

Ego Functions and Ego Development: Defense Mechanisms and Intelligence as Predictors of Ego Level

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ABSTRACT This study considers the contribution of two ego functions—intelligence and defense mechanisms—to ego developmental level. Two independent assessments of ego level were related to IQ and defense mechanism use in a sample of 89 young adults. Whereas IQ and defense were themselves found to be unrelated, both variables predicted ego level: The relation with IQ was linear, whereas the relation with defense was curvilinear. In addition, the relation between defense and ego level varied as a function of IQ level. At low levels of IQ, stronger use of Denial and Projection was associated with higher ego levels. At high IQ levels, strong use of Denial was associated with lower ego levels, whereas moderate use of Projection was associated with higher ego levels.

The importance of the concept of ego development as an overarching, unifying principle for integrating diverse aspects of personality and character development has been increasingly recognized (e.g., Block &

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Block, 1980; Loevinger, 1976). The essence of the ego is to integrate and make sense out of experience (Loevinger, 1969), while individual functions of the ego serve the purpose of adaptation to the demands of both the external and internal worlds (Hartman, Kris, & Loewenstein, 1964). The present research considers the relations of two ego functions—defense mechanisms and intelligence—to ego development.

Ego Development, Impulse Control and Defense Mechanisms: Theory

An important function of the ego involves the control of impulse; the development of this function is one of the defining factors in identifying different levels of ego development (Loevinger, 1976). Impulse control is accomplished in different ways; one of these is through the ego mechanisms of defense. As stages of ego development have been identified in terms of the degree of impulse control present, this suggests that there should be a correspondence between level of ego development and the use of defense mechanisms.

Theoretically, to describe the hypothesized relationship between ego development and impulse control, and the relevance of this for the use of defense mechanisms, we may divide the stages of ego development into three groups, based on the dimension of impulse control. In the first group, which includes the Impulsive and Self-Protective stages,¹ there is minimal conscious control of impulses; anxiety around the expression of these impulses takes the form of feared consequences (“objective anxiety,” Freud, 1936). Thinking, at this stage, is simplistic and is organized around dichotomies: good-bad, yes-no. For adults who remain at this stage, troubles are located outside of the self and blame is externalized (Cohn, 1991; Loevinger, 1976). The simplistic thought processes associated with these stages suggest that low level defense mechanisms would be typical. Denial, a defense that is based on dichotomous thinking in which a negative marker (no, not) is attached to an anxiety-arousing perception² in order to turn it into something less threatening, should be characteristic. In the Self-Protective stage, in which negative affect is externalized onto others, followed by mistrust of those others (Loevinger, 1976), projection also should be characteristic.

1. One earlier stage is assumed to be nonverbal and thus not easily assessed.
2. The perception may be of an external or internal event.

The second group includes the Conformist and Self-Aware levels. To reach the Conformist stage of ego development, there is a major change regarding impulse control. In this stage, there is a conscious recognition of the need to control impulses, although the source of this control is seen as external to the self. At the Conformist stage, social norms control behavior. The advent of this conscious control, based on external sanctions, replaces the need for unconscious mechanisms of control—that is, for defense mechanisms. The next, Self-Aware level, is a transition period. Conscious control of impulses based on external rules continues, replacing the need for defense mechanism use. From the perspective of impulse control, the transition involved here is from conscious control based on external rules to conscious control based on internal dictates. Rules are internalized, but not yet fully integrated into the ego.

The third group includes the Conscientious, Individualistic, and Autonomous stages. With the beginning of the Conscientious stage, the conscious control of impulses is based on internalized standards of conduct. Impulse control is maintained through conscience, but conscience is still closely tied to external sanctions and moral realism. This stage is followed by the Individualistic level; internal control of impulses continues, but the moralism of the preceding stage is replaced with a conscious awareness of inner conflict (Loevinger, 1976). To the extent that this conflict can be tolerated, there is little need for defense use; to the extent that awareness of conflict creates anxiety, defenses may be called into play. Finally, at the Autonomous stage, there is a capacity to acknowledge and consciously cope with conflict, “rather than ignoring it or projecting it onto the environment” (Loevinger, 1976, p. 23). At this stage, the role of lower level defense mechanisms, such as denial and projection, should be minimal.

The previous characterization of the relation between defense and ego level suggests curvilinearity: The use of lower level defenses will be greatest at the lowest levels of ego development, will be least at the mid-range of ego development, but may increase somewhat at the highest levels of ego development, depending on tolerance for conflict.

Defense Mechanism Development: Theory and Research

In the previous description, it is suggested that immature defenses would be associated with low levels of ego development. Cramer (1987, 1991a)

has proposed a model that assumes a sequence in the emergence of defense mechanisms as part of normal development, in which different defenses appear at different periods of development and are typical for that period. Denial, an immature defense, is one of the earliest defenses to develop, becoming predominant in the preschool years, but under normal circumstances declining in importance during childhood and thereafter. Projection increases in importance beginning in early childhood and continues to be prominent during adolescence. A third defense, identification, develops more slowly and emerges as predominant in the late adolescent period, when issues of identity formation are central. Empirical studies have supported this model of defense development (e.g., Cramer, 1987, 1997b, 1998; Cramer & Gaul, 1988; Smith & Danielsson, 1982; Smith & Rossman, 1986).

