

A Hostility Scale for the California Psychological Inventory: MMPI, Observer Q-Sort, and Big-Five Correlates

Sally H. Adams

*Department of Epidemiology
University of California at Berkeley*

Oliver P. John

*Department of Psychology and Institute of
Personality and Social Research
University of California at Berkeley*

Using two samples, we developed and validated a hostility scale that can be scored from the California Psychological Inventory (CPI) and serves as an alternate for the Cook-Medley Hostility Scale (Ho; Cook & Medley, 1954). The CPI Hostility (H) scale consists of 33 items that are either duplicates or close equivalents of specific Ho items, and the two scales correlate at least .90 in samples differing in sex. The H and Ho scales show a similar pattern of correlations with conceptually relevant MMPI scales and with observer-rated personality attributes tapping Barefoot, Peterson, et al.'s (1991) five hostility categories of Hostile Affect, Cynicism, Aggressive Responding, Social Avoidance, and Hostile Attributions. These findings provide evidence for the equivalence of the two hostility scales, as well as external validation for those personality characteristics that are purported to underlie the construct of hostility as tapped by both the original Ho scale and the new CPI H scale.

Trait hostility has been implicated in both unhealthy behaviors (Schervitz et al., 1992; Siegler, Peterson, Barefoot, & Williams, 1992) and a range of negative health outcomes (e.g., Adams, 1994; Barefoot, Haney, Hershkowitz, & Williams, 1991; Cartwright, Wink, & Kmetz, 1995; Dembroski, MacDougall, Williams, Haney, &

Blumenthal, 1985). Additionally, four longitudinal studies found a relation between hostility and mortality (Barefoot, Dahlstrom, & Williams, 1983; Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989; Koskenvuo et al., 1988; Shekelle, Gale, Ostfeld, & Oglesby, 1983). Although not all studies have found relations between hostility and health outcomes (Hearn, Murray, & Luepker, 1989; Leon, Finn, Murray, & Bailey, 1988; McCranie, Watkins, Brandsma, & Sisson, 1986), the evidence for a relation is sufficiently suggestive to warrant continued investigation.

Hostility has been assessed by both self-report and interview-based measures. The Cook-Medley Hostility scale (Ho; Cook & Medley, 1954), developed from items on the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943), is the most frequently used self-report hostility measure. The existence of MMPI archival data sets has allowed health researchers to examine the longitudinal associations between hostility and subsequent health outcomes in follow-up studies. Another frequently used personality measure is the California Psychological Inventory (CPI; Gough, 1957, 1987). The CPI assesses characteristics that can be observed in normal day-to-day functioning, as compared to the MMPI, which assesses characteristics indicative of clinical syndromes and maladjustment. So far, no hostility scale has been available for the CPI, thus it could not be used to examine associations between hostility and health outcomes.

The primary aim of this article was to make use of the rich CPI item pool to develop a hostility scale that can substitute for the Ho scale. The availability of such a scale would allow researchers to assess the important construct of hostility (as defined by the Ho scale) using the CPI in normal samples. The CPI is one of the most frequently used personality assessment instruments, and special-purpose scales for the CPI are frequently constructed (e.g., Wink & Gough, 1990). A CPI-based hostility scale will be of advantage because the CPI focuses on normal personality, and has been and will be administered in normative studies in which the MMPI has not and would not be considered. Having available a reliable and valid hostility scale would provide the many past and future CPI users with the capacity to assess this important personality dimension, and thus adds to the utility and comprehensiveness of the CPI as a broad-band measure of normal personality. In short, our goal was not to develop a conceptually different hostility measure but to develop a scale using CPI items that would replicate the MMPI-based Ho scale as closely as possible.

Another issue of interest is that psychosocial correlates of the Ho scale have been demonstrated in numerous self-report studies (e.g., Smith & Frohm, 1985; Smith, Pope, Sanders, Ailred, & O'Keefe, 1988), but little is known about this scale in relation to observer data. Thus, our secondary aim was to examine observer-rated psychosocial characteristics, both for the original Ho scale and for our new CPI Hostility scale. These multimethod analyses serve to test the external validity of the two scales and thus provide further evidence for their psychometric equivalence.

COOK AND MEDLEY'S (1954) Ho SCALE

The Ho was developed from a set of MMPI items that were selected because they distinguished between teachers scoring in the top and bottom 8% on a questionnaire assessing teachers' rapport with pupils (Cook & Medley, 1954). The bottom 8% of teachers (i.e., the high-hostility group) reported thinking that students were dishonest, untrustworthy, insincere, and lazy, among others, indicating chronic anger and hate. In contrast, the top 8% (low hostility) reported having excellent rapport and regard for students. The resulting 50-item Ho scale was originally purported to tap a sense of cynical mistrust and paranoid alienation (Cook & Medley, 1954).

Barefoot (1992) suggested that the construct of hostility often includes affective, cognitive, and behavioral components, and that different hostility measures may tap these components differentially, thus accounting for sometimes modest associations between measures. The Ho scale includes items from six categories (five specific and one unclassified-other) of item content (Barefoot et al., 1989): (a) Hostile Affect, (b) Cynicism, (c) Aggressive Responding, (d) Social Avoidance, (e) Hostile Attribution, and (f) Other unclassified items. These categories were derived from a content analysis that categorized all 50 of the Ho items. For a more detailed review of the literature on the Ho scale, see Smith (1992).

