



Title: Brief Implicit Association Tests of Stigmatizing Attitudes, Awareness of Mental Distress and Label-Avoidance: A Study in People with Depressive Symptoms

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Abstract

This study aims to develop and implement brief implicit association tests (BIATs) assessing stigmatizing attitudes towards mental illness, awareness of mental distress and self-identification as having a mental illness. We recruited 229 people (age range 18–80 years) with currently untreated depressive symptoms. In addition to BIATs, explicit measures assessed depression severity, contact experience and self-identification as having a mental illness. BIATs showed good feasibility. Age and educational differences were observed for each BIAT. Regarding depression severity, people with mild depression severity showed stronger implicit label-avoidance. Novel BIATs proved feasible and future research should investigate the predictive value of implicit measures on help seeking in people with mental illness.

Keywords Brief implicit association test · Mental illness · Stigmatizing attitudes · Awareness of mental distress · Label avoidance · Depression

Introduction

The stigma of mental illness, including negative stereotypes or discrimination by others, often results in severe consequences such as low self-esteem and empowerment, social exclusion and educational disadvantages (Corrigan 2004; Corrigan et al. 2000; Crisp et al. 2000; Livingston and Boyd 2010). Especially when having a mental illness, internal evaluation processes cause stigmatizing attitudes towards one. In these self-evaluations, people judge themselves negatively and therefore experience diminished self-esteem and self-efficacy which leads to self-stigmatization (Blankertz 2001; Corrigan 2004). Affected people internalize negative

public images of mental illness, experience self-stigma and are less likely to seek treatment (Corrigan 2004; Eisenberg et al. 2009). Moreover, internalized stigma for people with mental illness is also negatively associated with psychosocial variables, low treatment adherence and increased symptom severity (Clement et al. 2015; Livingston and Boyd 2010; Rüscher et al. 2009), and can therefore worsen the course of mental illness and results in poor health and quality of life (Corrigan and Rao 2012). Evidence shows that people with stronger stigmatizing attitudes are less likely to attribute their current depressive symptoms to a potential mental health problem (Schomerus et al. 2012). Likewise, self-perception and self-labeling of a person as having a mental illness has been shown to increase perceived stigma-stress and less well-being (Rüscher et al. 2014). Avoiding the label of having a mental illness in order to evade negative self-perceptions can be a barrier to seeking professional help (Stolzenburg et al. 2017).

Brief implicit association tests (BIATs) are a valid way to assess those personal attitudes towards oneself on a subconscious, implicit level. Implicit measurements have been utilized to gain information about the attitudes towards people with mental illnesses (e.g. schizophrenia, borderline personality disorder, alcoholism), towards mental health stigmatization and mental health treatment (Goguen et al.

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2016; Lindgren et al. 2013; Rüsçh et al. 2007, 2010, 2009; Stull et al. 2013). Moreover, studies investigated implicit attitudes of people with and without mental illness (Rüsçh et al. 2010; Teachman et al. 2006). Research on whether self-stigma operates in an automatic and implicit manner has shown that greater implicit self-stigma is associated with lower levels of quality of life (Rüsçh et al. 2009). Hence, people with severe mental illness report more implicit attitudes of self-guilt towards their mental health problems than people without mental illness (Rüsçh et al. 2010). Nevertheless, studies investigating implicit symptom awareness and attitudes towards self-labeling in persons with mental illness are still missing (Rüsçh et al. 2010). With implicit measures, we are able to assess constructs that differ from, but are related to self-reported explicit measures. Furthermore, implicit measure can explain certain behavior variations (e.g. help seeking) that cannot be solely predicted by explicit measures (Nosek et al. 2011).

Advances in the field of assessing implicit attitudes towards people with mental illnesses have been made. Yet, the unique perspectives and attitudes of people with depressive symptoms have been neglected in prior research. Therefore, this study develops and tests BIATs in people with symptoms of depression. Therefore, already existing BIATs assessing stigmatizing attitudes towards people with mental illness such as guilt (BIAT 1) or normalcy (BIAT 2) are used. Additional new BIATs focusing on awareness of mental distress (BIAT 3) and label-avoidance (BIAT 4) are created and tested.

Aim of the Study

We report on the development of implicit measures to extend the research on people with internalized stigmatizing attitudes and mental health problems. Our aim is to present the methodology and development of four BIATs on personal stigmatizing attitudes and mental illness, symptom awareness and label-avoidance. BIATs were developed as part of an original study to investigate explicit and implicit stigmatizing attitudes and their association with help seeking behavior and barriers to treatment in people with untreated mental health problems. The BIATs serve as groundwork for future studies that will examine the impact of implicit measures on help seeking in people with depressive symptoms.