This conception of defense mechanism development, as part of the ego, is consistent with Loevinger's model for ego development: "Ego development is at once a developmental sequence and a dimension of individual differences in any age cohort . . ." (1976, p. 13). That is, just as the individual moves through qualitatively different stages of ego development, so s/he moves from the use of denial as the predominant defense to the use of projection and subsequently to the use of identification. Within any one sample, however, there will be individual differences; some persons will rely on defenses that are characteristic of earlier or of later developmental periods. When defenses are used beyond the time that they are developmentally appropriate, they are considered to be "immature," as, for example, in the case of the use of denial by adults (Cramer, 1991a; Cramer & Block, 1998; Vaillant, 1977).

Ego Development, Defense Mechanisms and Impulse Control: Research

Theory suggests that ego development, as assessed by Loevinger's Sentence Completion Test (SCT; Loevinger & Wessler, 1970), should be related to the use of defense mechanisms, and there is some support for this expectation in the research literature. The conclusions to be drawn from the existing studies, however, are hampered by inconsistent findings, the use of idiosyncratic samples, inadequate measurement reliability, lack of information regarding the external validity of the measures, and in some cases by the restricted range of ego levels represented (Bond, Gardner, Christian, & Sigal, 1983; Haan, Stroud, & Holstein, 1973;

Jacobson, Beardslee, Hauser, Noam, Powers, Houlihan, & Rider, 1986; Levit, 1993). To add to the confusion, studies with older adults have generally found a lack of relation between defense maturity and ego level, in women (Helson & Wink, 1987) and in college-educated men (Vaillant & McCullough, 1987).

Given these problems, the relation between ego development and defense use remains unclear. Furthermore, none of the previous studies considered the possible role of intelligence as a moderator variable in the relation between ego development and defense. In the present article, we rectify the previous problems by studying young adult men and women from the general population, using defense measures that have demonstrated reliability and validity, and include the role of intelligence in predicting ego level.

Other research has related ego development to impulse control. Individuals at the lower levels of ego development have been found to have weak impulse control (Beardslee, Jacobson, Hauser, Noam, Powers, Houlihan, & Rider, 1986; Browning, 1986; Rozsnafsky, 1981; Starrett, 1989), but further evidence suggests that the relation between ego level and impulsiveness is curvilinear, not linear, if the full range of ego development is considered (Starrett, 1983; Lorr & Manning, 1978).

These findings, showing a curvilinear relation between impulse control and ego level, when the full range of ego levels is represented, suggest that the relation between defense mechanism use and ego level might also be curvilinear. That is, when impulse control is weakest and impulsivity greatest, as at the lowest Impulsive and Self-Protective ego levels, then the need for defense mechanisms use is greatest. When the ability for conscious control and delay of impulse expression is greatest, however, as at the Conformist and Self-Aware levels, then the need for defense mechanisms is least. At the highest ego levels, when impulse control has become less rigid, the need for defenses may increase somewhat. In other words, the relation between defense mechanisms and ego level should be the inverse of that between impulse control and ego level—that is, should be U-shaped.

Ego Development, Intelligence, and Defense Mechanisms

Intellectual activity, including the capacity to reason, to make judgments, to anticipate, and to evaluate consequences, is another function of the ego that develops over time, and that may be used to control impulses.

Research evidence supports the expectation that intelligence is positively related to ego level, as assessed by scores on the SCT. Loevinger (1976) and other investigators have reported correlations varying from .10 to .50 between ego level and various measures of intelligence (Hauser, 1976; McCrae & Costa, 1980; Westenberg & Block, 1993).

The relation between IQ and defense use is less clear. Although several studies suggest that there may be a positive relation between IQ and developmental level of defense use (Baxter, Becker, & Hooks, 1963; Haan, 1963; Haan et al., 1973; Schimek, 1968), the sample limitations again make this conclusion far from clear-cut. Moreover, in samples of college men, working-class men, and gifted women, Vaillant (1993) found no relation between IQ and maturity of defenses. As yet, the combined role of defense mechanisms and IQ in the development of ego level has not been investigated. As defense mechanisms involve cognitive operations of varying degrees of complexity, it is possible that the importance of defense mechanisms, and/or the type of defense used, may vary at different levels of IQ.

Predictions

In the present investigation, we study the contribution of two ego functions—defense mechanisms and intelligence—to ego development, in a sample of young men and women. Based on the preceding discussion of theory and empirical research, it is expected that, within this young adult group, the two lowest levels of ego development—Impulsive and Self-Protective—where impulse control is weakest and most needed, will be associated with the use of the lower level defenses of denial and projection. Low levels of ego development also should be negatively related to IQ. At subsequent levels of ego development (Conformist and Self-Awareness), external sanctions that control expression of impulses will replace the need for defenses, such that these ego levels should be negatively related to defense use. At the highest levels of ego development, when internalized intellectual processes assume control of impulses, we would predict a positive association between ego level and intelligence and a minimal association with denial and projection.

Implicit in these predictions is the hypothesis that defense mechanisms and intelligence function somewhat independently in their contribution to ego development. Defenses are predicted to have a curvilinear, U-shaped relation with ego level, whereas intelligence is predicted to have

a linear relation with ego level. If, as predicted, these two ego functions do operate independently, we should not expect to find a correlation between them.

METHOD

Participants. The participants in this investigation are from the Block and Block longitudinal study of personality and cognitive development. (See J. H. Block & J. Block, 1980, for a full description of the early phases of the study; for a description of the later stages, see Block, 1993). Participants were initially recruited into the study at age 3. They have been studied periodically since then. The participants reside primarily in urban areas and are heterogeneous with respect to parental social class and education. Approximately two thirds of the participants are European American, one fourth are African American, and one twentieth are Asian American. In the most recent assessment at age 23, 104 participants (of the original 128) participated. Valid data were available for 89 of these (43 males and 46 females), who are included in the present study.

