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Research Article

IMPLICIT AND EXPLICIT DEPRESSION IN OBESE AND NON OBESE - A CROSS SECTIONAL STUDY

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ABSTRACT

Background: Obesity and depression are increasingly prevalent and associated with numerous health complications including physical and mental, to examine the nature of the association between depression and obesity we have conducted a cross sectional study.

Objective: This study aimed to explore the association between depression and obesity through implicit and explicit measures and to analyze their relationship in obese and non-obese.

Materials and Methods : In this cross sectional study 124 participants both obese and non-obese were obtained from Arogyadhama a holistic health centre, S-VAYSA University, Bangalore, were assessed using a Implicit association test(IAT) to measure the implicit depression, BDI-II questionnaire for explicit depression were used with help of inquisit.3 software.

Results: Obese are slightly depressed than non obese implicitly ($P < 0.05$), and explicitly obese people showed more depressed than non-obese people ($P < 0.001$). Congruence between implicit and explicit depression in obese and non-obese, there was a strong correlation between implicit and explicit depression in non-obese group ($r_s = -.61, p < .001$), compared to obese group ($r_s = -.003, p < .97$).

Conclusion: This study provides evidence that obese are slightly depressed implicitly (unconscious) and more depressed explicitly (conscious) compared to non-obese, an important, new observation that implicit and explicit incongruence can be found in obese individuals than non-obese individuals.

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INTRODUCTION

Obesity and depression are increasingly prevalent and associated with numerous health complications, including physical and mental, apart from physical problems associated with obesity and overweight, there are issues which affect psychological well being of an individual; and also it is being stigmatized in many ways. Depression is commonest psychological co-morbidity of obesity. People with obesity face accusation and discrimination in many areas of their lives, and it has been assumed that their psychological well-being is compromised as a result. Obese reported poorer psychological well-being when compared with normal weight controls (Wardle, Volz & Golding, 1995). From previous studies association between obesity and depression have yielded inconsistent results (Friedman, Brownell, 1995). Some studies found an association (Roberts, *et al.*, 2002) others did not. Obesity and depression continue to confound modern medicine, may have a disturbing link: it is possible that treatment of one may trigger the other, The increasing prevalence of overweight

and obesity is a major public health concern. Clinical studies have reported higher rates of depression and psychopathology among persons with severe obesity (Hopkinson & Bland, 1982). Previous research suggests that obesity may be significantly associated with mood disorders (Stunkard *et al.*, 2003), (Faith *et al.*, 2002). Several community surveys in the United States and Canada have found associations between obesity and depressive symptoms, (Johnston *et al.*, 2004) (Heo *et al.*, 2006), Longitudinal studies have found that depression predicts the subsequent onset of obesity (Hasler *et al.*, 2004) that obesity predicts the subsequent onset of depression, successful weight loss is associated with decreased depression, and that depression predicts poorer success in weight loss (Dixon *et al.*, 2003).. Upcoming work in the area of depression and obesity should seek to further understand the direction of causation based on current work attempting to establish a firm link between the implicit and explicit variables in obese and non obese. This involves proving that the link is statistically more likely than chance, or coincidence. The present study seeks to further our understanding of depression in obese and

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how obesity and depression are related through a measurement of co-morbidity in study participants. Lastly, it is important to note that a significant correlation (or co-morbidity) between obesity and depression would indicate an important link between a physical illness and mental illness, which is methodologically important because outward symptoms of a mental illness provide a surer and more certain way of diagnosing those mental illnesses.

METHODOLOGY

Participants and Methods

The cross-sectional analytical sample consists of 124 obese and non-obese, obese 70 (Mean age=35.87 years, SD=±10.38) and non - obese 54 (Mean age=32.42 years, SD= ± 8.14), obtained from Arogyadhama a holistic health center, S-VAYSA University, situated in Bangalore. Subjects were in BMI range (28 kg/m² to 45 kg/m²) for obese group, and for comparison group non-obese subjects were in BMI range (< 25 kg/m²) were taken after screening. Those with associated medical problems such as cardiac problems, uncontrolled hypertension, diabetes, osteoarthritis and on psychiatric medications, Poor eyesight or eye problems were excluded. The tests were administered in individual sessions lasting about 30 min, during the normal schedule, with the support of a laptop computer. Data were collected following informed consent procedures established by the institutional review ethical committee of SVYASA University, Bangalore, India.

