

Measurement of Hostility, Anger, and Depression in Depressed and Nondepressed Subjects

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This study examined the relationship between hostility and depression in depressed and nondepressed subjects as well as the reliability and validity of several measures of anger, hostility and depression. Sixty-nine subjects were evaluated for depression using the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960). These subjects were then administered the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957), Hostility and Direction of Hostility Questionnaire (HDHQ; Foulds, Caine, & Creasy, 1960) and the State-Trait Anger Scale (STAS; Spielberger, Jacobs, Russell, & Crane, 1983). Results showed the BDI, STAS-TRAIT, HDHQ, and BDHI to have good temporal stability. Support was found for the convergent validity of all measures of depression, hostility, and anger. Limited discriminant validity was found between measures of anger and hostility and measures of depression. This latter finding was interpreted as lending support for the relationship between hostility and depression rather than as an indication of limited construct validity for the measures. Intercorrelations among hostility, anger, and depression scales offer some support for the hypothesis that depression is linked most strongly with attitudinal versus motoric forms of hostility. However, normative data suggests that both forms of hostility increase with severity of depression. Clinical implications and directions for further research are discussed.

Essential to the understanding of the relationship between hostility and depression is use of reliable and valid measures of these constructs. Although a large body of research has been conducted over the past two decades examining the reliability and validity of various anger, hostility, and depression instruments with various physiological and psychological disorders, knowledge of their psychometric properties remains incomplete. For example, several reliability and validity studies (Biaggio, 1980; Biaggio, Supplee, & Curtis, 1981; Biaggio & Maiuro, 1983) indicated moderate concurrent and predictive validity of the Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957). However, the authors concluded that although the BDHI provides a global measure of hostile feelings and a tendency to act out anger, the subscales do not possess high discriminant validity. In a more recent study, Nerella, Conn, and Schill (1987) examined the degree of content saturation among the items of each subscale. Their findings showed that only 14 items had significantly higher correlations with their designated scales than with the irrelevant scales, calling into question the factorial and discriminant validity of the instrument. With regard to other measures of hostility, Biaggio and Maiuro (1983) have called into question the reliability and validity of the State-Trait Anger Scale (STAS; Spielberger, Jacobs, Russell, & Crane, 1983) and the validity of the Hostility and Direction of Hostility Inventory (HDHQ; Foulds et al., 1960).

With regard to measures of depression, the discriminant validity of the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) has been called into question (Shaw, Vallis, & McCabe, 1985), as has the convergent validity of the BDI across severity of depression (Carroll, Fielding, & Blashki, 1973). Thus, the usefulness of this instrument in the examination of theoretical relationships between hostility and depression is tenuous at best. Previous studies using the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960) have reported this instrument to have good interrater reliability, discriminant validity, and concurrent validity (Carroll et al., 1973; Hamilton, 1960). However, support for the reliability and discriminant validity of the HRSD across severity of depression remains questionable (Carroll et al., 1973; Shaw et al., 1985). Of equal importance to reliability and validity issues is clarifying the relationship between hostility and depression. Although several empirical studies have tended to confirm the association between hostility and depression, the exact nature of this association has remained equivocal. For example, some investigators (e.g., Foulds et al., 1960; Gershon, Cromer, & Klerman, 1968; Kendell, 1970; Selby, 1986) have concluded that depression is linked to inward, but not outward, aggression. However, more recent studies (e.g., Hayworth et al., 1980) have disputed this finding.

One purpose of this study was to gather additional reliability and validity data on several commonly used measures of anger, hostility, and depression in order to gain a greater understanding of their usefulness in personality research and clinical assessment. If the measures were found to be psychometrically sound, the data would be used further to investigate the relationship between hostility and depression among nondepressed and clinically depressed subjects.