Measures

Measuring defense mechanisms. The Defense Mechanism Manual (Cramer, 1987, 1991a) was employed to assess the use of defense mechanisms in TAT stories. Subjects were given the standard TAT instructions (Murray, 1943), and told stories to six TAT pictures (Cards 2, 8GF, 8BM, 10, 15, and 18GF). These stories were recorded and subsequently transcribed.

Without knowledge of the subject's gender or other information, each of the 534 stories was scored by a trained coder³ for the presence of three defense mechanisms—Denial, Projection, and Identification—according to the Defense Mechanism Manual. For each defense, there are seven categories representing different aspects of the defense; each category is scored as many times as it occurs in each story. The scores for each defense were then summed over the six stories, yielding a total score for Denial, for Projection, and for Identification.

The categories for each defense are as follows:

Denial: (1) Omission of major characters or objects; (2) Misperception; (3) Reversal; (4) Statements of negation; (5) Denial of reality; (6) Overly maximizing the positive or minimizing the negative; (7) Unexpected goodness, optimism, positiveness, or gentleness.

3. Appreciation is expressed to Jennifer Whitfield for her assistance in the scoring process.

Projection: (1) Attribution of hostile feelings or intentions, or other normatively unusual feelings or intentions, to a character; (2) Additions of ominous people, animals, objects, or qualities; (3) Magical or autistic thinking; (4) Concern for protection from external threat; (5) Apprehensiveness of death, injury, or assault; (6) Themes of pursuit, entrapment, and escape; (7) Bizarre story or theme.

Identification: (1) Emulation of skills; (2) Emulation of characteristics, qualities, or attitudes; (3) Regulation of motives or behavior; (4) Self-esteem through affiliation; (5) Work; delay of gratification; (6) Role differentiation; and (7) Moralism. A more complete description of these categories, with detailed rules for scoring, is presented in Cramer (1991a).

This measure of defense mechanisms has been demonstrated in previous studies to have adequate interrater reliability, with children, adolescents, adults, and psychiatric patients (e.g., Cramer, 1991a, 1997b, 1998; Cramer & Block, 1998; Hibbard, Farmer, Wells, Difillipo, Barry, Korman, & Sloan, 1994). In the present study, a second coder independently scored a random selection of 100 of the stories. The agreement between coders, based on Pearson's r , was .80 for Denial, .85 for Projection, and .78 for Identification, indicating adequate inter-rater reliability. Disagreements were subsequently resolved by discussion.

The validity of the coding approach has been demonstrated both through observational studies of children and psychiatric patients, in which defense mechanism scores differentiated between age groups or were related to psychiatric psychopathology in ways predicted by theory (Cramer, 1987, 1997b; Cramer, Blatt, & Ford, 1988; Dollinger & Cramer, 1990; Hibbard et al., 1994), and through investigations in which an experimental manipulation produced predicted changes in defense mechanism use (Cramer, 1991b, 1998; Cramer & Gaul, 1988).

Measuring ego development through personality descriptors. Under the direction of M. Westenberg (Westenberg & Block, 1993), ego level was assessed in two different ways. One method was based on prototype Q-sorts that had been created to describe the personality associated with each of the seven levels of ego development. Two personality psychologists who were highly experienced with the concept of ego developmental levels (J. Loevinger and L. D. Cohn) each used the California Adult Q-set (CAQ; Block, 1978) to provide descriptions of the personality characteristics associated with each level of ego development. There was a high degree of agreement between the two raters, with an average correlation of .84. For each ego level, the two Q-sorts were then averaged to yield composite CAQ ego level prototypes. For each ego level prototype, the distribution of CAQ item prototype values was then standardized, in order to achieve metrical comparability across prototypes.

The correlation between a participant's actual Q-sort, described below, and these prototypical Q-sorts was used to assess the similarity of the participant to each of the seven ego level personality prototypes. (For a full description of

the method used to establish the prototypes, see Westenber & Block, 1993.) Using this approach, seven ego level prototypical scores were obtained for each participant.

The actual Q-sort for each participant was also based on the CAQ. At age 23, six psychologist raters (doctorate level and graduate students in clinical and personality psychology) had each separately and independently interacted with the participants over a period of time during which interviews and other assessment procedures were carried out. Each judge, working independently, sorted the 100 items of the CAQ into a forced-choice, nine-step distribution for each participant, ranging from *not at all salient* to *highly characteristic or salient*. The estimated internal consistency reliability of the Q-items, based on correlations among observers, was .70. The multiple Q-sorts for each participant were then composited to form a pooled judgment for each participant. These composite Q-sort descriptions were used for the present analyses.

Measuring ego development with the Sentence Completion Test. The second method used to assess ego development was based on the Washington University Sentence Completion Test of Ego Development (SCT; Loevinger & Wessler, 1970). Each participant completed the SCT, which was scored according to the procedures outlined by Loevinger and Hy (1989). For each sentence stem, responses were typed and randomized across subjects. These anonymous responses were rated by two experienced, trained raters; differences were resolved by discussion. The “borderline rules” were used to arrive at a total protocol rating (TPR). Reliability data, obtained prior to discussion, showed perfect interrater agreement (both ratings were at the same ego level) to range from 67% to 89%. Within stage interrater agreement (disagreement not larger than one successive stage) ranged from 91% to 98%.