Measurements

Implicit depression: implicit Association Test

The IAT is a computerized reaction time task originally designed by Greenwald (Greenwald, McGhee, & Schwartz, 1998), to measure the relative strengths of automatic associations between two contrasted target concepts and two attribute concepts. Words from all four concept categories appear in mixed order in the middle of a computer screen and participants are instructed to sort them with a left (E) or right (I) response key. The premise here is that the sorting becomes easier when a target and attribute that share the same response key are strongly associated than when they are weakly associated. The category labels are visible in the upper left and right-hand corners of the screen during the whole task (for an example see <https://implicit.harvard.edu/implicit>). Following the design of Egloff and Schmukle (Egloff, Schmukle, 2002), IAT was constructed to measure automatic self-depressive association. For the IAT the target labels were me and other. The attribute labels were depressed and elated. Each category consisted of eight stimuli. IAT consisted of two critical test blocks that were preceded by practice blocks (see Table 1). In one test block me and depressed (and other and elated) shared the same response key, whereas in the other test block me and elated (and other and depressed) shared the response key. Before the start of a new sorting task, written instructions were presented on screen. After a correct response, the next stimulus was presented after 500ms. Following an incorrect response, the symbol “x” (wrong) appeared shortly above the stimulus. Meanwhile, the stimulus remained on the screen until the correct response was given.

To obtain explicit self-beliefs of depression, participants rated a 5-point scale (1=hardly/not at all, 5=very much) (i.e., “how much you feel, you are depressed.”).

Table 1 IAT structure

Block	No. of trials	Task	Response key assignment	
			Left Key	Right key
1	20	Target discrimination	Me	Others
2	20	Attribute discrimination	Depressed	Elated
3	20	Initial combined task (Practice)	me / depressed	other / elated
4	40	Initial combined task (Test)	me / depressed	other / elated
5	20	Reversed target discrimination	Elated	Depressed
6	20	Reverse combined task (practice)	me / elated	other / depressed
7	40	Reverse combined task (test)	me / elated	other / depressed

IAT = Implicit association test

Explicit Depression: Beck’s Depression Inventory (BDI): This is a 21-item questionnaire to assess symptoms of depression. There is much support for its reliability and predictive validity both in clinical and nonclinical populations (Kendall, Hollon, Beck, Hammen, & Ingram, 1987). Cronbach’s α 0.93 in our study.

Procedure

All participants volunteered to participate in the study, the procedure and requirement for the test were explained to the participants. After informed consent the experiment was administered through computer using Inquisit 3.0 stimulus presentation software. (Inquisit, 2011) the subjects typed demographic details and took the IAT and later an explicit BDI-II questionnaire, participants were individually assessed by a clinical psychologist in a quiet room for approximately 30 minutes.

Data Reduction IAT

The data were collected using computers. Inquisit stimulus presentation software was utilized for all tests including informed consent, questionnaires, and demography data sheet. IATs were administered through the stimulus presentation software, INQUISIT, version 3.0. The Inquisit program automatically generates and stores subjects' responses in a data file, with extension '.dat'. IAT scoring was done using the improved scoring algorithm (Pinter, Greenwald, 2005). For scoring the questionnaires, scoring scripts were written in R. Demographic details were extracted directly from the Inquisit output file. R statistical package(R Development Core Team, 2012) was used to analyze the data.

Data Analysis

All variables were expressed as mean \pm standard deviation. A two sample wilcoxon’s test was used to compare the obese and non-obese. Statistical significance was set at $p < 0.05$, and all the analyses were performed using R soft ware.

RESULTS

Obese and non obese between group comparison, the data were not normally distributed, two sample wilcoxon’s test showed obese are slightly depressed than non obese implicitly ($P < 0.05$) and explicitly obese people showed more depressed than non-obese people ($P < 0.001$).

*Positive D_score in implicit scale means: I DO NOT consider myself as depressive; and Negative score means I consider myself as depressive. Value of Implicit D score ranges from -2 to +2; And 0 means almost no preference towards either side.

dysfunctional self-associations could function as a repeating trigger for repetitive negative thoughts or depressive mood, even when more positive beliefs might exist on an explicit level.