METHOD

Subjects

Thirty-eight men and 31 women ($N = 69$) from the Medical Center ($N = 34$) and Counseling/Learning Center ($N = 23$) at the University of Utah and the Counseling Center ($N = 12$) at the University of California, Santa Barbara, served as volunteer participants. The average age of these subjects was 35. Forty-five percent of the subjects were married. The average educational level was 15.2, and 88% of the subjects were either employed, in college, or both. Sixty-four percent of the subjects had been in previous counseling, and 13 subjects were currently on psychotropic medication (4 subjects from the severely depressed group, 6 subjects from the moderately depressed group, 2 subjects from the mildly depressed group, and 1 subject from the nondepressed group). Treatment status at the time of the study was not recorded. Participation in the study was voluntary.

Measures

HRSD. The HRSD is the most common measure of depression conducted via clinical interview (Carroll et al., 1973). Information elicited by the interviewer from the patient is quantified along 3-point to 5-point Likert-type scales for 21 variables related to depression. Factor analyses on these variables have consistently yielded a depression factor and an anxiety-retardation factor (Shaw et al., 1985). The HRSD has demonstrated good interrater reliability and concurrent validity, moderate convergent validity, and questionable discriminant validity (Shaw et al., 1985).

BDI. The BDI is the most common self-report measure of depression (Shaw et al., 1985). It consists of 21 items designed to assess the cognitive, affective, behavioral, and somatic aspects of depression. Each item contains a cluster of sentences describing depressive symptoms that increase in severity through the range of choices. Test-retest reliability on the BDI has been found to range from .69 to .90. Reports of concurrent validity have ranged from .62 to .77. Studies examining the convergent validity have reported it to be moderate to good (Shaw et al., 1985). However, the discriminant validity of the BDI remains questionable, particularly with respect to anxiety (Shaw et al., 1985).

BDHI. The BDHI is the most well known and widely used measure of hostility to date (Biaggio & Maiuro, 1983). It consists of 75 true/false items and provides an overall total hostility score as well as separate scores on seven subscales of hostility (assault, indirect hostility, irritability, negativism, resentment, suspicion, and verbal hostility), and one guilt subscale. The total score on the BDHI has consistently evidenced good reliability and concurrent validity. Some evidence for the discriminant validity of the BDHI total score has been reported by Selby (1984). In this study, the BDHI was found to significantly discriminate between violent

and nonviolent adult male felons. However, the reliability and validity of the subscales is yet to be determined.

HDHQ. The HDHQ (Foulds et al., 1960) consists of 48 items extracted from the MMPI and has been said to be the best known MMPI-derived measure of hostility (Spielberger et al., 1983). It is based on Foulds's (1965) theory of personality where hostility is defined as a function of intro-punitive and extrapunitive phenomena. Thus, the HDHQ consists of four subscales for hostility: Intro-punitiveness, Extrapunitiveness, Direction of Hostility (Intro-punitiveness minus Extrapunitiveness) and General Hostility (Intro-punitiveness plus Extrapunitiveness). The reliability of the HDHQ has varied widely. The generalizability of the HDHQ is difficult to assess, as most validity studies have been conducted in Great Britain (Biaggio & Maiuro, 1983).

STAS. The STAS (Spielberger et al., 1983) was developed to assess state anger and trait anger, a distinction that typically has been excluded in the measurement of anger and hostility (Biaggio & Maiuro, 1983). The STAS consists of 30 items, 15 that measure state anger (how angry one feels at the moment) and 15 that measure trait anger (how angry one feels in general). Factor analyses on the State Anger scale have yielded a unitary Anger factor, whereas factor analyses on the Trait Anger scale have yielded two factors: Angry Temperament and Angry Reaction. Since the completion of this study, this instrument has been further revised and renamed the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988).

Procedure

Sixty-nine subjects recruited from the Learning Center, Counseling Center, Depression Clinic, and Inpatient Psychiatry Unit from the University of Utah, as well as from Counseling and Career Services at the University of California, Santa Barbara, were administered the HRSD. Based on their score, subjects were assigned to one of the following groups: nondepressed, mildly depressed, moderately depressed, or severely depressed. Subjects in all groups also completed the BDI, BDHI, HDHQ, and STAS within two days following their interview for depression. Two advanced level graduate students in clinical and counseling psychology and one staff psychologist from the depression clinical conducted the clinical interviews. Twenty subjects (5 per group) were randomly selected to complete the aforementioned measures 7 to 10 days after the initial testing in order obtain reliability data. Four subjects from this group were either unavailable or unwilling to participate, reducing the retesting group to 16.

