



## Brief Report

# Validity of a happiness Implicit Association Test as a measure of subjective well-being <sup>☆</sup>

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**Abstract**

The current study examined the validity of a happiness Implicit Association Test (IAT) as a measure of SWB. One hundred and fifty participants (75 pairs of friends) completed a newly developed happiness IAT and a standard self-esteem IAT. Participants also made self and informant ratings of life satisfaction and happy and sad affect. The results revealed convergent validity among the explicit measures, and among the implicit measures. Explicit–implicit correlations were lower. Self-ratings (.88) and informant ratings (.78) were more highly related with a common SWB factor than the implicit measures (.31). This finding suggests that implicit measures of well-being and happiness assess a different construct that overlaps only modestly with SWB. As a result, these implicit measures have limited utility to control for response styles in self-ratings of SWB.

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**1. Introduction**

Subjective well-being (SWB) is a prominent construct in contemporary personality research. SWB is defined as a positive evaluation of one's life, and a positive balance of positive and negative affect (Diener, Suh, Lucas, & Smith, 1999). Research on SWB has

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relied almost exclusively on self-reports of affect and life satisfaction. The main limitation of this approach is that self-report measures are susceptible to social desirability responding. To address this limitation, it would be desirable to develop alternative measures of SWB that are not susceptible to social desirable responding.

One solution may be to assess SWB with implicit measures because implicit measures are generally assumed to overcome the problem of social desirable responding. In addition, they also promise to address another limitation of self-report measures, namely that people can only report information that is consciously accessible. In contrast, implicit measures may reveal information that is outside of awareness. Asendorpf, Banse, and Mücke (2002) suggest that implicit measures in general, and the Implicit Association Test (IAT) in particular, “tackle these two key problems of explicit personality self-ratings—namely self-presentational biases and limited cognitive accessibility—at once” (p. 381).

It has been overlooked that an implicit measure can only fulfill both promises under very restrictive conditions. One possibility is that explicit information that is consciously accessible overlaps with implicit information. In this case, all the valid information in the explicit measure is shared with the implicit measure, and it is only necessary to assess the implicit measure. The explicit measure information can be discarded because it is either redundant or contaminated by social desirable responding. The other possibility is that the explicit measures contain no valid information.

If we assume, however, that explicit measures contain some valid information that is not shared with implicit measures, an implicit measure cannot replace the explicit measure, and it is necessary to use both explicit and implicit measures. In fact, many researchers have argued that implicit measures and explicit measures assess different constructs that may overlap very little (Greenwald & Farnham, 2000; Nosek, 2005). If this is the case, the explicit measure is still contaminated by social desirable responding, and the implicit measure is unable to distinguish between valid and biased responses in the explicit measure because the valid variance in the explicit measure is not shared with the implicit measure. As a result, the implicit measure fails to solve the problem of social desirable responding in explicit measures, if it assesses predominantly implicit information.

The possibility that explicit measures contain valid information that is not shared with implicit measures is especially important for the assessment of SWB because SWB is by definition a subjective construct (Sumner, 1996). First, the cognitive component of SWB, life satisfaction, is by definition a conscious and deliberate evaluation of one’s life based on subjectively chosen criteria (Schimmack, Diener, & Oishi, 2002). Second, the affective component of SWB is based on conscious experiences of pleasure and displeasure. Thus, implicit measures of well-being can only be used to assess SWB if implicit measures and explicit measures of SWB share common variance. In this case, implicit measures may be able to measure SWB more accurately because explicit measures also contain variance due to social desirable responding. In contrast, if implicit measures of well-being mostly tap information that is outside of people’s awareness, they can be useful measures of individual differences in implicit associations, but they cannot be used to measure SWB.

Whether implicit measures and explicit measures share common variance is an empirical question. It is difficult to make a priori predictions about the relation between implicit and explicit measures of well-being for two reasons. First, implicit–explicit correlations vary dramatically across domains. Nosek and Smyth (2007) found that correlations ranged from as low as  $r = .01$  for attitudes towards Whites versus Asians to  $r = .79$  for attitudes towards pro-choice versus pro-life. The second problem is that it is unclear why

implicit–explicit correlations vary so dramatically. One possibility is that social desirable responding varies across domains (Nosek, 2005). As a result, correlations between implicit and explicit measures fail to reveal the full extent of shared valid variance between explicit and implicit measures. To address this limitation, it is necessary to include a third measure of the underlying construct in the study because a study with three independent methods can be used to determine the amount of shared and non-shared variance in each of the three methods. Because few studies have used a multi-method approach with three methods, it is unclear whether low implicit–explicit correlations are due to social desirable responding on explicit measures or due to the fact that explicit and implicit measures assess different constructs.

