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Adolescent Egocentrism and Formal Operations: Tests of a Theoretical Assumption

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The theoretical relation between adolescent egocentrism and formal operations was addressed in two studies. In the first study this relation was assessed with the Adolescent Egocentrism Scale (AES) and a battery of formal reasoning tasks devised by Lunzer, administered to a sample of 6th-, 8th-, 10th-, and 12th-grade subjects. The results revealed only significant negative or nonsignificant correlations between the measures in early adolescence. There was also no evidence of significant developmental covariation from early to middle adolescence. The validation effort was extended in Study 2 to include the two extant measures of adolescent egocentrism (AES and the Imaginary Audience Scale, or IAS) and a second battery of formal operations problems (Test of Logical Thinking). These measures were administered to a sample of 7th-, 9th-, and 11th-grade students and to a sample of college undergraduates. There was once again no evidence of significant developmental covariation among the measures. The correlations between the AES and IAS were modest, reflecting differences in the nature and content of the measures. Little support exists in this study or in the literature for the crucial theoretical assumption of adolescent egocentrism. Suggestions for future research are outlined.

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The concept of adolescent egocentrism has proven to be a popular and durable construct for understanding the nature of adolescent cognition. According to Elkind (1967), adolescent egocentrism is to be understood in the context of the ontogenetic changes in egocentrism that characterize logical development from the sensorimotor stage to formal operations. Although each successive stage in the sequence is said to liberate the child from the egocentrism of the previous stage, it nonetheless ensnares the child in its own form of egocentrism. Hence, though formal operations free the child from the egocentrism of concrete operations, they nonetheless involve their own variant of egocentrism. The onset of formal operations is thus seen to involve a type of differentiation failure with respect to second-order operations.

Two complementary processes, the imaginary audience and the personal fable, are thought to emerge with this differentiation failure of formal operations. The former represents the process in which the adolescent anticipates the reaction of others to himself or herself in real or imagined situations. The adolescent believes that he or she will be the focus of others' attention, and that the ensuing audience will be just as critical or admiring of him or her as is he or she. The personal fable reflects an overdifferentiation of feelings and the concomitant belief in one's personal uniqueness and indestructibility. These twin components of adolescent egocentrism have been used to account for a variety of typically observed adolescent behaviors, such as heightened self-consciousness, risk taking, idealism, and "adolescent boorishness, loudness and faddish dress" (Elkind, 1967, p. 1030).

A number of studies have attempted to corroborate the theory of adolescent egocentrism. Elkind and Bowen (1979), for example, constructed an Imaginary Audience Scale (IAS) with which they assessed the degree to which an adolescent would be willing to reveal aspects of his or her abiding and transient self to others. A general unwillingness to self-reveal was thought to indicate self-consciousness, the presence of which, in turn, was used to infer the imaginary audience. The IAS does not operationalize the personal fable. Elkind and Bowen (1979) found that young adolescents (eighth graders) were significantly more self-conscious than both younger children and older adolescents. Girls were also found to be more self-conscious than boys (although sex differences are not always found; Adams & Jones, 1981). These results were interpreted as support for the theory that the imaginary audience (via self-consciousness) is a characteristic of early adolescence, which is coincident with the onset of formal operations. However, there was no test of the theoretical relation between the presence of the imaginary audience and formal thought in Elkind and Bowen's study.

Enright and his colleagues (Enright, Lapsley, & Shukla, 1979;

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Enright, Shukla, & Lapsley, 1980) also provided support for the adolescent egocentrism construct, although their methodology was quite different from that of Elkind and Bowen (1979). Whereas Elkind and Bowen (1979) restricted their operationalization of adolescent egocentrism to the single imaginary audience component, Enright et al. (1979, 1980) constructed separate subscales for both the imaginary audience and the personal fable, and they also devised a general self-focus subscale. In addition, the *imaginary audience* was defined as the tendency to imagine hypothetical social situations in which the adolescent is the object of critical or admiring audiences, rather than as a general unwillingness to reveal transient or abiding aspects of the self to others. They found a general decline in personal fable and imaginary audience ideation from early to late adolescence. However, these studies also provided no test of the putative relation between adolescent egocentrism and formal operations.