RESULTS

Thirty-eight men and 31 women participated in this study. Ten men and 8 women, 8 men and 8 women, 11 men and 7 women, and 9 men and 8 women were

respectively classified as nondepressed (ND), mildly depressed (MD), moderately depressed (MOD), and severely depressed (SD) based on their HRSD scores. In addition, retest data on 16 randomly selected subjects (six ND, four MD, four MOD and three SD) were obtained.

Reliability

Test-retest reliability coefficients for all measures are listed in Table 1. The test-retest correlation for the BDI was .78 ($p < .001$), and intrarater reliability (i.e., testing and retesting with the same examiner) for the HRSD was .89. Interrater reliability between the three raters noted previously was not obtained.

Test-retest correlations for the anger and hostility measures were .92 ($p < .001$) for the BDHI, .84 ($p < .001$) for HDHQ Intropunitiveness, .93 ($p < .001$) for HDHQ Extrapunitiveness, .66 ($p < .01$) for HDHQ Direction, and .93 ($p < .001$) for HDHQ General scales. Test-retest coefficients for the State and Trait Anger scales were -.02 (ns) and .80 ($p < .001$), respectively.

Validity

Correlations among the anger and hostility measures are presented in Table 2. The State and Trait Anger scales correlated significantly with each other and most of the other scales. The highest correlations were found between the STAS-Trait and BDHI Total (.83) and between the STAS-Trait and HDHQ General (.74).

Examination of the relationship between STAS-State and subscales of the HDHQ and BDHI revealed generally moderate and positive correlations with the exception of a small negative correlation with HDHQ Direction of Hostility (-.01, ns) and a small, nonsignificant positive correlation with BDHI Indirect Hostility scale (.18).

TABLE 1
Test-Retest Reliability Coefficients of Anger, Hostility, and
Depression Measures

<i>Measures</i>	<i>Correlation</i>
Anger/hostility measures	
STAS State	.02 (ns)
Trait	.80 **
HDHQ Intropunitiveness	.84 **
Extrapunitiveness	.93 **
Direction	.66 *
General	.93 **
BDHI Total	.92 **
Depression measures	
BDI	.78 **
HRSD	.89 **

Note. $n = 16$.

* $p < .01$. ** $p < .001$. ns = nonsignificant.

TABLE 2
Correlation Matrix of Anger and Hostility Scales

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. STAT State	—														
2. Trait	.60***	—													
3. HDHQ Intropunitiveness	.53***	.63***	—												
4. Extrapunitiveveness	.55***	.72***	.67***	—											
5. Direction	-.01(ns)	-.04(ns)	.46***	-.31**	—										
6. General	.60***	.74***	.87***	.94***	.00(ns)	—									
7. BDHI Assault	.44***	.59***	.33***	.42***	-.02(ns)	.42***	—								
8. Indirect	.18(ns)	.48***	.28*	.48***	-.18(ns)	.43***	.28*	—							
9. Irritability	.43***	.68***	.56***	.60***	.06(ns)	.63***	.38***	.44***	—						
10. Negativism	.45***	.60***	.49**	.59***	-.05(ns)	.60***	.40***	.42***	.50***	—					
11. Resentment	.55***	.66***	.69**	.71***	.05(ns)	.76***	.35**	.34*	.59***	.52***	—				
12. Suspicion	.53***	.60***	.75**	.75***	.05(ns)	.82***	.35**	.24*	.47***	.47***	.69***	—			
13. Verbal	.44***	.60***	.31**	.47***	-.14(ns)	.44***	.54***	.44***	.51***	.56***	.42***	.34***	—		
14. Guilt	.52***	.47***	.68***	.52***	.20(ns)	.63***	.20(ns)	.23(ns)	.47***	.38***	.54***	.62***	.31**	—	
15. Total	.62***	.83***	.72***	.80***	.00(ns)	.83***	.63***	.60***	.78***	.72***	.78***	.74***	.67***	.67***	—

Note. $n = 69$.

