The Psychological Inventory of Criminal Thinking Styles (PICTS)

A Review and Meta-Analysis

Glenn D. Walters
Federal Correctional Institution

*The Psychological Inventory of Criminal Thinking Styles (PICTS) is an 80-item self-report measure designed to assess crime-supporting cognitive patterns. Data from men (*N = *450) and women (*N = *227) offenders indicate that the PICTS thinking, validity, and content scales possess moderate to moderately high internal consistency and test-retest stability. Meta-analyses of studies in which the PICTS has been administered reveal that besides correlating with measures of past criminality, several of the PICTS thinking and content scales are capable of predicting future adjustment/release outcome at a low but statistically significant level, and two scales (En, CUR) are sensitive to program-assisted change beyond what control subjects achieve spontaneously. The factor structure of the PICTS is then examined with the aid of exploratory and confirmatory factor analysis, the results of which denote the presence of two major and two minor factors.*

Keywords: criminal, assessment, PICTS, thinking styles

Self-report inventories may be underused in correctional and forensic settings because of the presumption that offenders are less than forthright in discussing their past criminal actions and current criminal thinking. However, if crime is based, at least in part, on belief systems, then self-report measures are indispensable in exploring these attitudes. The Psychological Inventory of Criminal Thinking Styles (PICTS) is an 80-item self-report questionnaire designed to measure eight thinking styles (mollification, cutoff, entitlement, power orientation, sentimentality, superoptimism, cognitive indolence, discontinuity) considered instrumental in protecting and maintaining a criminal lifestyle (Walters, 1990). There is consequently a need to assess whether the PICTS meets traditional standards of test reliability and validity, by pulling together relevant PICTS data.

The purpose of this article is to organize, synthesize, and survey the diverse literature on the PICTS. To this end, the results of several published studies are reviewed. However, because many investigations on the PICTS have not been published and sample sizes in a majority of studies are small, it is reasoned that a meta-analysis, in which both weighted and unweighted effect sizes are calculated, provides a more equitable and comprehensive evaluation of PICTS utility than a simple review of published studies. Also, two confirmatory factor analyses of the original PICTS exploratory factor analysis are conducted to determine whether the factor structure identified in an earlier exploratory factor analysis of the PICTS continues to apply to more recently derived samples.

DESCRIPTION AND DEVELOPMENT OF THE PICTS

The initial version of the PICTS (Version 1.0) was written in 1989 and covered 32 items, 4 items for each thinking style, rated on a 3-point Likert-type scale (*agree*, *uncertain*, *disagree*). A year later, the PICTS was revised (Version 2.0), with the addition of two validity scales (Confu-

The assertions and opinions contained herein are the private views of the author and should not be construed as official or as reflecting the views of the Federal Bureau of Prisons or the U.S. Department of Justice. Address all correspondence, including requests for copies of the PICTS, to Glenn D. Walters, Psychology Services, FCI-Schuylkill, P.O. Box 700, Minersville, PA 17954-0700.

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sion, Defensiveness) and division of the agree category into two separate categories, agree and strongly agree, to form a 4-point rating scale (*strongly agree*, *agree*, *uncertain*, *disagree*). In 1992, the PICTS was revised once again, yielding the PICTS: Version 3.0, in which the number of items for each scale was doubled from 4 to 8. Revised validity scales (Walters, 2001b), factor scales (Walters, 1995a), and content scales (Walters, 2002b) were later added. All PICTS research reported in this article was conducted using Version 3.0.

Every scored item from Version 3.0 was retained in Version 4.0 along with 8 new fear-of-change items (Walters, in press-b). The PICTS: Version 4.0, then, is an 80-item inventory composed of two validity scales (revised Confusion scale [Cf-r] and revised Defensiveness scale [Df-r]), eight thinking-style scales (Mollification scale [Mo], Cutoff scale [Co], Entitlement scale [En], Power Orientation scale [Po], Sentimentality scale [Sn], Superoptimism scale [So], Cognitive Indolence scale [Ci], and Discontinuity scale [Ds]), four factor scales (Problem Avoidance scale [PRB], Interpersonal Hostility scale [HOS], Self-Assertion/Deception scale [AST], and Denial of Harm scale [DNH]), two general content scales (Current Criminal Thinking scale [CUR] and Historical Criminal Thinking scale [HIS]), and one special scale (Fear of Change scale [FOC]).

PICTS VALIDITY SCALES

The PICTS validity scales are used to assess response styles and sets. The Confusion scale (Cf) is designed to identify a "fake bad," malingering, or "yea-saying" response set and consists of extreme items that are rarely endorsed by most people (e.g., "Strange odors, for which there is no explanation, come to me for no apparent reason"). Some respondents may elevate this scale as a result of comprehension difficulties caused by poor concentration, limited reading ability, or unfamiliarity with the English language. The other validity scale, Defensiveness (Df), is sensitive to "fake good" response sets in which respondents try to create overly favorable impressions of their psychological stability by denying ordinary human foibles and concerns (Walters, 1995b). These scales were each originally composed of four positively scored items (*strongly agree* = 4, *agree* = 3, *uncertain* = 2, *disagree* = 1) and four negatively scored items (*strongly agree* = 1, *agree* = 2, *uncertain* = 3, *disagree* = 4).

As a consequence of their poor showing vis-à-vis the thinking-style scales, the validity scales were revised. In the revision, the four negatively scored Cf items and four positively scored Df items were dropped and replaced by four positively scored items and four negatively scored items, respectively, from the thinking scale item pool (Walters, 2001b). This produced a Cf with eight positively scored items and a Df with eight negatively scored items. Subsequent analysis revealed that the revised validity scales showed improvement on the Cronbach alpha coefficient, mean interscale item correlations, and test-retest reliability relative to the original Cf and Df. In only one instance did a revised validity scale not outperform the original scale, that is, 10-week test-retest reliability on the Df in the male subsample (see Table 1).