The Ho scale generally has good psychometric characteristics. Published internal-consistency reliabilities range from .80 to .86 (Cook & Medley, 1954; see Smith, 1992). Test-retest stability tends to be quite high in samples of adults, with correlations of .85 over 1 year (Barefoot et al., 1983) and .84 over 4 years (Shekelle et al., 1983). In younger samples and over longer time intervals, however, retest stabilities tend to be considerably lower (see Smith, 1992).

PSYCHOSOCIAL CORRELATES OF THE Ho SCALE

Significant differences in the Ho scale have been reported for several demographic background variables, such as gender, age, and socioeconomic status (e.g., Barefoot, Peterson, et al., 1991; Scherwitz, Perkins, Chesney, & Hughes, 1991). In general, women score lower than men, older individuals lower than younger ones, and better educated individuals lower than those less well-educated. A number of studies have shown that the Ho scale correlates with various forms of negative affect, including self-reported resentment and suspicion (Smith & Frohm, 1985), anger (Spieberger, Jacobs, Russell, & Crane, 1983), as well as depression and anxiety (Smith & Frohm, 1985). Moreover, the Ho scale was associated with stressful life events and lower satisfaction with self-reported social support (see Smith, 1992).

How is the Ho scale related to the "Big-Five" personality dimensions (Costa & McCrae, 1992; John, 1990) that have received recent attention in the personality

literature? A number of studies using self-report measures of the Big Five have shown that the Ho scale is consistently associated with two of the five dimensions (e.g., Barefoot et al., 1989; Suarez & Williams, 1990): (a) negatively with Agreeableness (versus Antagonism), which refers to a sympathetic, cooperative, and trusting style, as contrasted with an interpersonal style consisting of callousness, uncooperativeness, criticality, and mistrust and (b) positively with Neuroticism, which is defined as the tendency to experience negative emotions, including anxiety, anger, and depression. In sum, the Ho scale has been related to numerous psychological characteristics as measured by self-report.

In terms of external validity, fewer data are available. The Ho scale has been shown to predict ratings of potential for hostility based on the Type A interview (Dembroski et al., 1985). Likewise, it is related to higher levels of overt hostile behavior during interactions of married couples (Smith, Sanders, & Alexander, 1990). A recent review of research on the Ho scale (Smith, 1992) suggested that, with the exception of hostility per se, the psychosocial characteristics of individuals scoring high on the Ho scale had not been studied with observer data.

THIS STUDY

In this study we describe the new CPI-based Hostility (H) scale and its psychometric characteristics and validity in two samples. Means, standard deviations, and coefficient alpha reliabilities are reported for a large sample of men and women, as well as for a longitudinal sample of college-educated women at two ages. Most important are analyses that demonstrate the degree of convergence of the new CPI H scale with the original Ho scale. To test whether both scales show similar relations to other constructs and measures, we report correlations with conceptually related MMPI scales (anxiety, social introversion, and depression). Moreover, we also examine relations with observer-based measures of the Big-Five personality dimensions. We expected that both the H and Ho scales would relate negatively to Agreeableness and positively to Neuroticism, as suggested by the self-report findings.

To examine observer-rated psychosocial characteristics of individuals scoring high on the hostility scales in more detail, we report on the correlations of both hostility scales with the comprehensive set of personality attributes included on the California Adult Q-set (CAQ; Block, 1961). In these analyses, we selected CAQ items relevant to hostility using Barefoot et al.'s (1989) content categories for the Ho scale: (a) Hostile Affect, (b) Cynicism, (c) Aggressive Responding, (d) Social Avoidance, (e) Hostile Attribution, and (f) Other unclassified. In this last category, we included CAQ items tapping general negative affects that have been linked with hostility (Smith & Frohm, 1985). Specifically, we report correlations between observer-rated CAQ items reflecting these aspects of hostility with both the CPI H

scale and the original Ho scale. As with the other validity analyses, our concerns are two-fold: First, to examine the similarity between the two scales, and second, to add to the evidence for the validity of the hostility construct captured by the H and Ho scales.

METHOD

Participants

IPAR assessment sample. Participants were 350 individuals (175 women and 175 men) who had taken part in assessments at the Institute of Personality Assessment and Research (IPAR; see Wink & Gough, 1990 for a more detailed description of the sample). This sample consisted of 198 college sophomores (half women and half men) who were on average 19 years old, and 152 adult San Francisco Bay Area residents (half women and half men) who were on average 36 years old. All participants completed a number of psychological inventories, including the MMPI and the CPI. Moreover, 280 of the participants participated in extensive personality assessments that took place at IPAR over 2 weekend days and included personal interviews, group procedures, laboratory tasks in perception, and informal interactions with IPAR assessment staff. The other 70 participants did not attend the full assessment weekend, but instead participated in two in-depth interviews with clinical psychologists and completed an extensive battery of personal history questionnaires and psychological inventories.