* $p < .05$. ** $p < .01$. *** $p < .001$. ns = nonsignificant.

Intercorrelations between subscales of the BDHI and subscales of the HDHQ showed the HDHQ Intropunitiveness subscale to be significantly and positively correlated with all BDHI subscales, with the highest correlation between the BDHI Suspicion subscale (.75) and the lowest with the BDHI Indirect Hostility subscale (.28). The HDHQ Extrapunitiveness subscale also correlated significantly and positively with all BDHI subscales, the highest being with the BDHI Suspicion subscale (.75) and the lowest with the BDHI Assault (.42) subscale. Finally, the HDHQ Direction of Hostility subscale showed no significant relationship with any of the BDHI subscales.

Examining the relationship among HDHQ scales, the highest correlations were found between HDHQ General and HDHQ subscales measuring Extrapunitiveness (.94) and Intropunitiveness (.87). Examination of the relationship between the BDHI Total score and BDHI subscales showed a strong, positive correlation with all subscales, the highest being Resentment and Irritability (.78), and the lowest Indirect hostility (.60). Finally, examination of intercorrelations among BDHI subscales showed low to high correlations, with the highest between Resentment and Suspicion (.69), and the lowest between Guilt and Assault (.20).

Correlations between anger, hostility, and depression measures are presented in Table 3. The correlation between the HRSD and BDI was .84. Significant, positive correlations were found between all measures of anger/hostility and depression with the exception of the BDHI Indirect Hostility subscale (.07). With regard to total scores, HDHQ General score had the highest correlations with depression measures (.62 with the HRSD and .65 with the BDI), followed by BDHI Total score

TABLE 3
Correlation Matrix of Anger/Hostility and Depression Measures

<i>Measures</i>	<i>HRSD</i>	<i>BDI</i>
STAS State	.46***	.54***
Trait	.41***	.44***
HDHQ Intropunitiveness	.71***	.71***
Extrapunitiveness	.47***	.51***
Direction	.36***	.28*
General	.62***	.65***
BDHI Assault	.34**	.35**
Indirect	.07	.16
Irritability	.45***	.45***
Negativism	.28*	.29*
Resentment	.45***	.55***
Suspicion	.59***	.61***
Verbal	.28*	.28*
Guilt	.54***	.58***
Total	.54***	.58***
HRSD		.84***

Note. $n = 69$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

(.54 with the HRSD and .58 with the BDI), STAS-State (.46 with the HRSD and .54 with the BDI), and STAS-Trait (.41 with the HRSD and .44 with the BDI).

Examination of correlations between depression measures and hostility subscales showed the HDHQ Intropunitiveness scale to have the strongest relationship (.71 with HRSD and BDI) followed by BDHI suspicion (.59 with the HRSD and .61 with the BDI) and BDHI Guilt (.54 with the HRSD and .58 with the BDI). The lowest correlations between hostility subscales and depression measures were found between the BDHI Indirect Hostility subscale (.07 with the HRSD and .16 with the BDI), the BDHI Verbal Hostility subscale (.28 with HRSD and BDI) and the BDHI Negativism subscale (.28 with the HRSD and .29 with the BDI).

Normative data on measures of anger and hostility across ND, MD, MOD, and SD groups are presented in Table 4. Overall, mean scores on each scale increased as the severity of depression increased. Statistical differences in anger and hostility across level of depression are discussed in Moreno, Fuhriman, Brown, and Allred (1987).

