Journal of Adult Development, Vol. 9, No. 3, July 2002 (© 2002)

The Relationship of Cognitive Development to Age, When Education and Intelligence Are Controlled For

Albert B. Hood[1,3] **and David L. Deopere**[2]

In this study 165 volunteers aged 18–87 were recruited from educational, employment, church, and social organizations and administered 3 paper-and-pencil instruments: the Quick Test, a measure of verbal–perceptual intelligence; the Scale of Intellectual Development, a Perry measure of cognitive development; and an inventory of life experiences. Age was found to be negatively related to cognitive development, as was extent of participation in community or church activities, whereas intelligence and education were positively so related. Less dualistic thinking and more relativistic thinking were related to higher educational achievement. Nevertheless, dualistic thinking was found to increase among older age groups, even with intelligence and education controlled for.

KEY WORDS: aging; cognitive development; intelligence; Perry theory; dualistic thinking; relativistic thinking; cognitive assessment; educational background; life experiences; Quick Test.

Much of the literature concerning cognitive development has been based on the landmark work of Piaget (1954) that deals with stages of child and adolescent development. Theories of cognitive development include Kohlberg's model for the development of moral judgment (Kohlberg, 1971); Loevinger's ego development model (Loevinger, 1976); Harvey, Hunt, and Schroeder's stage theory of integrated complexity (Harvey et al., 1961); Perry's scheme of intellectual and ethical development (Perry, 1970); Baxter-Magolda's patterns of knowing (Baxter-Magolda, 1992); and King and Kitchener's reflective judgment model (King & Kitchener, 1994).

These cognitive developmental theories describe the individual as an active interpreter imposing a meaningful order upon information being processed. The manner in which this takes place differs depending upon a set of stages that describe a different way of thinking. This development occurs at an irregular rate of movement along the qualitatively different sequence of stages. Perry's theory of intellectual and ethical development is based on an assumption similar to the Kohlberg model that stage development is oriented to an internal cognitive structure.

Perry formulated his theory by assessing the development of Harvard students through a series of longitudinal interviews. His scheme suggests that students progress through a hierarchy of nine observable, developmental positions. These nine positions identify the "dominant form" utilized to interpret experience, particularly in the areas of knowing, valuing, and responsibility. The first three positions describe a dualistic (Right–Wrong) concrete view of the world. The next three stages include a more cognitively complex perspective in which knowledge and values are relativistic and contextual. The highest three stages involve a mature level of commitment within a relativistic world, regarding important decisions, such as relationships, ethics, career, and religion, and accompanied by a clear sense of personal identity.

A number of studies have investigated the validity of this theory including those done by Baxter-Magolda (1992) and King and Kitchener (1994; also King, Kitchener, Wood, & Davidson, 1989) for their

[1]Lindquist Center, The University of Iowa, Iowa City, Iowa.
[2]Franciscan Mental Health Center, Rock Island, Illinois.
[3]To whom correspondence should be addressed at N338 Lindquist Center, The University of Iowa, Iowa City, Iowa 52242; e-mail: albert-hood@uiowa.edu.

1068-0667/02/0700-0229/0 © 2002 Plenum Publishing Corporation

adaptation of the Perry model. The results of these studies have tended to support the sequential nature of the first two portions of the Perry scheme, dualism and relativism, but have been more equivocal regarding the higher commitment positions. When objectively scored Perry instruments (Erwin, 1983; Parker & Hood, 1997) have been administered to both 1st-year and upperclass undergraduates, less dualistic thinking and greater relativistic thinking have typically been found among 3rd- and 4th-year students in studies at American and European universities although not among those in China (Hood, Ferreira, & Zhang, 1998; White & Hood, 1989; Zhang & Hood, 1998).

Fourteen cross-sectional studies (Kitchener & King, 1989) using 800 traditional-age college students have shown increases in mean cognitive development as educational level has increased. Longitudinal data collected on seven samples (age range from 15 to 27 years) showed increasing development over 1–4-year intervals for most, but not all, individuals.

In these samples both education and age were related to cognitive development with education appearing to play a stronger role than other life experiences. Fewer studies have examined such development and change in older populations. Concepts of continued cognitive development in adulthood with possible stages beyond those found in younger groups have been advanced by Commons, Richards, and Armon (1984). Several different intellectual processes such as motor-cognitive flexibility and attitudinal rigidity have been shown to be related to aging and also to other various life experiences (Miller, Slomczynski, & Kohn, 1987; Salthouse, 1990).

