classrooms and their fluctuating social and emotional experiences. The view that self concept can become differentiated in varying contexts as influenced developmentally by a perceptual mode maintains self concept as a stabilizer, but it also adds a feature of flexibility which permits more interaction of self concept with the environment. This view is more consistent with findings in education that classroom learning can best be explained by an interaction of curriculum, teaching approaches, and the biology of the students. Provided assessment procedures are further improved as a result of a multitrait-multimethod analysis, self-concept differentiation as part of the network of the field-independence theory can be conceived as a variable to add to the research in classroom learning in regard to differing

influences upon achievement of teaching methods among students with differing personalities (cf., McKeachie, 1958).

Further implications are mainly of a methodological nature. Characteristically much research in educational settings includes many and diverse variables together with results that usually may be interpreted only in the context of particular studies. As there is less agreement upon the results, there is an even greater need for studies to adopt construct validity as the principal aim. As numerous variables are studied and relationships and consistencies demonstrated, construct validity may increase and generalizations may become admissible that cut across different procedures and settings.

The approach to construct validity of a multitrait-multimethod analysis includes "common sense" criteria. There are no criterion scores but only observations of relative highs and lows, and so it is not necessary to consider the scores on the tests as absolute and definitive. Suggestions have been made in the literature (cf., Campbell & Fiske, 1959) for illustrating contrasts of regions in the matrix by summary statistics, but some of these are not warranted because of the implication that the scores are definitive. One further summary procedure has been suggested that may be useful for interpreting the data even when method variance is high (Humphries, 1962). This procedure consists of obtaining a measure of the aggregate of correlations when either the construct or method is constant. Because the data can be interpreted in a gross, relative manner and still provide such a powerful form of analysis, the multitrait-multimethod approach is particularly suited for research in educational settings.

Melton (1941) stated that the distinction between laboratory research in learning and that occurring in classroom settings can be described merely along a continuum representing degree of control of the independent variables. On the one end of the continuum the variables to be manipulated are more easily isolated, varied, or held constant, while on the other end, as in classroom settings, the variables are much less amenable to control. Under the latter conditions the criteria are less solidly grounded and characteristically offer more of a variety of alternative interpretations for the phenomena under study. Thus the multitrait-multimethod analysis serves this unique function of helping eliminate inconsistent alternative interpretations.

The multitrait-multimethod procedures may be related in a positive manner to another issue in research. Cronbach (1957) described two historical streams in the development of psychology as the experimental and correlational disciplines, and further stated, in expressing needs and positive developments in research, that there should be an interaction of the two disciplines. The experimental discipline is concerned with a formal theory and makes statistical comparisons of different conditions or treatments of the data to confirm the theory. Individual differences tend to invalidate the data and are an "annoyance" to the experimentor. The correlational discipline is interested in the effects of environment and biology upon persons and so is directly concerned with individual differences, but in this case the treatment variations or varying circumstances for the study become the invalidating factors to the correlations. Cronbach (1957) suggested that an interaction of the two

consists of each mutually sharing the potential contributions of the other so that ultimately the results should permit predicting behavior of individual differences in varying situations. The multitrait-multimethod analysis utilizes procedures directly analogous to this interaction view. Multi-variables help to isolate the effects of individual differences for each treatment or method, and multi-treatments or methods help to isolate the effects upon individuals of varying circumstances for obtaining the data.

As mentioned before, gross observations made from the multitrait-multimethod analysis become powerfully discriminating for selecting plausible interpretations of the data. One of the primary purposes of the procedure is thus to serve in further development of assessment procedures; for instance, it is possible that with this analysis one construct may be demonstrated to be so diffuse as to be uninterpretable, and another may be demonstrated to be sufficiently unitary that with further conceptual development it may become more succssful in further prediction. Educational settings characteristically offer a broad field in which many constructs and many methods for measuring these constructs may be tested. The multitrait-multimethod analysis can be most efficiently used when there is an intent beforehand to select both methods and constructs that are as independent as possible. Methods often available in classroom settings that have a high degree of independence from one another are questionnaires, observations and ratings by judges, personal interviews or projective techniques, apparatuses that can be manipulated as stimuli are presented, etc. In regard to selecting constructs, the aim of the

study usually dictates that they have some relevance to one another and thus show less independence. It may be observed, however, that method variance can be isolated to a much higher degree, and method covariance can more ideally approach zero if at least one construct is selected which on a rational basis is completely out of the domain of the constructs primarily under study.