Although other research has been concerned with the effects of certain social contexts on adolescent egocentrism, such as parenting styles (Adams & Jones, 1982; Anolik, 1981), school environments (Simmons, Rosenberg, & Rosenberg, 1973), and peer relations (Simmons & Rosenberg, 1975), only recently has there been much interest in documenting the theoretical relation between adolescent egocentrism and formal thought. Elkind (1985) remarked that this relation is crucial to the theory, to the extent that if the hypothesized relation does not obtain, then a revision of the adolescent egocentrism theory would be required. The available evidence is equivocal, but not encouraging. For example, in one of the earliest studies, Peterson (1982) claimed to have found no support for the formal-thought–adolescent-egocentrism (IAS) relation, but this conclusion must be regarded as tentative on methodological grounds. Gray and Hudson (1984) found only partial support for their hypothesis that abiding self (AS) and transient self (TS) scores would be highest in subjects who are in transition to formal operations. Last, Riley, Adams, and Nielsen (1984) reported a negative correlation between the TS subscale and a paper-and-pencil measure of formal thought. They argued that formal operations may actually diminish adolescent egocentrism. However, inasmuch as this study was restricted to seventh graders, the developmental patterning of the formal-thought–imaginary-audience relation is thereby obscured, although their conclusion is entirely plausible.

Our purpose is to report on two further tests of the crucial theoretical assumption of adolescent egocentrism. If the theory is correct, one should expect to observe a positive correlation between adolescent egocentrism and formal thought in early adolescence. According to Elkind (1967), adolescent egocentrism tends to diminish by middle adolescence, "the age (15 or 16) at which formal operations becomes firmly established" (p. 1032). This suggests that the pattern of correlations between adolescent egocentrism and formal thought should change as well from early to middle adolescence. This changing pattern could be reflected in either of two theory-supporting outcomes: (a) if the sign of the correlation changes from positive to negative as the assessment is charted from early to middle adolescence or (b) if the magnitude of the correlation decreases with age. In the first study we assess these relations by using the Enright et al. (1979, 1980) Adolescent Egocentrism Scale (AES) and a paper-and-pencil formal operations battery. In the second study we extend the validation effort by using both measures of adolescent egocentrism, the IAS and the AES, and also a more comprehensive assessment of formal thought. The second study not only permits a further test of the theoretical issue at hand but also provides evidence on the empirical relation between the IAS and AES measures.

Study 1

Method

Subjects. Subjects were drawn from four grades representing the range from early to middle adolescence. They included 45 (19 male, 26 female) sixth graders, 39 (19 male, 20 female) eighth graders, 50 (27 male, 23 female) tenth graders, and 49 (13 male, 36 female) twelfth graders, for a sample total of 183 subjects. The average age of sixth-grade subjects was 11 years, 5 months; for eighth graders, 13 years, 5 months; for tenth graders, 15 years, 6 months; for twelfth graders, 17 years, 1 month. These subjects were drawn from feeder schools in a small metropolitan school district in the midwest.

Instruments and procedure. To assess adolescent egocentrism, we used the Adolescent Egocentrism Scale (AES) developed by Enright et al. (1979, 1980). This instrument consists of separate subscales for both the imaginary audience (IA) and personal fable (PF) constructs. There are also subscales for measuring general self-focus (SF) and for sociocentric and nonsocial concerns. The latter two subscales are not of particular interest in this study. There are five items each in the subscales of imaginary audience, personal fable and self focus. The AES is a Likert-type scale on which subjects are required to rate the importance of each item along a five-step continuum, ranging from *no importance* (1) to *great importance* (5). A total score per subscale is obtained by means of summing the total per item in that scale. The total egocentrism scale (IA, PF, SF) and each of its subscales has been found to possess excellent psychometric properties (Enright et al., 1980). The actual test items are reported in Enright et al. (1980).

To assess formal operational thought, we used the paper-and-pencil battery of formal operations tasks developed by Lunzer (1965). The Lunzer battery requires subjects to solve 20 verbal and 20 numerical analogies. These two sets of analogies were treated separately in the data analysis because they may tap different aspects of formal operations. Each correct answer was given a score of 1, so that scores ranged from 0 (*none correct*) to 20 (*total correct*) in either set of problems.

Subjects were tested in group settings in accordance with standardized instructions. The order in which the scales were administered was completely random (for each subject) to control order effects. The total time of testing was approximately 50 min.

Results and Discussion

The first set of analyses estimated scale reliabilities via Cronbach's coefficient alpha. For the IA scale, $\alpha = .65$; for PF, $\alpha = .77$; for SF, $\alpha = .87$. The reliability of the total adolescent egocentrism scale, which is a composite of these three scales, was .72. The reliability of the verbal and mathematical formal operations analogies was .86 and .88, respectively. Hence all of the measures used in this study demonstrated adequate reliabilities.