To our knowledge, only one previous article has directly examined the relation between explicit and implicit well-being measures (Kim, 2004). The results of this study are inconclusive for four reasons. First, the study failed to control for random measurement error, which can attenuate implicit–explicit correlations (Greenwald & Farnham, 2000; Nosek & Smyth, 2007). Second, the study reported low retest correlations for both explicit and implicit measures. Thus, it is clear that the observed correlations were substantially attenuated by random measurement error alone. Third, the implicit well-being measure was not even related to a second implicit measure of self-esteem. This finding suggests measurement problems with the implicit well-being measure, unless one assumes that implicit attitudes towards one's life are independent of implicit attitudes towards oneself. Finally, the study lacked a validation criterion. Thus, the study could not reveal the causes of a low correlation between self-ratings of SWB and an implicit measure of well-being.

To examine the validity of an implicit well-being measure, we used Schimmack and Diener's (2003) approach to examine the correlations between implicit measures, self-ratings of SWB, and informant ratings of SWB as a third measure. Our implicit measure of well-being focused on the affective component of SWB. We reasoned that an associative task like the IAT would be better able to assess the frequency of positive versus negative emotions than complex satisfaction judgments. It is common for individuals to reflect on their emotions and to label their emotions in this process (Shaver, Schwartz, Kirson, & O'Connor, 1987). This process allows people to make fast and accurate explicit judgments of the frequency of their emotions (Schimmack, 2002). This process might also create chronically and readily accessible associations between the self-concept and emotion labels that can influence performance on an IAT. The IAT requires two response categories. We chose the emotions *happiness* and *sadness* because they are the best predictors of other components of well-being such as life satisfaction (Schimmack, Oishi, Furr, & Funder, 2004). Furthermore, happy and sad are prototypical emotion concepts that are most likely to be used to label emotional episodes (Shaver et al., 1987). Thus, individuals should have well-established associations with these emotion concepts that the IAT can capture.

In addition, we administered a self-esteem IAT. We included the self-esteem IAT for several reasons. First, it is the most widely used implicit measure in the personality literature. Second, a few studies have reported small to moderate observed correlations between implicit self-esteem and well-being measures (Bosson, Swann, & Pennebaker, 2000). These correlations may be substantial after taking measurement error into account. Third, we wanted to examine the reliability of Kim's (2004) finding that implicit self-esteem and implicit well-being are unrelated.

## 2. Methods

### 2.1. Participants

Participants were 150 best friends recruited from the Introductory Psychology subject pool at the University of Toronto Mississauga. Participants received either partial course credit or \$20 for their participation. Participants' age ranged from 18 to 25 years ( $M = 19$  years). Length of friendship ranged from 6 months to 25 years ( $M = 4.91$  years).

### 2.2. Procedure

Participants came to the laboratory with the same-sex best friend for a 2-h testing session. Within each pair, the subject pool participant was designated the target while the other participant was designated the friend. Each member of the pair was assigned a number and seated in their own cubicle with a desk and computer terminal. In the first hour participants completed a paper-and-pencil questionnaire package. In the second hour participants completed a happiness IAT and a self-esteem IAT.

### 2.3. Measures

#### 2.3.1. Life satisfaction

A modified 10-item version of the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) was used to assess life satisfaction. Participants indicated the extent to which they agreed or disagreed with each item and the extent to which they thought their friend agreed or disagreed with each item using a 7-point Likert scale (strongly disagreed to strongly agreed); Chronbach's  $\alpha > .80$ .

#### 2.3.2. Affect

Six items were used to assess how happy participants felt on a typical day (happy, cheerful, joyful) and how sad participants felt on a typical day (sad, depressed, blue). Participants rated the extent to which they felt each emotion and the extent to which they thought their friend felt each emotion on a 7-point scale (almost never to almost always); Chronbach's  $\alpha > .80$ .