CHAPTER IV

SUMMARY

One of the difficult problems in research regarding the self concept is making generalizations across studies and interpreting these results in the context of various theories dealing with the self. This problem arises because of the variety of bases for defining the self and because of the many different assessment instruments that have been used. Research is needed in this area to determine construct validity of the postulated self. This involves two kinds of study, one of which is first an analysis of the assessment instruments together with the definitions of the postulate itself in order to gain confidence in what is measured, and the other is to show predictable relations of the postulate to the other variables in a psychological theory.

The present study was designed to determine construct validity of self as defined in a differentiation theory. It was proposed that the differentiation of self concept can be indexed and is related to analogous constructs in the psychological differentiation theory of Witkin et al. (1962). According to the latter theory it is postulated that the organism's perceptual system becomes increasingly differentiated as a function of development, and that one of the organizing principles of perceptual development is the mode by which persons perceive the relationship of figure to ground. Persons are described as having a field-independent mode of perception who have a high degree of differentiation and who show a tendency

to perceive external objects without the influence of the ground. An extension of this view was made in which the self is the object and differing social contexts are the ground. Accordingly, it was postulated that school students' attitudes toward self become less global and more differentiated in various social contexts as a result of development. As they progress from the 3rd grade through the 11th grade their self concept becomes more separable in the contexts of self, their family, their friends, and their school, and furthermore, this differentiation is related to the field-independent mode of perception. The first procedure in the study was to determine confidence in the assessment of the four constructs used, and secondly to form predictions from the differentiation theory and employ constructs in testing the theory that were successful in meeting the criteria of the first procedure.

In the first, or assessment part of the study, a multitrait-multimethod analysis was used to show how much of the variance obtained may be attributed to one method of assessment over another or to one construct over another. The multitrait-multimethod analysis is a relatively new methodological procedure which has been shown to be powerfully discriminating, even though it uses only gross criteria for observing the interrelationships. The data for the study were prepared in the following manner. Product-moment correlation coefficients were obtained between scores on the AQ and SEI assessment instruments, each of which measured self concept in the context of self, family, friends, and school. The coefficients were placed into an 8 by 8 matrix, and 10 matrices were thus obtained from sample groups of boys and girls in 3rd, 5th, 7th, 9th, and

11th grades. Additional entries were made in each matrix consisting of Kuder-Richardson reliability coefficients for each measure of a construct.

The first procedure in the analysis compared the reliability coefficients with all of the other coefficients according to the rationale that an instrument measuring a construct should correlate higher with itself than with any other measure. The second procedure determined convergent validity by showing the success of two different instruments in measuring one construct as compared with measures of other constructs. Discriminant validity was determined by the next three procedures which compared the interrelationship of trait-method units between separate instruments and separate constructs. The criterion for the third procedure stated that correlations with one another of separate measures of separate constructs should not be high, and these correlations should at least be lower than those for the same construct measured separately. Method covariance was indicated by a high correlation of separate constructs with separate instruments. In the fourth procedure, also, measures of separate constructs by the same instrument should not correlate highly, and the correlations should be lower than for separate measures of the same construct. Method variance was indicated by high correlations between separate constructs measured by one instrument. The criterion for the fifth procedure stated that a consistent pattern should exist for the entries within the matrix regardless of the general differences in level of correlation within different regions of the matrix.

It was necessary to accumulate the results over each of the procedures in a multitrait-multimethod analysis in order to determine construct validity, but this was not sufficient. Results of the analysis

were used in defining an index of differentiation of self concept for use in the prediction part of the study. This latter part of the study involved relating the field-independent mode of perception to the index of self-concept differentiation, and then these two constructs were related to several other measures of classroom behavior in a manner predictable from the differentiation theory. The research suggests that field-independent persons favor a degree of independence of activity, aloofness from interaction with others, and an active analytic approach to the field of experiences. Mode of perception is conceived as one of the determinants of general psychological differentiation, including differentiation of self concept in varying social contexts. It was thus postulated that field independence as well as self-concept differentiation would be related to the attitudes of students toward their field of experiences as mentioned above. The rationale for this part of the study is that in further establishing construct validity by making multiple predictions in a formal theory, the nomological network is filled in by showing that constructs which cannot be directly measured may be related to other constructs which can be more successfully measured by observable behavior.

