

Exploring Age and Gender Differences in Vocational Interests

Richard C. Thompson, David A.C. Donnay,
Mike L. Morris, and Nancy A. Schaubhut
CPP, Inc

A large cross-sectional sample of respondents who completed a research version of the *Strong Interest Inventory*® assessment were examined for differences in the RIASEC themes based on age and gender. The data were examined using a 2 (gender) by 5 (age category) MANOVA and follow-up ANOVAs. Anticipated gender differences were found and replicate past research. The effects of age and age by gender interactions were significant, but very small. A linear trend across age categories with level of interest generally increasing with age was found. Some implications of the findings are discussed.

A potentially fruitful area of research regarding vocational interests, which remains largely unexplored, is the development of interests across the lifespan (Gottfredson, 1999). As an entry into this area, the current study examines the expression of interests by individuals comprising different age groups, ranging from age 13 to 59. It was observed by the researchers that there appear to be differences in levels of vocational interests based on the age of respondents during a recent revision of the *Strong Interest Inventory*® assessment. To examine these differences more explicitly, the current study compares the reported level of interest in the six General Occupational Themes (GOTs) measured on the Strong based on self-reported respondent gender and categorized age.

Much of the research conducted on interests over time has focused on the issue of interest stability and change (Swanson, 1999). There has been considerable research on the various factors that developmentally influence or are related to expressed vocational interests. Such factors include intelligence (Kaufman & McLean, 1998), personality (Ackerman &

Heggestad, 1997; Barrick, Mount, & Gupta, 2003; Holland, 1999; Larson, Rottinghaus, & Borgen, 2002; Nordvik, 1996), genetics (Gottfredson, 1999; Lykken, Bouchard, McGrue, & Tellegen, 1993), ethnicity (Fouad, Harmon, & Borgen, 1997; Kaufman, Ford-Richards, & McLean, 1998), culture (Fouad, 2002), and gender (Harmon, Hanson, Borgen, & Hammer, 1994). Research has also examined the vocational interests of a variety of identifiable populations that span the relevant developmental timeframe (Holland, 1997; Tracey & Ward, 1998). Underlying many of these areas of research focus is an implicit assumption that these characteristics serve as a proxy measure for the background and experiences of the individuals that comprise the respective groups. These proxy measures generally are included in models of interest development (Holland, 1997).

Longitudinal studies of vocational interests have demonstrated that there is considerable stability of interests over time (Swanson, 1999). Lubinski, Benbow, & Ryan (1995) show that there is little change in interests for gifted adolescents obtained at age 13 to their interests at age 28, where the dominant interest was concordant or adjacent to the dominant interest at age 28.

A related study by the same authors shows that math and science aptitude at age 13 can be used to predict education levels and career focus at age 33, with commensurate levels of occupational satisfaction, career success, and life satisfaction.

Swanson (1999) also discusses the impact of age and interval on stability of interests. Generally, when length of interval was held constant, the stability of interests increased as the age of the respondent at the time of the first measurement increased. These studies suggest that differences between age cohorts are more likely to be attributed to differences in interest development rather than changing interests over time.

Swanson (1999) also indicates that in general, interests are particularly stable after age 30. The research on interest stability and change suggests that differences found in interests for different age group cohorts then are not likely due to changes in interest patterns over time. Instead, it is possible that age cohorts exposed to different environments and differing opportunities to explore and develop interests may result in differing interest profiles.

Schools provide an environment through which most U.S. citizens pass. It is also an environment where considerable efforts have been made to modify the experiential exposure of both female and male students to educational topics, experiences, and activities that were more likely to be gender stereotyped prior to 1972. The main vehicle for motivating such efforts in educational settings was the passage of Title IX in 1972. The law requires that educational institutions of all kinds do not discriminate on the basis of sex in the availability of opportunities for both females and males.

Title IX applies to a broad array of educational opportunities, including non-

discrimination in entry standards to public and private high schools, colleges, and vocational training institutions, as well as attempts to create equal opportunities to participate in athletics and other non-curricular activities. Since the initial passage of Title IX, the U.S. Department of Education and the Courts have broadened these opportunities and continue to modify the administration of Title IX. According the U.S. Department of Education (1997), Title IX has been generally successful in achieving its goals. The Department of Education reports large increases in the number of female entrants into universities and colleges, parity in the number of bachelors degrees awarded to female and male students, and broader inclusion of female students in intercollegiate sports, although there are remaining opportunities for further improvement (Kite et al., 2001).