Mills longitudinal study. The second sample consisted of Mills College graduates participating in a longitudinal study (see Helson, 1967; Helson & Wink, 1992, for a complete description of the Mills sample). The Mills women were originally studied in 1958 and 1960, when they were college seniors at Mills College in Oakland, California, and were about 21 years old. Since then, they have been followed up three more times using extensive mailings of inventories, questionnaires, and free-response surveys. For this study, we used data from age 21 ($N = 135$) and age 27 ($N = 94$) because at these times the women had completed both the MMPI and the CPI.

Measures

MMPI and CPI Hostility scales. All participants in the IPAR sample completed the MMPI and the CPI within the same assessment, allowing us to test the convergence correlation between the MMPI-based Cook–Medley Ho scale and our new CPI H scale. Participants in the Mills sample completed both instruments at ages 21 and 27, providing us with a test of scale convergence at two different ages.

Additional scales used from the MMPI included the Depression and Social Introversion scales (Hathaway & McKinley, 1943) and the Taylor Manifest Anxiety scale (Taylor, 1953).

Development of the CPI H scale. We used the 480-item version of the CPI (Gough, 1957). Approximately 200 of these items were also used on the MMPI. Of the original 50 MMPI items that make up the Ho scale, 24 are also present on the CPI and could thus be used as the core of the CPI-based H scale. The item numbers of these 24 CPI items, in the 480-item form, are as follows: True-keyed = 11, 27, 32, 49, 57, 60, 124, 128, 136, 142, 173, 176, 188, 194, 206, 209, 219, 247, 266, 282, 294, 351, 375; False-keyed = 107. Nine additional items (10, 56, 117, 225, 349, 405, 426, 446, 457, all keyed True) were selected by content analysis; each of these items closely corresponded to an MMPI Ho scale item not identically reproduced on the CPI.¹ Thus, the final scale consisted of 33 items. The preponderance of true-keyed items is similar to the 50-item Ho scale, which contains only three false-keyed items. To give the reader examples of typical item content on the H-scale, we present the 6 CPI items with the highest item-total correlations. Four of these items are identical to items on the original Ho scale. Two items closely correspond to Ho scale items in meaning, but differ in language on the CPI-based H scale. The four identical items are: (176) I commonly wonder what hidden reason another person may have for doing something nice for me; (209) Most people are honest chiefly through fear of being caught; (266) I think most people would lie to get ahead; and (206) I have often found people jealous of my good ideas, just because they had not thought of them first. The two H scale items close in meaning to Ho items are: (225) People pretend to care more about one another than they really do and (457) A person is better off if he doesn't trust anyone.²

Observer-rated California Q-set. The personalities of the participants in the IPAR sample were assessed by trained observers using Block's California Adult Q-set (CAQ; Block, 1961). The CAQ consists of 100 psychological descriptors that the personality assessor sorts into 9 categories ranging from highly characteristic to highly uncharacteristic of the subject being described, with a fixed quasi-normal distribution. The 280 participants who participated in the full-weekend assessments were rated by five to seven assessors, and the 70 participants who participated in the two interviews were rated by the two assessors who interviewed them. The

¹We are grateful to the author of the California Psychological Inventory (CPI), Harrison Gough, for his consultation on which CPI items would provide adequate substitutes for particular MMPI items on the Cook-Medley Scale.

²Modified and reproduced by special permission of the Publisher, Consulting Psychologists Press, Inc., Palo Alto, CA 94303 from *California Psychological Inventory* by Harrison Gough. Copyright 1987 by Consulting Psychologists Press, Inc. All rights reserved. Further reproduction is prohibited without the Publisher's written consent.

assessors were PhD psychologists and advanced graduate students in clinical and personality psychology. The CAQ data for each participant were composited across assessors, yielding an average score for each of the 100 items ranging from 1 to 9. Level of interrater agreement for the 100 items is generally substantial (see Lanning, 1994).

The individual CAQ items provide an observer-based assessment of a wide range of psychosocial characteristics that may be associated with high scores on the two hostility scales. Using the six Barefoot et al.'s (1989) content categories, we consensually selected CAQ items for each category: Hostile Affect (e.g., CAQ item "Expresses hostile feelings directly"); Cynicism (e.g., "Is basically distrustful of people in general; questions their motivations"); Aggressive Responding (e.g., "Is subtly negativistic; tends to undermines and obstruct or sabotage"); Social Avoidance (e.g., "Keeps people at a distance, avoids close personal relationships"); Hostile Attribution (e.g., Extrapunitive; tends to transfer or project blame onto others"); and Other unclassified into which we placed negative and unstable affects (e.g., "Has fluctuating moods").

In addition, we used these CAQ data to score observer measures of the "Big-Five" personality dimensions, including Agreeableness (vs. Antagonism) and Neuroticism, the two dimensions most strongly associated with the Ho scale in previous research using self-reports (e.g., Barefoot et al., 1989; Suarez & Williams, 1990). In particular, we computed the Big-Five scales on the basis of McCrae, Costa, and Busch's (1986) factor analysis of the CAQ. Each Big-Five scale consisted of CAQ items loading .30 and above on each Big-Five factor. Neuroticism was scored using 30 items loading on the Neuroticism factor; Extraversion included 21 items; Openness included 14 items; Agreeableness (versus Antagonism) included 18 items; and Conscientiousness included 13 items (see also Donahue, Robins, Roberts, & John, 1993).

