Beck Depression Inventory Minimum Important Difference

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Beck Depression Inventory

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 561- 571.

Beck, A.T., Rush, A.J., Shaw, B.F., & Emery, G. (1979). *Cognitive therapy for depression.* New York: Guilford Press.

Beck, A.T. & Steer, R.A. (1993). *Beck Depression Inventory*. San Antonio, TX: Psychological Corporation.

Beck Depression Inventory: Psychometric reviews

- Beck, A.T., Steer R.A., & Garbin, M.G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review*, *8*, 77-100.
- Moran, P.W. & Lambert, M.J. (1983). A review of current assessment tools for monitoring changes in depression. In M.D. Lamber, E.R. Christiensen and S.S. Dejolie (Eds.), *The assessment of psychotherapy and outcomes*. New York: Wiley.
- Yonkers, K.A. & Samson, J. (2000). Mood disorders measures. In American Psychiatric Association, *Handbook of Psychiatric Measures*. Washington, DC: American Psychiatric Association.

BDI:
Symptoms and attitudes

- Mood
- Pessimism
- Sense of failure
- Lack of satisfaction
- Guilt feelings
- Sense of punishment
- Self-dislike
- Self-accusation
- Suicidal wishes
- Crying
- Irritability
- Social withdrawal
- Indecisiveness
- Distortion of body image
- Work inhibition
- Sleep disturbance
- Fatigability
- Loss of appetite
- Weight loss
- Somatic preoccupation
- Loss of libido

BDI: Review from IMMPACT II

- Designed to measure the behavioral manifestations of depression in adolescents and adults
- Current version includes 21 groups of four statements relating to symptoms of depressive disorder
- Respondents report how they are feeling “right now”
- Responses in each cluster are scored numerically with a 0 to 3 representing level of severity; range for measure is 0-63

BDI: Review from IMMPACT II

- Indices of internal consistency range from 0.73 to 0.95
- Stability indices range from 0.80 to 0.90
- Validity estimates average around 0.60 for nonpsychiatric patients
- Responsive to change during psychotherapy and medication trials; including relatively large number of pain intervention trials

BDI: Review from IMMPACT II

- Strengths
  - Excellent psychometrics
  - Subject of extensive research in the pain field
  - Responsive to change in pain intervention research

- Weaknesses
  - Not designed for use among persons with pain
  - Challenges regarding relevance of somatic symptoms and potential inflation of depressive symptom severity among persons with pain

BDI: Additional information

- Numerous translations; reviews available for Spanish and German versions
- Usually takes 5-10 minutes to complete
- Fifth or sixth grade reading level

What are the implications of normative data on the BDI from other populations?

Normative data from psychiatric or substance abusing populations

Mixed diagnostic (n=248): 38.27 (12.98)

MDD/Single epi.(n=113): 38.52 (13.98)

MDD/Recurrent (n=168): 37.21 (12.51)

Dysthymic (n=99): 36.15 (11.07)

Alcoholic (n=105): 37.99 (9.97)

Heroin (n=211): 27.65 (5.81)

BDI: Recommended cut-offs

None to minimal depression: <10

Mild to moderate depression: 10-18

Moderate to severe depression: 19-29

Severe depression: 30-63

Beck & Steer (1993)

BDI: Recommended cut-offs

These cut-off scores are derived from analyses of mean BDI scores for persons classified in categories of depression based on clinical ratings:

- Minimal: 10.9 (8.1)
- Mild: 18.7 (10.2)
- Moderate: 25.4 (9.6)
- Severe: 30.0 (10.4)

Implications for determining a minimally important difference in pain outcome studies

Recommendation 1: Improvement is judged to be present when an individual reports a BDI score in the "normal" range (I.e., below 10) following treatment

Recommendation 2: Improvement is judged to be present when a person's post-treatment score falls into a lower category of depression severity (I.e., a change from the moderate to the mild category)

Implications for determining a minimally important difference in pain outcome studies

Recommendation 3:

- Principle: A minimally important difference is judged to be ½ standard deviation of the population mean
- Observation: The standard deviation for each category of depression severity ranges from 8.1 to 10.4
- Specific recommendation based on normative data: A change of 5 on the BDI is judged to be a minimally important difference

What useful information can be derived from pain-relevant studies?