The PICTS validity scales were assayed in a study contrasting three different instructional sets. One group of 15 randomly assigned inmates completed the PICTS after being read the standard instructions. A second group of 15 inmates was asked to simulate a positive record (fake good) by assuming that a judge would be reviewing the PICTS results prior to rendering a decision on early release. Finally, a third group of 15 inmates was given negative simulation instructions (fake bad) in which they were told that if the psychiatrist reviewing the PICTS believed they were mentally ill they would be transferred to a hospital where in all likelihood they would be released earlier than if they remained in prison. The negative simulation group earned significantly higher scores on the original Cf than the standard group, but there were no significant group differences on the Df (Walters, 1995b). In comparison to the standard test-taking group, the negative simulation group secured significantly higher scores on the Cf-r and the positive simulation group witnessed significantly higher scores on the Df-r (Walters, 2001b).

PICTS THINKING AND CONTENT SCALES

The PICTS was originally designed to appraise the eight thinking styles believed to support a criminal lifestyle (Walters, 1990). Although validity scales have been added and content and factor scales constructed, the thinking-style scales are still the focus of the PICTS.

Reliability

Table 2 furnishes data on the internal consistency and stability of the PICTS thinking-style and content scales. Internal consistency, as judged by Cronbach's alpha and the mean interitem correlation, is moderate. Peak levels of internal consistency ($\alpha \geq .75$; intraclass correlation coefficient $\geq .25$) were recorded on the Co, Ci, and Ds thinking-style scales and both content scales (CUR, HIS). Test-retest stability is even stronger with all values above a Pearson product-moment correlation of .70 after 2 weeks and only two correlations falling below .50 after 12 weeks. As an estimate of PICTS scale stability, the proportion of subjects whose test and retest scores were in the same clin-

TABLE 1
Internal Consistency and Stability of the Psychological Inventory of Criminal Thinking Styles (PICTS) Validity Scales: Original and Revised

	Men				*Women*			
	Cf	*Cf-r*	*Df*	*Df-r*	*Cf*	*Cf-r*	*Df*	*Df-r*
Cronbach's alpha coefficient (α)[a]	.31	.66	.31	.67	.54	.77	.40	.73
Mean interscale item correlations (*r*)[a]	.07	.20	.06	.20	.14	.28	.10	.26
Test-retest stability (*r*)								
2-week interval[b]					.79	.91	.34	.78
10-week interval[c]	.35	.64	.66	.47				
12-week interval[b]					.67	.87	.42	.67

NOTE: Cf = original Confusion scale; Cf-r = revised Confusion scale; Df = original Defensiveness scale; Df-r = revised Defensiveness scale.
a. Male validation sample (*N* = 386) from Walters (1995a) or female cross-validation sample (*N* = 227) from Walters, Elliott, and Miscoll (1998).
b. Subsample of 20 female federal inmates from Walters et al. (1998).
c. Subsample of 30 male medium-security federal inmates from Walters (in press-b).

TABLE 2
Internal Consistency and Stability of the Psychological Inventory of Criminal Thinking Styles (PICTS) Thinking and Content Scales

	Alpha		*IIC*		*2-Week TR*		*12-Week TR*		*12-Week ST*	
	M[a]	*F*[b]	*M*[a]	*F*[b]	*M*[c]	*F*[d]	*M*[c]	*F*[d]	*M*[e]	*F*[d]
Mollification (Mo)	.64	.65	.22	.20	.81	.73	.71	.48	.60	.58
Cutoff (Co)	.78	.77	.35	.29	.82	.76	.73	.47	.70	.48
Entitlement (En)	.59	.54	.17	.13	.80	.90	.57	.81	.53	.79
Power Orientation (Po)	.65	.76	.24	.28	.80	.90	.58	.86	.67	.47
Sentimentality (Sn)	.55	.54	.13	.14	.73	.82	.70	.71	.70	.74
Superoptimism (So)	.63	.61	.20	.18	.83	.89	.68	.85	.53	.58
Cognitive Indolence (Ci)	.76	.75	.29	.27	.79	.93	.68	.80	.53	.63
Discontinuity (Ds)	.79	.79	.32	.33	.85	.85	.71	.78	.47	.58
Current (CUR)	.88	.88	.39	.37	—	.87	.73[e]	.74	.73	.53
Historical (HIS)	.83	.82	.29	.27	—	.96	.77[e]	.87	.63	.74

NOTE: Alpha = Cronbach alpha coefficient (α); IIC = mean interitem correlations (*r*); 2-Week TR = 2-week test-retest correlations (*r*); 12-Week TR = 12-week test-retest correlations (*r*); 12-week ST = 12-week stability (%); M = male; F = female.
a. Male derivation sample (*N* = 450 male minimum-, medium-, and maximum-security federal prisoners; Walters, 1995a).
b. Female cross-validation sample (*N* = 227 female state and federal inmates; Walters, Elliott, and Miscoll, 1998).
c. Subsample of male derivation sample (*n* = 50 male medium-security federal prisoners; Walters, 1995a).
d. Subsample of female cross-validation sample (*n* = 20 female federal inmates; Walters et al., 1998).
e. Group of 30 male medium-security federal prison inmates tested 10 weeks apart (Walters, in press-b).

ically relevant range (*T* score < 50; *T* score of 50-60; *T* score > 60) is reported in the final two columns of Table 2. As the results indicate, half to three quarters of the scores remained in the same range between testings. The reliability of the PICTS thinking-style and content scales therefore seems adequate.