In this study we examined the relationship of age to cognitive development by comparing the cognitive development of older and younger adults while statistically controlling for educational level and intelligence. We also examined the question of whether educational level or intelligence continues to be related to cognitive stages among older adults or whether other types of life experiences become more important during the adult years.

METHOD

This study involved the administration of a Cognitive Development Scale, an intelligence test, and a Life Experience Survey to a group of 165 adults and college students. The relationships between cognitive development and age, educational level, intelligence, and a varied life experience were examined for this group.

Sample

The participants included roughly equal proportions of women (56%) and men (44%) ranging in age from 18 to 87 with a mean age of 36. Eighty-eight were adult volunteers residing in three Western counties of Illinois. We recruited from church groups, senior citizen centers, social groups, and medical center employees. The 88 adults included 9, who had not graduated from high school; 30, who had not obtained education beyond high school graduation; 17 with some college; and 32, who were college graduates. Of this group, 15% were laborers, 25% held clerical positions, 40% were professionals, and 20% were retired.

The 77 college students were either freshmen or sophomores enrolled in introductory psychology courses in a state university ($N = 40$) or a community college ($N = 37$).

Instruments

The Scale of Intellectual Development (SID) is an instrument developed by Erwin (1983) to measure Perry's scheme of intellectual and ethical development. The SID, a 101-item paper-and-pencil instrument, is a modified version of the Scales of Ethical and Intellectual Development developed by Roberts (1977). Three SID scales of Dualism, Relativism, and Commitment were developed from a factor analysis of the Roberts items. Internal consistency reliability coefficients for these scales fall in the range of .7–.8. Erwin established various types of construct validity for the scales of the SID by examining relationships with other similar instruments and from studies in which he administered the instrument to several thousand students at Texas A & M University.

Prior to administering the SID to participants in this study, we made minor modifications in 12 of the items to make items, originally constructed for college students, more appropriate for older and retired adults. For example, in the item "I prefer that teachers should simply tell me what is important to know" the word "experts" was substituted for "teachers." Correlations among scales (shown in Table I) and scale reliabilities remained similar to those reported by Erwin.

To control for varying intelligence levels, the Quick Test (QT; Ammons & Ammons, 1962) was administered to the 165 participants. The QT was

Table I. Relationship of Life Experiences to SID Scores

	Dualism	Relativism	Commitment
Relativism	−.08		
Commitment	−.25**	−.08	
Community activity	.05	−.20**	−.08
Church activity	.13	−.33**	.01
Travel	−.19**	−.05	.08

Note. $N = 165$.
** $p < .01$.

developed to provide a brief measure of verbal–perceptual intelligence and yields correlations in the vicinity of .8 with other widely used individually administered intelligence tests. The QT typically takes less than 10 min to administer, usually on an individual basis. Four black and white drawings are presented to individuals being tested, and they are asked to identify in which of the four drawings a word is either actually drawn or shown in context. Words are presented in order of difficulty until the individual misses six consecutive items. In this study we photocopied the QT plates onto separate sheets of paper for each individual, and the instrument was administered in a group setting. The individuals in this sample obtained QT IQ scores ranging from 75 to 135 with a mean of 101.3 and a standard deviation of 11.2.

We developed the Life Experience Survey to gather demographic data from the participants, such as age, occupation, marital status, and religious preference, as well as information about life experiences, including educational level, self-perceived activity in community and church activities, and amount of travel experience.

Procedure

The study was conducted at various locations including work settings, churches, senior citizens' centers, and college classrooms. The QT was administered first, taking from 7–8 min for the college students to 12–15 min for the senior citizens. Participants then completed the SID and the Life Experience Survey. After all participants had completed the three instruments, a brief presentation on the nature and purpose of the study was provided. The total time spent completing the three instruments ranged from approximately 35 min for the college students to about 1 hr for the senior citizens. Correlations were computed between scores on three SID scales and age, IQ, educational level, community activity, religious activity, and amount of travel experience. Multiple regression analyses were performed to identify the unique variance that each of the independent variables contributed to the variance of each of the SID scales.