RESULTS

Psychometric Characteristics

Table 1 shows the means, standard deviations, and alpha reliabilities for both the CPI H scale and the Ho scale in both the IPAR and the Mills sample. Note that because the new CPI-based H scale is considerably shorter (33 items versus 50 items), it has smaller means and standard deviations than the original Ho scale. We first examined age differences. Within the Mills sample, the age 21 and age 27 assessments did not differ on either the new H scale or the Ho scale. Within the IPAR sample that included both students and adults, the mean scores for the two age groups were very similar for both the H and Ho scales. For undergraduate women and adult women, respectively, the H scale means were 12.8 and 12.9 and

TABLE 1
 Psychometric Characteristics of the California Psychological Inventory (CPI)
 Hostility (H) Scale and the Cook-Medley Hostility (Ho) Scale, and the
 Convergence Correlation Between the Two Scales

Subject	N	H Scale			Ho Scale			Convergence Correlation
		M	SD	Alpha	M	SD	Alpha	
IPAR assessment								
Women	175	12.9	4.8	.76	18.2	6.6	.79	.90
Men	175	13.6	5.2	.77	20.0	7.2	.83	.91
Mills college								
Initial testing (age 21)	135	9.3	4.2	.74	13.2	6.4	.81	.90
Follow-up (age 27)	94	9.1	4.3	.76	12.6	6.3	.80	.90

Note. IPAR = Institute of Personality Assessment and Research (now Institute of Personality and Social Research).

the Ho scale means were 18.2 and 18.4. Likewise for the men, the H scale means were 13.7 and 13.5 for undergraduate and adult samples, respectively, and the means of Ho scale for the two ages were identical. Thus, we combined the samples across age groups.

The IPAR sample showed the familiar sex difference, with men scoring somewhat higher than women as shown in Table 1; this difference was significant for the original Ho scale, $t(348) = 2.3$, $p < .05$ but less pronounced for the new CPI-based H scale, $t(348) = 1.5$, $p < .10$ (one-tailed tests). The alpha reliabilities of the CPI H scale were similar across samples, ranging from .74 to .77. As expected, the longer Ho scale had slightly higher alphas, ranging from .79 to .83. Similarly, as Adams (1994) noted, the Ho scale had slightly higher temporal stability ($r = .59$) over the 6-year span between the age 21 and age 27 assessments than the shorter H scale ($r = .47$).

Most important, the H and Ho scales showed substantial convergence. As shown in Table 1, all convergence correlations were at least .90, in the IPAR sample for both men and women and in the Mills sample for both ages of testing. Thus, the CPI H scale consistently maps onto the original Ho scale. To examine the types of items the H scale includes, we compared its item content to the item content of the full Ho scale, using Barefoot et al.'s (1989) specific five content categories (Hostile Affect; Cynicism; Aggressive Responding; Social Avoidance; Hostile Attribution) plus an Other nonspecific category. Because each item on the CPI H-scale is either identical or similar in content to a corresponding MMPI Ho item, we were able to place each CPI H item into one of the Barefoot et al. categories. An analysis of the item distribution across categories showed that the shorter H scale contains 11 of the 13 Cynicism items, 7 of the 12 Hostile Attribution items, 4 of the 5 Hostile

Affect items; 4 of the 9 Aggressive Responding items; 3 of the 4 Social Avoidance items, and 4 of the 7 Other items. These findings suggest that all of Barefoot et al.'s (1989) content categories of the original HO scale are represented on the H scale. Moreover, the Cynicism, Hostile Affect, and Social Avoidance categories are particularly well represented in the H scale, whereas the Hostile Attribution, Aggressive Responding, and Other categories have relatively fewer items.³

Correlations With Other Measures

Next we examined how the two hostility scales related to other measures. In all analyses using the IPAR sample, we initially analyzed the data separately by sex and by age to probe for sex and age differences in the patterns of associations. However, because the patterns of correlations were quite similar between women

³A series of factor analyses showed that the H scale, like the original Ho scale, lacks a stable factor structure. Thus, our findings are consistent with the literature on the Ho scale; for example, Contrada and Jussim (1992) compared nine factor models (several of which were based on exploratory analyses) and concluded that all nine showed "an equivalently poor degree of fit with the data" (p. 615).

TABLE 2
Correlations of the California Psychological Inventory (CPI) Hostility (H)
Scale and the Cook-Medley Hostility Scale (Ho) With Relevant Scales
From the Minnesota Multiphasic Personality Inventory (MMPI)

<i>Samples and Measures</i>	<i>H Scale</i>	<i>Ho Scale</i>
IPAR assessment sample ^a		
MMPI Social Introversion	.40**	.36**
MMPI Depression	.17**	.17**
MMPI Taylor Manifest Anxiety	.38**	.40**
Millis College sample		
Initial testing (age 21) ^b		
MMPI Social Introversion	.34**	.35**
MMPI Depression	.33**	.35**
MMPI Taylor Manifest Anxiety	.57**	.57**
Follow-up (age 27) ^c		
MMPI Social Introversion	.25*	.23*
MMPI Depression	.12	.06
MMPI Taylor Manifest Anxiety	.53**	.54**

Note. IPAR = Institute of Personality Assessment and Research (now Institute of Personality and Social Research).