Since the environment for male and female students has been becoming more similar over the last thirty-five plus years, it is possible that these experiences have had an effect on vocational interests. One broad model of vocational interests is Holland's (1997) model. The Holland model includes six primary dimensions of interests; 1) **Realistic** interests involve building and mechanical activities that present opportunities for using tools, machines, and other objects; 2) **Investigative** interests encompass science and mathematics activities that allow systematic observation, and symbolic and creative investigation of phenomena; 3) **Artistic** interests include art, music, dramatics, and writing and focus on that allow for creative expression through these media; 4) **Social** interests entail activities that provide opportunities to help and cure, enlighten and develop others; 5) **Enterprising** interests involve persuasion of others to obtain goals and create economic success, such as managing, selling, and persuading; and 6) **Conventional** interests focus on

opportunities that include organizing, manipulating and evaluating data using predefined sets of rules.

Holland's model is generally presented as a hexagon, where adjacent themes or dimensions are considered to be more closely related than to interests on the opposite side of the hexagon. In addition, the model applies both to interest and environments. While the exact structure of measured interest data is the source of some debate (Anderson, Tracey, & Rounds, 1997; Fouad, Harmon, & Borgen, 1997; Holland, 1997; Tracey & Rounds, 1995; Tracey & Ward, 1998), the RIASEC constellation provides a useful model for examining general interests and corresponds to the measures of General Occupational Themes on the Strong. Past research has shown gender differences in these dimensions of interests (Fouad, Harmon, & Borgen, 1997; Hanson & Campbell, 1985; Harmon, Hanson, Borgen, & Hammer, 1994), but we were unable to find similar research that focused on age as a primary predictor of interest levels.

It was expected that the historical gender differences on the RIASEC themes would be reproduced in this study. Specifically, it was anticipated that males would have higher average scores on Realistic, Investigative, Enterprising, and Conventional interests, while females would have higher average scores on Social and Artistic Interests (Harmon, Hanson, Borgen, & Hammer, 1994). It was also expected that there would be age differences in the levels of expressed interest for some or all of the RIASEC themes. However, the direction or pattern of these differences was not specified.

Given the efforts in education and other settings to provide more equal opportunities to obtain experiences, it was also expected that to the extent that efforts

to influence the interests of males and females have been successful, there would more be similarity of interest for younger female and male respondents compared with older female and male respondents. Said another way, it was hypothesized that for at least some of the RIASEC dimensions, there would be significant interactions between gender and age cohorts.

Method

Procedures. Data were collected as part of a larger research project to revise the *Strong Interest Inventory*® assessment. In this effort, a research version of the Strong was developed that contained 361 items organized into six sections. One of the major changes that occurred on the research form of the newly revised Strong assessment relative to earlier versions was an expansion of the response options for the Like, Indifferent, and Dislike items. Here, the 3-point response options were expanded to 5-point response options, with the extreme responses anchored with Strongly Like, and Strongly Dislike, respectively. The research version of the Strong was administered using both paper and pencil and Internet administrations to over 25,000 male and female respondents. The reliance on the Internet for much of the data collection does not appear to be problematic (Gosling, Vazire, Srivastava, & John, 2004). As a result of analyses not detailed here, among other measures, the newly revised Strong measures six General Occupational Themes, thirty Basic Interest Scales, and five Personal Style Scales. Each of these scales is standardized to have a mean of 50 and a standard deviation of 10 (T-scores). The six revised GOTs serve as dependent variables in this study.

Respondents. The ratio of females to males in the total data collection was about 2 to 1. From the larger group of respondents, a

sample was drawn for the current study. The sample developed excluded those respondents used in the creation of the General Representative Sample or used in the development of Occupational Scales for the forthcoming revision. Next, to provide

more equal sample sizes based on gender, a subset of female respondents was selected at random. The final distribution of ages, age categories and genders is summarized in Table 1.

Table 1. Summary of Respondent Age, Age Category, and Gender

Age Category	Age	Gender		Total
		Female	Male	
age 13 to 19	13	55	66	121
	14	89	116	205
	15	166	127	293
	16	263	186	449
	17	353	363	716
	18	365	351	716
	19	334	217	551
Total		1625	1426	3051
age 20 to 29	20	275	186	461
	21	303	194	497
	22	300	202	502
	23	252	191	443
	24	253	216	469
	25	217	208	425
	26	238	179	417
	27	197	188	385
	28	168	181	349
	29	144	158	302
Total		2347	1903	4250
age 30 to 39	30	186	157	343
	31	159	119	278
	32	182	169	351
	33	116	124	240
	34	141	108	249
	35	119	91	210
	36	90	108	198
	37	103	85	188
	38	127	93	220
	39	99	75	174
Total		1322	1129	2451
age 40 to 49	40	100	82	182
	41	85	67	152
	42	88	69	157
	43	85	74	159
	44	84	64	148
	45	62	65	127
	46	60	51	111
	47	64	54	118
	48	51	65	116
	49	40	40	80
		719	631	1350
age 50 to 59	50	56	47	103
	51	33	27	60
	52	30	28	58
	53	23	29	52
	54	25	32	57
	55	14	34	48
	56	13	18	31
	57	11	16	27
	58	12	10	22
	59	3	7	10
Total		220	248	468

