

Administrator's Guide

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Introduction and Purpose

The *Picture Interest Career Survey, 3rd Edition (PICS-3)*¹, is a brief, essentially language-free self-report vocational interest inventory based on the widely used RIASEC occupational coding system (Holland, 1959, 1992) and the *people, data, things, ideas* interest categories and work tasks defined by Prediger (1982).

The original *PICS* was designed and developed for use with individuals representing a broad age range (10 to 65 years), and for individuals representing a wide range of ability levels. *PICS-3* fits these same parameters. The *PICS-3* is especially suitable for special needs individuals, non-readers, struggling readers, and non-English-speaking individuals, as well as individuals for whom English is a second language. The pictures can also be described to the visually impaired.

The *PICS-3* consists of 36 question item sets. Each item is made up of three (3) pictures of an individual engaged in a work activity. The pictures show individuals working in a variety of settings and at various skill levels. Each picture represents a work environment (e.g., hospital). In each item, the *PICS-3* user is asked to choose one picture of the three presented that they find most interesting. If a user picks an image of a doctor, this might represent an interest in working at a hospital (but not necessarily as a doctor). The basic premise of *PICS-3* is that users will search for environments where they can use their skills and abilities and express their values and attitudes. For example, Investigative types search for Investigative environments; Artistic types look for Artistic environments, and so forth. According to the RIASEC model, people who choose to work in an environment similar to their personality type are more likely to be successful and satisfied.

The 36 user responses can then be classified using the RIASEC occupational coding system, and the user's own *Occupational PICS Code* can be determined. The individual's *Occupational PICS Code* can then be used with the *PICS Career Locator*, which includes job titles from the O*NET database arranged by occupational interest area and education and training requirements. The *PICS Career Locator* is available for free download at <https://JIST.com>.

Other occupational materials based on the RIASEC system can also be used with the *PICS-3* results. These include the *O*NET Dictionary of Occupational Titles* and the O*NET database, the *Dictionary of Holland Occupational Codes, 50 Best Jobs for Your Personality* (Farr & Shatkin, 2005), Strong Campbell interest materials, *The Occupations Finder* (Holland, 2000), and military career material.

¹ In general, the acronym *PICS* will be used for the first three editions of the *Picture Interest Career Survey*; however, in the text of this guide, the acronyms *PICS-1*, *PICS-2*, and *PICS-3* may be used in reporting research findings and in situations when their use adds clarity or brevity to the text.

Administration and Scoring

The *PICS-3* can be administered individually or in groups. It can be self-scored or collected and scored by the administrator. The administration of the *PICS-3* should be straightforward. Orientation may include explaining that the *PICS-3* is a survey of *interests*, and as such is *not* a measure of aptitude or ability. Further, the pictures represent work *environments* (*not* necessarily job types); for example, a picture of a doctor represents a job in a hospital/clinic setting, *not* specifically a job as a doctor. *PICS-3* users may be told that the *PICS-3* is brief—only 36 items, that each item of the *PICS-3* consists of three pictures of persons working, and that there are no right or wrong answers. Users may need to be reminded that their selections should not be based on patterns or gender (e.g., the third image in each item set, or only images representing men, etc.). Finally, users may be told that the *PICS-3* will organize their interests in a way that will enable them to use RIASEC resources and materials and will facilitate career exploration, career/life planning, and career counseling.

Suggested directions that could be used with individual(s) taking the *PICS-3* are as follows (note: the text in **bold** should be spoken aloud):

Take a look at the sample item on the cover page. Pause. **Notice that it is made up of three pictures.** Pause. **Notice that each picture depicts a person working.** Pause. Now pointing to each picture in succession, say, **Picture A is a person cleaning a floor, picture B is a person arranging flowers, and picture C is a person delivering mail.** Pause.

In this sample, the individual taking the *PICS* was asked to choose one picture out of these three that was the *most interesting* to them. Pause. Pointing to picture B, say, **They chose Picture B as most interesting, so they circled their choice, picture B.** If they indicate they understand the process, continue by saying, **Now let's turn the page and go to step 1, item 1.** Pause, turn to the first page, point to item one and say, **Look at each of these three pictures in item 1.** When they have finished looking at each picture, say, **Now decide the most interesting picture out of the three.** Pause. Then say, **Now circle that picture.** When circled say, **Now go on to the next item.** Pause. Then say, **There are 36 items in all. Remember, choose only one picture in each item to circle.** Pause. Then say, **Be sure to complete all 36 items.**

Scoring takes approximately five minutes and can begin when the *PICS-3* user finishes. First check to see that all 36 items have a response. If an item is missed, ask the user to complete it. Next, notice that to the right of the items on each page there are six columns. Each column is headed by either **R, I, A, S, E,** or **C.** Notice that the letters **A, B,** and **C** appear in the columns following each item. Starting with item 1, circle the letter in the column that corresponds to the letter under the picture that was circled in that item. Go to item 2 and circle the letter in the column that corresponds to the letter under the picture circled in item 2. Repeat this procedure with items 3 through 36.