^a*n* = 350. ^b*n* = 134. ^c*n* = 91.

p* < .05. *p* < .01.

TABLE 3
Correlations of Hostility Scales with California Adult Q-Set (CAQ) Items Relevant to
Barefoot et al.'s (1989) Hostility Content Categories in the iPAR Assessment Sample

<i>Observer Q-Sort Items</i>	<i>Self-Report</i>	
	<i>H Scale</i>	<i>Ho Scale</i>
A. Hostile Affect		
Has hostility toward others.	.16**	.19**
Expresses hostile feelings directly.	.22**	.23**
Over-reactive to minor frustrations; irritable.	.12*	.16**
B. Cynicism		
Is basically distrustful of people in general; questions their motivations.	.16**	.18**
Evaluates the motivation of others in interpreting situations.	-.07	-.10
C. Aggressive Responding		
Is subtly negativistic; tends to undermine and obstruct or sabotage	.15**	.16**
Behaves in a sympathetic or considerate manner. ^a	-.19**	-.22**
Behaves in a giving way toward others. ^a	-.13*	-.15**
Tends to arouse liking and acceptance in people. ^a	-.11*	-.13*
Is guileful and deceitful, manipulative and opportunistic.	.12*	.15**
Characteristically pushes and tries to stretch limits; sees what he can get away with.	.16**	.19**
D. Social Avoidance (vs. closeness)		
Keeps people at a distance; avoids close personal relationships.	.10	.11*
Has warmth, has the capacity for close relationships; compassionate. ^a	-.14**	-.16**
Emphasizes being with others; gregarious. ^a	-.15**	-.14*
Has social poise and presence; appears socially at ease. ^a	-.16**	-.16**
E. Hostile Attributions to Others		
Extrapunative, tends to transfer or project blame.	.18**	.19**
Is thin-skinned, sensitive to anything that can be construed as a criticism or interpersonal slight.	.13*	.14**
Feels cheated and victimized by life.	.10	.14**
F. Other Unclassified (negative affect)		
Feels a lack of personal meaning in life.	.11*	.17**
Is vulnerable to real or fancied threat; generally fearful.	.07	.09
Has fluctuating moods.	.13*	.14**
Is cheerful. (Low rating indicates depressed mood.) ^b	-.14**	-.17**

Note. $N = 350$. H = California Psychological Inventory Hostility scale; Ho = Cook-Medley Hostility scale; iPAR = Institute of Personality Assessment and Research (now Institute of Personality and Social Research).

^aItem measures low hostility. Some CAQ-set items are abbreviated; see Block (1961) for complete item text.

* $p < .05$. ** $p < .01$.

and men, and between the undergraduate and adult samples, the results are reported for the combined sample.⁴

Do the two hostility scales show similar relations to other MMPI scales previously linked to the Ho scale (depression, social introversion, and anxiety)? The relevant correlations are shown in Table 2 and generally replicate the previous findings for the Ho scale in both samples. The CPI H scale results closely mirror both the pattern and the magnitude of the correlations for the Ho scale. The majority of these correlations are of moderate size, suggesting that both hostility scales are meaningfully related to measures of negative affectivity. At the same time, the moderate size of these correlations suggests that the overlap between hostility and negative affect is limited.

Table 3 shows the individual CAQ observer correlates of the two hostility scales. With few exceptions, these CAQ items showed statistically significant correlations in the expected direction. For example, participants who scored high on the hostility scales were rated by observers as more likely to "express hostile feelings directly" and less likely to "behave in a sympathetic or considerate manner." Again, the pattern of correlations shown in Table 3 is very similar for the H and Ho scales. To assess the degree of similarity more formally across all 100 CAQ items, we computed a correlational index: the correlation between the complete set of 100 CAQ-item correlates for the H scale and the set of 100 CAQ-item correlates for the original Ho scale. This correlation was .98, demonstrating that the pattern of external validity correlates of the two scales was virtually the same.

Table 4 presents the correlations of both the H and Ho scales with the Big-Five dimensions. As expected, both Hostility scales showed a negative association with

⁴Tables of correlations between hostility scales and the MMPI scales, the CAQ items, and the Big Five, analyzed separately for women and men are available from Sally H. Adams.

TABLE 4
Correlates of Self-Report California Psychological Inventory Hostility (H) and
Cook-Medley Hostility (Ho) Scales to Observer-Based Big-Five Personality Dimensions

<i>Observer-Based Big Five</i>	<i>Self-Report</i>	
	<i>H Scale</i>	<i>Ho Scale</i>
Agreeableness ^a	-.19**	-.21**
Neuroticism	.14*	.18**
Extraversion	-.07	-.08
Openness	-.05	-.08
Conscientiousness	-.13*	-.20**

Note. $N = 350$.

^aThe opposite pole of Agreeableness is Antagonism.

* $p < .01$. ** $p < .001$.

Agreeableness (vs. Antagonism) and a positive association with Neuroticism. These correlations, though modest in absolute magnitude, were significant in the predicted direction, thus extending earlier findings based on self-report. Moreover, as expected, both hostility scales were unrelated to Extraversion and Openness, thus demonstrating discriminant validity. Finally and unexpectedly, we found that the two hostility scales were also related to Conscientiousness, with r s of $-.13$ and $-.20$ (both p s $< .01$) for the H and Ho scale, respectively.