Geisser et al. (1997)

132 consecutive patients with chronic pain; 44 had MDD according to DSM-IV

Discriminant function analysis suggested a cut-off score on the BDI of 21 for MDD; correctly classified 75% of sample (68.2% sensitivity, 72.7% specificity, PPV = 61.2%, NPV = 83.1%)

	Non-depressed	Depressed
BDI Total	14.8 (8.3)	25.5 (9.9)

Morley et al., 2002

1947 patients entering chronic pain treatment

Mean BDI = 17.58 (8.66); Median = 16; (range = 0-53)

Applying cut-offs:

- Beck et al. (1988)
  - <10 (minimal depression): 17.8%
  - 10-19 (mild depression): 45.6%
  - 20-29 (moderate depression): 26.6%
  - 30> (severe depression): 10%
- Geisser et al., 1997)
  - 21> (depressed): 28.5%

Morley et al., 1999

Meta-analysis of randomized controlled trials of cognitive-behavior therapy and behavior therapy for chronic pain

Included 25 suitable trials (16 included Mood/Affect measures [BDI, CES-D, &/or STAI-S] & provided data for calculating effect sizes)

Effect sizes for Mood/Affect

CBT or BT vs WL control: 0.52 (95% CI=0.19-0.84)

CBT or BT vs Rx control: -0.14 (95% CI=-.032-0.04)

Pain treatment outcome studies that considered question of clinical significance

Jensen et al., 1994

70 persons with chronic spinal pain

4 wks of Multi-Modal CBT

Within pair differences from pre-post = 2.9, $p<.01$

Concluded that “important improvement” occurred since the baseline score for the reference group decreased from a mean above 11 to a mean in the normal range (i.e., ,10) at post-treatment and at 6 month follow-up

Vlaeyen et al., 1995

71 persons with chronic low back pain

RCT comparing operant conditioning, cognitive-behavioral, operant-respondent rxs to waiting list control; 8 wks of rx

Significant effect of time (F-14.45, $p<.001$)

Vlaeyen et al., 1995

Reported on “clinical significance” using a criteria of a >4 unit decrease on BDI based on “clinical judgment” and a post-treatment score <12 as indicative of responders

Percent responders

	Post	F.U.
Operant-Conditioning	31	47
Operant-Cognitive	39	14
Operant-Respondent	53	31

Slater et al., 1997

34 persons with chronic pain

RCT comparing Behavioral/Multidisciplinary Pain RX vs Standard Care

Employed recommendations from Jacobson& Truax (1991) to determine “clinically significant change”; defined as a post-treatment score on a measure that is closer to the mean for the normal population than it is to the mean for the patient population

Slater et al., 1997

Considered score of <10 as “normal” on the BDI

16 patients were in the normal range prior to randomization

4 patients (24%) in the Beh Rx group were characterized as evidencing clinically significant improvement

BDI means from pain samples

Pain sample means

Authors	Population	Sample size	Means (SD)
Williams & Richardson, 1993	Mixed; beh rx	207	18.1 (8.89)
Richardson et al., 1994	Mixed; beh rx	109	Workers: 14.7 (6.7) Non-work: 19.4 (8.4)
Junge et al., 1995	Disk surgery	381	7.46 (5.72)
Geisser et al., 1997	Mixed; non-rx132	Non-depr: 14.8 (8.3)	Depressed: 25.5 (9.9)
Auerbach et al., 2001	TMD	258	9.76 (9.15)
Morley et al., 2002	Mixed; MPC	1947	17.58 (8.66)
Evers et al., 2003	Rheumatology	64	CBT:12.79 (6.46) Cont: 12.18 (6.70)