Methods

Recruitment & Sample

Community-dwelling adults were recruited through newspaper articles, Facebook posts and flyers. The call for

participants listed typical depressive symptoms such as exhaustion; sleep disturbance, loss of interest or lack of concentration without mentioning psychiatric or mental illness. People who experienced these symptoms were encouraged to call the study team. A study assistant screened potential participants for study eligibility in accordance to the inclusion criteria: > 18 years of age, depression score (PHQ-9) > 8 and not being in current psychological or psychiatric treatment. Eligible persons were immediately invited to participate in an extensive interview, which included self-report questionnaires, Brief BIATs and a structured diagnostic interview. Participants gave informed consent in participating in the study and received an incentive of 30 € after interview completion. The recruitment procedure was carried out in four cities in Northern Germany from November 2015 until July 2016. In sum, 429 people contacted the study center, of which 266 were eligible for the study and invited to the personal interview. Of these, 31 missed the appointed interview despite various attempts to reschedule, and three people dropped out before finalizing the interview. A total of 233 people completed the interview. Additionally, four participants had to be excluded from the analysis because they were currently using professional treatment. The ethics committee of the University Medicine Greifswald gave ethical approval.

Implicit Measurements—BIATs

Implicit tests investigate people's associations towards external cues such as pictures, colors or words. A commonly used tool to assess implicit attitudes are BIAT; Sriram and Greenwald 2009), which were developed based on cognitive-behavioral paradigms that measure the strength of automatic (implicit) associations between concepts of people's mental representations by measuring latency in sorting tasks. When cues are closely associated, responses occur with shorter latency, whereas cues without cognitive connection require longer latencies.

General Procedure

A BIAT consists of two trial blocks with the same four categories and stimulus–response mappings (associated words) (for procedure see Sriram and Greenwald 2009). Each BIAT consists of three focal and one non-focal category. Focal categories are presented alternating throughout the trials whereas the non-focal category is not shown. Each BIAT starts with the introduction of the four categories and their associated words. Participants are trained to use the required commands for the computer-based sorting task (key 'I'—word belongs to the displayed category; key 'E'—word does not belong to the displayed category). Participants sort the words according to the displayed categories whilst

the latency for the correct response is measured. A false response generates a red cross in the display that vanishes when the correct key is pressed. It takes 5–7 minutes to complete all trials of a BIAT.

In this study, participants were introduced to the procedure by using an established BIAT (flowers-insects vs. good–bad), for detailed information see (Greenwald et al. 1998). This easily understandable BIAT enabled participants to get used to the presentation modus of the categories, stimuli and modality of the trial. With this practice BIAT, we ensured people would be accustomed to the general procedure of the BIAT.

Scoring and Measurement

Each BIAT consists of two response blocks with 20 trials (sorting tasks). As a measure of relative association strength, *D* is calculated as the difference between mean latencies of the two BIAT blocks divided by the standard deviation of latencies in the two blocks (Greenwald et al. 2003; Sriram and Greenwald 2009). The *D*-value is interpreted as an effect size and ranges between -2 and $+2$ (Sriram and Greenwald 2009). It is comparable to the effect size of Cohen's *d* and higher values represent stronger the associations (Greenwald et al. 2003).

Development of Implicit Measures

We aimed to assess personal stigmatizing attitudes, awareness of mental distress and label-avoidance as having a mental illness. For each BIAT a literature search was conducted. Only one BIAT was identified assessing implicit stigmatizing attitudes towards persons with mental illness using the categories guilty and innocent (Rüsch et al. 2010). For this study, we translated and adapted this BIAT and created three new BIATs in accordance with previous studies (Meites et al. 2008; Nosek et al. 2005; Peris et al. 2008; Rüsch et al. 2007, 2010; Sriram and Greenwald 2009). An overview of attribute and target categories for each BIAT is displayed in Supplement 1. For the BIATs, attribute and target categories were determined and a web-based word search for synonyms that best described the categories and attributes in German was initiated. An expert group discussed the word choices and determined four subordinate words for each of the four categories. In a pre-test with $N=30$ people, we tested the feasibility and made changes in case of misunderstandings. The pre-test showed that participants understood the task and only few changes in capitalization or wording were made.

The program INQUISIT 4 (Draine 2014), a computer-based response-latency software by millisecond, was used (for detailed procedure, <http://www.millisecond.com>). The

software and available BIAT templates were used for technical implementation.

