

Monographic article

# Mindful eating and its relationship with body mass index, binge eating, anxiety and negative affect

*Comer con atención plena y su relación con el índice de masa corporal, atracones, ansiedad y afecto negativo*

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## Abstract

Mindful eating concerns an awareness of our dietary habits, while its absence is typically associated with anxiety, negative affect and binge eating. The objective of this study was to analyze these variables in a sample of 216 individuals, divided in four groups: students who practiced sport regularly, university athletes, yoga practitioners and persons suffering from obesity. They were assessed by a semi-structured interview and the questionnaires MEQ, BES, PANAS and BAI. Statistical analyses included descriptive statistics, Pearson correlation, ANOVA and multiple regression. Results demonstrated that people who have less awareness of their eating habits are generally more overweight, more anxious and have higher levels of negative affect, while they demonstrate less control over their eating habits. Moreover, these variables can predict binge eating. The model obtained was significant ( $p < .001$ ) and its predictive capacity through  $R$  square corrected was .51. This means that the model predicts a 51% of binge eating from mindful eating, body mass index, anxiety and negative affect.

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**Keywords:** Mindful eating; Obesity; Anxiety; Negative affect; Binge eating

## Resumen

*Mindful eating* se concibe como una consciencia de nuestros hábitos alimenticios, mientras que su ausencia está asociada a la ansiedad, al afecto negativo y a los atracones alimenticios. El objetivo de este estudio es analizar estas variables en una muestra de 216 participantes, divididos en 4 grupos: estudiantes que practican deporte regularmente, atletas universitarios, practicantes de yoga y personas con obesidad. Todos ellos fueron evaluados mediante una entrevista semiestructurada y los cuestionarios MEQ, BES, PANAS y BAI. Los análisis estadísticos que se utilizaron fueron los estadísticos descriptivos, la correlación de Pearson, ANOVA y la regresión múltiple. Los resultados demostraron que las personas con menores niveles de consciencia sobre sus hábitos alimenticios tenían un peso más elevado, más niveles de ansiedad y afecto negativo y menor control sobre sus hábitos alimenticios. Además, estas variables podían predecir el atracón alimentario. El modelo obtenido fue significativo ( $p < 0.001$ ) y su capacidad predictiva mediante  $R^2$  fue de 0.51. Esto indica que el modelo es capaz de predecir un 51% de los episodios de atracón alimentario mediante el *mindful eating*, el índice de masa corporal, la ansiedad y el afecto negativo.

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**Palabras clave:** Comer conscientemente; Obesidad; Ansiedad; Afecto negativo; Atracón alimentario

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## Introduction

Mindfulness is a practice that allows the mind to concentrate on the present moment. Brown, Ryan, and Creswell (2007) define mindfulness as the awareness of an event without judging the moment. The roots of the concept are based on different philosophical and psychological trends, such as Buddhism, existentialism, humanism and the American transcendentalism (Brown et al., 2007). Mindfulness is defined as a moment-to-moment visualization that keeps judgments aside while maintaining an open heart (Kabat-Zinn, 2005). A useful metaphor proposed by Rappaport, Trantham, Surrey, Chang, and Mullin (2013) is to picture in our minds a hurricane in which we settle in its eye while there is chaos all around us. We are thus able to maintain peace and to capture the situation from different perspectives.

One of the main focuses in training mindfulness is conscious of the body, considered as an interactive and dynamic process that includes the perception about the states, processes, acts and sensations of the corporal entity (Mehling et al., 2009). This corporal consciousness can be modified by different mental processes, which include attention, interpretation, values, memories, aptitudes, conditioning and affection (Mehling et al., 2011). Moreover, corporal consciousness has been linked with diseases such as diabetes, overweight and eating disorders (Dalen et al., 2010; Daubenmier et al., 2011; Framson et al., 2009; Hulbert-Williams, Nicholls, Joy, & Hulbert-Williams, 2014; Kristal, Littman, Benitez, & White, 2005; Mantzios & Wilson, 2015).

Due to the well-known relationship between eating habits and emotional well-being there has recently been an interest in the link between mindfulness and nutrition. Some training programs based on mindfulness have shown satisfactory results in this context. They demonstrate how mindfulness training shifts eating habits away from external factors like the form and smell of food, toward a greater appreciation of internal factors such as appetite (Rodin, 1981). The result is less consumption based exclusively on external stimuli – smell and/or attractiveness of the food – and, by extension, a general shift in eating preferences toward healthier foods. Consequently, there is a reduction in weight (Dalen et al., 2010; Hong, Lishner, Han, & Huss, 2011; Kristeller & Hallett, 1999; Kristeller & Wolever, 2010; Wansink, Painter, & North, 2005; Wansink, 2004; Wansink, 2010).