Group differences and trend analyses. In the second set of analyses, we examined grade differences and patterns of trend for each variable tested. A series of 4×2 (Grade $\times$ Sex) analyses of variance (ANOVAs) were calculated for each of the AES sub-

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Table 1
Means and Standard Deviations of Adolescent Egocentrism Scales and Formal Operations Analogies by Grade

Variable	Grade 6	Grade 8	Grade 10	Grade 12
Imaginary audience				
M	12.84	12.85	13.42	12.22
SD	3.61	4.29	3.23	3.22
Personal fable				
M	14.62	13.15	14.26	14.92
SD	5.02	5.06	3.43	3.56
Self-focus				
M	19.27	17.85	18.18	21.16
SD	4.08	3.92	4.09	3.52
Verbal analogies				
M	7.13	7.46	9.36	10.16
SD	4.12	4.84	4.85	5.37
Numerical analogies				
M	6.95	7.97	10.10	9.82
SD	3.22	4.16	5.16	4.79

Note. Scores range from 5 to 25 on each of the Adolescent Egocentrism Scale subscales. Scores range from 0 to 20 on each of the formal operations tasks.

scales and for the verbal and numerical formal operations measures. Means and standard deviations for these measures by grade are reported in Table 1. Because of the unequal gender ratio, particularly in the 12th-grade sample, we proceeded conservatively by treating sex as a blocking variable in the calculation of the error sum of squares. Significant main effects for grade emerged for both the verbal, $F(3, 175) = 3.95$, $p < .05$, and numerical, $F(3, 175) = 5.56$, $p < .05$, formal operations tasks. A significant grade effect was also found for the general self-focus scale, $F(3, 175) = 6.75$, $p < .05$. Post hoc analysis with the Scheffé procedure showed that 10th- and 12th-grade subjects performed significantly better on the numerical analogies than did 6th graders; 12th graders did significantly better on the verbal analogies than did 6th graders; 12th graders were significantly more self-focused than 8th graders and 10th graders. No other post hoc contrast was significant. No significant main effects were found for the personal fable and imaginary audience measures.

To determine whether the data could be described as developmental functions, we generated orthogonal polynomials for linear and quadratic trend. A significant linear trend, $F(1, 179) = 5.58$, $p < .05$, and a significant quadratic trend, $F(1, 179) = 14.37$, $p < .05$, emerged for general self-focus. As Table 1 indicates, self-focus declined from sixth to eighth grade, only to increase again by the end of high school. Enright et al. (1980) reported a similar trend in the literature for general self-focus. We also found a significant linear trend for the verbal analogies task, $F(1, 179) = 11.94$, $p < .05$, and for the numerical analogies task, $F(1, 179) = 3.41$, $p < .05$. No other trend analysis was statistically significant.

Correlational analyses. We next examined whether egocentrism was correlated with formal thought in adolescence. This part of Elkind's (1967) theory requires the observance of positive correlations between egocentrism and formal operations in early adolescence, with negative correlations or attenuation in the magnitude of the correlations as development proceeds into middle adolescence. To address this question, we assessed the pattern of correlation on a grade-by-grade basis. These data are reported in Table 2. The most apparent feature of Table 2 is that in early adolescence, for which positive correlations are expected between components of adolescent egocentrism and the formal operations analogies, only significant negative or nonsignificant correlations obtain. For sixth graders, the personal fable was negatively correlated with verbal analogies ($r = -.29$, $p < .05$). For eighth graders, the imaginary audience was negatively correlated with the numerical analogies ($r = -.31$, $p < .05$). Although self-focus was positively correlated with the verbal ($r = .28$, $p < .05$) and numerical ($r = .27$, $p < .05$) analogies in eighth grade, this was apparently not translated into personal fable or imaginary audience constructions, as we would expect from Elkind's theory. For 10th graders we again found a negative correlation between the personal fable and verbal analogies ($r = -.33$, $p < .05$). Last, for 12th graders, we observed a negative correlation between the imaginary audience and verbal analogies measures ($r = -.32$, $p < .05$). Hence in cases in which the imaginary audience and personal fable scores were significantly correlated with formal operations, the correlation was negative. Although negative correlations are not problematic for Elkind's theory in later adolescence, it casts doubt on the claim that adolescent egocentrism is the result of emerging formal operations in early adolescence, because positive correlations would be expected for that age.