From these SCT data, two measures of ego level were determined. First, the TPR rating was used to assign each participant to one stage of ego level development. In addition, the total item sum score (ISS) was determined for each person; high ISS indicates high ego level. Thus, both categorical and continuous (ISS) variable measures of SCT ego level were available for each participant.

Measuring IQ. At age 18, each participant was given the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981). Participants’ responses were scored according to standardized procedures to yield a Full Scale IQ score.

It is important to note that the four sources of data—TAT stories coded for defense mechanism use, CAQ-based ego level prototype scores, SCT ego level scores, and WAIS-R IQ scores—are derived from entirely independent measures.

RESULTS

Descriptive statistics. To determine the relative use of the three defenses, a Gender (2) \times Defense (3) repeated measures multivariate analysis of variance (MANOVA) was carried out, with Defense as a repeated measure. There was a significant main effect for Defense, $F(2, 176) = 46.64, p < .001$. There were no effects for Gender, or for the Gender \times Defense interaction. Tests for mean differences indicated that the defense of Projection ($M = 10.22, SD = 6.91$) was used more than Denial ($M = 5.46, SD = 4.41$), $t(88) = 6.86, p < .001$, and more than Identification ($M = 4.73, SD = 2.80$), $t(88) = 7.75, p < .001$. Thus, within this general population of young adults, of the three defenses studied, Projection was the most frequently used.

Ego level was assessed using three different measures. From the SCT, both total protocol rating (TPR) and the total item sum score (ISS) was determined. From the CAQ, a prototype score for ego level was determined. As would be expected, given that they are based on the same set of scores, the SCT-TPR measure correlated .91 with the SCT-ISS measure. Furthermore, both the SCT-ISS and the SCT-TPR correlated with the CAQ Prototype measures in ways that would be expected. High SCT scores were positively correlated with high ego level prototype scores, and negatively correlated with low ego level prototype scores. (See Table 2.)

A comparison of males and females for SCT Ego level indicated that females ($M = 5.68, SD = .81$) had higher SCT-TPR ratings than males ($M = 4.84, SD = 1.33$), $t(88) = 3.99, p < .001$, and higher SCT-ISS scores (female $M = 183.33, SD = 16.48$) than males ($M = 168.93, SD = 22.50$), $t(88) = 3.79, p < .001$, as has been found in previous research. A breakdown of the TPR ratings by gender indicated the following number of women and men at each TPR level: Impulsive/Self-Protective: 0,7; Conformist: 2,6; Self-Aware: 17,16; Conscientious: 21,11; Individualistic/Autonomous: 6,3. Consistent with these results, a comparison of male and female participants for Prototype Ego level, using a repeated measures MANOVA, Gender (2) \times Prototype Ego level (7), indicated a significant main effect for Ego level, $F(6, 522) = 68.79, p < .001$, and for Gender, $F(1, 87) = 8.05, p < .006$. There was also a significant Gender \times Ego level interaction, $F(6, 522) = 5.59, p < .001$. In general, females had lower

Prototype scores than males at the two Pre-Conformist levels, and higher scores at the Post-Conformist levels.

Finally, a comparison of the male and female participants' WAIS-R Full Scale IQ scores indicated no statistically significant difference: male mean = 116.70, female mean = 112.84, $t(86)^4 = 1.48$, $p > .10$.

Relation of Ego level (SCT-TPR) to defenses and WAIS-R IQ. Trend analyses were used to investigate linear and quadratic relations of Ego level (SCT-TPR) with defense use, and with IQ. Based on theory and previous research, it was predicted that the relation of Denial and Projection to Ego level would be curvilinear, whereas the relation of Identification and WAIS-R IQ to Ego level would be linear.

For these analyses, participants were assigned to Ego level on the basis of their SCT-TPR ratings. Because there were few participants in the lowest and highest Ego levels, the two Ego levels defined as lacking impulse control (Impulsive and Self-Protective) were combined, as were the two levels defined as possessing most clear internal control of impulses (Individualistic and Autonomous).

Table 1 presents the mean level of defense use for each Ego level group. The five groups were compared by a one-way analysis of variance (ANOVA) trend analysis, for each of the defenses, and for IQ. For Denial, there was a significant quadratic trend, $F(1,84) = 6.62$, $p < .01$; the linear trend was not significant. For Projection, there also was a significant quadratic trend, $F(1,84) = 6.27$, $p < .01$; the linear trend was not significant. For Identification, the quadratic trend was borderline significant, $F(1,84) = 2.97$, $p < .09$; the linear trend was not significant.

Using a similar analysis for IQ and Ego level, the linear trend was significant, $F(1, 82) = 4.57$, $p < .04$; the quadratic trend was not significant (see Table 1).

These results show that both Defenses and IQ are related to Ego level, but in different ways. The relation with Denial and Projection is curvilinear while the relation with IQ is linear.