DISCUSSION

Reliability

Our findings are consistent with previous studies reporting moderate to high temporal stability of the BDI and HRSD. In this study, the reliability coefficient for the HRSD was an "intrarater" correlation, which indicates that one rater appears to be as consistent in administering the HRSD as are two. This is important as it is often financially and/or technically unfeasible to obtain conjoint interviews of patient/subjects (Shaw et al., 1985), which was the original method recommended by Hamilton (1960). The test-retest reliability coefficients for the State and Trait Anger scales suggest that these two instruments are unstable and stable measures of anger, respectively. The instability of the State Anger scale, however, is to be expected, given that it was designed to be sensitive to immediate fluctuations in anger arousal (Spielberger et al., 1983). The stability of the Trait Anger scale in this study is encouraging because it was designed to measure the frequency of state anger over time (Spielberger et al., 1983). To some extent, the discrepancy in reliability between state and trait anger found in this study is testimony to the discriminant validity of the two scales (i.e., measures of state and trait anger should correlate differently with themselves over time, otherwise they would both be measuring trait anger). Validity aside, however, these data offer preliminary support for the Trait Anger scale, given that reliability studies on this scale are few.

The BDHI Total scale and HDHQ General Hostility subscale demonstrated good temporal stability as did the subscales Intropunitiveness and Extrapunitiveness. The HDHQ Direction scale demonstrated only marginal test-retest reliability; however, this correlation was considerably higher than was reported by Biaggio and Maiuro (1983). Although these authors did not report the specific correlations

TABLE 4

Normative Data on Measures of Anger and Hostility Across Non-, Mildly, Moderately, and Severely Depressed Groups

Measures of Anger/Hostility	Severity of Depression											
	Non ^a		Mild ^b		Moderate ^c		Severe ^d		All Groups ^e			
	x	SD	x	SD	x	SD	x	SD	x	SD		
STAT State	17.17	3.90	23.38	8.61	24.50	10.70	28.89	13.34	23.41	10.43		
Trait	27.67	6.52	30.38	7.25	36.06	8.47	35.29	9.98	32.36	8.72		
HDHQ Intropunitiveness	3.94	2.21	6.75	3.15	8.67	2.50	10.24	2.77	7.38	3.53		
Extrapunitiveness	5.94	3.04	8.81	4.69	11.11	5.09	11.18	5.94	9.25	5.17		
Direction	10.50	4.30	12.38	3.70	12.78	4.14	15.53	4.75	12.77	4.53		
General	9.94	4.24	15.56	7.38	19.78	7.00	21.59	8.11	16.68	8.07		
BDHI ^f Assault	2.61	1.75	2.44	1.82	4.06	2.78	4.29	2.66	3.63	2.40		
Indirect	5.72	2.24	4.12	2.31	5.39	2.25	5.88	2.09	5.30	2.28		
Irritability	5.22	1.83	6.38	2.45	7.44	2.94	7.82	1.88	6.71	2.49		
Resentment	2.00	1.72	3.06	2.08	4.11	2.05	4.06	2.30	3.30	2.18		
Suspicion	1.44	1.20	2.94	1.91	4.67	2.52	4.59	2.35	3.41	2.42		
Verbal	5.44	2.41	6.69	2.21	6.78	2.62	7.35	3.18	6.55	2.67		
Total	27.17	8.69	32.25	10.47	41.00	12.91	42.29	12.91	35.68	12.80		

Note. ^aN = 69.^an = 18. ^bn = 16. ^cn = 18. ^dn = 17. ^eN = 69. ^fNegativism and Guilt Scales not included.

for the Intropunitiveness and Extrapunitiveness scales, they did note that the test-retest coefficients for the five subscales (Acting Out Hostility, Criticism of Others, Self-Criticism, Projected Delusional Hostility, Delusional Guilt) that comprise these two scales ranged from .23 to .70. Thus, it is possible that our test-retest data for the Intropunitiveness and Extrapunitiveness scales are considerably higher than was found in the earlier study.