Validity

Concurrent validity. The concurrent validity of the PICTS thinking style and content scales has been scrutinized by correlating these scales with criminal history indicators and scores on more established criminality measures like Factor 2 of the Psychopathy Checklist–Revised (PCL-R: Hare, 1991) and the Lifestyle Criminality Screening Form (LCSF) (Walters, 1998; Walters, White, & Denney, 1991). Table 3 lists the three studies in which correlations have been calculated between the PICTS and criminal history/criminality indicators. A meta-analysis in which overlapping criteria from the same study were averaged (e.g., prior arrests, prior commitments, age at first arrest, age at first conviction in the Walters 1995a study) was also undertaken, whereby studies were combined using formulae supplied by Hedges and Olkin (1985) and sampling error was calculated with the Schmidt-Hunter method (Hunter, Schmidt, & Jackson, 1982). As depicted in Table 3, many of the PICTS thinking and content scales continue to explain a significant portion of variance in past criminality after age and race (White/non-White) are controlled in a two-stage multiple regression analysis.

TABLE 3
The Psychological Inventory of Criminal Thinking Styles (PICTS) as a Correlate of Past Criminality

	Subject Characteristics					*Correlations*[a]									
Study	*Location*	N	*Sex*	*Description*[b]	*Outcome*[c]	*Mo*	*Co*	*En*	*Po*	*Sn*	*So*	*Ci*	*Ds*	*CUR*	*HIS*
Walters (1995a)	United States	417	M	Federal inmates	Prior arrests	.13	.22*+	.17*+	.13	.07	.19*+	.18*+	.21*+	.17*+	.22*+
					Prior commitments	.13	.23*+	.17*+	.14	.10	.14+	.17*	.22*+	.18*+	.20*+
					Age at first arrest (–)	.21*+	.28*+	.28*+	.16*+	.17*+	.28*+	.24*+	.28*+	.23*+	.32*+
					Age at first commitment (–)	.22*+	.28*+	.30*+	.18*+	.19*+	.27*+	.26*+	.30*+	.22*+	.30*+
		150	M	Federal inmates	LCSF total score	–.00	.24*+	.11	–.04	.17+	.09	.18	.22	.20	.22
Walters, Elliott, and Miscoll (1998)	United States	161	F	State and federal inmates	LCSF total score	.07	.24*+	.10	.08	.02	.13	.21+	.28*+	.19	.15
Di Fazio (2000)	Canada	22	M	Federal inmates	PCL-R Factor 2 score	.42+	.48+	.46+	.54+	.10	.47+	.57*+	.42+	.53+	.53+
Meta-analysis effect sizes ($k = 4$)[d]															
Unweighted effect size (r)						.17	.32	.23	.20	.11	.23	.30	.29	.29	.30
Unweighted 95% confidence interval						.10-.24	.24-.37	.16-.30	.13-.26	.03-.18	.16-.30	.24-.37	.23-.36	.22-.35	.23-.36
Weighted effect size (r)						.12	.25	.19	.11	.11	.18	.22	.26	.21	.24
Weighted 95% confidence interval						.05-.19	.18-.32	.12-.25	.04-.18	.04-.18	.11-.25	.15-.28	.19-.32	.14-.28	.17-.30

NOTE: Mo = Mollification; Co = Cutoff; En = Entitlement; Po = Power Orientation; Sn = Sentimentality; So = Superoptimism; Ci = Cognitive Indolence; Ds = Discontinuity; CUR = Current; HIS = Historical; LCSF = Lifestyle Criminality Screening Form; PCL-R = Psychopathy Checklist–Revised.

a. Pearson product moment correlations between the continuous PICTS scales and continuous measures of past criminality.

b. Description of the sample.

c. Background measure that was postdicted. "(–)" indicates that the correlations were actually negative, but they are reported as positive to be consistent with other hypothesis-congruent correlations.

d. k = number of effect sizes compiled.

*$p < .05$ using Bonferroni correction. $p_T = .0012$ for Walters (1995a) correlations. $p_T = .005$ for all other correlations. +$p < .05$ using multiple regression analysis controlling for age and race (White, non-White).

The results of a meta-analysis of the PICTS–criminal history relationship are summarized in Table 3. As outlined in this table, all eight thinking style scales and both content scales achieved significant, albeit modest, associations with traditional benchmarks of past and present criminal activity (lower end of confidence interval > .00). Although correlations between the PICTS and PCL-R in the Di Fazio (2000) study were two to three times higher than correlations in the Walters (1995a) investigation, only one of the former compared to a majority of the latter were significant due to large discrepancies in sample size. By combining studies and outcomes, the meta-analytic procedure affords a more evenhanded evaluation of PICTS–criminal history correlates. Di Fazio also discerned that the PICTS scales, on average, correlate nearly twice as high with Factor 2 (Unstable Antisocial Lifestyle) of the PCL-R as with Factor 1 (Affective/Interpersonal Traits). Concurrent validity was further verified by a second-order factor analysis of the PICTS in which a general PICTS factor correlated significantly with neuroticism, sensation seeking, and disagreeableness (Egan, McMurran, Richardson, & Blair, 2000).

Predictive validity. The predictive validity of the PICTS thinking style and content scales has also been assessed (see Table 4). Criterion measures have included disciplinary adjustment while in prison (Walters, 1996; Walters & Elliott, 1999), recidivism following release from prison (Walters, 1997; Walters & Elliott, 1999), and dropping out of psychological programming (Walters, 2002c; Walters & Di Fazio, 2001). A meta-analysis of the average effect sizes (r_{pb}) attained using the PICTS thinking style and content scale as predictors of future outcome showed that all 10 scales realized significant mean effect sizes (lower end of confidence interval > .00; see bottom of Table 4), with the Co and CUR being most predictive and the So and HIS least predictive of criminal justice outcome. The incremental validity of the PICTS was verified in a series of logistic regression analyses in which age and race (White/non-White) were entered into the equation ahead of the PICTS scale (see Table 4).