The results for construct validity by a multitrait-multimethod analysis were positive for self concept in the context of Family among the eleventh-grade boys and for School among the eleventh-grade girls. When assessment by the SEI instrument was considered alone, more favorable results in satisfying the criteria were demonstrated, in addition, for Friends among the eleventh-grade boys, Family among the eleventh-grade girls, Self and Family among the ninth-grade boys, and School among the

ninth-grade girls. The results showed, in addition, that convergent validity was relatively well demonstrated for most of the constructs throughout the samples. Discriminant validity was not so well demonstrated, however, since method variance tended to be high for the SEI and even higher for the AQ instrument. Method covariance was explained in large part by the response set that was measured by the Lie Scale used as a detection scale with the SEI. Method variance contributing to the AQ appeared to be the result of the Ss sometimes not fixing their attention on the changing concepts given in the questionnaire. In the SEI there was less homogeneity of items than in the AQ, and there was also a restricted range of scores resulting from so few items in three of the scales. These conditions in the SEI attentuated the reliability of the scales and introduced method variance. Meagre supporting evidence was obtained for the hypothesis that self-concept differentiation increases with the grade level. Convergent validity increased for Family and Friends and to a lessor degree for Self across the grades. Discriminant validity did not demonstrate a change, however, except for Family in the 9th and 11th grades. The hypothesis was not confirmed that differentiation of self concept occurs earlier in boys.

The results for the prediction portion of the study were based upon the results obtained in the multitrait-multimethod analysis. The index of self-concept differentiation was derived and used in a sample of ninth-grade boys. The hypothesis was not confirmed proposing a relationship between field independence and the index of self-concept differentiation. Of the 13 additional postulates comparing the two constructs with other

observable behaviors, the results were in the positive direction for 12 of the postulates regarding field independence, and 8 regarding self-concept differentiation. Field independence, and to a lesser degree self-concept differentiation, were predictably related to the creativity measures of ideational fluency and remote associations. Measures of both constructs were related to the tendency to choose activities in school with incentive value for Need Achievement. In addition, social structure of the classroom was perceived as having the locus of responsibility in the teacher and a few peers and thus a narrow rather than broad contact pattern of communication. The results were in the negative direction to that predicted in regard to the students' attitude toward aspects of the classroom dealing with mental health. The subjects high on the field-independence measure and index of self-concept differentiation showed more dissappointment and anxiety toward tests and less liking for the schoolwork in general.

The results herein did not show a high degree of construct validity in either the assessment portion or the prediction portion of the study, but they do exemplify the usefulness of the multitrait-multimethod methodology with the aim of redeveloping the measures and redefining theoretical constructs. It has been demonstrated that two necessary approaches to construct validity are observing a complex of measurement data and demonstrating multiple relations predicted by a formal theory. When taken singly, a measure may appear to show validity, but when contrasted with relevant measures it may show less promise; furthermore, a single measure may show little precision in predicting observable behavior, but when

interrelated with a network of measures, it may show more promise. Thus certain assessment instruments may either be abandoned or by the results of the analysis further refined and developed, and likewise, constructs that appear to overlap may receive further delimitation. The multitrait-multimethod analysis becomes a particularly strong methodological procedure when used in classroom research in education, since typically there are numerous variables under study. Many facets of classroom behavior occurring within a given moment are not able to be controlled as in a single-variable study in the laboratory. Thus a multidimensional approach may be successful which evaluates the data by capitalizing upon the relative influence of the many facets of behavior on one another.