However, it is also possible that higher correlations found in this study may be attributed to differences in retest intervals. In this study, the test-retest interval was 7 to 10 days, whereas in HDHQ studies reviewed by Biaggio and Maiuro (1983) it was one year. Finally, our findings of higher retest correlations among measures of anger and hostility may be attributed to the fact that anger and hostility are related to depression (Moreno et al., 1987; Selby, 1986). As most subjects in this study were exhibiting some level of depression, it would be expected that this clinical population would display more consistency on these traits than a nonclinical sample. This suggests that measures of anger and hostility may be more reliable among clinical populations.

Validity

The correlation between the HRSD and BDI offers support for the convergent validity of the two measures. This finding is of particular relevance in that earlier studies (e.g., Carroll et al., 1973) have questioned the ability of the BDI to measure higher levels of depression. However, half of the subjects in this study scored in the moderate to severe range of depression on the HRSD. Given the strong correlation between the two measures, it would appear that the BDI is indeed capable of assessing more severe levels of depression. This finding also suggests that the BDI can be used in place of the HRSD, which involves significantly more administration time.

These findings also provide additional convergent validity for the three measures of anger and hostility. The relatively high correlations among STAS-Trait, HDHQ General Hostility, and BDHI Total are consistent with previous studies (e.g., Biaggio & Maiuro, 1983; Spielberger et al., 1983) that have found significant correlations between these and other measures of hostility and anger. As previous validation studies on the HDHQ have been performed primarily with clinical populations in Great Britain, our findings also provide *external validity* for this measure. This suggests that the HDHQ is similar to hostility and anger instruments developed in the United States. In general, measures of anger and hostility were limited in their ability to discriminate between anger/hostility and depression. Our results are consistent with previous discriminant validity findings for these measures (Biaggio et al., 1981; Spielberger et al., 1983). However, these findings may be interpreted as supporting previous research (e.g., Moreno et al., 1987; Selby, 1986; Kendell, 1970) that indicates that depression is linked to hostility/anger and most strongly with the attitudinal (e.g., resentment, suspicion, guilt, intropunitiveness) as opposed to the motoric (e.g., assault, verbal hostility) forms. In this study, the mean correlation for the attitudinal forms of hostility/anger was .57, whereas

the mean correlation for the motoric forms was .31. Finally, the fact that both STAS-State and the STAS-Trait correlate about equally with the two measures of depression is evidence for the physiological/emotional consistency of the anger experience regardless of whether it is dispositionally or situationally derived.

Normative Data

Subject scores on all measures increased with severity of depression. Moreno and colleagues (1987) found that many of these differences on measures of anger and depression across depressed groups were statistically significant. Thus, although anger has historically been considered to represent an improvement in depression (Weissman, Fox, & Klerman, 1973), hostility may mask underlying depression (Spiegel, 1967). Further, hostility in depressed persons may also be prognostic of suicidality. For example, Weissman and colleagues (1973) found hostility to differentiate between depressed suicide attempters and depressed non-suicide-attempters. This suggests that clinicians and researchers should pay attention to anger and hostility when assessing for depression and suicidality in their patients. In summary, this study offers support for the reliability and validity of several measures of depression, anger, and hostility in depressed and nondepressed subjects. In addition, normative data suggests that anger and hostility in patients may be a significant diagnostic sign of suicide potential as well as depression. Finally, the limited discriminant validity between depression and anger measures is interpreted as supporting previous research indicating the relationship between depression and hostility/anger.

Although findings are somewhat limited in that possible ethnic and gender differences on measures used in the study were not examined, correlational patterns between men and women have been addressed in subsequent research (Moreno, Fuhrman, & Selby, in preparation). In addition, it would be useful in future research studies to collect data on interrater reliability of the HRSD in order to examine consistency across raters, as intrarater reliability does not insure that all raters are scoring responses in the same fashion. Finally, it would be important for future studies to examine the relationship between treatment status and measures of hostility, anger, and depression. For example, subjects in this study were recruited from a wide range of treatment sites (e.g., Learning Center vs. Depression Clinic) and presumably evidenced varying degrees of depression. Thus, not only the degree of depression but the type of treatment intervention (e.g., from none to medication) may have a significant effect on the relationship between hostility, anger, and depression.

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