One limitation of correlations is that they are susceptible to base rate effects. To minimize the base rate effect, a receiver operating characteristics (ROC) analysis was performed and an area under the curve (AUC) estimate calculated. The AUCs for the Mo (range = .513-.678, *Mdn* = .613), Co (range = .554-.683, *Mdn* = .630), Ci (range = .526-.692, *Mdn* = .611), Ds (range = .545-.706, *Mdn* = .650), and CUR (range = .572-.710, *Mdn* = .629) were on par with the PCL-R and LCSF (cf. Walters, 2002c). To test whether a combination of PICTS scales would improve on the accuracy of the single best PICTS predictor, a series of discriminant analyses were performed. Although there were no differences in the hit rates attained by the composite and the single highest correlating PICTS scale for disciplinary outcome in men (57.1% vs. 57.9%) and release outcome in women (69.2% vs. 69.5%), the composite PICTS measure was superior to the highest correlating scale in predicting female disciplinary reports (81.5% vs. 71.0%), male release outcome (66.7% vs. 57.1%), and attrition from programming (72.9% vs. 59.4% [Walters, 2002d]; 72.5% vs. 65.0% [Walters & Di Fazio, 2001]).

Construct validity. Psychologists in the United States, Canada, and Australia have used the PICTS to assess program outcome. The results, along with findings from several waiting-list control and nonparticipant samples, are detailed in Table 5. Effect sizes for each of the PICTS scales were calculated by converting the one-tailed significance level of the pre-post comparison obtained from a paired sample *t* test to a *Z* score and then converting the *Z* score to a correlation coefficient. The effect sizes were combined using procedures previously described, the results of which showed that all 10 PICTS scales registered significant reductions over the course of intervention (lower end of the weighted and unweighted confidence intervals > .00), whereas none of the scales recorded significant bilateral (weighted *and* unweighted) reductions in control subjects. Direct comparisons of male program and control samples disclosed that the En and CUR detected significantly larger reductions in male program participants than nonparticipants (nonoverlapping confidence intervals for both weighted and unweighted comparisons) and that the unweighted comparison was significant for the Mo and the weighted comparison was significant for the Co. It has also been noted that larger reductions on the CUR predict fewer subsequent disciplinary reports in correctional program participants (Jackson, 2001; Walters, Trgovac, Rychlec, Di Fazio, & Olson, 2002).

In a further test of construct validity, clinical staff members familiar with the daily behavior of 60 inmates enrolled in a drug program were asked to rate the accuracy of interpretative statements generated from the PICTS. By randomly assigning half of the interpretations to an inmate other than the one who had produced the PICTS profile and half of the interpretations to an inmate correctly matched with his own PICTS data, two groups of interpretations were formed: 30 genuine interpretations and 30 random (or bogus) interpretations. Accuracy was judged on a 5-point scale, with 45 of the protocols receiving independent ratings from two different clinicians. Inasmuch as there were no significant differences in the rated accuracy of genuine and bogus interpretations, the interrater reliability of the evaluations was poor (kappa = .07). Improved interrater reliability, however, widened the gap between the two sets of interpretations. When the sample

(text continues on p. 286)

TABLE 4
The Psychological Inventory of Criminal Thinking Styles (PICTS) as a Predictor of Institutional Adjustment, Recidivism, and Program Completion

	Subject Characteristics						*Correlations*[a]									
Study	*Location*	N	*Sex*	*Description*[b]	*Outcome*	*Average Follow-Up*	*Mo*	*Co*	*En*	*Po*	*Sn*	*So*	*Ci*	*Ds*	*CUR*	*HIS*
Walters (1996)	United States	536	M	Federal inmates	Disciplinary reports	23 months	.05	.11+	.12	.14*+	.11	.06	.08	.08	.10	.07
Walters (1997)	United States	63	M	Federal inmates	Recidivism	27 months	.10	.31+	.17	.15	.16	.02	.06	.26+	.21	.14
Walters and Elliott (1999)	United States	118	F	State inmates	Recidivism	60 months	.17	.16	.20	.13	.38*+	.10	.19+	.20+	.20+	.13
	United States	100	F	Federal inmates	Disciplinary reports	18 months	.25	.33*+	.37*+	.35*+	.22	.24	.28+	.32*+	.34*+	.22
Walters and Di Fazio (2001)	Canada	40	M	Federal inmates	Therapy dropout	15 weeks	.23	.22	.19	.14	–.11	.16	.13	.11	.20	.23
Walters (2002d)	United States	207	M	Federal inmates	Therapy dropout	10 weeks	.16	.13	.02	–.04	.11	.02	.18	.15	.16	.08
Meta-analysis effect sizes ($k = 6$)[c]																
Unweighted effect size (r)							.16	.21	.18	.15	.15	.10	.15	.19	.20	.14
Unweighted 95% confidence interval							.10-.22	.15-.27	.12-.24	.09-.21	.09-.21	.04-.16	.09-.21	.13-.24	.14-.26	.08-.20
Weighted effect size (r)							.11	.16	.14	.12	.15	.07	.13	.14	.16	.10
Weighted 95% confidence interval							.05-.17	.10-.22	.08-.20	.06-.18	.09-.20	.01-.14	.07-.19	.08-.20	.10-.22	.04-.16

NOTE: Mo = Mollification; Co = Cutoff; En = Entitlement; Po = Power Orientation; Sn = Sentimentality; So = Superoptimism; Ci = Cognitive Indolence; Ds = Discontinuity; CUR = Current; HIS = Historical.
a. Point-biserial correlations between continuous PICTS scales and dichotomized measures of outcome.
b. Description of the sample.
c. k = number of effect sizes compiled.
*$p < .05$ using Bonferroni correction. $p_r = .005$. +$p < .05$ using logistic regression analysis controlling for age and race (White, non-White).