The sample includes full time students (24.8%), persons employed full-time (33.1%), persons employed part-time (10.2%), persons not working for income (9.4%), retirees (0.3%) and those who indicated other options or did not respond (22.3%). The sample is also ethnically diverse, with 71% reporting being white or Caucasian, 7.5% black or African-American, 4.7% Hispanic, 5.9% Asian or Pacific Islander, 0.5% Native American, and 9.1% multi-ethnic.

Results

The hypotheses were tested by conducting an age category (13 to 19, 20 to 29, 30 to 39, 40 to 49, and 50 to 59) by gender (female and male) MANOVA using the RIASEC interest dimensions as dependent variables, and examining the Step-down ANOVAS for each interest dimension. The overall MANOVA suggested that there are gender [$F(6,11555) = 528.24, p < .001$] and age category [$F(24,40312) = 34.94, p < .001$] differences for all of the interest dimensions, as well as the gender by age category interaction [$F(24,40312) = 8.44, p < .001$]. The partial η^2 indicate that the only meaningful difference, in terms of effect sizes for this analysis is for gender (partial $\eta^2 = .215$). Age category accounted for less than 2% of the variance, and the interaction less than 1%. Overall, this finding indicates that there is no sizable effect of age on interests.

Given the significant multivariate result, univariate ANOVAs were then examined for each of the RIASEC themes. The results of this analysis are summarized in Table 2, in addition to estimates of partial η^2 . For each of the analyses, post hoc analyses as well as trend analyses were computed. Generally, for all of the analyses, the linear and quadratic trend lines fit the data, however, the best fitting trend in all cases was linear. The estimated marginal means

and standard errors for each of the analyses are summarized in Table 3. An examination of Tables 2 and 3 shows that the hypotheses regarding the direction of gender differences for each of the RIASEC dimensions were confirmed. Males scored higher on the Realistic, Investigative, Enterprising and Conventional themes, while females scored higher on the Artistic and Social themes. The difference for the Realistic theme was the largest, and the difference for Enterprising the smallest. Indeed, the difference was very small and likely emerged as significant due to the very large sample size. The same is true for Investigative, Artistic, and Conventional themes.

As predicted, the results do show some small differences in the themes based on age. The Artistic theme had an effect size near 5%, the largest of any of the themes. The Social theme had an effect size of 4%. An examination of the means in Table 3 shows that the primary source of any difference is for the two youngest age categories, with males showing less interest in Artistic and Social themes compared with females. For the rest of the age groups, the means are very similar. The difference for the Realistic theme is likely due to the steady increase in interest as the age increases. The Enterprising and Conventional themes have very trivial differences based on age. Finally, the anticipated interactions did emerge, but the effect sizes of these results are very small, with each of them accounting for less than 1% of the variance.

Discussion

This study examined the impact of age and gender on the RIASEC Themes using a large data set collected during development of the newly revised *Strong Interest Inventory*® assessment. Before discussing the results, it is necessary to point out that

there are several shortcomings with this study. First, the data were cross-sectional in nature, so it is not possible to determine

whether any of the observed age differences are due to changing interests

[KMM1]

[KMM2][KMM3]

Table 2. RIASEC Theme Univariate ANOVA Summary

	SS	df	MS	F	p	Partial η^2
Realistic						
age category	24188.71	4	6047.18	77.59	.000	.026
Gender	148667.16	1	148667.16	1907.59	.000	.142
age category * gender	1207.77	4	301.93	3.87	.004	.001
Error	900923.91	11560	77.94			
Investigative						
age category	41670.13	4	10417.533	95.15	.000	.032
Gender	11820.09	1	11820.09	107.96	.000	.009
age category * gender	2972.50	4	743.13	6.79	.000	.002
Error	1265687.74	11560	109.49			
Artistic						
age category	57147.31	4	14286.83	142.91	.000	.047
Gender	10180.66	1	10180.66	101.83	.000	.009
age category * gender	6593.81	4	1648.45	16.49	.000	.006
Error	1155706.27	11560	99.96			
Social						
age category	54544.04	4	13636.01	121.18	.000	.040
Gender	21656.62	1	21656.62	192.46	.000	.016
age category * gender	7584.05	4	1896.01	16.85	.000	.006
Error	1300784.95	11560	112.52			
Enterprising						
age category	20604.90	4	5151.02	45.29	.000	.015
Gender	1113.34	1	1113.34	9.79	.002	.001
age category * gender	1064.11	4	266.03	2.34	.053	.001
Error	1314805.67	11560	113.74			
Conventional						
age category	14572.41	4	3643.10	31.24	.000	.011
Gender	5907.77	1	5907.77	50.66	.000	.004
age category * gender	1469.50	4	367.38	3.15	.013	.001
Error	1347985.59	11560	116.61			