RESULTS

In this sample, age was negatively related to education ($r = -.32$). This negative relationship is probably due to lower educational levels achieved by persons reaching young adulthood 40 and 50 years ago and because the younger members of this sample were all current college students. The positive correlation ($r = .18$) between educational level and scores on the IQ test would be expected. A positive relationship between age and IQ score ($r = .33$) was not expected given the direction of the above correlations and certainly not from most previous research. Age was positively related to scores on the Dualism scale and negatively related to scores on the Relativism scale (Table II). The older members of this sample seemed to engage more often in simplistic and dualistic reasoning and less often perceived diversity or engaged in contextual and relativistic reasoning.

Table II. Relationship of Age, Education, and IQ to Dualism and Relativism

Predictor variables	r or multiple r with dualism	R^2 (% variance)	r or multiple R with relativism	R^2 (% variance)
Age	.26**	6.7	−.39**	15.1
Education	−.48**	22.9	.17*	2.8
IQ	−.30**	9.2	−.18*	3.2
Education + IQ	.53*	27.8	.27**	7.4
Education + age	.49**	24.1	.39**	15.3[a]
IQ + age	.49**	23.5[a]	.39**	15.4[a]
Education + IQ + age	.57**	32.6[b]	.40**	15.9[b]

Note. $N = 165$.
[a] Age adds significantly to variance $p < .01$.
[b] Age adds significantly to variance $p < .05$.
* $p < .05$. ** $p < .01$.

Level of education achieved showed a strong negative relationship with dualism and a slight positive relationship with relativism. The more education members of this sample had received, the less likely they were to engage in dualistic thinking and the more likely they were to adopt a relativistic viewpoint. Scores on the IQ test were also negatively related to dualism and slightly negatively related to relativism. Persons with higher IQ scores were less likely to adopt dualistic cognitive functions.

There was a small relationship between education and scores on the Commitment scale, but neither age nor IQ scores were significantly related to commitment. Age, education, and IQ were related to differential cognitive functioning on Perry's dualistic and relativistic positions of development but did not differentiate among scores for the higher level of commitment.

Age

Age was significantly related to dualism with older persons obtaining higher scores on the Dualism scale. As can be seen in Table II, when educational level was controlled for, age did not contribute significantly to the variance (1.2%) in dualism scores. However, when IQ was controlled for, age continued to make a significant contribution (14.3%) to the variance associated with dualism. Age contributed 4.8% of the variance associated with dualism when both educational level and intelligence were held constant, with all three yielding a multiple correlation of .57.

Age was significantly negatively related to relativism (−.39). Age made a significant contribution to the variance associated with relativism scores when controlled for on measures of intelligence or educational level singly (12.2 and 12.5%, respectively) as well as when these two variables were combined (8.5%). Age was not significantly related to scores on the Commitment scale, however.

Education

Education was the variable most strongly associated with scores on the Dualism scale ($r = -.48$). The greater the person's educational background, the lower the score he tended to obtain on the Dualism scale. Educational background continued to contribute to the variance associated with dualism when age and intelligence were controlled for individually (17.4 and 18.6%) and jointly (9.1%). Educational background was significantly related to scores on the Relativism scale ($r = .17$), but it did not make a significant contribution to the regression coefficients obtained with either age or IQ alone or in combination. Education was the only variable to be significantly related to scores on the Commitment scale.

Intelligence

Scores on the intelligence test were moderately ($r = -.30$) related to scores on the Dualism scale and slightly ($r = -.18$) related to scores on the Relativism scale. IQ scores contributed 16.8% of the variance associated with dualism when age was held constant and 4.9% of the variance when educational level was held constant. When both age and education were held constant, IQ scores still accounted for 8.5% of the variance associated with dualism. Intelligence did not contribute to the total variance associated with relativism when age was held constant, but did contribute a significant portion of the variance (4.6%) when educational level was held constant.

Life Experiences

The Life Experience Survey requested information regarding the respondents' community activity, church activity, and travel experience. Responses were obtained on a 4-point scale from inactive to active for community activity (inactive 30%, active 14%) and church activity (inactive 31%, active 20%), and for travel experience the number of times they had traveled more than 300 miles from home on a 7-point scale ranging from Never to More Than 20 Times. Results for the latter measure ranged from 1% for the low extreme to 26% for the high extreme. Correlation coefficients between these three variables and the SID scales of Dualism and Relativism are shown in Table I. Those respondents who were more active in community and church activities tended to obtain lower scores on the Relativism scale and those who had done more traveling tended to obtain lower scores on the Dualism scale.