Brief Implicit Association Tests

Two BIATs were used to assess personal stigmatizing attitudes about mental illness in contrast to physical disability. Moreover, two new BIATs for awareness of mental distress and label-avoidance of having a mental illness were specifically developed for the study (detailed description in Supplement 1).

BIAT 1: Guilty-Innocent/Mental Illness-(Physical Disability)

First, mental illness is implicitly associated with responsibility in terms of guilt and innocence as presented by the study by Rüsch et al. (2010) and the stimuli were translated into German. Due to the arrangement of attribute and target categories in this BIAT, positive *D*-values represent a stronger association of 'mental illness—innocent' and negative *D*-values represent as a stronger association of 'mental illness—guilty'.

BIAT 2: Different-Normal/Mental Illness-(Physical Disability)

Second, a novel BIAT assesses whether mental illness is implicitly associated with being normal or different. This common stereotype was found in studies on stigmatization of mental illness (Corrigan and Watson 2002; Rüsch et al. 2005). Positive *D*-values represent a stronger association of 'mental illness—normal' and negative *D*-values are interpreted as a stronger association of 'mental illness—different'. BIAT construction followed the instructions by Greenwald et al. (2009).

BIAT 3: Mental Distress-Relaxation/Me-(Not Me)

The third BIAT assesses implicit awareness of mental distress. The association of oneself with being mentally distressed vs. relaxed is investigated. In this awareness BIAT, positive *D*-values represent a stronger association of 'me—relaxation' whereas negative *D*-values indicate a stronger association of 'me—mental distress'.

BIAT 4 Mental Illness–Mental Health/Me-(Not Me)

The fourth BIAT assesses self-labeling/label-avoidance of having a mental illness. It aims to examine the implicit association of considering oneself mentally ill or mentally healthy. In this BIAT, positive *D*-values are interpreted as a stronger association of 'me—mental health' (label-avoidance) and negative *D*-values represent a stronger association of 'me—mental illness' (self-labeling).

The BIATs were presented in two sets between questionnaires to provide variation within the interview. The practice BIAT and the first two BIATs assessing stigmatizing attitudes were presented as the first set which took participants about 15–20 min to complete. The second set comprised BIATs awareness of mental distress and self-labeling/label-avoidance, which were completed in 10–12 min.

Explicit Measurements

Depression Symptoms and Affective Disorders

The patient health questionnaire depression module (PHQ-9) was used to assesses severity of depressive symptoms (Kroenke et al. 2001). Nine items relating to the past two weeks are rated on a 4-point Likert-scale ranging from occurred not at all (0) to nearly every day (3). The PHQ-9 score indicates levels of depression severity: 0–4 is considered minimal, 5–9 mild, 10–14 moderate, and 14 or more indicate severe depressive symptoms (Kroenke et al. 2010). The PHQ-9 has an acceptable to good internal consistency in this sample (Cronbach's $\alpha = .78$). Missing values were imputed by mean values for each individual if not more than 25% of responses were missing (Downey and King 1998; Roth et al. 1999). A total score was calculated for statistical analyses. To clarify if participants had a major depressive or other mood disorder an additional clinical interview Mini International Neuropsychiatric Interview (M.I.N.I., Lecrubier et al. 1997) was conducted. To differentiate people with and without an affective disorder, a dichotomized (yes/no) variable was established.

Contact Experience

Contact experience with people having a mental illness is a consistent predictor of more tolerant explicit attitudes. Hence, implicit associations on stigmatizing attitudes, symptom awareness and label-avoidance of having a mental illness could be influenced by previous contact experiences with people having a mental illness (Thornicroft 2008). Thus, contact was assessed with three questions: (1) Has someone from your immediate environment already been in treatment for a mental health problems?; (2) Have you ever been in treatment for mental health problems?; (3) Have you personally, professionally or voluntarily been involved in the care or treatment of people with mental illness? The three-fold response format (yes, no, I do not know) were dichotomized (1—yes, 2—no/I don't know) for our analysis.

Single Items/Scales

For each BIAT, explicit items/scales were used to validate the construct. Two explicit items assessed responsibility

and normalcy of mental illness. First, “People with mental illness are not responsible for their own problems” (BIAT 1, responsibility) and second, “In people with mental illness, something is fundamentally different in comparison to other people.” (BIAT 2, normality). Both single items are answered on 5-point Likert-scale with not agreeing at all (1) to totally agree (5). The PHQ-9 scale for symptom severity complements BIAT 3 (symptom awareness).