Table 3. Estimated Age Category and Gender Marginal Means

Dependent Variable	Age Category	Gender			
		Females		Males	
		Mean	Std. Error	Mean	Std. Error
Realistic	13 to 19	41.54	.22	51.66	.23
	20 to 29	43.62	.18	53.71	.20
	30 to 39	45.59	.24	54.23	.26
	40 to 49	46.33	.33	55.25	.35
	50 to 59	45.31	.60	55.49	.56
Investigative	13 to 19	45.47	.26	46.26	.28
	20 to 29	47.36	.22	50.25	.24
	30 to 39	48.99	.29	51.07	.31
	40 to 49	49.61	.39	52.78	.42
	50 to 59	49.54	.71	54.12	.66
Artistic	13 to 19	48.79	.25	43.47	.26
	20 to 29	51.10	.21	48.70	.23
	30 to 39	52.14	.27	50.35	.30
	40 to 49	52.52	.37	51.34	.40
	50 to 59	54.19	.67	52.33	.63
Social	13 to 19	48.63	.26	41.86	.28
	20 to 29	51.86	.22	47.39	.24
	30 to 39	51.91	.29	48.63	.32
	40 to 49	51.86	.40	49.69	.42
	50 to 59	52.02	.72	50.41	.67
Enterprising	13 to 19	46.22	.26	46.11	.28
	20 to 29	48.07	.22	49.41	.24
	30 to 39	48.41	.29	49.69	.32
	40 to 49	49.23	.40	50.17	.42
	50 to 59	49.99	.72	50.67	.68
Conventional	13 to 19	45.83	.27	48.29	.29
	20 to 29	47.71	.22	49.75	.25
	30 to 39	48.91	.30	49.66	.32
	40 to 49	49.92	.40	51.01	.43
	50 to 59	48.82	.73	52.04	.69

over time. The sizes of the differences here do not seem inconsistent with the types of changes observed by stability and change researchers (Swanson, 1999). Second, while the cross-sectional nature of the data would have prevented any attributions regarding cause or direction of effects, the small effects of age category, and the age category by gender interactions prevent any interpretation of the results as they relate to the efficacy of Title IX.

This study also has several strengths. First, the sample included a broad age range of respondents. These respondents were drawn from a pool that differs largely from many studies of interests, specifically college students in psychology courses. While the respondents in the younger age group were typically students, many of the respondents in the older age categories were employed in a wide variety of work settings. The sample was quite large and probably reflects the population of people who complete interest inventories in general.

As expected, this study found that there were gender differences for all of the RIASEC themes. Not surprisingly, these differences were consistent with past research, with males having slightly higher means on the Realistic, Investigative, Enterprising, and Conventional themes. Female respondents reported higher levels of interest on the Artistic and Social themes. Across the entire age range, the size of these differences was generally small, with the largest and most consistent difference occurring for the Realistic theme.

Although meaningful differences based on the interaction of age category and gender did not emerge, an unanticipated age related result was identified in this study. Specifically, the trend analyses for all of the interest dimensions show that there is a general linear trend for all of the RIASEC dimensions, with interest in general increasing with age, across both genders. What is not clear is if this is due to slight increases in general interest as individuals age, or due to some other factor. A number of potential explanations of this trend can be identified. First, there could be an increasing level of disinterest in younger respondents to the stimuli presented on the assessment. Another alternative could be that there were differing response styles for younger respondents versus older respondents. Specifically, the new "Strongly Dislike" response option on the research version of the Strong may have been used more frequently by younger versus older respondents. Another explanation could be that there were differing motivations for participation in the research. Younger respondents may have participated in the study to obtain desired career exploration information, whereas the older respondents, who typically were employed, may have had broader openness to experience, and therefore completed the inventory out of curiosity. While it is important not to over interpret this modest trend result, considering the large sample size used in this study, this finding could be an indicator of a future challenge for career professionals interpreting the results of interest inventories.