TABLE 5
The Psychological Inventory of Criminal Thinking Styles (PICTS) as a Measure of Change: Therapeutically Mediated and Control Comparisons

	Subject Characteristics						*Correlations*[a]									
Study	*Location*	N	*Sex*	*Description*[b]	*Program*[c]	*Length*	*Mo*	*Co*	*En*	*Po*	*Sn*	*So*	*Ci*	*Ds*	*CUR*	*HIS*
Walters (1995a)	United States	50	M	Federal inmates	No intervention	12 weeks	.03	.01	.06	.16	.05	.01	.02	.06		
Olson (1999)	United States	18	M	State inmates	Changing Lifestyles	10 weeks	.29	.79*	.62	.47	.25	.27	.54	.59		
Bartholomew and Aurora (2001)	Australia	12	M	Probationers	Problem Solving	11 weeks	.38	.34	.76	.75	.05	.33	.33	.00		
		10	M	Probationers	Waiting-list control	11 weeks	.15	.38	.02	.55	–.06	.08	.48	.07		
		11	M	Maximum-security inmates	Problem Solving	15 weeks	.48	.04	.42	.08	.28	–.02	.44	.59		
		14	M	Maximum-security inmates	Waiting-list control	15 weeks	–.09	.38	.42	.54	.48	.52	.29	.48		
Di Fazio, Walters, and Rychlec (2001)	United States	85	M	Federal inmates	Lifestyle Issues	10 weeks	.26	.20	.27	.27	.14	.24	.31*	.28		
		49	M	Federal inmates	Waiting-list control	10 weeks	.10	.19	.13	.00	.11	–.03	.07	.17		
	United States	19	M	State probationers	AC/PST/CSG	4-16 weeks	.30	.47	.40	.21	.35	.29	.53	.59		
	Canada	18	M	Federal inmates	PVO/A&E	4-16 weeks	.36	.47	.50	.43	.40	.12	.28	.23		
Rinehart (2001)	United States	28	F	Probationers	IOO	36 weeks	–.16	–.03	–.25	–.08	–.39	–.33	–.28	–.03	.06	–.31
		52	M	Probationers	STIRRT	2 weeks	.32	.29	.20	.10	.04	.13	.11	.26	.29	.20
Walters and Trgovac (2001)	United States	25	M	Federal inmates	Lifestyle Issues	20 weeks	.11	.28	–.06	.22	.44	.25	.29	.02		
Walters, Trgovac, Rychlec, Di Fazio, and Olson (2002)	United States	85	M	Federal inmates	Lifestyle Issues	10 weeks									.26	.05
		49	M	Federal inmates	Waiting-list control	10 weeks									.15	.17
	United States	18	M	State inmates	Changing Lifestyles	10 weeks									.78*	.53
	United States	25	M	Federal inmates	Lifestyle Issues	20 weeks									.19	.19
	United States	19	M	State probationers	AC/PST/CSG	4-16 weeks									.51	.47
	Canada	18	M	Federal inmates	PVO/A&E	4-16 weeks									.42	.26
Walters (in press-a)	United States	148	M	Federal inmates	No intervention	26 weeks	.09	–.03	–.10	–.03	–.03	–.07	.05	.06	.06	–.08

Meta-analysis effect sizes: male program participants (k = 8)[d]										
Unweighted effect size (r)	.32	.39	.42	.34	.25	.20	.36	.34	.45	.29
Unweighted 95% confidence interval	.19-.43	.27-.50	.30-.52	.22-.45	.12-.37	.07-.33	.24-.47	.22-.45	.33-.56	.16-.41
Weighted effect size (r)	.29	.33	.32	.28	.20	.21	.31	.30	.29	.20
Weighted 95% confidence interval	.16-.40	.21-.44	.20-.44	.15-.40	.07-.32	.08-.33	.18-.42	.18-.42	.27-.50	.07-.33
Meta-analysis effect sizes: male control subjects (k = 5)[d]										
Unweighted effect size (r)	.06	.19	.12	.26	.12	.11	.19	.18	.10	.04
Unweighted 95% confidence interval	–.10-.18	.07-.31	.00-.24	.15-.37	–.00-.24	–.01-.23	.08-.30	.05-.29	–.04-.24	–.10-.18
Weighted effect size (r)	.07	.06	.04	.06	.04	–.01	.08	.10	.08	–.02
Weighted 95% confidence interval	–.04-.19	–.07-.18	–.08-.16	–.06-.19	–.08-.16	–.13-.11	–.04-.19	–.02-.22	–.06-.22	–.16-.12

NOTE: Mo = Mollification; Co = Cutoff; En = Entitlement; Po = Power Orientation; Sn = Sentimentality; So = Superoptimism; Ci = Cognitive Indolence; Ds = Discontinuity; CUR = Current; HIS = Historical.
a. Alpha significance level of a paired sample t test (pre vs. post) converted to Z and then to a correlation.
b. Description of the sample.
c. Program implemented. AC = anger control; PST = prosocial thinking; CSG = cognitive skills group; PVO = persistently violent offender; A&E = anger and emotions; IOO = intensive offender outpatient program; STIRRT = short-term intensive residential remediation treatment.
d. k = number of effect sizes compiled (note: for the CUR and HIS control subjects, k = 2).
*$p < .05$ using Bonferroni correction. $p_T = .005$.

was restricted to the 13 cases in which the two independently derived accuracy ratings were identical (i.e., both ratings were 1, 2, 3, 4, or 5), the eight genuine interpretations were judged to be significantly more accurate than the 5 bogus interpretations (Walters, 1994).

Moderator variables. The validity of the PICTS can be limited by the action of certain moderator variables. Four such variables may have a particularly powerful effect on the PICTS: age, gender, ethnic status, and confining offense. Age, as depicted in Table 6, consistently correlates inversely with the various PICTS thinking and content scales. The pattern represented by these findings is consistent with the traditional negative association obtained when criminologists correlate age with crime (Hirschi & Gottfredson, 1983). This would seem to suggest that scores on the PICTS scales decline with age. However, retesting the same group of individuals several years later with the PICTS using a longitudinal panel design is required before we can conclude that criminal thinking, as measured by the PICTS, dwindles with age or increased maturity. Equally important is determining whether the PICTS is effective for use with adolescents because none of the samples in which the PICTS has been examined has included individuals younger than the age of 18 years.