Reported personal activity in community-related affairs added a small but statistically significant contribution (2.1%) to the variance in relativism scores when age, IQ, and education were controlled for. Personal involvement in church-related activities beyond normal attendance made a substantial contribution (6.2%) to the variance in relativism scores after age, IQ, and education were controlled for. Although the number of times the respondent had traveled more than 300 miles from home was negatively related to

dualism scores (Table I), travel experience did not add a statistically significant contribution to scores on the Dualism scale after age, IQ, and education had been controlled for.

DISCUSSION

In this study increasing age was related to higher scores on the Dualism scale indicating that older persons are more likely to see the world in the terms of Us-Right-Good versus Other (Them)-Wrong-Bad. At all levels of education and intelligence, there appears to be an effect of age on dualistic thinking. The inverse relationship between age and relativism would be expected given the accompanying relationship/correlation found between age and dualism—as age increased, relativism scores tended to decrease. When the effects of educational level and intelligence were removed, age still contributed to the variance among relativism scores. At all levels of education and intelligence, younger participants tended to be more relativistic than older participants. A possible explanation might be the findings that as adults age, they tend to think more egocentrically; however, Kausler (1991) has reported that differences in educational level accounted for a large proportion of this effect.

It might be hypothesized that increasing age would bring about more varied experiences and more opportunities to be faced with uncertainty and diversity of opinion and lead to more relativistic thinking. This does not appear to be the case because increasing age was positively related to dualism scores and negatively related to relativism scores. Further longitudinal studies might examine if older persons engage in a cognitive retreat from diversity in an ever-changing society to a more simplistic mode where their answers are more certain. In any case, the stereotype of older persons becoming more dogmatic in their opinions and less capable or willing to handle complexity in their thought processes received some support from these results.

Schaie (1990) has reported that those with flexible attitudes in midlife tend to experience less decline in flexibility than do those who were observed to be fairly rigid at that life stage. Life style variables, such as affluence and being interested in cultural and educational activities, are characteristics related to high levels of attitudinal flexibility in old age, and these characteristics are likely to be related to educational level. Because life experiences, such as exposure to stimulating environments and utilization of cultural and educational resources throughout adulthood, may impact cognitive functions in later life, there is a need for longitudinal studies to examine such relationships.

Higher levels of education were related to lower scores on Dualism scale and, to a lesser extent, higher scores on the Relativism scale. The findings of this study support the importance of formal education in the development of cognitively complex thought processes.

Intelligence, as measured by the QT, was also negatively related to dualism but positively related to age. Contrary to most previous research findings, the older participants in this study tended to obtain higher scores on the IQ test than did the younger ones. There is considerable evidence that at least part of this effect is due to a decline in speed or slowing of response time that is likely to occur with age (Schaie, 1993; Schooler, 1990), but the QT is not speeded, and individuals are allowed as much time as they wish. In addition, the QT assesses primarily verbal ability that has been shown to be less effected by age than other types of cognitive functioning assessed by the typical individually administered intelligence test (Salthouse, 1991).

Another interesting finding in this study was the negative relationship of community activity and church activity to relativistic thinking. Even after controlling for the effects of age, educational level, and intelligence, as self-reported activity in church increased, relativism scores decreased. It might be expected that those active in church and community activities would have greater interaction with others and therefore develop a greater acceptance of diversity in their outlook toward the world. Instead, perhaps persons participating in community activities and particularly church activities interact with others where particular opinions and attitudes are reinforced increasing dualistic thinking and decreasing a relativistic point of view.

In the Perry scheme, students tend to be at the dualistic stages when they begin higher education and move into the relativism stages during the undergraduate years. Some anticipate the need for future commitments in a contectual world by the time they graduate, and only a few reach the higher stages of commitment within relativism. The results of this study offer some validation for Perry's theory in regard to his positions of dualism and relativism. Few statistically significant results were found related to Perry's position of commitment (as measured by the commitment scores on the SID). These results are

consistent with the earlier research by King (1977) that suggested that the Perry scheme does not adequately measure cognitive development "beyond relativism."

The focus on this study was to assess *whether* there was in fact a relationship between age and cognitive development rather than *why* that might be so. Further research with larger samples of older persons is needed to explore this association and to assess the relative linearity or curvilinearity of such a relationship.

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