References

- Ackerman, P. L. & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence of overlapping traits. *Psychological Bulletin, 121*, 219-245.
- Anderson, M. Z., Tracey, T. J. G., & Rounds, J. (1997). Examining the invariance of Holland's Vocational Interest Model across gender. *Journal of Vocational Behavior, 50*, 349-364.
- Barrick, M. R., Mount, M. K., & Gupta, R. (2003). Meta-Analysis of the relationship between the five-factor model of personality and Holland's occupational types. *Personnel Psychology, 56*, 45-74.
- Fouad, N. A. (2002). Cross-cultural differences in vocational interests: Between-groups differences on the Strong Interest Inventory. *Journal of Counseling Psychology, 49*, 283-289.
- Fouad, N. A., Harmon, L. W., & Borgen, F. H. (1997). Structure of interests in employed male and female members of U.S. racial-ethnic minority and nonminority groups. *Journal of Counseling Psychology, 44*, 339-345.
- Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions about Internet questionnaires. *American Psychologist, 59*, 93-104.
- Gottfredson, L. S. (1999). The Nature and Nurture of Vocational Interests. In M.L. Savickas & A. R. Spokane (Eds.), *Vocational Interests: Meaning, Measurement, and Counseling Use* (pp. 57-85). Palo Alto, CA: Davies-Black Publishing.
- Hanson, J. C. & Campbell, D. P. (1985). *Manual for the SVIB-SCII Strong-Campbell Interest Inventory Form T325 of the Strong Vocational Interest Blank*. (4 ed.) Stanford, CA: Stanford University Press.
- Harmon, L. W., Hanson, J. C., Borgen, F. H., & Hammer, A. L. (1994). *Strong Interest Inventory Applications and Technical Guide*. Palo Alto: Consulting Psychologists Press, Inc.
- Holland, J. L. (1997). *Making Vocational Choices: A Theory of Vocational Personalities and Work Environments*. (3 ed.) Lutz, FL: Psychological Assessment Resources, Inc.
- Holland, J. L. (1999). Why Interest Inventories are also Personality Inventories. In M.L. Savickas & A. R. Spokane (Eds.), *Vocational Interests: Meaning, Measurement, and Counseling Use* (pp. 87-101). Palo Alto, CA: Davies-Black Publishing.
- Kaufman, A. S., Ford-Richards, J. M., & McLean, J. E. (1998). Black-white differences on the strong interest inventory general occupational themes and basic interest scales at ages 16 to 65. *Journal of Clinical Psychology, 54*, 19-33.
- Kaufman, A. S. & McLean, J. E. (1998). An investigation into the relationship between interests and intelligence. *Journal of Clinical Psychology, 54*, 279-295.
- Kite, M. E., Russo, N. F., Brehm, S. S., Fouad, N. A., Hall, J. S., & Kcita, G. P. (2001). Women Psychologists in Academe: Mixed Progress,

- Unwarranted Complacency. *American Psychologist*, 56, 1080-1098.
- Larson, L. M., Rottinghaus, P. J., & Borgen, F. H. (2002). Meta-analyses of big six interests and big five personality factors. *Journal of Vocational Behavior*, 61, 217-239.
- Lubinski, D., Benbow, C. P., & Ryan, J. (1995). Stability of Vocational Interests Among the Intellectually Gifted From Adolescence to Adulthood: A 15-Year Longitudinal Study. *Journal of Applied Psychology*, 80, 196-200.
- Lykken, D. T., Bouchard, T. J. Jr., McGrue, M., & Tellegen, A. (1993). Heritability of interests: A twin study. *Journal of Applied Psychology*, 78, 649-661.
- Nordvik, H. (1996). Relationships between Holland's vocational typology, Schein's career anchors and Myers-Briggs' types. *Journal of Occupational & Organizational Psychology*, 69, 263-275.
- Swanson, J. L. (1999). Stability and Change in Vocational Interests. In M.L. Savickas & A. R. Spokane (Eds.), *Vocational Interests: Meaning, Measurement, and Counseling Use* (pp. 135-158). Palo Alto: Davies-Black.
- Tracey, T. J. G. & Rounds, J. (1995). The Arbitrary Nature of Holland's RIASEC Types: A Concentric-Circles Structure. *Journal of Counseling Psychology*, 42, 433-439.
- Tracey, T. J. G. & Ward, C. C. (1998). The Structure of Children's Interests and Competence Perceptions. *Journal of Counseling Psychology*, 45, 290-303.
- U.S. Department of Education (1997). Title IX: 25 Years of Progress. (Accessed 06-24-2004 at <http://www.ed.gov/pubs>TitleIX/index.html>)