The self-identification as having a mental illness scale (SELF-I) assesses the degree to which a person considers the recent symptoms as signs of mental illness (Schomerus et al. 2012). It contains five items answered on a 5-point Likert-scale (don't agree at all (1) to agree completely (5)). The pilot study showed excellent internal consistency (Cronbach's $\alpha = .90$). It was inversely related to personal stigmatizing attitudes and positively related to perceived need for help (Schomerus et al. 2012). The self-identification scale (SELF-I) will be correlated with BIAT 4 (self-labeling/label-avoidance).

Statistical Analysis & Software

Statistical analyses are performed with SPSS 22.0. For the BIATs, the general mean D-value, standard deviation and confidence intervals are calculated. Group differences are calculated for socio-demographic variables (gender, age groups, education). Analyses include t-tests, univariate analysis of variance and correlations (level of significance $\alpha = .05$). Conventions for correlation coefficients are small ($r = .10$), medium ($r = .30$) and large ($r = .50$) (Cohen 1988).

Results

Descriptives

The sample consisted of $N = 229$ participants that met our inclusion criteria with an age range of 18–80 years ($M(SD) = 50.36 (16.25)$). Of these, 160 were women; the majority of the sample was single and had a basic school education of 10th grade (Table 1). The sample consists of Caucasian people living in Northern Germany. The religious background of participants was not assessed.

Regarding depressive symptoms measured with the PHQ-9 of the participants, 3.1% reported minimal, 29.2% mild, 36.7% moderate, 23.5% moderately severe and 7.5% severe depressive symptoms. Participants reported a mean of $M(SD) = 12.23(4.83)$ depressive symptoms, which equals moderate depression.

Table 1 Descriptive sample characteristic (N = 229)

	<i>M</i>	<i>SD</i>
Mean age	50.36	16.25
PHQ-9 score	12.23	4.83
	<i>N</i>	<i>%</i>
Gender		
Male	69	30.1
Female	160	69.9
Age groups by mean		
< 49 years	94	41
> 50 years	135	59
Age groups by quartile		
< 32 years	46	20.1
33–49 years	48	21
50–61 years	72	31.4
> 62 years	63	27.5
Educational level		
≤ 8 classes/middle School	25	11
9–10 classes/junior High School	112	49.1
12 classes/high School	91	39.9
Family status		
Single	85	37.1
Married, living together	66	28.8
Married, but separated	20	8.7
Divorced	47	20.5
Widowed	11	4.8
Monthly income (in Euro)		
0–500	35	15.4
501–1000	74	32.5
1001–1500	67	29.4
1501–2000	28	12.3
> 2001	24	10.5
Depressive symptoms		
Minimal depression	7	3.1
Mild depression	66	29.2
Moderate depression	83	36.7
Moderately severe depression	53	23.5
Severe major depression	17	7.5
Affective disorder		
No	54	23.6
Yes	175	76.4

Descriptive Analysis of BIATs

The BIATs were evaluated when the sorting accuracy was good (> 75% correct answers), otherwise participants' BIATs were excluded from the calculations (Greenwald et al. 2003). Reasons for invalid BIATs were refusal to take the task due to a lack of comprehension or inability to use the computer; others failed to finish the

computer-based task (displayed as invalid BIATs, Table 2). The percentage of correct answers per BIAT suggests a high mean accuracy of correct sorting. After excluding invalid data, participants reached valid results (Table 2): 93.4% in BIAT 1, 86.9% in BIAT 2 (implicit stigmatizing attitudes), 87.8% in BIAT 3 (awareness of mental distress) and 88.6% in BIAT 4 (label-avoidance). In general, the mean D-values for all BIATs are rather low which is

Table 2 Descriptive statistics of BIAT D-values, numbers and percentages of valid and invalid responses (N = 229)

	<i>M</i>	<i>SD</i>	Min	Max	Valid <i>N</i> (%)	Invalid <i>N</i> (%)
D-value						
BIAT 0	0.267	0.37	−0.95	1.35	214 (93.4)	15 (6.6)
BIAT 1	0.020	0.28	−0.95	0.74	199 (86.9)	30 (13.1)
BIAT 2	−0.059	0.30	−0.85	0.70	201 (87.8)	28 (12.2)
BIAT 3	−0.265	0.32	−0.99	0.71	202 (88.2)	27 (11.8)
BIAT 4	−0.199	0.27	−1.08	0.44	203 (88.6)	26 (11.4)
Percentage (%) of correct responses						
BIAT 0	95.23	5.17	76.56	100		
BIAT 1	94.93	6.01	75	100		
BIAT 2	95.79	5.43	75	100		
BIAT 3	96.61	4.57	76.56	100		
BIAT 4	96.68	4.18	75	100		