Relation of Ego level (SCT-ISS) to defenses and WAIS-R-IQ. The continuous SCT-ISS measure of Ego level was correlated with the three defense measures, and with IQ (see Table 2). As a result of the curvilinear relations between Defenses and Ego level noted

4. One male and one female subject had no IQ scores.

Table 1
Means and Standard Deviations (SD) of Defense and IQ Scores,
by Ego Level (SCT-TPR)

Ego Level	Defense ^a			WAIS-R ^b
	Denial	Projection	Identification	
Impulsive + Self-Protective (<i>n</i> = 7)	7.43 (5.44)	14.71 (5.99)	5.43 (2.99)	110.57 (18.81)
Conformist (<i>n</i> = 8)	3.50 (2.20)	7.00 (3.82)	5.38 (2.77)	103.88 (12.81)
Self-Awareness (<i>n</i> = 33)	5.52 (5.11)	8.45 (4.11)	4.70 (3.00)	114.81 (14.31)
Conscientious (<i>n</i> = 32)	4.62 (3.25)	11.25 (8.84)	3.97 (2.36)	118.81 (10.89)
Individualistic + Autonomous (<i>n</i> = 9)	8.44 (4.64)	12.77 (8.08)	6.44 (3.00)	114.78 (9.54)
Trend Analysis				
Linear	.46	.01	.10	4.57*
Quadratic	6.62**	6.27**	2.97 [†]	.36

[†] = $p < .10$. * = $p < .05$. ** = $p < .01$.

^a $df = 1$ and 84. ^b $df = 1$ and 82.

above, the zero-order correlations with SCT-ISS were close to zero (Denial, $r = -.07$); Projection, ($r = -.04$); Identification, ($r = -.10$). The correlation between SCT-ISS Ego level and IQ was positive, $r = .21$, $p < .05$.

Relation of Ego level prototypes to defenses and WAIS-R IQ. Table 2 also presents the correlations between each of the seven Ego level Prototypes and the defenses. As shown, the use of Denial was positively associated with the Pre-Conformist levels—Impulsive and Self-Protective—(both $r_s = .21$, $p_s < .05$). In contrast, the use of Denial was negatively correlated with the next two—Conformist and Self-Awareness—ego levels ($r_s = -.31$ and

Table 2
Correlations Between Ego Level, Defenses, and IQ

	Defenses ^a			SCT-ISS ^a	SCT-TPR	WAIS-R ^b
	Denial	Projection	Identification			
Ego Level Prototype Scores ^a						
Impulsive	.21*	.14	.06	-.44***	-.40***	-.33**
Self-Protective	.21*	.18 [!]	.08	-.44***	-.41***	-.28**
Conformist	-.31**	-.28**	-.02	.12	.05	-.05
Self-Awareness	-.24*	-.24*	-.19 [!]	.37***	.31**	.16
Conscientious	-.17	-.12	-.04	.44***	.41***	.37***
Individualistic	-.15	-.08	-.02	.42***	.39***	.32**
Autonomous	-.13	-.06	.01	.40***	.38***	.33**
Ego Level SCT Scores ^a						
Item Sum Scores	-.07	-.04	-.10		.91***	
WAIS-R IQ ^b	-.06	-.10	-.12	.21*	.21*	

[!] = $p < .10$. * = $p < .05$. ** = $p < .01$. *** = $p < .001$.

^a $N = 89$. ^b $N = 87$. High SCT-ISS score indicates high ego level.

-.24, $ps < .01$ and $.05$), and was unrelated to the highest three ego levels (Conscientious, Individualistic, and Autonomous).

The relation between Ego level Prototype and Projection shows a similar pattern. At low Ego levels, the relation was positive but insignificant. In contrast, the use of Projection was negatively correlated with the next two ego levels—Conformist and Self-Awareness, $rs = -.28$ and $-.24$, $ps < .01$ and $.05$, and was unrelated to the highest three Ego levels (see Table 2).

In contrast to Denial and Projection, the use of Identification was not related to Prototype level of Ego development.

In sum, the results reported in Table 2 showing the relation between defense and Ego Prototype level are consistent with those based on the SCT-TPR measure of Ego level (see Table 1). Using the Prototype measure of Ego level, the same curvilinear relations between Ego level and the defenses of Denial and Projection were found as had been found with the SCT categorical measure of Ego level.

Table 2 also presents the correlations of WAIS-R Full Scale IQ with the seven Prototype levels of Ego development. As shown, IQ is negatively correlated with the two lowest Ego levels (Impulsive and Self-Protective), and positively correlated with the three highest levels of Ego development (Conscientious, Individualistic, and Autonomous). IQ level generally was unrelated to the Conformist and Self-Aware levels of Ego development. This pattern of correlations between IQ and Prototype Ego level is consistent with the significant linear trend found for the relation of IQ to SCT-TPR ratings of Ego level, discussed above.

Relation of WAIS-R IQ to defenses. Table 2 also presents the correlations between WAIS-R IQ and the defenses of Denial, Projection, and Identification. In contrast to the relation between IQ and Ego level, IQ was not related to any of the defenses.

Joint contribution of defense and IQ in predicting Ego level. In order to obtain a more complete picture of the relation between defense and IQ in predicting Ego level, a polynomial multiple regression analysis (Aiken & West, 1991; Aiken, West, & Krull, 1996) was used. In all cases, predictor variables were centered prior to analysis. This type of analysis allows us (1) to determine the relative contribution of defense and IQ in predicting Ego level, (2) to determine if the relations are linear or curvilinear, and (3) to assess the role of possible interactions between the two variables. Inspection

of the zero-order correlations obtained (see Table 2) suggested that the relation between the defenses and Ego level may be curvilinear, while the relation between IQ and Ego level is linear. It also is possible that defense and IQ may interact in predicting Ego level.⁵

Once the result from the full equation is obtained, the contribution of each individual term in the regression equation may be determined by testing the significance of the full equation against a reduced equation, in which one or more terms are eliminated. In this way, the significance of each component term for predicting Ego level may be ascertained.