DISCUSSION

This study presents two important findings pertaining to the measurement and assessment of hostility. First, hostility as construed on the Ho scale can be assessed using our new CPI H scale. The present findings demonstrate that the CPI H scale closely mirrors the Ho scale as shown by high convergent correlations in two separate samples. The means and standard deviations of the Ho scale in these samples are similar to those published by others (Barefoot et al., 1989; Scherwitz et al., 1991). Additionally, the H and Ho scales show consistent and parallel associations with relevant self-report scales from the MMPI, supporting previous findings that the Ho scale is related to negative affects, such as depression and anxiety (e.g., Smith & Frohm, 1985).

Second, both hostility scales were significantly associated with independent observer ratings of personality characteristics proposed to relate to the hostility construct (e.g., Barefoot et al., 1989). The present findings are among the first to provide independent validation of the psychological characteristics of high scorers on the Ho scale, utilizing independent personality assessments by observers. This hetero-method approach of relating self and observer perspectives on hostility helps to fill in a gap in our current knowledge regarding how high scorers on the H and Ho scales are seen by others, as opposed to more frequently reported correlates based on self-reports. These findings generally support Barefoot's (1992) suggestion that the hostility construct taps affective, cognitive, and behavioral components. In particular, psychologists who observed participants during a weekend assessment program rated hostile individuals as higher on CAQ items including hostile *affect*, *cognitions* related to cynicism and hostile attributions to others, and *behaviors* of social avoidance and aggressive responding.

Note that the individual associations between both hostility scales and the CAQ items were generally modest in size. These findings show that hostility should not be equated with any one of these psychosocial characteristics; rather, hostility represents a whole pattern of diverse attributes, as Barefoot et al. (1989) suggested. Moreover, these validity coefficients are based on relations across two rather different methods, thus limiting the size of the effects to be expected (e.g., Campbell & Fiske, 1959; Cheek, 1982). The advantage of the observer ratings used here is that they reflect participants' observable behavior during a structured assessment

period: at the same, they are necessarily limited by the relatively short duration of these observations and the potential constraints on participants' behavior imposed by the assessment setting. Despite these limitations, such observational methods are indispensable to control for the various biases inherent in the more typically used self-report methodology (John & Robins, 1994).

Moreover, both the H and Ho scales were significantly associated with observer-based CAQ scales for Agreeableness (vs. Antagonism) and Neuroticism (McCrae et al., 1986), thus extending the associations between hostility and these two Big-Five dimensions from self-reports to observer data. As in the self-report literature, neither of the hostility scales related to Extraversion or Openness, thus providing some evidence for the discriminant validity of the hostility construct. Finally, one unexpected finding was that both of the hostility scales were negatively related to Conscientiousness. In other words, on the basis of their behavior during the assessments, high-hostility individuals were rated as less dependable, reliable, and likely to control their impulses. Although not found in the self-report studies, this link between hostility and Conscientiousness fits other findings from the Big-Five literature using observer data. For example, adolescents low in Conscientiousness were rated as more likely to have externalizing problems that—similar to hostility—include aggression, impulsiveness, and a tendency to be irritable and moody (John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994). Future research should examine the possibility that this difference between self- and observer findings is due to biases in the self-reports of hostile individuals. Although they may not see themselves as less conscientious, their observable behavior may well suggest otherwise.

In general, the associations between hostility and both the self- and observer-reported characteristics suggest that the Ho and H scales tap a broad construct that reflects an overarching negative world view that has important implications for many aspects of daily experience. Hostile individuals hold negative views of others; they have hostile feelings about them; they are cynical about others and attribute negative motives to them; and they try to avoid others and else respond aggressively. These affective, cognitive, and behavioral tendencies are likely to color the daily experiences hostile individuals have with others, as shown in the IPAR assessment data. In turn, these negative experiences may further reinforce their already negative expectations of others. In light of these findings, it is not surprising that hostile individuals report lower levels of social support (see Smith, 1992).

One important reason for studying hostility is to understand how it affects health factors and outcomes. The CPI H scale can contribute to that purpose by allowing researchers to study the health-hostility link in present and future samples using the CPI as the normal-personality assessment instrument of choice. The CPI H scale has already demonstrated its usefulness in the longitudinal prediction of health outcomes in two ongoing longitudinal studies. In the Mills Longitudinal Study (Helson, 1967), the H scale was shown to predict ratings of general health across

a span of 25 years (Adams, 1994). In a longitudinal study of female physicians (Cartwright et al., 1995) the H scale, administered at age 24, predicted which women would develop serious health problems 22 years later. A third study of hostility and health outcomes, using the H scale, is now underway in the Radcliffe Longitudinal Study of Women (Stewart, 1978).

In addition to predicting negative health outcomes, hostility has likewise been associated with other important aspects of daily experience, including negative life events (Smith et al., 1988) and both marital and job satisfaction (Adams, 1994; Smith et al., 1988). Because these findings suggest that hostile individuals have interpersonal difficulties within several major social contexts, the evaluation of psychological functioning in these contexts should include the assessment of hostility. The presence of a hostility scale on the CPI allows for an expanded assessment of relevant personality characteristics in these contexts.