N sample size, *M* mean, *SD* standard deviation, *Min* Minimum, *Max* Maximum *BIAT 0* practice BIAT preference (flowers/insects—good/(bad)), *BIAT 1* personal stigmatizing attitudes (guilty/innocent vs. mental illness/(physical disability)), *BIAT 2* personal stigmatizing attitudes (different/normal vs. mental illness/(physical disability)), *BIAT 3* symptom awareness (psychological distress/relaxation vs. me/(not-me)), *BIAT 4* label-avoidance/self-labeling (mental illness/mental health vs. me/(not me))

caused by high standard deviations and broad value ranges of minimum and maximum (Table 2).

Moreover, missing analysis by age group showed that older people (aged 62 years and older) were significantly more likely to produce missing values in each BIAT than younger participants (Table 3). All participants completed the practice BIAT to get accustomed to the procedure. It served as a feasibility check. The high amount of valid

practice BIATs over the broad age range of this sample represents good comprehension and feasibility of the task.

Results of New BIATs

We investigated differences in BIATs for gender, age (Table 4) and education (Supplement 2).

Table 3 Missing analysis by four age groups (N = 229)

	Age groups by quartile (in years of age)					Test statistic	
	Total	<32	33–49	50–61	>62	χ^2 (3)	<i>p</i>
BIAT 0							
No	224	46	48	72	58	13.469	.004**
Yes	5	0	0	0	5		
BIAT 1							
No	220	46	46	71	57	8.341	.039*
Yes	9	0	2	1	6		
BIAT 2							
No	215	46	46	69	54	11.118	.011*
Yes	14	0	2	3	9		
BIAT 3							
No	212	46	46	68	52	14.03	.003**
Yes	17	0	2	4	11		
BIAT 4							
No	211	46	46	68	51	16.243	.001***
Yes	18	0	2	4	12		

BIAT 0 practice BIAT: Preference (flowers/insects—good/(bad)), *BIAT 1* personal stigmatizing attitudes (guilty/innocent vs. mental illness/(physical disability)), *BIAT 2* personal stigmatizing attitudes (different/normal vs. mental illness/(physical disability)), *BIAT 3* symptom awareness (psychological distress/relaxation vs. me/(not-me)), *BIAT 4* label-avoidance/self-labeling (mental illness/mental health vs. me/(not me))

p* < .05; *p* < .01, ****p* < .001

Table 4 Age differences in BIATs – age split in half for younger and older age groups (N = 229)

	Age in years	N	M	SD	t	df	p	95% CI
BIAT 0	< 49	92	0.25	0.32	-.517	21,188 ^a	.606	-0.125; 0.073
	> 50	122	0.27	0.41				
BIAT 1	< 49	92	0.073	0.27	2.497	197	.013*	0.021; 0.178
	> 50	107	-0.026	0.28				
BIAT 2	< 49	88	0.004	0.26	2.712	199	.007**	0.031; 0.197
	> 50	113	-0.10	0.316				
BIAT 3	< 49	91	-0.19	0.33	2.799	200	.006**	0.036; 0.21
	> 50	111	-0.32	0.29				
BIAT 4	< 49	91	-0.13	0.23	3.259	200,534 ^a	.001***	0.048; 0.196
	> 50	112	-0.25	0.302				

N valid sample size, M mean, SD standard deviation, t- test statistic, df degrees of freedom, CI confidence interval, BIAT 0 practice BIAT, preference (flowers/insects—good/(bad)), BIAT 1 personal stigmatizing attitudes (guilty/innocent vs. mental illness/(physical disability)), BIAT 2 Personal stigmatizing attitudes (different/normal vs. mental illness/(physical disability)), BIAT 3 Symptom awareness (psychological distress/relaxation vs. me/(not-me)), BIAT 4 label-avoidance/self-labeling (mental illness/mental health vs. Me/(not me))

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

^aViolation of assumption of homoscedasticity of variances (Levene test $p < .05$)

Stigmatizing Attitudes

For BIAT 1 (guilty/innocent—mental illness), we found significant differences between younger and older participants. Younger people had a stronger association of ‘mental illness—innocent’ than older participants who associated mental illness with guilt more strongly. Post hoc analyses showed significant age group differences between people aged 33–49 years and 50–61 years ($p = .034$), with stronger associations for older adults.