Table 1 Implicit and Explicit Depression in Obese And Non -Obese Comparison

Variable	Mean obese	±Sd obese	Mean Non-obese	±Sd Non-obese	Shapiro-wilk p-val	Levene's Test p-val	p-vale	Effect size
IAT D_score	-0.02	0.45	0.14	0.49	0.27	0.90	0.03	0.36
Average latency	1831.69	800.10	1433.76	579.54	0.86	0.19	0.009	0.56
Error%	20.81	12.52	11.57	9.96	<0.00	0.02	0.000	0.81
BDI	24.22	9.66	3.03	6.67	<0.00	0.00	0.000	2.55

(BDI=beck's depression inventory, IAT=implicit association test, D_score= depression score). *p < 0.05; **p < 0.01; ***p < 0.001.

Table 2 Implicit -Explicit Depression Correlation in Obese and Non-Obese

Obese group N=70			Implicit-Explicit Correlation	Non-obese group N=54		
Variable	P-val	r _s		Variable	P-val	r _s
BDI-IAT	0.9783	-0.003		BDI-IAT	<0.001	-0.611

(BDI=beck's depression inventory, IAT=implicit association test, r_s= spearman's co-relation)

Data were analyzed for implicit and explicit correlation; a Spearman's correlation was run to determine the congruence between implicit and explicit depression in obese and non-obese. There was a strong correlation between implicit and explicit depression in non-obese group (r_s = -.61, n = 54, p < .001), compared to obese group (r_s = -.003, n = 70, p < .97).

DISCUSSION

This article contrasts the pattern of depression association between obese and non-obese implicitly and explicitly. The major finding of this research is that obese are slightly depressed than non obese implicitly (P<0.05) and obese people showed more depression explicitly than non-obese people (P<0.001) found in this study is similar to findings reported previously obesity is statistically significant in its co-relational relationship to major depressive symptoms (Lester *et al.*, 2011 & Murphy *et al.*, 2009), in addition to that the interactions between automatic self-depressive associations and explicit self-depressive beliefs did not match in obese compared to non-obese, it is an important, new observation that implicit and explicit incongruence can be found in obese individuals than non-obese. This research suggests that automatic self-depressive associations showed predictive validity for depression in obesity, according to recently developed information processing models (Wilson *et al.* 2000), automatic and explicit cognitions are assumed to predict different kind of behaviors. Explicit associations (beliefs) tend to predict more deliberate, controlled behaviors, whereas automatic associations are most critical for guiding relatively spontaneous behaviors (Asendorpf *et al.* 2002; Egloff & Schmukle 2002; Huijding & de Jong 2006). There is evidence that this is especially important in circumstances where there is little cognitive capacity left to deliberate about these automatic associations. Obesity was related to worse mental health in both white and black women (Reed, 1985), Cognitive capacity could also play a role in the context of depression in obesity. When cognitive capacity is limited, for example by natural ability or by other factors such as life-stress, dysfunctional automatic self-associations might obtain a stronger influence (Beavers 2005). In these cases, the automatic activation of

These findings highlight the critical need of psychological wellbeing in obese, particularly because obesity was associated with an increased risk of depression (Carpenter *et al.*, 2000), which confirms that a higher ratio of psychopathology (depression, behavioral problems, low-esteem) is seen among clinical obese adolescents than among non-clinical obese adolescents (Serpil *et al.*, 2004), obese and overweight Chinese adolescents were associated with more experience of depression (Xie *et al.*, 2003). Important directions for future research include measures of psychological wellbeing in obese and interventions pointing towards enhancing mental health by reducing depressive mood and implicit explicit incongruence. In summary, the present research suggests that obese are slightly depressed implicitly (unconscious) and more depressed explicitly (conscious) compared to non-obese. Future obesity management efforts should be aimed at elevating the psychological wellbeing of obese by decreasing depressive mood. This research sheds light on conscious and unconscious association of depressive mood related to obesity that can be used to formulate appropriate intervention strategies in this and similar populations.

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Conflict of interest statement

The authors declare that they have no competing interests.

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