Now count vertically down the circled letters in each column. For example, count column **R** on every page and record the total in column **R-Realistic** in the **Totals** row of the *Occupational PICS Profile*

(in the example below, 15 Rs were counted); then count column **I** and record the score, column **A** next, and so on. The grand total for all scores should equal 36. When you have finished recording the column totals, place an X for each score in the appropriate row and column in the *Occupational PICS Profile* table, and then connect the Xs with a line to complete the profile.

For example:

	R Realistic	I Investigative
Totals	15	
18		
17		
16		
15	X	
14		
13		

Determine the individual user's *Occupational PICS Code* by placing the first letter of the highest scored interest on the first line, the next highest letter on the second line, and the third highest on the third line. For ties, draw a circle around the tied codes and combine them as one in your interpretation. You may record all interest letter codes in descending order. The *Occupational PICS Code* will be the three highest scored interest areas.

For example (this code is R, S, A):

Occupational PICS Code: R S A C E I

For example (due to a tie between S and A, this code is R, A-S, C):

Occupational PICS Code: R S A C E I

Interpretation Tips

Occupational PICS Codes align to the RIASEC system. The following is a brief explanation of each code letter (Holland, 1959, 1992):

(R) **Realistic:** Individuals interested in this area like to work with things, use tools and machines, and prefer physical, outdoors, and mechanical work. They are doers and often described as persistent and practical. They prefer a structured work environment. Workers with high realistic interest are found in construction and skilled trades, production and manufacturing, agriculture, transportation, hospitality and recreation, food service, and natural resources.

(I) **Investigative:** Individuals interested in this area like to work with ideas and data and prefer figuring out problems mentally. They are thinkers and often described as curious, intellectual, and independent. They favor jobs that require abstract thinking, research, and analysis. Workers with high investigative interest are found in the life and physical sciences, health and behavioral sciences, applied technologies, academics, research and development, mathematics, and engineering.

(A) **Artistic:** Individuals interested in this area like to work with forms, designs, and patterns and prefer creative and self-expressive work. Artistic individuals are creators and often described as imaginative and original. They favor flexible and less predictable work environments. Workers with high artistic interest are found in design, applied arts, architecture, culinary arts, performing arts, fine arts, education, communication and media, and fashion.

(S) **Social:** Individuals interested in this area usually like to work with people and prefer helping, teaching, and healing work. Social individuals are helpers and often described as supportive, understanding, patient, and generous. They favor jobs that require listening, comforting, serving others, and advising. Workers with high social interest are found in education, health and human services, recreation and fitness, safety and service, and religious vocations.

(E) **Enterprising:** Individuals interested in this area like to work with start-up ideas and new projects and prefer leading. Enterprising individuals are persuaders and often described as confident, ambitious, and energetic. They generally favor jobs that involve selling and achieving set goals. Workers with high enterprising interest are often found in business and administration, marketing, finance and insurance, sales, regional planning, and law.

(C) **Conventional:** Individuals interested in this area usually like to work with set procedures, data, and details and prefer clerical and computational work. Conventional individuals are organizers and often described as organized, efficient, and careful. They generally favor jobs that involve routine work with numbers, machines, and computers to meet required goals. Workers with high conventional interest are found in accounting, banking, statistics, office work, and computer applications.

Interpretation of *Occupational PICS Codes* is individual, that is ipsative. Each code consists of three letters in descending order. Because there may be ties, there may be four or more letters that can be used in

combination with each other, so it would be possible to have more than one three-letter code. More than one tie suggests that an individual may have a wide range of interest and the ties merely reflect this range.

Additional descriptions of attributes associated with RIASEC personality typologies can be gleaned from the research of Armstrong, Day, McVay and Rounds (2008). They examined the links between RIASEC types and measures of individual characteristics, environmental demands, and ability requirements. A summary of selected descriptors from their findings are presented in Table 1.

Table 1: Summary of Selected Individual Characteristics, Environmental Demands, and Ability Requirements Linked to RIASEC Typologies (Armstrong et al., 2008).