There are currently two samples of women for whom PICTS data are available: a group of 127 female state prisoners and a group of 100 female federal prisoners (Walters & Elliott, 1999; Walters, Elliott, & Miscoll, 1998). As depicted in Figure 1, the mean PICTS thinking style and content scale scores posted by these 227 women were significantly higher than the scores earned by the 450 men who composed the PICTS derivation sample (Walters et al., 1998). Two possibilities suggest themselves. First, because it is less socially acceptable for women to participate in crime, those women who commit criminal acts are more deviant than men who engage in the same behavior. A second possibility is that compared to men, women are more open and less defensive in responding to an instrument like the PICTS. It should be noted that these explanations are not mutually exclusive and that both may be operating to some extent. Regardless of how one chooses to explain gender differences on the PICTS, it would seem that the PICTS is no less effective for women than men in postdicting criminal history (see Table 3) and predicting future criminal outcomes (see Table 4), although it may be less sensitive to psychotherapeutically assisted change in women than men (see Table 5).

In the derivation (Walters, 1995a) and cross-validation (Walters et al., 1998) samples, African American subjects attained mean PICTS thinking style and content scale scores that were often 1 to 2 raw score points higher than the scores produced by White subjects. Hispanics, on the other hand, typically fell within ½ raw score point of the mean value registered by White respondents. Whereas the PICTS scale discrepancies between Whites and African Americans are often statistically significant and the variations between Whites and Hispanics nonsignificant, more recent investigations have found fewer significant differences between ethnic groups on the PICTS thinking style and content scales (Lacy, 2000; Olson, 1999). Studies examining the relative validity of the PICTS based on ethnic status have proven equally inconclusive. In the derivation sample, African American subjects displayed stronger correlations with past criminality than White and Hispanic inmates (Walters, 1995a), whereas in the cross-validation sample, correlations between the PICTS and past criminality (Walters et al., 1998), disciplinary adjustment, and release outcome (Walters & Elliott, 1999) were roughly equivalent between White and non-White respondents. The PICTS, however, was a more effective predictor of disciplinary outcome in African American men than White men (Walters, 1996) and a more effective predictor of release outcome in White men than African American men (Walters, 1997).

The offense for which an inmate is currently serving time may also have a bearing on how he or she completes the PICTS. Comparisons indicate that federal prisoners incarcerated for drug trafficking differ only slightly from federal inmates serving time for other types of offenses on the PICTS thinking style and content scales (Walters, 1995a; Walters et al., 1998). On the other hand, offenders with a drug misuse background, regardless of their instant offense, tend to record significantly higher scores on the PICTS thinking style scales than inmates with no reported substance abuse history (Lacy, 2000). Sex offenders have also been studied with the PICTS because there is a general belief among clinicians that the perpetrators of sexual crimes differ in fundamental ways from those who commit non–sex crimes. Whereas one study failed to identify any significant differences on the PICTS thinking style scales between sex offenders and violent non–sex offenders (Di Fazio, Abracen, & Walters, 2001), a comparison of child molesters and non–sex offenders proved more fruitful (Hatch-Maillette, Scalora, Huss, & Baumgartner, 2001). In the latter study, inmates convicted of child molestation recorded significantly lower PICTS thinking style scores relative to non–sex offenders, with particularly wide discrepancies on the Co and En.

FACTOR STRUCTURE OF THE PICTS

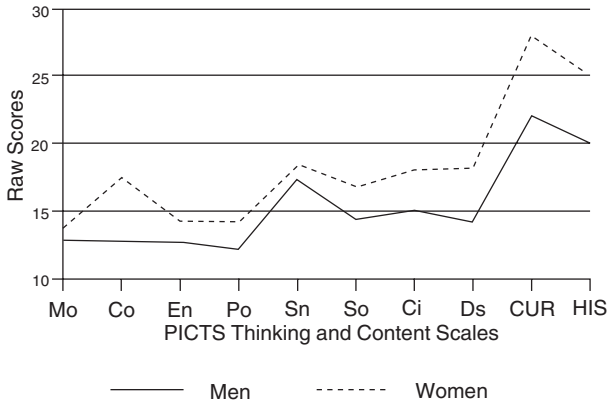
In an attempt to explore the underlying factor structure of the PICTS, Walters (1995a) subjected the 80 PICTS items to an image extraction with oblimin (oblique) rotation factor analysis. An exploratory factor analysis of the

TABLE 6
Correlations Between the Psychological Inventory of Criminal Thinking Styles (PICTS) Scales and Chronological Age