In the second BIAT (different/normal—mental illness), significant age groups differences ($p = .007$) were found, in which older participants had stronger implicit associations of ‘mental illness—different’. No gender and no educational differences were found for these two BIATs of stigmatizing attitudes.

Awareness of Mental Distress

For BIAT 3, the mean D -value of $M(SD) = -.26(0.32)$ suggested a moderate association of the categories ‘me—mental distress’ which means that people with depression implicitly associated themselves more with mental distress. Older people showed significantly stronger associations of ‘me—mental distress’ than younger people ($p = .006$). This relationship was also seen for age differences in the four age groups. Post hoc group tests showed significant differences between participants aged 18–32 years and 50–61 years. Stronger associations for the categories ‘me - mental distress’ compared to ‘me—relaxation’ were found for all age groups, whereas younger people showed the weakest associations. Furthermore, participants with higher education showed a

significantly stronger association of ‘me—mental distress’ than people with lower education ($p = .022$).

Self-Labeling/Label-Avoidance of Having a Mental Illness

BIAT 4 investigated whether participants implicitly labeled themselves as mentally ill or avoided the label of having a mental illness. Overall, a mean D -value of $M(SD) = -.19(.27)$ showed a moderate negative association. This characterizes a stronger association of ‘me—mental illness’ in participants and represents self-labeling (Table 4). Both age groups showed slight to moderate negative associations. Older adults had significantly stronger implicit associations of ‘me - mental illness’ than younger people ($p = .001$). Significant post-hoc group differences showed between people younger than 32 years in comparison to people aged 50–61 years ($p = .02$) and compared to older adults 62 years and older ($p = .004$). Neither gender nor educational significant differences were found for implicit self-labeling.

Correlations of Implicit and Explicit Measures

Correlations were examined for implicit and explicit measures (Table 5).

Depression Severity and Affective Disorders

The correlations of depression severity and each BIAT were small and ranged from $r = .03$ (BIAT 3) to $r = .13$ ($p = .057$;

Table 5 Pearson correlation coefficients for implicit and explicit measures. Point-biserial correlation coefficient for nominal data and bivariate correlations for interval data

	BIAT 1	BIAT 2	BIAT 3	BIAT 4
Depression severity ^a	0.047	0.071	0.031	0.135
Affective disorders ^b	0.148*	0.075	−0.015	0.042
Contact questions ^c				
Contact with people with mental illness (nominal)	−0.104	−0.096	−0.048	−0.097
Been in treatment for mental illness (nominal)	0.1	−0.029	−0.024	0.031
Involved in care/treatment of people with mental illness (nominal)	0.024	−0.073	0.028	−0.116
Single item				
“People with mental illness are not responsible for their own problems.”	−0.105	−0.054	−0.136	−0.088
Single item				
“‘In people with mental illness, something is fundamentally different in comparison to other people.’”	−0.094	−0.027	−0.15*	−0.057
SELF-I scale (self-identification)	0.102	0.135	0.081	0.125

BIAT 1 personal stigmatizing attitudes (guilty/innocent vs. mental illness/(physical disability)), *BIAT 2* personal stigmatizing attitudes (different/normal vs. mental illness/(physical disability)), *BIAT 3* symptom awareness (psychological distress/relaxation vs. me/(not-me)), *BIAT 4* label-avoidance/self-labeling (mental illness/mental health vs. me/(not me))

* $p < .05$

^aPHQ-9 score (interval)

^bDiagnosed with M.I.N.I. (nominal – yes/no)

^cNominal (yes vs. no/I do not know)

BIAT 4). Taking a closer view on BIAT 4, the data distribution revealed that people with mild depression severity showed stronger implicit label-avoidance than people with severe depressive symptoms.

Affective disorders were significantly associated with stigmatizing attitudes (BIAT 1; $r = .14$, $p = .037$). Specifically, people fulfilling criteria for an affective disorder in the M.I.N.I. interview implicitly associated mental illness with innocence, and people without affective disorders showed stronger implicit stigmatizing attitudes for the association of mental illness and guilt.

Contact Experiences with Mental Illness

Neither implicit stigmatizing attitudes, awareness of mental distress nor label-avoidance of having a mental illness BIATs was significantly correlated with any of the contact questions.

Single Items/SELF-I Scale

Correlations between all BIATs with two single items, one for the responsibility for mental illness and one for being different, showed statistically insignificant correlations for BIAT 1, 2 and 4. Merely BIAT 3 was negatively correlated with both single items. People with a stronger association of ‘mental distress—me’ explicitly disagreed that people with mental illness are different ($r = -.15$, $p = .03$). Moreover, people with an implicit association of ‘mental distress—me’

did not tend to consider people to be responsible for their own problems ($r = -.138$, $p = .053$).