The data in Table 2 reveal grade differences in patterns of correlations among the adolescent egocentrism and formal op-

Table 2
Correlation Matrices of AES Subscales With Formal Operations by Grade

Subscales	Personal fable	Self-focus	Verbal analogies	Numerical analogies
Grade 6				
Imaginary audience	.53*	.29*	−.21	.11
Personal fable		.54*	−.29*	−.05
Self-focus			−.17	−.15
Verbal analogies				.43*
Grade 8				
Imaginary audience	.58*	.43*	−.15	−.31*
Personal fable		.49*	−.19	−.15
Self-focus			.28*	.27*
Verbal analogies				.59*
Grade 10				
Imaginary audience	.48*	.09	−.08	.07
Personal fable		.46*	−.33*	−.15
Self-focus			.16	.08
Verbal analogies				.58
Grade 12				
Imaginary audience	.22*	−.03	−.32*	−.16
Personal fable		.26*	−.03	−.20
Self-focus			.24*	.13
Verbal analogies				.67*

* $p < .05$.

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erations measures. Another question of interest is whether the pattern of intercorrelations could be described as developmental functions. If Elkind's (1967) theory is correct, one should expect to find a more robust relation between formal operations and the egocentrism subscales in early adolescence, with attenuation in middle adolescence. Hence trend analyses were performed on the correlation coefficients describing the relation between the verbal and numerical analogies and each of the AES subscales (IA, PF, SF). The correlation coefficients were transformed to z scores with Fisher's r-to-z transformation, then analyzed for linear and quadratic trend; the resulting test statistic was compared with a critical z value. The results of this analysis revealed no significant evidence for developmental trends in the pattern of relations between formal operations and both the imaginary audience and personal fable constructs. A significant linear ($z = 1.66$, $p < .05$) and quadratic ($z = 2.02$, $p < .05$) trend described the relation between self-focus and the verbal analogies task. Significant linear ($z = 4.24$, $p < .05$) and quadratic ($z = 2.52$, $p < .05$) trends were also observed for the self-focus–numerical-analogies relation. These findings indicate that correlations between self-focus and formal operations tend to increase through early adolescence (grades 6 to 8), with some attenuation thereafter. However, changes in the self-focus–formal-operations relation is not accompanied by concomitant developmental changes in the relation between formal operations and the imaginary audience and personal fable.

Together, these results do not lend support for the theoretical claim that the onset of formal thought in early adolescence is accompanied by imaginary audience and personal fable ideations. This is particularly evident in (a) the significant negative or nonsignificant correlations between formal thought and both the imaginary audience and personal fable scales and (b) the absence of significant developmental covariation among these measures from early to middle adolescence. One unexpected finding is the absence of grade differences for the IA and PF subscales. Although the stability of these constructs over age may actually characterize the adolescents in the sample (see General Discussion section), this finding would be at variance with previous research (with the AES) that has shown age differences in these constructs (e.g., Enright et al., 1979). Because there was no manipulation check on the validity of the AES scales other than their relation with age, and because this relation was lacking in this study (apart from the self-focus data), no definitive statement about the theoretical relation between adolescent egocentrism and formal thought, or about the stability of IA and PF responses, is warranted. Hence we designed a second study to further address these issues.

In Study 2 we used the extant measures of adolescent egocentrism, the AES that was used in Study 1 and Elkind and Bowen's (1979) IAS. To our knowledge, a demonstration of the empirical relation between these scales has never before been attempted. In addition, we also used a second measure of formal operations (Tobin & Capie, 1981). This measure was included to enable one to more fully assess the features of formal thought. Whereas the Lunzer (1965) scale enables one to assess second-order thinking in terms of verbal and mathematical analogies, the Tobin and Capie (1981) Test of Logical Thinking (TOLT) enables one to assess five additional modes of formal thinking, namely, isolation of variables and proportional, probabilistic, correlational, and combinatorial reasoning. Thus Study 2 included two measures of adolescent egocentrism and two measures of formal operations.

Study 2

Method

Subjects. Subjects were drawn from four educational levels representing the range from early to late adolescence. They included 39 (16 male, 23 female) seventh graders, 43 (26 male, 17 female) ninth graders, 35 (21 male, 14 female) eleventh graders, and 56 (31 male, 25 female) college freshman. The average ages for these samples were 12 years and 3 months, 14 years and 8 months, 17 years and 5 months, and 20 years and 9 months, respectively. The three younger samples were drawn from feeder schools in a midwestern metropolitan school district that also included the small university from which the undergraduates were recruited.