	Subject Characteristics				*Correlations*[a]									
Study	*Location*	N	*Sex*	*Description*[b]	*Mo*	*Co*	*En*	*Po*	*Sn*	*So*	*Ci*	*Ds*	*CUR*	*HIS*
Walters (1995a)	United States	150	M	Minimum-security federal inmates	–.23*	–.19	–.18	–.05	–.14	–.30*	–.16	–.20	–.14	–.22
		150	M	Medium-security federal inmates	–.21	–.16	–.24*	–.10	–.19	–.20	–.14	–.20	–.16	–.16
		150	M	Maximum-security federal inmates	–.05	–.07	–.27*	–.08	–.11	–.19	–.11	–.20	–.11	–.22
Walters, Elliott, and Miscoll (1998)	United States	127	F	State prison inmates	–.24	–.21	–.14	–.17	–.02	–.10	–.15	–.08	–.11	–.08
		100	F	Federal prison inmates	–.22	–.24	–.22	–.17	–.09	–.28*	–.29*	–.20	–.27	–.24
Lacy (2000)	United States	176	M	Low-security federal inmates	–.16	–.18	–.19	–.25*	–.06	–.08	–.36*	–.31*		
Walters, Trgovac, Rychlec, Di Fazio, and Olson (2002)	United States	139	M	Medium-security federal inmates	–.20	–.05	–.20	–.05	–.11	–.22	–.02	.00	–.01	–.15
	United States	25	M	Medium-security federal inmates	–.53	–.04	–.43	–.40	–.59*	–.45	–.40	–.46	–.41	–.46
	Canada	18	M	Federal prison inmates	.23	.35	–.02	.07	.11	–.23	–.01	.36	.26	–.08
	United States	19	M	Community probationers	–.18	.10	–.06	–.33	.01	–.16	–.08	–.04	.02	–.03
Walters (in press-a)	United States	148	M	Medium-security federal inmates	–.01	.04	.01	.10	–.13	–.09	–.03	–.05	.00	–.08
Meta-analysis effect sizes (k = 11)[c]														
Unweighted effect size (r)					–.17	–.06	–.16	–.13	–.13	–.21	–.16	–.13	–.10	–.17
Unweighted 95% confidence interval					–.22-–.11	–.12-–.00	–.21-–.10	–.19-–.08	–.18-–.07	–.26-–.16	–.22-–.11	–.18-–.07	–.16-–.03	–.23-–.11
Weighted effect size (r)					–.16	–.12	–.15	–.10	–.11	–.18	–.16	–.16	–.11	–.17
Weighted 95% confidence interval					–.22-–.11	–.17-–.06	–.20-–.10	–.16-–.01	–.17-–.06	–.24-–.13	–.22-–.11	–.21-–.10	–.17-–.04	–.23-–.11

NOTE: Mo = Mollification; Co = Cutoff; En = Entitlement; Po = Power Orientation; Sn = Sentimentality; So = Superoptimism; Ci = Cognitive Indolence; Ds = Discontinuity; CUR = Current; HIS = Historical.
a. Pearson product-moment correlations between the continuous PICTS scales and chronological age.
b. Description of the sample.
c. k = number of effect sizes compiled (note: for the CUR and HIS control subjects, k = 10).
*$p < .05$ using Bonferroni correction. $p_T = .005$.

FIGURE 1
Comparison of Mean Psychological Inventory of Criminal Thinking Styles Scores by Gender



PICTS using the 450 men from the PICTS derivation sample revealed the presence of a four-factor solution (Walters, 1995a). The first factor identified was chiefly composed of items from the Co, Ci, and Ds and was subsequently labeled Problem Avoidance. The second factor, by comparison, did not originate from any particular set of PICTS thinking style scales. All the same, high loading items betrayed anger and hostility, thus giving rise to the factor label Interpersonal Hostility. Items from the Mo, En, and So loaded heaviest on Factor 3 (Self-Assertion/Deception), with content reflecting the desire to impose one's will on the environment and avoid responsibility for the consequences of these actions. Finally, a factor composed of items professing denial of harm to others was identified in this exploratory factor analysis.

Two confirmatory factor analyses were recently performed to evaluate the stability and generalizability of the factor structure suggested by the original Walters (1995a) exploratory factor analysis. Items loading .40 or higher on a particular factor and at least .20 higher on that factor than on any other factor in the original exploratory factor analysis were selected to represent each of the four PICTS factors. This procedure yielded nine items for Factor 1 (Problem Avoidance), two items for Factor 2 (Interpersonal Hostility), four items for Factor 3 (Self-Assertion/Deception), and two items for Factor 4 (Denial of Harm). Confirmatory factor analysis was performed using the AMOS procedure (Version 3.6: Arbuckle, 1997). In a sample of 325 men administered the PICTS prior to enrolling in a 10-week psychoeducational group, the results showed a goodness-of-fit index (GFI) of .94 and root mean square residual (RMR) of .052. Next, a confirmatory factor analysis of the 227 women in the cross-validation sample produced a GFI of .92 and RMR of .058. Using the standard of a GFI of .90 or higher and a RMR of .05 and lower (Bentler & Bonett, 1980), these findings indicate the presence of a reasonably good fit between the results of the original exploratory factor analysis conducted by Walters and the factor structure observed in two subsequent and independent samples. The factor loadings and regression weights for the 17 contributing PICTS items can be found in Table 7.

Taking issue with the use of an oblique rotation, Egan et al. (2000) performed a principal components analysis with varimax (orthogonal) rotation of the PICTS scale intercorrelations. This analysis uncovered a single general factor that accounted for 58.8% of the total PICTS variance and a two-factor solution that explained 65.6% of the total PICTS variance. The first factor of the two-factor solution loaded positively on the Co, Ci, and Ds, whereas the second factor loaded principally on the Mo, En, and Po. The two factors identified by Egan et al. appear to parallel the first (Problem Avoidance) and third (Self-Assertion/Deception) factors extracted in the oblique factor analysis conducted by Walters (1995a). It should be noted that Egan et al. used interscale correlations rather than interitem correlations in their factor analysis, and so their efforts qualify as a second-order factor analysis rather than a primary-order factor analysis. Combining the results of these different factor analyses denotes the presence of a general criminal thinking factor that can be further divided into a Problem Avoidance factor, which overlaps extensively with the CUR content scale, and a Self-Assertion/Deception scale, which correlates robustly with the HIS content scale.