The explicit self-identification scale (SELF-I) was positively yet insignificantly associated with the stigmatizing attitude BIAT 2 ($r = .135$, $p = .058$) and the label-avoidance BIAT 4 ($r = .125$, $p = .077$). For BIAT 2 and the SELF-I, results suggest that more explicit self-identification with having a mental illness is associated with less implicit associations of ‘mental illness and different’. This can also be seen in BIAT 4, participants who explicitly self-identify as having a mental illness, showed less implicit self-labeling, and therefore showed lower associations of being mentally disturbed, ill or unbalanced with oneself.

Discussion

According to previous research, new BIATs are carefully developed and now add new facets of implicit measures to the field. They fill an important gap investigating implicit attitudes in people with current symptoms of mental illness. This study used two established and two newly developed BIATs assessing stigmatizing attitudes, awareness of mental distress and avoidance of self-labeling. We tested implicit measures in this sample with regard to socio-demographic variables and their associations with explicit measures.

All implicit measures showed good feasibility as indicated by high completion rates over a broad age range and a high number of BIATs completed with sufficient scoring of

over 80%. Overall, the correlations of implicit and explicit measures were small. Significant correlations were mainly found for the M.I.N.I. classification of having an affective disorder and BIAT 1. People with an affective disorder according to the M.I.N.I. interview implicitly associated mental illness more with innocence, whereas people without a M.I.N.I. diagnosis for affective disorder showed stronger implicit associations of mental illness and guilt. Another significant correlation between explicit and implicit measures was seen for the single item assessing the attitude of perceiving mentally ill people being different with the symptom awareness BIAT 3. Usually we would have expected symptom awareness (BIAT 3) to be significantly associated with the SELF-I Scale. However, previous research also found small and insignificant correlations between implicit and explicit measures (Hofmann et al. 2005; Stull et al. 2013). In fact, the meta-analysis of Hofmann et al. (2005) shows that the association is particularly small when investigating stereotypes and using pronouns (for instance, in BIAT 3 and 4). Oftentimes, implicit measures are regarded as valid as they are less affected by shame and social desirability than explicit measures (Saporito et al. 2011; Stull et al. 2013). In addition, implicit measures are favorable to explicit measures in predicting stigmatized or socially undesirable outcomes, such as discriminatory behavior (Sekaquaptewa et al. 2003; Stier and Hinshaw 2007; Teachman et al. 2003), therefore this investigation warrants further research (Pavlovic and Zezelj 2013). In this context, implicit attitudes might be more strongly connected to discrimination against people with mental illness compared to explicit measures.

Descriptive analysis showed age group differences for each BIAT, but no significant gender differences. Although the prevalence of self-reported depressive symptoms is higher among females in the German population (Bretschneider et al. 2017), this does not translate to implicit attitudes, as these are supposed to reflect involuntary, automatic processes that are less affected by most socio-demographic factors (Stier and Hinshaw 2007). Older adults, however, showed stronger implicit stigmatizing attitudes towards people with mental illness as being guilty and different. This is in line with previous findings using explicit measures also showing stronger stigma in older persons, regardless of birth cohort (Schomerus et al. 2015). Lack of knowledge about mental illness and treatment opportunities as well as a lack of experiences and contact with mentally ill people may cause these implicit stigmatizing attitudes. In addition, older adults implicitly associated themselves more strongly with mental distress (awareness) and less with mental illness (label-avoidance). It can be argued that older adults might be more aware of their distress due to long-lasting symptoms or focus on bodily symptoms caused by multiple morbidities (Gunn et al. 2012). In comparison to older adults, younger people

showed implicit associations in the same directions, but those associations were less pronounced. Educational differences were only found for BIAT 3 showing that people with higher education implicitly reported more mental distress, which is supported by evidence of higher educated people to be more health literate and therefore more likely able to detect health problems in order to seek help (Tiller et al. 2015). However, we could not corroborate this observation with BIAT 4, which underlines the difference between self-labeling and awareness of mental distress, with the first being more definite and status-related than the latter (Stolzenburg et al. 2017). As a similar concept, continuum beliefs of mental illness that aim to reframe symptoms of mental illness as a continuum rather than a definite label (Schomerus et al. 2013), are also connected to higher education, but also lower stigma and more positive attitudes towards treatment.