#### 2.3.3. Implicit measures

Each IAT was administered using personal computers that constructed idiographic IAT happiness and self-esteem measures for each participant by eliciting from each participant a series of eight self-descriptive (*me*) items (e.g. first and last names) and eight other-descriptive (*not me*) items (e.g. a research assistant's first and last names) (Greenwald & Farnham, 2000). Eight happy (e.g. happy, elated) and eight sad (e.g. sad, depressed) words were selected to comprise the stimuli for the happiness IAT, and eight positive (e.g. bright, gold) and eight negative (e.g. failure, poison) non-emotion words were selected from the stimuli list in Greenwald and Farnham (2000) for the self-esteem IAT.

The administration of the IAT followed the standard procedure with five blocks of reaction time tasks (three practice blocks (1, 2 and 4) and two critical blocks (3 and 5)). In each block, participants were presented different words singly on a computer screen and were required to rapidly categorize the words by pressing one of the two mouse

buttons. Response latency was measured and averaged for each block. In the happiness IAT, in block 3 responses to *me* and *happy* words were paired on the same button and responses to *not me* and *sad* words were paired on the same button. In block 5 the category-mouse button assignments in block 3 were reversed. Sad and happy words were replaced with positive and negative words in the self-esteem IAT. The IATs were scored using the standard protocol (see Greenwald, Nosek, & Banaji, 2003), which compared average response latencies in blocks 3 and 5. Faster response latencies in block 3 relative to block 5 indicated relatively higher implicit happiness or implicit self-esteem.

#### 2.4. Data analysis

The dyadic design of our study produces dependencies in our data. Thus, our data analysis used dyads ( $N = 75$ ) as units of analysis. To estimate the correlation between two measures for the total sample of individuals with a proper estimate of standard errors, we used structural equation modeling software (EQS6.1) and constrained equivalent coefficients. We also used structural equation modeling to test a higher-order factor model with a general SWB factor at the higher level, and method-specific latent factors at the lower level. The relation between the SWB factor and the method-specific factors reveal the validity of the three methods to assess SWB.

### 3. Results

On average, participants were faster when associating the self with happy compared to sad items and positive compared to negative items (Table 1). This pattern is consistent with previous findings that most people have high SWB and self-esteem (Greenwald & Farnham, 2000; Schimmack & Diener, 2003).

To take the dyadic nature of the data into account, correlations among the items were computed by means of constrained coefficients in a structural equation model with dyads as units of analysis. Table 1 shows only the theoretically important within-subject relations. Implicit measures were strongly correlated. Similarly, explicit measures were corre-

Table 1  
Descriptive statistics and correlations among subjective well-being measures

	1	2	3	4	5	6	7	8	<i>M</i>	<i>SD</i>
IAT										
1. Happiness	—								.13	.10
2. Self-esteem	.53*	—							.21	.12
Self-rated										
3. Life satisfaction	.14	.27*	—						5.15	.80
4. Positive affect	.11	.20*	.53*	—					5.23	.84
5. Negative affect	-.08	-.17*	-.50*	-.35*	—				2.86	.92
Informant-rated										
6. Life satisfaction	.03	.06	.34*	.26*	-.29*	—			5.18	.68
7. Positive affect	.06	.11	.30*	.29*	-.29*	.50*	—		5.55	.73
8. Negative affect	-.16	-.19*	-.41*	-.35*	.46*	-.51*	-.53*	—	2.79	1.02

Note.  $N = 75$  friendship pairs; correlations are constrained across friends.

\*  $p < .05$ .

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lated with each other both within-rater and across rater. Third, implicit measures had small to moderate correlations with explicit measures. The high significant correlation between implicit happiness and implicit self-esteem suggests that Kim's (2004) finding of low correlation was probably due to measurement problems. The convergent validity between self-ratings and informant ratings replicates previous findings and shows that self-ratings and informant ratings are valid measures of SWB (e.g. Schimmack & Diener, 2003).

To examine the validity of the three methods to measure a common construct, SWB, we created a higher-order latent factor model (Fig. 1). For each member of the dyad, the three self-ratings were used to create a self-report factor of SWB and the three informant ratings were used to create an informant-report factor of SWB. For each of the two implicit measures, the reaction times of individual trials were randomly split into two halves to create two separate indicators. The four indicators were used to create a common implicit measure of SWB. We tested two versions of the basic model that differed in the modeling of the implicit factor. One model allowed for correlated errors between the two self-esteem IAT indicators. As a result, the implicit factor is primarily a measure of implicit happiness. A second model, allowed for correlated errors between the two happiness IAT indicators. In this model, the implicit self-esteem factor represents primarily implicit self-esteem. Fig. 1 shows the result for the second model, which produced higher correlations with the SWB factor. The different results can be traced back to the pattern of observed correlations in Table 1, which shows stronger implicit–explicit correlations for the self-esteem IAT than the happiness IAT. The fit of the model in Fig. 1 was acceptable (Schermelleh-Engel, Moosbrugger, & Müller, 2003); that is Comparative Fit Index = .96, Root Mean Square Error of Approximation = .04,  $\chi^2 (N = 150, df = 181) = 202.99$ . The most important finding was that the self-ratings had the strongest correlation with the SWB factor, although the difference between self-ratings and informant ratings was not significant. In contrast, the implicit factor had a moderate correlation with the SWB factor. The 95% confidence intervals show that explicit measures had significantly more validity than the implicit mea-