RIASEC	Individual Characteristics, Environmental Demands, or Abilities Required
R	Numerical, Occupational Reinforcers: Moral Values and Independence
R-I	Stamina, Spatial, Eye-Hand-Foot Form Perception, Motor Coordination
I	Flexibility of Closure, Visualization, Finger Dexterity
I-A	Academic Type(F), Openness, Originality, Dominance, Color Discrimination, Visualization, Intelligence
A	Academic Type(M), Occupational Reinforcers: Ability Utilization, Creativity, Originality, Achievement and Variety
A-S	Openness, Imagination, Sensitivity, Non-conformity, Fluency of Ideas, Achievement, Variety, Self-Direction
S	Interpersonal Confidence, Sociability, Occupational Reinforcers: Authority and Coworkers
S-E	Extroversion, Impulsivity, Independence, Academic Achievement
E	Academic Achievement, Occupational Reinforcer: People
E-C	Planfulness, Dogmatism (F), Warmth, Conscientiousness, Conformity, Shrewdness
C	Sensing, Clerical, Structured Work Environment, Occupational Reinforcer: Tech/HR supervision
C-R	Accountability, Job Security, Dogmatism (M), Data, Occupational Reinforcer: Company Policies

Note: (F) = Female; (M) = Male

Other factors to consider in interpreting the *PICS* include addressing the established relationships between RIASEC interest types and career-related self-efficacy (Armstrong & Vogel, 2009). Career self-efficacy has to do with an individual's beliefs in their own capabilities and capacity to make career choices and to succeed (Betz, 2004). An individual's "life record outcomes" and general cognitive abilities (Lubinski, 2010), their motivation and values (Brady, 2008), and their readiness, responsiveness, persistence, and flexibility (Brady, 2010) can be additional considerations in the interpretation process, vocational planning, and career decision-making.

Any career resource and planning material using the RIASEC system can be used with an individual's *Occupational PICS Code*. Helpful materials include *O*Net Online* (<https://onetonline.org>), *The Occupations Finder* (Holland, 2000), *Dictionary of Holland Occupational Codes* (Gottfredon & Holland, 1996),

and *Military Careers* (U.S. Department of Defense, 2001). Table 2 provides a convenient cross reference of 16 interest areas with the RIASEC Vocational Personality type.

Table 2: RIASEC Codes Compared to 16 Interest Areas

	GOE Interest Areas		RIASEC Vocational Personality Type
01	Agriculture and Natural Resources	RI	Realistic-Investigative
02	Architecture and Construction	R	Realistic
03	Arts and Communication	A	Artistic
04	Business and Administration	CE	Conventional-Enterprising
05	Education and Training	SI	Social-Investigative
06	Finance and Insurance	CE	Conventional-Enterprising
07	Government and Public Administration	CR	Conventional- Realistic
08	Health Science	SI	Social-Investigative
09	Hospitality, Tourism, and Recreation	ER	Enterprising-Realistic
10	Human Services	S	Social
11	Information Technology	I	Investigative
12	Law and Public Safety	E	Enterprising
13	Manufacturing	R	Realistic
14	Retail and Wholesale Sales and Services	E	Enterprising
15	Scientific Research, Engineering and Math	I	Investigative
16	Transportation, distribution and Logistics	R	Realistic

Development and Psychometric Characteristics

Research reported in *Picture Interest Career Survey, Administrator's Guide* (Brady, 2007) provided support for the content validity, construct validity, concurrent validity, and reliability of the *Picture Interest Career Survey (PICS)*. The results are summarized in Table 3 (see the next page).

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Table 3: Summary of Research Projects for the *Picture Interest Career Survey (PICS)*

Number of Studies	Type of Study	Participants	<i>n</i>	Research Findings
	<i>PICS Written Version</i>			
1	Construct Validity (June 2003)	Working Adults		<i>Mean C index = 12.03, SD = 3.9</i> <i>t = 3.91, p < .0001 *</i>
1	Test-retest Reliability (July 2003)	Working Adults	21	<i>rs = .87, p < .01</i>
	<i>PICS Picture Versions</i>			
1	Concurrent Validity (April 2005)	Vocational Rehab Adults	42	94% affirmative matches (hit rate) <i>Mean Jaccard Coefficient = .891, SD = .078</i> Tukey = 99.5% level of confidence
1	Concurrent Validity (May 2005)	Career Pathways High School Students	25	98% affirmative matches (hit rate) <i>Mean Jaccard Coefficient = .965, SD = .025</i> Tukey = 99.5 % level of confidence
1	Concurrent Validity (June 2005)	Voc/Trade School Residential Students	70	95% affirmative matches (hit rate) <i>Mean Jaccard Coefficient = .929, SD = .017</i> Tukey = 99.49% level of confidence
1	Construct Validity (March 2004)	Working Adults	12	<i>rs = .755, p < .05</i>
1	Construct Validity (September 2005)	Working Adults	11	<i>rs = .66, p < .05</i>
1	Test-retest Reliability (April 2004)	Working Adults	18	<i>rs = .82, p < .001</i>
1	Test-retest Reliability (April 2004)	Working Adults	8	<i>rs = .99, p < .001</i>
1	Test-retest Reliability (May 2004)	High School Seniors	13	<i>rs = .75, p < .05</i>
1	Congruence of Gender Form (February 2006)	Working Adults	30	<i>Mean C index = 16.3, SD = 1.96</i> <i>t = 10.09, p < .0001 *</i>
1	Alternate form Reliability (April 2006)	Working Adults	37	<i>rs = .90, p < .001</i>
Total = 12			Total N= 313	