APPENDIX A

Correlation Matrix for Eleventh-Grade Girls

(N=38)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.82							
Family	B_1	.63	.74						
Friends	C_1	.78	.70	.83					
School	D_1	.57	.38	.30	.69				
Self Esteem Inventory									
Self	A_2	.61	.35	.40	.50	.81			
Family	B_2	.27	.56	.25	.17	.45	.64		
Friends	C_2	.66	.54	.54	.12	.44	.38	.66	
School	D_2	.41	.20	.32	.64	.63	.27	.00	.57

APPENDIX B

Correlation Matrix for Ninth-Grade Boys

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.78							
Family	B_1	.53	.82						
Friends	C_1	.67	.61	.78					
School	D_1	.53	.30	.59	.72				
Self Esteem Inventory									
Self	A_2	.50	.21	.26	.34	.75			
Family	B_2	.29	.47	.27	.24	.30	.78		
Friends	C_2	.28	.11	.05	.08	.44	.29	.54	
School	D_2	.35	.17	.13	.19	.42	.36	.38	.47

APPENDIX C

Correlation Matrix for Ninth-Grade Girls

(N=38)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.77							
Family	B_1	.68	.87						
Friends	C_1	.81	.80	.81					
School	D_1	.62	.44	.58	.76				
Self Esteem Inventory									
Self	A_2	.28	.16	.22	.35	.73			
Family	B_2	.23	.37	.26	.25	.46	.64		
Friends	C_2	.31	.17	.25	.45	.46	.16	.62	
School	D_2	.21	.04	.16	.53	.47	.34	.34	.41

APPENDIX D

Correlation Matrix for Seventh-Grade Boys

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.78							
Family	B_1	.41	.79						
Friends	C_1	.60	.58	.80					
School	D_1	.60	.60	.66	.71				
Self Esteem Inventory									
Self	A_2	.42	.13	.10	.45	.69			
Family	B_2	.20	.07	-.01	.08	.42	.68		
Friends	C_2	.11	.08	.19	.16	.11	.35	.64	
School	D_2	.29	.12	.09	.26	.57	.44	.22	.67

APPENDIX E

Correlation Matrix for Seventh-Grade Girls

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.83							
Family	B_1	.66	.79						
Friends	C_1	.78	.73	.76					
School	D_1	.76	.68	.63	.78				
Self Esteem Inventory									
Self	A_2	.56	.30	.39	.45	.82			
Family	B_2	.37	.32	.29	.37	.50	.71		
Friends	C_2	.42	.39	.45	.22	.39	.22	.65	
School	D_2	.53	.35	.34	.42	.64	.32	.25	.69

APPENDIX F

Correlation Matrix for Fifth-Grade Boys

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.76							
Family	B_1	.70	.80						
Friends	C_1	.81	.73	.63					
School	D_1	.75	.63	.67	.82				
Self Esteem Inventory									
Self	A_2	.54	.40	.40	.59	.81			
Family	B_2	.40	.21	.21	.40	.65	.60		
Friends	C_2	.41	.33	.22	.44	.50	.60	.74	
School	D_2	.43	.29	.28	.46	.62	.62	.43	.58

APPENDIX G

Correlation Matrix for Fifth-Grade Girls

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.73							
Family	B_1	.65	.66						
Friends	C_1	.78	.66	.73					
School	D_1	.73	.63	.74	.71				
Self Esteem Inventory									
Self	A_2	.35	.31	.35	.28	.79			
Family	B_2	.21	.34	.22	.25	.37	.71		
Friends	C_2	.33	.31	.27	.30	.47	.42	.62	
School	D_2	.20	.30	.29	.34	.77	.40	.49	.60

APPENDIX H

Correlation Matrix for Third-Grade Boys

(N=47)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.72							
Family	B_1	.37	.83						
Friends	C_1	.51	.67	.58					
School	D_1	.47	.61	.70	.71				
Self Esteem Inventory									
Self	A_2	.51	.16	.40	.39	.79			
Family	B_2	.47	.22	.32	.29	.51	.54		
Friends	C_2	.14	.00	.02	.07	.45	.24	.58	
School	D_2	.46	.17	.29	.25	.58	.46	.52	.60

APPENDIX I

Correlation Matrix for Third-Grade Girls

(N=50)

		Attitude Questionnaire				Self Esteem Inventory			
		A_1	B_1	C_1	D_1	A_2	B_2	C_2	D_2
Attitude Questionnaire									
Self	A_1	.83							
Family	B_1	.54	.83						
Friends	C_1	.72	.51	.82					
School	D_1	.46	.55	.58	.82				
Self Esteem Inventory									
Self	A_2	.23	.27	.35	.49	.76			
Family	B_2	.30	.12	.18	.13	.43	.28		
Friends	C_2	.29	.22	.28	.40	.63	.41	.60	
School	D_2	.30	.13	.20	.24	.62	.48	.49	.46

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