Pain sample means

Authors	Population	Sample size	Means (SD)
Brown et al., 1999	Intrathecal opioid	38	13.18 (9.85)
Williams et al., 1999	Mixed; inpt MPC	113	17.2 (7.2)
Varia et al., 2000	Unexplained chest pain	30	Sertraline : 9.20 Placebo: 9.87
Burns, 2000	Mixed; MPC	93	16.8 (9.3)
Turner & Jensen, 1993	LBP	102	Cog Rx: 12.83 (8.59) Relax Rx: 8.29 (3.54) Cog+Rel: 12.26 (6.78) WL: 9.83 (6.81)
Jensen et al., 1997	Women w/ bp	54	SCBT: 10.7 (6.1) WCBT: 13.0 (8.0)

Summary of pain sample mean data

- BDI means range from:
  - 7.46 (disk surgery) or 9.20 (sertraline) samples
  - 25.5 (depressed, non-rx seeking)
- Standard deviations range from:
  - 3.54 (relaxation training)
  - 9.9 (depressed, non-rx seeking)

Treatment Responsiveness

Treatment Responsiveness

Authors	Diagnoses	Sample Size	Treatment	Change scores
Evers et al., 2003	Rheumatology clinic patients	64	CBT vs SC	CBT 2.81/3.28 SC –0.67/-0.89
	Effect sizes were 0.51 and 0.55 for 6 and 12 months, respectively			
Khatami & Rush, 1982	Mixed cp	23	MPC	9.1 (partial completers = -0.9)
Williams et al., 1996	Mixed cp	121	Inpt MPC Opt MPC WL	Inpt Opt WL 8.3 4.6 –0.7
Slater et al., 1997	Mixed cp	34	Beh/MPC	BEH/MPC SC 6.0 1.2
Marhold et al., 2001	Women cp Long term sick leave vs short term sick leave	72	CBT vs SC	Rx/Short 1.4 Con/Short -1.6 Rx/Long 6.2 Con/Long 7.6

Treatment Responsiveness

Authors	Diagnoses	Sample size	Treatment	Change scores
Robbins et al., 2003	Chronic pain	127	MPC, w/ & w/o PT	<u>Pre-Post</u> PT in 5.74 PT out 1.43
Nicholas et al., 1991	CLBP	58	Cog Rx, Beh Rx, Rel Rx, Attn Cont No Attn Cont	<u>Pre-12 mo</u> Cog 12.30 Beh 5.95 Cog/Rel 3.69 Beh/Rel 11.00 Attn 5.11 No Attn 1.69
Turner & Jensen, 1993	CLBP	102	Cog Rx, Rel Rx, Combo, WL	<u>Pre-12 mo</u> Cog 6.33 Rel 3.86 Combo 5.43

Treatment Responsiveness

Authors	Diagnoses	Sample size	Treatment	Change scores
Jenkins et al., 1976	CLBP; w/ or w/o hx of back disease	59	Tofranil (25mg)/ Placebo	Hx / No Hx Tofranil 3.5 / 8.5 Placebo -3.0 / 2.0
Atkinson et al., 1998	CLBP	78 men	Nortriptyline (titrated to 100mg qhs) vs placebo	Nortriptyline 3.79 (4.53) Placebo 2.08 (3.94)

Summary and Recommendations

Nothing is known about meaningful change in emotional functioning from perspective of persons with chronic pain

Return to “normal” range on BDI seems to be unreasonable

- Too conservative; probably lacks sensitivity
- Doesn’t correspond to other improvements
- Depression isn’t primary endpoint and not often explicitly targeted in treatment; unreasonable to expect return to “normal”

Summary and Recommendations

Change in category

- Somewhat arbitrary
- Some data to support validity of cut-offs
- Normal distribution of persons with pain across cut-offs recommended by Beck and Steer
- Would allow for comparisons across samples and studies

Summary and Recommendations

Change of 5 (or 4 units) on BDI

- More clearly linked to empirical data
- Equivalent of approximately ½ standard deviation; moderate effect
- Would permit comparisons across samples and studies

Question: Should a lower threshold be employed given lower means and standard deviations among samples of persons with chronic pain, particularly in pharmacological trials?

Bottom Line

Recommend that responders are those who experience a 5 point change on BDI and a change to a lower category of depressive symptom severity

Those in favor….