Denial. To evaluate the relation of Ego level to Denial and IQ, SCT-ISS, a continuous variable, was regressed on the variables of Denial and WAIS-R IQ. To test for a curvilinear relation between the use of Denial and Ego level, a regression equation was structured which included higher order (i.e., quadratic) terms for Denial and linear terms for IQ. The model tested is represented by the equation:

$$\hat{Y} = b_1X + b_2X^2 + b_3Z + b_4XZ + b_0,$$

where X = Denial, Z = WAIS-R IQ, and Y = SCT-ISS Ego level (Case 3, Aiken & West, 1991).⁶ The results of this analysis are shown in Table 3.

Further testing of this model, by contrasting reduced equations with the full equation (see Aiken & West, 1991, Ch. 6) indicated that the model cannot be treated as fully linear, $F(2, 82) = 5.90, p < .01$, that the variable of Denial adds to the prediction of Ego level, $F(2, 82) = 3.95, p < .05$, and that the relation of Denial to Ego level is curvilinear, $F(1, 82) = 5.30, p < .05$. While the variable of IQ does not add to the prediction of Ego level, $F(1, 82) = 3.50, p > .05$, the linear interaction between Denial and IQ, $F(1, 82) = 11.60, p < .001$, is a significant predictor.

A visual representation of these results is presented in Figure 1, which shows the regression surface representing the relations between Denial and WAIS-R IQ in predicting Ego level. The simple regression lines depicting the relation between level of Denial and Ego level, at three levels of IQ, are highlighted in black. Following the suggestion of Cohen

5. Preliminary regression equations with gender, defense, and IQ as predictor variables indicated that none of the 2-way or 3-way interactions including gender were significant.

6. An initial testing of the regression model including the quadratic interaction term (Case 4, Aiken & West, 1991) indicated that this interaction did not add significantly to the prediction of ego level.

Table 3
Regression of Ego Level (SCT-ISS) on Denial and IQ

Variable	Beta	SE Beta	<i>t</i>	sig. <i>t</i>
Denial	.06	.16	.37	.71
Denial ²	-.44	.19	-2.30	.02
WAIS-IQ	.19	.10	1.87	.06
Denial × IQ	-.48	.14	-3.39	.001

	R ²	df	<i>F</i>	<i>p</i>
Equation	.17	4,82	4.09	.004

N = 87.

and Cohen (1983) and Aiken and West (1991), these simple regression lines are plotted for low IQ, defined as one standard deviation below the mean of centered IQ; moderate IQ, defined as the mean of centered IQ; and high IQ, defined as one standard deviation above the mean of centered IQ. As seen in Figure 1, at low levels of IQ, the use of Denial is positively related to Ego level, until use of Denial reaches a very high level (+2 S.D.), where there is a slight drop in predicted Ego level. At moderate levels of IQ, the use of Denial is unrelated to Ego level. At high levels of IQ, the use of Denial is negatively related to Ego level. Thus, as IQ increases, the relation between Denial and Ego level changes from positive, concave upward to negative, concave downward.

These findings confirm the prediction that the relation between Denial and Ego level is curvilinear. In general, at low Ego levels, the use of Denial is greatest; at middle levels of Ego development, Denial is least used, whereas at higher levels there is a slight increase in the use of Denial. Further, the results show that IQ alone is a weak predictor of Ego level. The interaction between IQ and Denial is critical for predicting Ego level, however, and reveals that the prediction of a negative relation between Denial and Ego level must be modified on the basis of IQ. Whereas high IQ persons show the expected negative relations between Denial and Ego level, for low IQ persons there is generally a positive relation between the use of Denial and Ego level.

Projection. To evaluate the relation of Projection and IQ to Ego level, SCT-ISS was regressed on the variables of Projection and WAIS-R IQ. To test for the possibility of a curvilinear relation between the use of Projection and Ego level, a regression equation was structured which

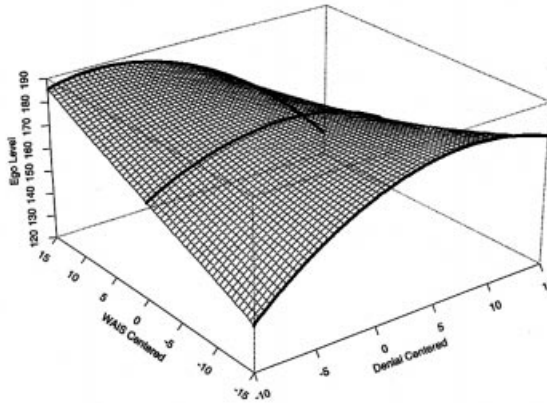


Figure 1
 Regression Surface: SCT-ISS Ego Level Regressed
 on Denial and WAIS-R IQ

included higher order (i.e., quadratic) terms for projection and linear terms for IQ. The model tested is represented by the equation:

$$\hat{Y} = b_1X + b_2X^2 + b_3Z + b_4XZ + b_5X^2Z + b_0,$$

where X = Projection, Z = WAIS-R IQ, and Y = SCT-ISS Ego level (Case 4, Aiken & West, 1991). The results of this analysis are shown in Table 4.