*The mean C index for the sample in this study is significantly higher than the theoretical population mean ($M = 9, SD = 3.69$). See Brown & Gore (1994), An Evaluation of interest congruence indices: distribution characteristics and measurement properties, *Journal of Vocational Behavior*, 45, 310-327.

***PICS* Research 2007 to 2010**

After the publication and release of *PICS* in 2007, concurrent-criterion validity studies were conducted on a yearly basis through 2010. Concurrent-criterion validity is the ability of a test to produce results in keeping with those of some criterion within the same timeframe (Selitiz et al., 1976). Summaries of the four yearly *PICS* studies and a combined study are reported here.

Study 1

In a 2007 concurrent validity study, the *Occupational PICS Codes* of adults ($N = 60$) in vocational rehabilitation with a mean age of 38.4 years ($SD = 10.27$, range = 18 to 65) were compared to the three-letter RIASEC codes of their current or most recent occupation. Interest-Occupational congruence was measured using the *C* index (Brown & Gore, 1994). A mean *C* index of 14.70 ($SD = 2.24$; range 10 to 18; 95% CI = 14.12, 15.27) was obtained and found to be significantly higher ($t = 19.71$, $p < .0001$) than the theoretical population mean of 9. *C* index scores have a range of 0 to 18 with higher scores indicating higher congruence. These results supported the concurrent validity of the *PICS*.

Study 2

Interest-Occupational congruence was again investigated in a 2008 concurrent validity study with adults in vocational rehabilitation ($N = 73$) with a mean age of 38.6 years ($SD = 12.30$, range = 19 to 62). The congruence between *Occupational PICS Codes* and current or most recent occupation was measured with the *C* index. When the mean *C* index of 14.35 ($SD = 2.16$; range = 10 to 18; 95% CI = 13.84, 14.85) fell significantly higher ($t = 21.16$, $p < .0001$) than the theoretical population mean, statistically significant Interest-Occupational congruence was established. Concurrent validity for the *PICS* was supported by these findings.

Study 3

Adults ($N = 77$) in vocational rehabilitation with a mean age of 35.4 years ($SD = 11.84$, range = 18 to 61) made up a concurrent validity study in 2009. In this study, the congruence between *Occupational PICS Codes* and the three letter RIASEC codes assigned to a participant's current or most recent occupation was tested using the *C* index. Results provided a mean *C* index of 14.47 ($SD = 1.90$; range 10 to 18; 95% CI = 14.03, 14.89) that was significantly higher ($t = 25.25$, $p < .0001$) than the theoretical population mean and provided support for statistically significant congruence between current or most recent occupations and *Occupational PICS Codes*. Findings strongly support the concurrent validity of the *PICS*.

Study 4

In 2010 another concurrent validity study was completed with adults ($N= 34$) in vocational rehabilitation with a mean age of 38.2 years ($SD = 14.09$, range = 18 to 56). Interest-Occupational congruence was assessed between *Occupational PICS Codes* and coded current or most recent occupations. Congruence was measured with the *C* index. Results yielded a mean *C* index of 14.53 ($SD = 1.96$; range 12 to 18; 95% CI = 13.84, 15.21). This *C* index was significantly higher ($t = 16.47, p < .0001$) than the theoretical population mean. Statistically significant congruence to support concurrent validity was obtained in this study.

Study 5

The concurrent validity studies for 2007, 2008, 2009, and 2010 were combined at the end of 2010 into a four-year study involving 244 adults in vocational rehabilitation with a mean age of 37.5 years ($SD = 11.97$, range = 18 to 65). 36 percent were female and 64 percent male. Study participants were from urban, suburban, and rural settings. 77.8 percent were Caucasian, 16 percent African American, 5 percent Mexican American, 0.8 percent Native American, and 0.4 percent Asian American. When Interest-Occupational congruence was assessed for this larger sample, the mean *C* index of 14.50 ($SD= 2.07$, range 10 to 18, 95% CI = 14.24, 14.76) fell significantly higher ($t = 41.45, p < .0001$) than the theoretical population mean of 9. These results continued to confirm the strength of the *PICS* as a valid measure of career interest. See the data summary in Table 4.