Continued examination of H scale psychometrics should include further study of gender, age, and ethnic differences, not only in mean level of hostility, but also in patterns of correlates of the H scale. In this study, we examined patterns of psychosocial correlates of the hostility scales separately across sex and age groups but found very similar results. However, the possibility that other samples may reveal age or sex differences should be explored. Further validation studies should examine both ratings by well-informed others (e.g., peers) and systematic behavioral observation. Additional issues to be addressed include the temporal stability of the scale and the related concern about changes in hostility across particular life periods. Smith (1992) and others suggested that hostility may become more stable with increasing age.

Hostility, as measured by the H and Ho scales, is tied to both interpersonal difficulties and personal unhappiness. Thus, it would be important to implement interventions to reduce hostility at an early age, such as during the early school and college years, with the aim to prevent the negative transactions between the person and the environment that lead to the crystallization of hostility into a highly stable trait later in adulthood. Again, the CPI H scale could contribute to this important endeavor.

ACKNOWLEDGMENTS

Sally H. Adams now at University of California at San Francisco.

Preparation of this report was supported by National Institutes of Mental Health Grants MH43948 and T32 MH19391, and National Heart Lung and Blood Institute Grant T32 HL07365-16. Oliver P. John was also supported by National Institute of Mental Health Grant MH49255.

We are indebted to Ravenna Helson for her tangible and intangible support of this research and for her generosity in giving us access to the data archives of the Mills Longitudinal Study. We are also grateful to the Institute of Personality and

Social Research (formerly the Institute of Personality Assessment and Research [IPSR]), University of California, Berkeley, and especially to Harrison Gough, for making available the IPAR assessment data set. Paul Wink and Brent Roberts deserve mention for their help with various data-analytic aspects of this project. We also wish to acknowledge the resources and support provided by the Institute of Personality and Social Research where this research was conducted. Nancy Adler, Ravenna Helson, and Gerald Mendelsohn provided thoughtful comments on earlier drafts of this article.

REFERENCES

- Adams, S. H. (1994). Role of hostility in women's health during midlife: A longitudinal study. *Health Psychology, 13*, 488-495.
- Barefoot, J. C. (1992). Developments in the measurement of hostility. In H. Friedman (Ed.), *Hostility, coping, and health* (pp. 13-31). Washington, DC: American Psychological Association.
- Barefoot, J. C., Dahlstrom, W. G., & Williams, R. B. (1983). Hostility, CHD incidence, and total mortality: A 25-year follow-up study of 255 physicians. *Psychosomatic Medicine, 45*, 59-63.
- Barefoot, J. C., Dodge, K. A., Peterson, B. L., Dahlstrom, W. G., & Williams, R. B. (1989). The Cook-Medley hostility scale: Item content and ability to predict survival. *Psychosomatic Medicine, 51*, 46-57.
- Barefoot, J. C., Haney, T. L., Hershkovitz, B. D., & Williams, R. B. (1991, March). *Hostility and coronary artery disease in women and men*. Paper presented at the annual meeting of the Society of Behavioral Medicine, Washington, DC.
- Barefoot, J. C., Peterson, B. L., Dahlstrom, W. G., Siegler, I. C., Anderson, N. B., & Williams, R. B. (1991). Hostility patterns and health implications: Correlates of the Cook-Medley hostility scale scores in a national survey. *Health Psychology, 10*, 18-24.
- Block, J. (1961). *The Q-sort method in personality assessment and psychiatric research*. Palo Alto, CA: Consulting Psychologists Press.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the monotrait-monomethod matrix. *Psychological Bulletin, 56*, 81-105.
- Cartwright, L. K., Wink, P., & Kmetz, C. (1995). What leads to good health in midlife women physicians? Some clues from a longitudinal study. *Psychosomatic Medicine, 57*, 284-292.
- Cheek, J. M. (1982). Aggregation, moderator variables, and the validity of personality tests: A peer-rating study. *Journal of Personality and Social Psychology, 47*, 1074-1090.
- Contrada, R. J., & Jussim, L. (1992). What does the Cook-Medley hostility scale measure? In search of an adequate measurement model. *Journal of Applied Social Psychology, 22*, 615-627.
- Cook, W. W., & Medley, D. M. (1954). Proposed hostility and pharisaic-virtue scales for the MMPI. *The Journal of Applied Psychology, 38*, 414-418.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Dembroski, T. M., MacDougall, J. M., Williams, R. B., Haney, T. L., & Blumenthal, J. A. (1985). Components of type A, hostility, and anger-in: Relationship to angiographic findings. *Psychosomatic Medicine, 47*, 219-233.
- Donahue, E. M., Robins, R. W., Roberts, B., & John, O. P. (1993). The divided self: Concurrent and longitudinal effects of psychological adjustment and social roles on self-concept differentiation. *Journal of Personality and Social Psychology, 64*, 834-846.