Instruments and procedure. As in Study 1, the Enright et al. (1980) AES and the Lunzer (1965) formal operations measure were used. However, in order to accommodate the school regimen, the Lunzer scale was revised in order to include only the verbal analogies (VA). The IAS was included in order to provide a second assessment of adolescent egocentrism. This measure consists of 12 short vignettes, each of which provides the subject with a context for revealing aspects of his or her transient or abiding self to others. The *abiding self* (AS) is defined as those enduring characteristics that the individual regards as permanent aspects of the self. The *transient self* (TS) is defined as those momentary appearances or behaviors that are not thought to reflect on the true self. The IAS includes six AS and six TS stories. After reading each vignette, subjects are required to choose one of three options that reflects levels of willingness to self-reveal to others. A general unwillingness to self-reveal is thought to indicate the imaginary audience. The IAS and its subscales possess adequate psychometric properties (Elkind & Bowen, 1979).

The Tobin and Capie (1981) Test of Logical Thinking is a paper-and-pencil measure that consists of 10 problems. Two problems are included for each of the five features of formal thought noted earlier. For the problems concerning proportional, probabalistic, and correlational reasoning, and for isolation of variables, a subject is required to choose both the "correct answer" and the "best reason." Success was scored (1 point) only if both answers were correct. Hence for these variables the TOLT score ranges from 0 (*none correct*) to 8 (*all correct*). The two combinatorial reasoning tasks require subjects to generate all the possible combinations (ns = 24 and 27, respectively) in a logical set. The two combinatorial reasoning tasks were scored according to the following scale: 4 = maximum number of combinations; 3 = at least two thirds of the possible set; 2 = at least one third of the possible set; 1 = less than one third. The total score on the two tasks was derived as an arithmetic average. Because the two combinatorial reasoning tasks (TOLT-C) are quite different in format from the other TOLT items, they are treated here as a separate index of formal thought. The excellent psychometric properties of TOLT were reported by Tobin and Capie (1981).

Testing was conducted on 2 consecutive days for each grade in order to prevent fatigue effects. On the first day subjects responded to one formal operations measure and one measure of adolescent egocentrism, the selection of which was determined by a coin toss. The remaining measures were then administered on the second day. The order of administration on either day was completely randomly for each subject. The total time of testing was approximately 50 min for each testing session.

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Results and Discussion

Total scale and subscale reliabilities (coefficient alpha) were uniformly high. The total AES (personal fable and imaginary audience) reliability was .86.[1] The reliabilities for the personal fable (PF), imaginary audience (IA), and general self-focus (SF) subscales were .84, .75, and .83, respectively. The total IAS reliability was .70, with subscale reliabilities of .62 (transient self) and .65 (abiding self). The reliability coefficient for the Lunzer analogies was .83; for TOLT, $\alpha = .91$; for the TOLT combinatorial reasoning tasks (TOLT-C), the Spearman–Brown estimate of reliability was .85. All of the estimates of reliability, then, fall within an acceptable range.

Group differences and trend analyses. The means and standard deviations for each measure by grade are reported in Table 3. A series of 4 × 2 (Grade × Sex) ANOVAs were calculated for each variable in order to examine group differences. As in Study 1, sex was once again treated as a blocking variable. These analyses revealed a significant grade main effect for the IAS, $F(3, 165) = 11.51$, $p < .05$; for the AES, $F(3, 165) = 3.10$, $p < .05$; for the Lunzer verbal analogies measure, $F(3, 165) = 88.47$, $p < .05$; for the TOLT, $F(3, 165) = 181.56$, $p < .05$; and for the TOLT-C, $F(3, 165) = 60.31$, $p < .01$. Post hoc analyses (Scheffé) revealed the following mean differences: For the IAS, 7th and 9th graders were significantly more concerned with the imaginary audience than were college freshmen, and 9th graders more concerned than 11th graders; for the AES, 9th graders displayed significantly more imaginary audience and personal fable ideations than did college freshmen; for the Lunzer verbal analogies task, 11th graders and college freshmen did significantly better than 7th graders, and 11th graders outperformed 9th graders; for the TOLT, all mean differences were significant except for the 7th-grade/9th-grade comparison; for the TOLT-C, all mean comparisons were reliable.