Table 4: Summary of *PICS* Concurrent Validity Studies, 2007-2010, Interest-Occupational Congruence Using *C* index.

Study	<i>n</i>	Mean Age	Age Range	<i>C</i> index	<i>SD</i> of <i>C</i>	95% CI*	<i>t</i>	<i>p</i>
Voc Rehab Adults 2007	60	38.4	18 to 65	14.70	2.24	14.12,15.27	19.71	< .0001**
Voc Rehab Adults 2008	73	38.6	19 to 62	14.35	2.16	13.84,14.85	21.16	< .0001**
Voc Rehab Adults 2009	77	35.4	18 to 61	14.47	1.90	14.03,14.89	15.15	< .0001**
Voc Rehab Adults 2010	34	38.2	18 to 65	14.09	1.95	13.84,15.21	16.47	< .0001**
Combined Studies 2007–2010	244	37.5	18 to 65	14.53	2.06	14.24,14.76	41.45	< .0001**

* CI = Confidence Interval; ** Statistically Significant

PICS Validity Studies

Content Validity of the PICS

Content validity involves a logical analysis of content domain (Lemke & Wiersma, 1976). Content validity includes both item validity and sampling validity (Gay & Airasian, 2000). “Item validity is concerned with whether the test items are relevant to the measurement intended. Sampling validity is concerned with how well the test samples the total content area being tested” (Gay & Airasian, 2000).

The Picture Interest Career Survey, 2nd Edition and 3rd Edition continue with the same theoretical framework as the *PICS-1*; that is, the six RIASEC career typologies (Holland, 1959, 1992; Campbell & Borgen, 1999) and the *people data, things, ideas* interest categories and work tasks (Prediger, 1982).

Since the publication of the *PICS* in 2007, clinicians and test administrators have provided valuable feedback regarding the content of some items. As a result, five item illustrations were updated for *PICS-2* or have undergone minor changes or refinements in order to address these concerns. Three judges involved in either career assessment, counseling psychology, or career development were asked to evaluate these revised items. There was complete agreement (Fleiss’ kappa, $\kappa = 1$) among the judges surveyed that revised items were appropriate replacements for the five *PICS-1* items (Fleiss, 1971). Similarly, in 2019, three additional illustrations were revised for *PICS-3*.

As with the *PICS-1*, the thirty-six items of the *PICS-2* and *PICS-3* consist of three pictures each; the total number of pictures is 108 ($36 \times 3=108$). Work themes representing all six constructs in the RIASEC occupational coding system are used. Each of the three picture panels in an item consists of a primary letter code that varies and a secondary letter code that is a constant. In terms of primary letter codes, there are eighteen pictures with R (Realistic) themes, eighteen pictures with I (Investigative) themes, eighteen pictures with A (Artistic) themes, eighteen pictures with S (Social) themes, eighteen pictures with E (Enterprising) themes, and eighteen pictures with C (Conventional) themes ($6 \times 18 = 108$). The secondary letter codes also appear eighteen times for each of the RIASEC codes ($6 \times 18 = 108$). See Table 5. The *people, data, things, ideas* interest categories and work tasks are also represented. There are twenty-seven pictures that include *people* themes, twenty-seven pictures that include *data* themes, twenty-seven pictures that include *thing* themes, and twenty-seven pictures that include *idea* themes ($27 \times 4 = 108$). Content validity criteria for both item validity and sampling validity were met.

It is important to note here that the images used in the *Picture Interest Career Survey* are not necessarily intended to represent specific occupations. Rather they represent individuals in a general work environment engaged in a work activity representative of the assigned personality type. In other words, the pictures are representative of work environments and personality typologies that can be applied to many specific occupations within a general career area. *PICS* is designed to help users discover what kinds of work they want to *do* and in what setting.