Two recent studies have used the PICTS factor scales to address topics of interest to criminologists. First, the conflicting results of studies on gender role and criminality were investigated by correlating the PICTS factor scales with scores on the Bem Sex Role Inventory (BSRI) (Bem, 1981). As predicted, the BSRI Masculinity scale correlated negatively with Problem Avoidance and positively with Self-Assertion/Deception in men, whereas the BSRI Femininity scale correlated positively with Denial of Harm but, contrary to predictions, did not correlate negatively with Interpersonal Hostility in women (Walters, 2001a). A second study probed prisonization by comparing the entrance PICTS scores of novice and experienced inmates with retest results obtained 6 months later. The outcome revealed that although experienced inmates displayed no significant changes on the PICTS, novice inmates logged significant increases on the Self-Assertion/Deception scale after 6 months (Walters, in press-a). The first study (Walters, 2001a) suggests that the contradictory results of research on gender role and crime may be largely the result of crime, or in this case criminal thinking, entering into mul-

TABLE 7
Psychological Inventory of Criminal Thinking Styles (PICTS) Factors Loading and Regression Weights for Three Samples of Offenders

		Exploratory FA	*Confirmatory FA 1*	*Confirmatory FA 2*
Factor	*Item*	*(N = 540 Men)*	*(N = 325 Men)*	*(N = 227 Women)*
1	26	.60	1.000	1.000
1	36	.64	0.923	0.995
1	39	.56	0.771	0.796
1	40	.62	0.695	0.740
1	43	.65	1.054	0.719
1	51	.65	0.864	0.832
1	62	.68	1.165	0.984
1	68	.61	1.077	1.106
1	79	.66	1.147	0.977
2	12	.42	1.000	1.000
2	42	.42	1.316	5.504
3	13	.59	1.000	1.000
3	38	.52	0.879	0.894
3	44	.63	1.073	1.231
3	76	.66	1.052	1.274
4	17	.47	1.000	1.000
4	77	.43	1.061	7.155

NOTE: FA = factor analysis.

tiple, and sometimes countervailing, associations with gender role identity, whereas the second study (Walters, in press-a) demonstrates that prisonization may have its foundation in nascent criminal thinking.

CONCLUSION

From the results presented in this article, it would appear that the internal consistency, test-rest reliability, and temporal stability of the PICTS scales are reasonably well established. Furthermore, changes made to the Cf-r and Df-r have created validity scales that perform on par with the eight standard thinking style scales. A great deal more variability and uncertainty appear to exist, however, with respect to the concurrent and predictive validity of the PICTS thinking style and content scales. The summed correlations between the PICTS thinking and content scales and measures of past and current criminality did not exceed .32, which means that none of the PICTS scales accounted for more than 10% of the variance in past and current criminality. A notable exception would be the correlations between several PICTS scales and Factor 2 of the PCL-R, which ran as high as .57, but only one correlation achieved Bonferroni-corrected significance because of the small number of participants included in the Di Fazio (2000) study ($N = 22$). In any event, although the relationship between the majority of PICTS scales and measures of past and current criminality is modest, all 20 correlations were found to be statistically significant when subjected to meta-analysis.

The predictability of the PICTS may be even weaker than its association with measures of past and current criminality. Only 7 of the 60 correlations between the PICTS scales and prospective measures of institutional adjustment, recidivism, and program completion were significant in individual studies using the Bonferroni correction for multiple correlations. The meta-analysis again demonstrated that a small but significant relationship exists between the PICTS scales and measures of future institutional adjustment, recidivism, and program completion. However, when ROC analysis was extended to the present sample of prediction studies, the median AUC values produced by 5 of the 10 PICTS scales (Mo, Co, Ci, Ds, CUR) were in a range (.611-.650) comparable to results obtained by such widely used and highly respected non-self-report risk measures as the PCL-R and HCR-20 (Kroner & Mills, 2001). Furthermore, a number of the PICTS scales achieved incremental validity beyond the contributions of such basic demographic measures as age and ethnic status. Hence, self-report may have a role in the prediction of criminal justice outcomes, supplemented, of course, by non-self-report actuarial measures.

Unlike the PCL-R and HCR-20, the PICTS can be used to assess change. Of the individual studies that have gauged the PICTS's sensitivity to change, only three produced Bonferroni-corrected significant results. On the other hand, a meta-analysis of the 10 PICTS thinking and content scales produced significant weighted and unweighted effect size confidence intervals. When program participants were contrasted with waiting-list control nonparticipants, the En and CUR displayed significantly greater reductions in participants than nonparticipants. The fact that all of the scales did not produce significantly better results in participants than waiting-list controls may reflect the inadequacy of these other scales as measures of change, the ineffectiveness of some of the programs in promoting change, or the possibility that waiting-list control subjects receive some of the benefits (attention, opportunity to explore criminal thinking through taking the test) once thought to be the exclusive province of program participation. The factor structure of the PICTS, another facet of construct validity, is supported by two confirmatory factor analyses, which suggest the presence of two major factors (Problem Avoidance and Self-Assertion/Deception) and two minor factors (Interpersonal Hostility and Denial of Harm).

There are many aspects of the PICTS and areas of potential application that demand attention. For one, the fac-

tor scales have lent themselves to several interesting applications (i.e., Walters, 2001a, in press-a) and may eventually become as important as the thinking style scales for clinical interpretation. For another, it is important to understand how the thinking styles assessed on the PICTS interact with other aspects of the belief systems that initiate and support a criminal lifestyle. In a 10-week follow-up of inmates participating in a psychoeducational group, it was determined that intake positive outcome expectancies for crime successfully predicted discharge scores on the CUR after controlling for contemporaneous correlations between the two measures. Although intake CUR scores also correlated positively with discharge positive outcome expectancies for crime, the relationship failed to attain statistical significance (Walters, 2002a). Investigations into the effectiveness of the PICTS with women, adolescents, and minorities are needed, as is research on how the PICTS performs as part of a larger test battery. Walters (1997) noted that the PICTS and LCSF achieved greater predictive efficacy than either measure was capable of realizing alone, and as witnessed in the present investigation, a composite of PICTS scales may outperform the single highest correlating scale in some instances.

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Glenn D. Walters, Ph.D., is a clinical psychologist and coordinator of the drug abuse program at the Federal Correctional Institution–Schuylkill in Minersville, Pennsylvania. His research interests include meta-analyses of the genetic correlates of crime, substance misuse, and problem gambling; creation and validation of psychological assessment measures for offender populations; and development of an overarching theory of psychology.