The analysis for linear and quadratic trend revealed a significant linear trend for the total AES score, $F(1, 169) = 4.78$, $p < .05$, and for the IA subscale, $F(1, 169) = 6.98$, $p < .05$. The quadratic component was also significant for the IA scale, $F(1, 169) = 7.58$, $p < .05$. The quadratic component is accounted for by the elevated IA scores evident in the 9th-grade sample.

Regarding the Elkind and Bowen (1979) measure, significant linear trends were observed for TS, $F(1, 169) = 33.90$, $p < .05$, for AS, $F(1, 169) = 4.35$, $p < .05$, and for the total IAS, $F(1, 169) = 21.96$, $p < .01$. Significant quadratic trends were evident for TS, $F(1, 169) = 9.90$, $p < .05$, and for the total IAS, $F(1, 169) = 5.22$, $p < .05$. Once again the quadratic component is reflected in the higher IAS and TS means for 9th graders. Last, significant linear trends were observed for the Lunzer analogies, $F(1, 169) = 214.58$, $p < .05$, for TOLT, $F(1, 169) = 437.08$, $p < .05$, and for TOLT-C, $F(1, 169) = 148.16$, $p < .01$.

Correlational analyses. The grade-by-grade analysis of intercorrelations are reported in Table 4. In cases in which significant correlations obtain between the various adolescent egocentrism subscales and the indices of formal operations in the 7th-grade sample, the sign is negative. Hence IA is negatively correlated with the TOLT measure ($r = -.25$, $p = .058$); the total IAS scale is negatively correlated with TOLT-C ($r = -.27$, $p < .05$); the TS is negatively correlated with TOLT ($r = -.25$, $p = .059$); and the total AES is negatively correlated with the Lunzer task ($r = -.26$, $p = .05$).

In the 9th-grade sample, significant positive correlations obtained for the PF-Lunzer measure ($r = .28$, $p < .05$), for the AS-Lunzer measure ($r = .28$, $p < .05$), for the correlation between TOLT and both TS ($r = .29$, $p < .05$) and the total IAS ($r = .27$, $p < .05$), and for the total AES–Lunzer relation ($r = .26$, $p = .05$). However, these correlations were uniformly modest and accounted for no more than 7% of the variance. In order to clarify these findings, polynomial (linear and quadratic) trend

Table 3
Means and Standard Deviations of Adolescent Egocentrism and Formal Operations Scales by Grade

Variable	Grade 7	Grade 9	Grade 11	College
Adolescent Egocentrism Scale	27.13	28.67	26.71	24.09
Imaginary audience				
M	13.13	14.53	13.46	11.50
SD	3.88	4.75	4.69	2.61
Personal fable				
M	14.00	14.14	13.26	12.59
SD	4.70	5.08	5.15	3.67
Self-Focus				
M	17.82	18.42	19.57	21.08
SD	4.79	4.47	3.90	2.65
Imaginary Audience Scale	11.28	12.32	9.80	8.14
Abiding self				
M	5.64	5.42	5.23	4.66
SD	2.14	2.67	2.39	2.22
Transient self				
M	5.64	6.91	4.57	3.48
SD	2.63	2.52	2.12	2.37
Test of Logical Thinking (TOLT)				
M	1.00	0.60	4.14	6.93
SD	1.29	1.09	2.34	1.32
Test of Logical Thinking–Combinational Reasoning (TOLT-C)				
M	1.81	1.52	2.83	3.44
SD	0.91	0.88	0.38	0.75
Verbal Analogies				
M	6.25	5.47	11.14	12.50
SD	3.26	2.02	2.61	2.14

Note. The maximum possible score on the total Adolescent Egocentrism Scale (imaginary audience and personal fable) is 50. For each of the AES subscales the maximum score is 25. The Abiding Self and Transient Self subscales of the Imaginary Audience scale each has a maximum score of 12, for a total scale score of 24. The maximum score for the Lunzer verbal analogies is 20. The TOLT and TOLT-C scales have maximum scores of 8 and 4, respectively.

[1] In Study 2 the total AES score is restricted to the PF and IA components. This was done for two reasons. First, this restriction is most in keeping with Elkind's (1967) theoretical framework, which emphasizes only the imaginary audience and personal fable components. Although self-focus clearly plays a role in the construction of these ideations, it has not been accorded as prominent a role in the theory. Second, given the modest correlation between SF and IA in Study 1, and the independent developmental patterns evinced by SF, the restriction seems prudent on empirical grounds as well.