Table 5. Primary and secondary RIASEC letter codes for the 3 pictures in each of the 36 items of the *PICS*. Item Codes Item Codes Item Codes Item Codes Item Codes Item

Item	Codes	Item	Codes	Item	Codes	Item	Codes	Item	Codes	Item	Codes
1	SR	7	AS	13	II	19	EE	25	AA	31	CC
	AR		CS		SI		AE		IA		EC
	IR		ES		AI		CE		SA		AC
2	CR	8	SS	14	EI	20	RE	26	RA	32	IC
	RR		IS		CI		SE		EA		RC
	ER		RS		RI		IE		CA		SC
3	AS	9	SR	15	CE	21	RI	27	IC	33	AA
	IS		AR		AE		SI		CC		RA
	CS		RR		IE		AI		AC		SA
4	RS	10	IR	16	SE	22	EI	28	EC	34	CA
	ES		CR		RE		II		SE		EA
	SS		ER		EE		CI		RC		IA
5	IR	11	SS	17	RI	23	CE	29	CA	35	AC
	CR		AS		II		SE		RA		CC
	RR		CS		CI		AE		IA		SC
6	ER	12	IS	18	AI	24	EE	30	SA	36	RC
	SR		RR		EI		IE		AA		EC
	AR		ES		SI		RE		EA		IC

Concurrent-Criterion Validity of the *PICS-2*

Study 1

A concurrent validity study using the *PICS-2* was undertaken in January 2011. Participants ($N = 35$) in this pilot study were adults with work experience and a mean age of 49.8 years ($SD = 15.70$, range 22-80). 63 percent were female and 37 percent were male. They represented occupational areas that included construction, manufacturing, business, health science, criminal justice, agriculture, design, human service, baking, computer science, graphic arts, and marketing. In this study the three letter code of the *PICS-2* and the three letter code of the occupation of each participant were used. It was hypothesized that a high level of congruence would be found between a participant's *PICS-2* code and the code of their occupation. The *C* index of congruence was used to compare the two sets of codes. *C* values range from 0-18, with a theoretical population mean of 9 ($SD = 3.69$). In this study the mean *C* index results, ($C = 15.69$, $SD = 2.05$, range = 12 to 18), suggest a very high level of congruence between a participant's *PICS* code and the code of their occupation. In addition a *t* test was used to test the significance of the difference between the mean *C* index of participants and the theoretical population mean. Results ($t = 19.31$; $p < .0001$; 95% CI = 14.98, 16.39), show that the *C* index of 15.69 was not only significantly different, but also in the direction that indicated a very high Interest-Occupational congruence between *PICS* codes and codes of occupations. These findings provide very strong support for the concurrent validity of the *PICS*.

Study 2

A concurrent validity study was conducted in February 2011 with participants ($N = 92$) from vocational-technical programs. The mean age of participants was 17.2 years ($SD = .755$, range 16-19). 65 percent were female, 35 percent were male. It was hypothesized that significant Interest-Occupational congruence would be found between involvement in vocational–technical programs and *PICS* codes. Three letter *Occupational PICS codes* from the *PICS* were compared to the three letter RIASEC codes associated with each student’s vocational-technical program; i.e., vocational environment, career pathway, and ultimate career goal. The *C* index was used to measure congruence (Brown & Gore, 1994). *C* index scores range from 0 to 18, with higher scores indicating higher congruence. A mean *C* index of 14.73 ($SD = 2.03$) was obtained in this study and was found to be significantly higher than the theoretical population mean of 9 ($t = 27.06$; $p < .0001$; 95% CI = 14.31,15.15). These results continue to confirm Interest- Occupational congruence and the concurrent validity of the *PICS*. See the summary in Table 6.

Table 6: Summary of *PICS-2* Concurrent Validity Studies, Interest-Occupational Congruence Using *C* Index

Participants	<i>n</i>	Mean Age	Age Range	<i>C</i> index	<i>SD</i> of <i>C</i>	95% CI*	<i>t</i>	<i>p</i>
Working Adults	35	49.8	22 to 80	15.69	2.04	14.94, 16.33	19.53	< .0001**
Voc-tech Students	92	17.2	16 to 19	14.73	2.03	14.31, 15.15	27.06	< .0001**

* CI = Confidence Interval; ** Statistically Significant

Reliability of *PICS-2*

Study 1

A *PICS-2* reliability study was initiated in January 2011 using the alternate-form method (Dunn, 1989). Alternate-form, or parallel-form reliability is determined by comparing the consistency of scores obtained on two alternate but equivalent forms of the same test, when the tests are administered to the same individuals within the same time frame—usually the same day (Hood & Johnson, 2007, p.31). This approach provides equivalence reliability or stability reliability (Lemke & Wiersma, 1976), and can determine how close the two test forms measure the same construct (Drummond & Jones, 2006, p.66). Participants in the study were adults with working experience ($N = 34$) with a mean age of 50.6 years ($SD = 15.21$, range = 22 to 80). They took both the *Picture Interest Career Survey (PICS-1)* and the *Picture Interest Career Survey, Second Edition (PICS-2)*. The rank order of all six RIASEC career typologies of the *PICS-2* were compared to the rank order of the six typologies of the *PICS-1* for each participant in the study. Spearman rho rank order correlations were used to compare the two sets of scores. Results yielded a median $r_s = .94$ (range = .86 to 1). The *t* test was used to determine a level of significance of r_s . The obtained *t* value ($t = 15.59$, $df = 32$) exceeded the critical value of *t* (3.365) and a statistically significance level of probability was found ($p < .001$). These results found a highly significant relationship between *PICS-1* and *PICS-2* codes and provided support for the reliability of the *PICS-2*.