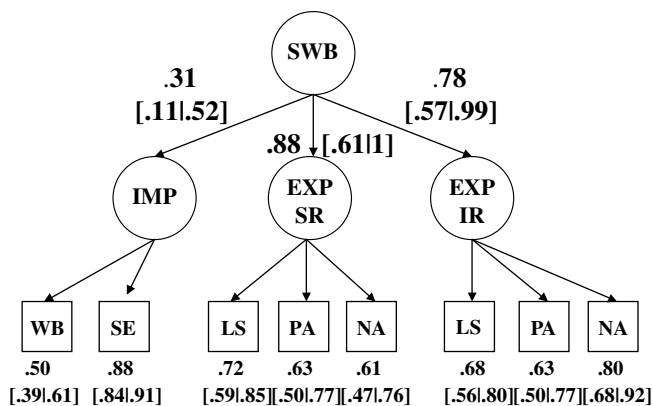


Fig. 1. Higher-order factor model of relations between explicit measures, implicit measures and a global latent SWB factor. Notes: 95% confidence intervals in parentheses. Only one of the two parallel IAT indicators is shown. WB, well-being; SE, self-esteem; LS, life satisfaction; PA, positive affect; NA, negative affect; IMP, implicit; EXP SR, explicit self-ratings; EXP IR, explicit informant ratings; SWB, subjective well-being. An output file with the model specifications and all model parameters is available from the authors upon request.

sure. The implied correlations among the three methods can be inferred from the product of the factor loadings (e.g.  $.31 \times .88 = .27$  for the correlation between the implicit and self-rating factor).

#### 4. Discussion

In the current study, we examined the validity of a newly developed happiness IAT as a measure of SWB. The study examined three questions. First, what is the correlation between implicit happiness and self-ratings of SWB? Consistent with studies of self-esteem, we found a low correlation (Greenwald & Farnham, 2000). In a study of 57 attitude objects, Nosek and Smyth (2007) found only 4 weak implicit–explicit correlations (White–Asian, Cold–Hot, Pants–Skirts, Future–Past). Second, we examined whether social desirable responding is responsible for low implicit–explicit correlations. Our results suggest that this is not the case because implicit measures also had low convergent validity with informant ratings, whereas self-ratings and informant ratings had moderate to high convergent validity. The third question was whether implicit measures assess a separate construct from explicit measures. Our finding of moderate to high correlations between the two implicit measures suggests that the implicit measures were related to a common factor that may represent unconscious associations of the self with positive attributes. One alternative explanation for the correlation between the two implicit measures could be shared method variance. However, Mierke and Klauer (2003) found that the new scoring algorithm of the IAT that we used to score the IAT greatly reduces the impact of shared method variance on correlations between different IATs. Therefore, we believe that the correlation between our happiness IAT and the self-esteem IAT is not a method artifact.

The main implication of our findings is that our happiness IAT does not fulfill the promise of measuring SWB without the problem of social desirable responding. Although, the implicit measures were significantly correlated with a latent SWB factor after controlling for measurement error, the factor loading suggests that the implicit measure contains only 9% ( $.31^2$ ) of the valid variance in SWB. Even at the upper limit of the 95% confidence interval, the amount of valid variance would be no more than 25%. In contrast, self-ratings and informant ratings contained more valid variance. Thus, it seems preferable to measure SWB with self-ratings and whenever possible with self-ratings and informant ratings rather than with implicit measures of well-being. Nevertheless, the modest amount of validity of implicit measures may be sufficient for comparisons of SWB between large groups. However, more research on the validity of implicit measures as measures of SWB is needed before substantive conclusions about causes and consequences of SWB can be based on findings with implicit measures related to SWB.

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