Moreover, we investigated the associations of implicit measures with depression severity (PHQ-9) and affective disorder (M.I.N.I. diagnosis). People classified with an affective disorder implicitly associated mental illness with innocence, whereas people without an affective disorder showed stronger implicit stigmatizing attitudes for the association of mental illness and guilt. Presumably, people with a current affective disorder are more frequently exposed to educational material or mental health professionals, for instance, and this experience can account for increased knowledge and reduced personal stigmatizing attitudes of mental illness and guilt (Lincoln et al. 2008). In this study, 53.4% of the participants have already sought professional treatment in the past (Stolzenburg et al. 2017). Previous contact with mentally ill people did not account for this association, as the correlations of the contact questions and implicit stigmatizing attitudes did not prove to be substantial. In comparison, depression severity (PHQ-9) showed only a small and insignificant correlation with this BIAT. Regarding depression severity, correlations with implicit measures showed small and insignificant associations. The correlation with label-avoidance showed the largest correlation. People with mild depression severity showed stronger implicit label-avoidance than people with severe depressive symptoms. Previous research showed that publicly identifying as being mentally ill is often harmful to a person's self-esteem and therefore may lead to avoidance of explicit self-labeling (Corrigan 2004). Given that BIAT 4 (label avoidance) focused on mental illness, it is possible that participants' concept of mental illness and self-identification has affected their response. As most laypersons tend to hold dichotomous rather than continuum beliefs of mental illness, this might also apply to self-labeling as having a mental illness (Schomerus et al. 2013). Therefore, stigmatizing attitudes might have a stronger impact on people with dichotomous, biogenetic beliefs than on people with continuum beliefs,

which should be evident on implicit as well as explicit levels. However, this constellation needs further investigation.

The association of two explicit items (people with mental illness being responsible/different) and implicit measures showed links to the symptom awareness BIAT. People who associated themselves with mental distress did not consider people with mental illness to be different or responsible for their problems. Moreover, correlations of the self-identification scale (SELF-I) and implicit measures showed positive associations with stigmatizing attitudes and self-labeling. Results suggest that explicit self-labeling as having a mental illness is associated with less implicit associations of ‘mental illness and different’ and people who labeled themselves as having a mental illness, showed less implicit self-labeling. Altogether, this might indicate that people in this sample who explicitly report depressive symptoms are experiencing less self-stigmatizing attitudes towards having a mental illness and are more aware of their own symptoms, which results in a congruency of implicit and explicit measures.

Limitations

A limiting factor of this study is the self-selection of the sample. Due to our special approach of investigating implicit attitudes in a sample of people with symptoms of mental disorders but without treatment we needed a broad recruitment approach. Participants in this study voluntarily contacted the study team. This may have attracted people willing to share personal and symptom-related information and therewith people who have already lowered their personal stigma. Moreover, about half of the sample reported having had experience with mental health treatment before, which might have affected the stigmatizing attitudes towards mental illness. Due to our recruitment process, a healthy control group is missing as reference sample. Future research should aim to test our implicit measures in other samples with mental illness and in comparison to healthy control groups. In addition, proficient reading literacy and the cognitive ability and capacity to execute a computer-based task that requires concentration are preconditions for the successful BIAT use, which might exclude people with limited cognitive functioning. Invalid BIAT responses might have occurred due to the comprehensive interview procedure and positioning of the implicit tasks that possibly caused tiredness or cognitive exhaustion in the last two BIATs, and the complex structure of the new BIATs. In our sample, older adults produced significantly more missing data in the BIATs compared to younger people, which is in line with evidence showing an association of older age and slower response latency (Greenwald et al. 2003). This age effect is discussed to be an artifact due to longer response latencies of older adults, which in turn increases D-values (Greenwald et al. 2003).

Nevertheless, our BIATs showed minor dropout between 4–8% and good feasibility across all age groups. However, all BIATs could be validated in samples with distinct mental illnesses (e.g., depression, anxiety), younger samples with different levels of mental stress (e.g., schoolchildren, college students, full-time employees only), and across different explicit and implicit measures (e.g., more elaborate IATs) to establish their applicability across different mental health-related contexts.

Conclusion

Implicit measures are an important tool to provide information and insight in addition to explicit measurements. The investigation of implicit stigmatizing attitudes in people with mental illness can inspire new approaches for anti-stigma campaigns, and develop early detection and low-key interventions for people with symptoms of mental disorders. Future research should use implicit measures to investigate their predictive value on help-seeking intentions and help-seeking behavior of people with mental illness.

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Compliance with Ethical Standards

Conflict of interest The authors declare no conflict of interest.

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