Study 2

Another reliability study using the alternate-form method was initiated in February 2011. Study participants were students ($N= 92$) enrolled in career-oriented, vocational-technical programs at a regional technology center. Programs included construction, graphic arts, health care, marketing, hospitality-food service, and agri-science. The participants had a mean age of 17.2 years ($SD = .755$, range = 16 to 19). 35 percent were male and 65 percent were female. They were administered both the *PICS-1* and *PICS-2*. The rank order of all six of RIASEC letter codes obtained on the *PICS-1* were then compared to the ranks of the six RIASEC letter codes on the *PICS-2* using Spearman rank order correlations. A statistically significant relationship was found between *PICS-1* and *PICS-2* codes with a median r_s of .92 ($t = 22.27$, $df = 90$, $p < .001$). These results provide continued strong support for the reliability, stability, and equivalence of the *PICS-2*. See Table 7.

Table 7: Summary of *PICS-2* Reliability Studies

Participants	<i>n</i>	Mean Age	Age Range	Median r_s	<i>t</i>	<i>df</i>	<i>p</i>
Working Adults	34	50.6	22 to 80	.94	15.59	32	< .001
Voc-tech students	92	17.2	16 to 19	.92	22.27	90	< .001
	Total <i>n</i> = 126						

Universal Usage: Ethnic, Racial, Cultural, Gender, & Age Considerations

The RIASEC system of coding of interests and occupations is based on vocational personality typologies (Holland, 1992). McCrae and Costa (1997), in their study of the five-factor model (FFM) of personality traits with samples representing diverse cultures and the five families of languages, found structural similarities and concluded that personality structure is a human universal. Using multidimensional scaling (MDS) procedures, Day and Rounds (1998) found similar RIASEC structuring among racial and ethnic minorities and theoretically related the universality of their vocational interest findings to the personality structure findings of McCrae and Costa (1997). Concept mapping as a descriptive research strategy can provide spatial representations showing the interrelatedness of elements on multiple dimensions (Kruskal & Wish, 1978; Goodyear, Tracey, Claiborn, Lichenberg, & Wampold, 2005). The relationship of RIASEC letter codes has been traditionally represented on a hexagon, and a mostly predictable relationship between adjacent, alternate, and opposite letter codes has been reported (Holland, 1992). The adjacent letters on the hexagon—RI, IA, AS, SE, EC, and CR—are equidistant and most related; the alternate letters on the hexagon—RA, IS, AE, SC, EA, and CI—are equidistant with an intermediate relationship; and the opposite letters on the hexagon—RS, IE, and CA—are equidistant and are the least related (Round & Tracey, 1993). See Figure 1. The letter code relationships have consistently produce circular type patterns,

a circumplex hexagonal model, or a quasi circumplex model (Armstrong, Hubert, & Rounds, 2003; Armstrong, Smith, Donnay, & Rounds, 2004).

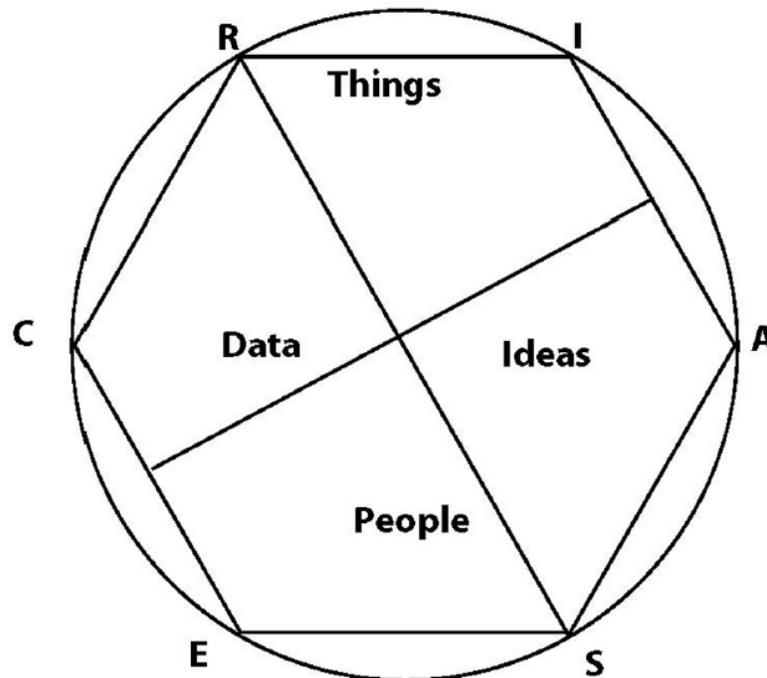


Figure 1. A Hexagonal Circumplex Model of the Holland (1992) vocational personality types—Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C)—and the *people, data, things, ideas* interest categories and work tasks defined by Prediger (1982).