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Table 4
Intercorrelation of Formal Operations and Adolescent Egocentrism Scales by Grade

Scale	IA	PF	SF	IAS	AS	TS	VA	TOLT	TOLT-C
Grade 7 (n = 39)									
AES	.79	.86	.34*	.30*	.22	.28*	−.26**	−.19	−.19
IA		.39*	.01	.35**	.22	.36*	−.17	−.25	−.23
PF			.52*	.16	.15	.12	−.15	−.19	−.11
SF				−.06	−.03	−.12	.17	.05	−.02
IAS					.81*	.87*	−.19	−.22	−.27*
AS						.42*	−.25	−.10	−.21
TS							−.09	−.25	−.24
FO-L								.26**	.47*
TOLT									.39*
Grade 9 (n = 43)									
AES	.90	.91	.38*	.29*	.25**	.18	.26*	.13	.03
IA		.65*	.17	.17	.18	.07	.18	.12	−.05
PF			.51*	.35*	.27*	.24	.28*	.11	.10
SF				.03	.01	.03	−.02	−.13	.07
IAS					.76*	.73*	.24	.27*	.01
AS						.11	.28*	.12	.03
TS							.07	.29*	.01
FO-L								.20	.34*
TOLT									.19
Grade 11 (n = 35)									
AES	.92*	.93*	.67*	.25	.18	.24	−.28*	.03	−.01
IA		.70*	.57*	.17	.06	.23	−.26	−.01	−.09
PF			.66*	.28*	.26	.19	−.26	.06	−.06
SF				.27**	.17	.27**	−.19	−.06	−.13
IAS					.85*	.80	−.25	−.42*	−.04
AS						.36*	−.09	−.29*	−.04
TS							−.33*	−.41*	−.13
FO-L								.51*	.44*
TOLT									.57*
College (n = 56)									
AES	.81	.91	.30*	.25*	.12	.29*	−.07	−.14	.04
IA		.49*	.14	.19	.02	.28	−.13	−.22*	−.08
PF			.35*	.24*	.17	.21	−.01	−.05	.12
SF				.03	−.02	.06	.07	−.02	−.002
IAS					.79*	.81*	−.01	−.06	.14
AS						.29*	.15	.17	.10
TS							−.16	−.26*	.12
FO-L								.45*	.09
TOLT									.23*

Note. AES = Adolescent Egocentrism Scale; IA = imaginary audience; PF = personal fable; SF = self-focus; IAS = Imaginary Audience Scale; AS = abiding self; TS = transient self; VA = verbal analogies; TOLT = Test of Logical Thinking; TOLT-C = Test of Logical Thinking–Combinatorial Reasoning; FO-L = Formal Operations (Lunzer). The maximum possible score on the total Adolescent Egocentrism Scale (imaginary audience and personal fable) is 50. For each of the AES subscales the maximum score is 25. The AS and TS subscales of the Imaginary Audience Scale (IAS) each has a maximum score of 12, for a total scale score of 24. The maximum score for the Lunzer verbal analogies (VA) is 20. The TOLT and TOLT-C scales have maximum scores of 8 and 4, respectively.
* $p < .05$. ** $p = .05$.

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analyses (across grade) were conducted on the correlation coefficients (after r-to-z transformation) for these variables in order to assess the developmental patterning of the adolescent-egocentrism–formal-operation relations. These analyses all proved to be nonsignificant. Last, as Table 4 indicates, the few significant correlations that do obtain between adolescent egocentrism and formal operations in both the 11th-grade and college samples are also negative.

What is the relation between the two measures of adolescent egocentrism (IAS and AES)? Recall that the AES operationalizes both the imaginary audience and personal fables components, and the IAS focuses only on the former. The overall correlation between the IAS and AES measures was .33 ($p < .01$). This correlation attenuates to .27 ($p < .05$) after age was partialed from their common correlation. Another way to assess the relation between these two measures is to directly compare the IA subscale (of the AES) and the IAS. The correlation, corrected by the Spearman–Brown formula, was .45 ($p < .01$). The average correlation among the subscales of these two measures (with age partialed) is only .18. The modest nature of these cor-

relations suggest that the two measures of adolescent egocentrism tap very different aspects of the construct and are certainly not interchangeable.