- Gough, H. G. (1957). *Manual for the California Psychological Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Gough, H. G. (1987). *The California Psychological Inventory administrator's guide*. Palo Alto, CA: Consulting Psychologists Press.
- Hathaway, S. R., & McKinley, J. C. (1943). *Minnesota Multiphasic Personality Inventory*. New York: Psychological Corporation.
- Hearn, M. D., Murray, D. M., & Luepker, R. V. (1989). Hostility, coronary heart disease, and total mortality: A 33-year follow-up study of university students. *Journal of Behavioral Medicine, 12*, 105-121.
- Heison, R. (1967). Personality characteristics and developmental history of creative college women. *Genetic Psychology Monographs, 76*, 205-256.
- Helson, R., & Wink, P. (1992). Personality change in women from the early 40s to early 50s. *Psychology and Aging, 7*, 46-55.
- John, O. P. (1990). The "Big Five" factor taxonomy: Dimensions of personality in the natural language and in questionnaires. In L. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 66-100). New York: Guilford.
- John, O. P., Caspi, A., Robins, R. W., Moffitt, T. E., & Stouthamer-Loeber, M. (1994). The "little five": Exploring the nomological network of the five-factor model of personality in adolescent boys. *Child Development, 65*, 160-178.
- John, O. P., & Robins, R. W. (1994). Accuracy and bias in self-perception: Individual differences in self-enhancement and the role of narcissism. *Journal of Personality, 66*, 206-219.
- Koskenvuo, M., Kaprio, J., Rose, R. J., Kesaniemi, A., Sarna, S., Heikkila, K., & Langinvainio, H. (1988). Hostility as a risk factor for mortality and ischemic heart disease in men. *Psychosomatic Medicine, 50*, 330-340.
- Lanning, K. (1994). Dimensionality of observer ratings on the California Adult Q-set. *Journal of Personality and Social Psychology, 67*, 151-160.
- Leon, G. R., Finn, S. E., Murray, D., & Bailey, J. M. (1988). The inability to predict cardiovascular disease from hostility scores of MMPI items related to Type A behavior. *Journal of Consulting and Clinical Psychology, 56*, 597-600.
- McCrae, R. R., Costa, P. T., & Busch, C. M. (1986). Evaluating comprehensiveness in personality systems: The California Q-set and the five-factor model. *Journal of Personality, 54*, 430-446.
- McCranie, E. W., Watkins, L. O., Brandsma, J. M., & Sisson, B. D. (1986). Hostility, coronary heart disease (CHD) incidence, and total mortality: Lack of association in a 25-year follow-up study of 478 physicians. *Journal of Behavioral Medicine, 9*, 119-125.
- Scherwitz, L., Perkins, L., Chesney, M., & Hughes, G. (1991). Cook-Medley Hostility Scale and subsets: Relationship to demographic and psychosocial characteristics in young adults in the CARDIA study. *Psychosomatic Medicine, 53*, 36-49.
- Scherwitz, L. W., Perkins, L. L., Chesney, M. A., Hughes, G. H., Sidney, S., & Manolio, T. A. (1992). Hostility and health behaviors in young adults: The CARDIA study. *American Journal of Epidemiology, 136*, 136-145.
- Shekelle, R. B., Gale, M., Ostfeld, A. M., & Paul, O. (1983). Hostility, risk of coronary heart disease, and mortality. *Psychosomatic Medicine, 45*, 109-114.
- Siegler, I. C., Peterson, B. L., Barefoot, J. C., & Williams, R. B. (1992). Hostility during late adolescence predicts coronary risk factors at mid-life. *American Journal of Epidemiology, 136*, 146-154.
- Smith, T. W. (1992). Hostility and health: Current status of a psychosomatic hypothesis. *Health Psychology, 11*, 139-150.
- Smith, T. W., & Frohm K. D. (1985). What's so unhealthy about hostility? Construct validity and psychosocial correlates of the Cook and Medley Ho Scale. *Health Psychology, 4*, 503-520.

- Smith, T. W., Pope, M. K., Sanders, J. D., Allred, K. D., & O'Keefe, J. O. (1988). Cynical hostility at home and work: Psychosocial vulnerability across domains. *Journal of Research in Personality, 22*, 525-548.
- Smith, T. W., Sanders, J. D., & Alexander, J. F. (1990). What does the Cook and Medley Hostility Scale measure? Affect, behavior, and attributions in the marital context. *Journal of Personality and Social Psychology, 58*, 699-708.
- Spielberger, C. D., Jacobs, G. A., Russell, S., & Crane, R. S. (1983). Assessment of anger: The State-Trait Anger Scale. In J. N. Butcher & C. D. Spielberger (Eds.), *Advances in personality assessment* (Vol. 2, pp. 52-76). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Stewart, A. J. (1978). A longitudinal study of coping styles in self-defining and socially defined women. *Journal of Consulting and Clinical Psychology, 46*, 1079-1084.
- Suarez, E. C., & Williams, R. B. (1990). The relationships between dimensions of hostility and cardiovascular reactivity as a function of task characteristics. *Psychosomatic Medicine, 52*, 558-570.
- Taylor, J. A. (1953). A personality scale of manifest anxiety. *Journal of Abnormal and Social Psychology, 48*, 285-290.
- Wink, P., & Gough, H. G. (1990). New narcissism scales for the California Psychological Inventory and MMPI. *Journal of Personality Assessment, 54*, 446-462.

Sally H. Adams
Department of Adolescent Medicine
1388 Sutter Street, Suite 605A
Box 1236
University of California at San Francisco
San Francisco, CA 94109

Received March 28, 1995
Revised May 31, 1996