In general, the circular-type pattern of relationships between and among the RIASEC letter code has been remarkably consistent in studies of Caucasian Americans, African Americans, Asian Americans (Day & Rounds, 1998; Armstrong et al., 2003), Hawaiian Americans (Oliver & Waehler, 2005), Native Americans, and Mexican Americans (Day & Rounds, 1998). In *PICS* studies, an affirmative match or hit rate of 95% was obtained for the native Caribbean youth, and there was a similar hit rate of 98% for the North American youth (Brady, 2007). In subsequent *PICS* studies from 2007 to 2010 reported here, *C* index scores for Interest-Occupational congruence fell consistently above the theoretical population mean for Caucasian American, African American, Mexican American, Native American, and Asian American participants. In short, the *PICS* can be confidently used with individuals regardless of their ethnic or cultural background.

In a meta analysis study of gender similarities, Hyde (2005) found personality attributes to be more similar than dissimilar. Anderson, Tracey, and Rounds (1997), in examining the RIASEC personality typology model, reported similar mean fit indices for males and females. Swan (2005) found essentially no gender difference in a study of male and female union carpenters: Predictably their highest letter code was R, Realistic. A gender study using the *PICS* was conducted in February 2006. Adults ($n = 30$, age range = 22–68 yrs), who were actively employed in occupations that included equipment operation, food service, manufacturing, construction, business, pharmacy, law enforcement, retailing, and human services participated in the study. Each participant was given a *PICS* that used items with opposite-gender workers.

When participant *Occupational PICS Codes* were compared to their RIASEC coded current careers, a mean *C* index of 16.3 was obtained (Brown & Gore, 1994). *C* index scores range from 0 to 18 with higher scores reflecting greater congruence. The mean $C = 16.3$ was significantly higher ($t = 10.09, p < .0001$) than the theoretical population mean of Brown and Gore (1994). Furthermore, in Interest-Occupational congruence studies conducted with the *PICS* from 2007 to 2010, the *C* index scores obtained by study participants ($N = 244, 36\%$ female, 64% male) consistently fell above the theoretical population mean. In addition, in a *PICS-2* Interest-Occupational congruence study conducted in 2011, every participant ($N = 92, 65\%$ female, 35% male) obtained a *C* index score that fell above the theoretical population mean.

In general, the universality of RIASEC vocational personality types was confirmed when studies using structural mapping procedures were found to produce mostly similar circular RIASEC relationship patterns for ethnic, racial, and culturally diverse samples, as well as for gender and age samples. Results from *PICS* studies found not only highly significant Interest-Occupational congruence, but also very high “hit rate” percentages when interests were matched with other career criteria for gender, age, and culturally diverse samples.

PICS Research Versions

Two pictorial research versions of the *PICS* were developed. Both forms used identical pictures except for the gender of the workers. Subsequent *PICS* studies (Brady, 2007) found significantly high congruence (hit rate range = 94% to 98%) between *Occupational PICS Codes* and current career criteria for all samples, regardless of ethnic, racial, cultural, or age differences. As Brady (2007) reported, when individuals were given *PICS* with opposite-gender workers, congruence continued to remain significantly high ($C = 16.3, p < .0001$). As a result of these findings, a single form of the *PICS* was then developed and worker gender balance was achieved using items from each of the research forms. A sample of working adults ($n = 37$) participated in a follow-up study of this unified single form of the *PICS*. Individuals were given both a same-gender form of the *PICS* and the unified single form of the *PICS*. When Spearman (r_s) rank order correlations were used to compare results from the two forms, a significantly high relationship was found (*median* $r_s = .90, p < .001$).

Summary

Since the inception of the *Picture Interest Career Survey*, over twenty-two studies ($N = 810$) have been conducted. Participants in the studies have ranged in age from 15 to 80 years. Results have consistently supported the content, concurrent, and construct validity of the *PICS*, as well as its reliability and consistency. Research studies using the second edition have provided strong support for the *PICS-2* as an equivalent form, as well as strong support for the content validity, concurrent validity, reliability, and stability of the *PICS-2*.

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