General Discussion

Together, the results of the two studies provide little support for the crucial theoretical assumption of the adolescent egocentrism theory: namely, that the emergence of adolescent egocentrism is correlated with the onset of formal operations in early adolescence. Although general self-focus and formal operations displayed developmental covariation in Study 1, this was not translated into imaginary audience and personal fable constructions. Indeed, only significant negative or nonsignificant correlations obtained between the indices of adolescent egocentrism and formal operations from early to middle adolescence. In Study 2 this pattern was again found for the 7th- and 11th-grade samples and for the college subjects. Although a few significant positive correlations were evident in 9th grade, the correlations (and R^2) were quite modest.

This latter finding points out a rather common problem in the literature regarding the developmental pattern of adolescent egocentrism. Whereas Enright et al. (1980) found a linear decline in imaginary audience and personal fable responding from early to late adolescence, Adams and Jones (1981) report a linear increase in egocentrism, at least from early to middle adolescence. Gray and Hudson (1984) found the peak of abiding self responses among 8th graders, and transient self responding peaked in 6th grade. Goossens (1984) found a stable level of responses across grade on a modified imaginary audience scale in one study, but reported peak responding in a 9th-grade sample in a follow-up study. In our first study, imaginary audience and personal fable responding showed no discernible developmental pattern (apart from self-focus) from early to middle adolescence, whereas in the second study we did find evidence of developmental decline from early to late adolescence. Clearly, the onset and decline of adolescent egocentrism shows some sample specific variability. But it certainly seems to be the case that "the developmental pattern in egocentrism . . . does not appear to be consistently linked to theoretical based patterns in formal operations of cognitive development" (Riley et al., 1984, p. 402). This is seen most clearly in our present studies in the lack of significant (linear and quadratic) trends in the correlations between the formal operations and adolescent egocentrism measures.

Gray and Hudson (1984) and Goossens (1984) suggested that a fair test of the crucial assumption of the adolescent egocentrism theory would involve the use of *methode clinique* assessments of formal operations, as opposed to the paper-and-pencil measures that we used. The argument is that questionnaire measures of formal thought fail to capture the social interactional character of formal problem-solving ability. However, the measures that we used have correlated highly in previous research with *methode clinique* assessments (see, e.g., Lunzer, 1965, p. 31; Tobin & Capie, 1981). Furthermore, the consequence of using questionnaire measures of adolescent egocentrism and formal operations is that method variance is held constant. Although shared method variance may contribute to artificially high correlations (and this is generally regarded as a more serious problem than low correlations resulting from different methods), the crucial point is that in our studies, despite methodological overlap, the adolescent egocentrism and formal operations measures still failed to correlate.

The lack of empirical support for the crucial assumption of adolescent egocentrism calls into question the theoretical framework of the construct. Lapsley and Murphy (1985; Lapsley, 1985) argued that although the imaginary audience and personal fable constructs are of decided theoretical interest, they are not well placed in the ontogenetic context of the egocentrisms of logical development. They argued that the construction of personal fables and of imaginary audiences constitutes a problem in interpersonal understanding. Because there are known developmental sequences for describing advances in interpersonal understanding (e.g., Selman, 1980), the appropriate theoretical context for understanding the imaginary audience and personal fable may be in terms of perspective-taking development. In their model, Lapsley and Murphy (1985) placed particular emphasis on the emergence of the "observing ego" in Stage 3 of Selman's (1980) sequence for understanding the onset of both the imaginary audience and personal fable constructs, and on Stage 4 of the sequence for accounting for the decline of these constructs in late adolescence. Given the lack of clear empirical support for the key assumption of the adolescent egocentrism theory, it may not be imprudent to begin looking for an alternative theoretical framework.

Last, Study 2 provides the first assessment of the relation between the two measures of adolescent egocentrism (IAS and AES). The correlations between the total scale scores and among the subscales are rather modest and disappointing. Although both measures generate acceptable reliabilities (the AES usually being higher), the lack of robust intercorrelations among the measures raises questions about the appropriate assessment of the imaginary audience and personal fable. Elkind and Bowen's (1979) Imaginary Audience Scale is generally considered to be a measure of self-consciousness (Adams & Jones, 1981). High levels of self-consciousness are then used (via the IAS) to infer the presence of imaginary audience ideation. The AES, on the other hand, explicitly operationalizes both the imaginary audience and the personal fable. Hence the modest intercorrelations are to be understood in light of the very different nature of the content of the two measures. Although self-consciousness may indeed play a role in the construction of the imaginary audience (and the personal fable), they are not identical constructs. What may be required is a more powerful theoretical framework by which one can reconceptualize the role that self-consciousness plays in the ontogenesis of the IA and PF (e.g., Lapsley & Murphy, 1985). Future researchers should address this issue.

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