Further testing of this model, contrasting reduced equations with the full equation (Aiken & West, 1991, Ch. 6) indicated that the model cannot be treated as fully linear, $F(2, 81) = 5.50, p < .01$, and that neither the linear relation of Projection nor the linear interaction between Projection and IQ were significant predictors of Ego level, both $F_s(1, 81) = .18, ns$. Rather, the quadratic Projection \times IQ interaction, $F(1, 81) = 5.00, p < .05$, was a significant predictor of Ego level, $F(1, 81) = 7.82, p < .01$. In addition, IQ was a significant linear predictor of Ego level, $F(1, 81) = 11.06, p < .01$.

A visual representation of these results is presented in Figure 2, which shows the regression surface representing the relation between Projection and WAIS-R IQ in predicting Ego level. The simple regression lines of Ego level on Projection, at three levels of IQ, are highlighted in black. As before, these simple regression lines are plotted for low IQ, moderate IQ, and high

Table 4
Regression of Ego Level (SCT-ISS) on Projection and IQ

Variable	Beta	SE Beta	<i>t</i>	sig. <i>t</i>
Projection	.05	.13	.39	.70
Projection ²	-.21	.13	-1.54	.13
WAIS-IQ	.37	.13	2.81	.006
Projection × IQ	-.04	.11	-.38	.70
Projection ² × IQ	-.33	.15	-2.25	.03
	R ²	df	<i>F</i>	<i>p</i>
Equation	.12	5,81	2.23	.06

N = 87.

IQ. As seen in Figure 2, at low levels of IQ, there is a slight positive relation between Projection and Ego level occurring at higher levels of Projection use. At moderate levels of IQ, Projection is unrelated to Ego level. At high levels of IQ, both low and high use of Projection are related to low Ego level, whereas moderate use of Projection is related to high Ego level. Thus, as IQ changes from low to high, the relation between Projection and Ego changes from a slightly U-shaped to an inverted U-shaped function.

DISCUSSION

The development of the ego is intimately tied to the problem of adaptation. As the ego develops, the capacity to control impulses increases, and the locus of control changes. Although the increasing capacity for control and adaptation is sometimes equated with the development of intelligence, successful adaptation also requires the capacity for affective and emotional control, which is not necessarily accomplished through intelligence alone.

The results of the present study, based on cross-sectional correlational data, are consistent with a model in which the development of the ego is contributed to both by intelligence and by defense mechanisms, two ego mechanisms that are shown to be independent from one another. Intelligence was demonstrated to be related to ego development in a linear manner. In contrast, the relation between ego level and defense was found to be curvilinear, a pattern observed in previous

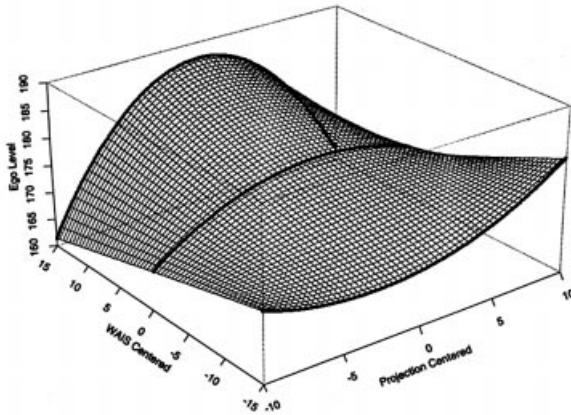


Figure 2
Regression Surface: SCT-ISS Ego Level Regressed
on Projection and WAIS-R IQ

research relating variables of impulsivity and impulse control to ego level (Lorr & Manning, 1978; Starrett, 1983; Westenberg & Block, 1993). Furthermore, this curvilinear relation was consistent with the theoretical description of the locus of impulse control that characterizes each ego level. Ego levels characterized by low internal impulse control showed stronger defense use, ego stages characterized by external control of impulses showed the least use of defenses, and ego stages characterized by internal control showed somewhat greater use of defenses. The explanation for this last, seemingly inconsistent result is found in the interactive effects of defense and IQ in predicting ego level; the use of defenses at high ego levels occurs in relation to low IQ.

The reliability of this curvilinear relation between defense and IQ was demonstrated by using two different, independent methods to assess ego level—Loevinger's frequently used Sentence Completion Test and expert based personality ratings. Both measures of ego level yielded the same pattern of relations with defense mechanisms and IQ.

The Pre-Conformist levels of ego development, in which impulse control is lacking, were related to the use of the lower level defenses of denial and projection, and to lower levels of IQ. These findings are consistent with Loevinger's description of these ego levels as being

characterized by simplistic, dichotomous thinking and the externalization of blame. As previous research has shown that impulse control and the ability to delay gratification is weak at these levels (Westenberg & Block, 1993), whereas impulsivity is high (Roznafsky, 1981; Starrett, 1983), we interpret the present findings to indicate that, at the Pre-Conformist levels of ego development, the lower level defense mechanisms function to protect the individual from experiencing the affect, or anxiety associated with the presence of uncontrolled impulses.

In contrast, beginning with the Conformist level of ego development, the use of denial and projection are negatively related to ego level, and IQ is unrelated. Again, the findings are consistent with Loevinger's description of the Conformist and Self-Aware levels, in which impulses are controlled through conscious adherence to external rules and social norms; they also are consistent with previous research showing a decrease in impulsivity at these stages (Roznafsky, 1981; Westenberg & Block, 1993). If impulses are being successfully controlled from without, there is no need for defenses. Behavior that is based on the adherence to rules rather than rational evaluation is reflected in the absence of a relationship between ego level and IQ. Overall, it appears that the importance of external control at these levels supercedes the role of internal ego functions of defense and intelligence in managing impulse expression.

Beginning at the Conscientious level, however, external sources of impulse control are internalized to form an inner conscience, reducing the importance of external controls. Now, the ego function of intelligence becomes more important, while the role of defenses is less important. Again, these findings fit with theory. At the Conscientious levels and higher, cognitive functioning becomes increasingly complex: the ability to deal with uncertainties increases and the capacity for self-evaluation develops. The appearance of such higher forms of thinking would be expected to be related to level of intelligence. At the same time, the progressive freeing of impulses from the rigid controls of conscience is accompanied by some increase in defense use.

This picture is made more complex when we consider the interaction of intelligence with defenses. As shown by the multiple regression analysis using the SCT to assess ego level, *high* levels of ego development were associated with high intelligence and low use of denial,

or, alternatively, with low intelligence and high use of denial. In contrast, *low* levels of ego development were associated with high intelligence and high use of denial, or with low intelligence and low use of denial. At average levels of IQ, denial was unrelated to ego development.

The combination of intelligence and projection, as these relate to ego level, produces a somewhat different picture. Here, ego level is predicted primarily by IQ. Within the low IQ range, strong use of projection is associated with higher ego levels. In contrast, at high IQ levels, both low and high use of projection is associated with lower ego levels, whereas moderate use of projection is associated with higher ego levels.

Although there was weak evidence for a curvilinear relation between the defense of identification and ego level, the overall use of identification in this sample is lower than that found in college populations (Cramer, 1991b, 1995, 1998). Possibly, this defense has not yet fully developed, and so would be of less importance in the ego functioning of this group of individuals at this time. Rather, for this sample, projection is the characteristic defense.

One way to conceptualize these findings is to consider the “fit” between defense and intellectual level. The results show that denial, a low level defense, is related to higher ego development at low levels of IQ, but not at mid and high levels of IQ. Developmentally, this makes sense. Denial is a defense that “fits” with lower levels of intellectual development. Owing to their lesser cognitive capacities, young children do not “see through” the defense of denial (Chandler, Paget, & Koch, 1978; Dollinger & McGuire, 1981). Lesser cognitive capacities allow this defense to function effectively and to protect the child from excessive negative affect. As children’s cognitive capacities develop, however, they become able to “demystify” (Chandler et al., 1978) the defense of denial; they understand its function, and thus the defense loses its utility, in the sense that it no longer can keep the individual from being aware of upsetting thoughts and feelings. The continued use of an age-inappropriate defense (denial) at higher mental ages is unlikely to be successful, and would be expected to be related to interference with ego development, as seen in the present study. At lower mental ages, however, the continued use of denial is developmentally more appropriate, and is seen to contribute to ego development.

In the course of maturation, projection replaces denial as the age-appropriate defense. Now, both IQ and moderate use of the age-characteristic defense of projection are related to positive ego development, but either excessive over- or under-use of the defense will hamper ego development. When projection is the age-characteristic defense, however, low IQ may be compensated for by the strong use of projection, then showing a positive relation with ego development.

In general, then, we see that for low IQ individuals, the use of either a mental age appropriate defense (denial), or a chronologically characteristic defense (projection) is positively related to level of ego development. For higher IQ individuals, the use of a developmentally inappropriate defense (denial) is related to low levels of ego development, whereas the use, in moderation, of a developmentally characteristic defense (projection) is positively related to ego development. For these higher IQ persons, deviation from the group norm in magnitude of projection, in either direction, is associated with lower levels of ego development.

As the present study makes clear, it is important to include individuals from the full range of ego development when investigating relation of ego development with other variables. Persons at the extreme ends of distributions, however, are sometimes considered to be outliers whose data may distort relations among variables. Thus, in the present study, a cautionary note should be raised that these outliers might bias the relations reported. Nevertheless, to the extent that theory predicts the results found with these persons included, we consider the findings to be valid rather than spurious. When the full range of ego development is represented, some of the relations are shown to be curvilinear, not linear, consistent with the findings of Lorr and Manning (1978), Starrett (1983) and Westenber and Block (1993). In contrast, when the range of ego development is restricted—that is, either the highest and/or the lowest levels are not represented—the curvilinear relations are lost, with the result, for example, that the relation of defenses or impulsivity to ego level appears to be linear (e.g., Browning, 1986; Levit, 1993). In fact, the curvilinear relations demonstrated in the present study better fit the theoretical description of ego levels given by Loevinger (1976), in which both lowest and highest levels of ego development are characterized by impulsivity.

CONCLUSION

Defense mechanisms and intelligence, as two independent ego functions, have been shown to predict level of ego development in a heterogeneous sample of young adults. In general, these two ego functions considered jointly do a better job of prediction than does either individually. Undoubtedly, there are additional ego functions that would add to this predictive power, as shown, for example, by Westenberg and Block (1993). Indeed, as discussed by Hauser (1976), it is unlikely that one would find a single personality variable that would predict any particular stage of ego development. Rather, it is the pattern, or constellation of relationships, that is likely to be important. The present findings indicate that there are different constellations of defense and IQ that are associated with higher levels of ego development. When IQ is low, the control of impulses required to reach high levels of ego development may occur through the use of defense mechanisms. When IQ is high, the use of age-inappropriate defenses is related to low levels of ego development; the use of age-characteristic defenses, in moderation, is associated with higher levels of ego development. The present study also demonstrates that if we wish to investigate the relation between ego development and other personality variables, it is essential that the full range of ego development be represented in the sample under investigation. The use of a restricted range will restrict the meaningfulness of the findings obtained.

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