In this sense, mindful eating is defined as the connection between the mind and body that permits awareness of what we are eating and how it makes us feel (Hirshmann & Zaphiropoulos, 2012). In short, it concerns why we eat: because we are hungry, because it is time to eat, because of a particular social situation, for example, even though we are not hungry (Bahl, Milne, Ross, & Chan, 2013; Hepworth, 2011; Hong et al., 2011; Rodin, 1981). Mindful eating is thus described as a state of attention without judgment about the physical and emotional sensations we experience while eating (Framson et al., 2009). Accordingly, the practice of mindful eating involves our full awareness so as to identify emotional or physical hunger. It helps to distinguish the needs of our body and to determine whether or not we have had enough food (The Center for Mindful Eating,

2013). This allows for the greater enjoyment of eating, including an appreciation of the form, smell and flavor of food, while recognizing that these external factors are not the main cause of eating.

Thich Nhat-Hanh and Cheung (2010), in their book “Savor, mindful eating, mindful life” explain how cultural, economic and marketing practices are inherent to the way we consume and buy food. With technological improvements and lifestyle changes we have become increasingly sedentary, which in turn affects our eating habits. Their teachings show that the principal factors that change people’s eating habits involve particular emotions, the environment and individual levels of awareness. Similar studies have revealed a negative correlation between mindful eating and obesity (Dalen et al., 2010; Daubenmier et al., 2011; Framson et al., 2009; Hulbert-Williams et al., 2014; Kristal et al., 2005; Mantzios & Wilson, 2015). Accordingly, people suffering from obesity have demonstrated a reduced consciousness of what and how they consume.

Based on these previous investigations we can infer that obesity is highly related to negative emotions. Anger, anxiety, sadness, or depression all contribute to our eating habits. It can lead to an increased appetite and search for higher calorie foods thus forming a chain reaction in which the individual is unable to better understand the relationship between mood and consumption (Hulbert-Williams et al., 2014; Lindeman & Stark, 2001). In the case of persons diagnosed with bulimia, guilt and anxiety result in the consumption of large amounts of high calorie foods and compensatory conducts to eliminate these negative feelings (Mauler, Hamm, Weike, & Tuschen-Caffier, 2006). Anxiety, for example, is one of the principal emotions involved with an increase in eating habits (Daubenmier et al., 2011, 2012; Hearon, Utschig, Smits, Moshier, & Otto, 2013; Levitan & Davis, 2010). Similarly, for Davenport, Houston, and Griffiths (2012), food works like a reward wherein women suffering from anxiety feel better though eating. In short, consumption becomes a coping mechanism to reduce negative emotions.

In addition, other authors have contributed to our understanding of mindful eating by treating it as a measureable characteristic. Framson et al. (2009), for example, created the Mindful Eating Questionnaire (MEQ) to evaluate the level of mindfulness of our eating habits. According to the study, people with a higher body mass index demonstrate less mindful eating than the people who practice yoga and meditation. Further to this, other authors demonstrate that mindful eating is highly related to yoga and sport practice (Daubenmier, 2005; Kristal et al., 2005; McIver, O’Halloran, & McGartland, 2009).

These findings could be related with the body awareness, an interactive and dynamic process which includes the perception about the states, processes, actions and sensations of the body (Holzel et al., 2011; Mehling et al., 2009). In this sense, people who practice yoga and sport could have more body awareness and following this, more mindful eating.

Moreover, other studies show that mindful eating is negatively correlated with binge eating (Cohen, 2008; Jordan, Wang, Donatoni, & Meier 2014; Kristeller, Wolever, & Sheets, 2014; Mauler et al., 2006; Rodin, 1981; Wansink, 2010, 2011). This relates to a loss of control in a short period of time when a

person eats large quantities of food. In addition, as mentioned, anxiety and negative affect is strongly associated with uncontrolled eating (Berrocal & Ruiz, 2002; García-García et al., 2008; López-Aguilar et al., 2010). Following these findings, Dalen et al. (2010), created a technique called Mindful Eating and Living (MEAL) to treat people with obesity. They observed that participants who completed the program experienced weight loss, and a reduction in levels of anxiety and binge eating. But it is necessary more investigation that study the relationship between binge eating, obesity, mindful eating, and psychological symptoms as negative affect and anxiety.

Following the expert literature in the study with mindful eating, it has found some limitations and these have made us to ask the next questions: are there similar levels of mindful eating in people who practice yoga and sport compared with people who suffer obesity? Are there correlations between mindful eating, body mass index, binge eating, anxiety and negative affect in our sample? If there are relations, are these variables predicting the binge eating?

#### *Aim of the study and assumptions*

The objectives of this work are: to analyze the levels of mindful eating between four groups: yoga practitioners, sport recreational practitioners, university athletes and people suffering obesity; to analyze the relationship between mindful eating and body mass index, binge eating, anxiety and negative affect; and finally, to analyze the predictive capacity of these variables in the binge eating.

The assumptions of the study are:

- People who practice sport or yoga would have more mindful eating than people who suffer obesity.
- Low levels of mindful eating are related with body mass index, binge eating, anxiety and negative affect.
- Low levels of mindful eating and higher levels of body mass index, anxiety and negative affect would predict the binge eating.

## **Method**

### *Participants*

The sample consisted on 216 participants with Mexican nationality, 56.94% women ( $N=123$ ) and 43.05% ( $N=93$ ) men, from the ages 18 to 30, with an average of 22.46 ( $SD=3.161$ ). It was a nonprobability and purposive sampling, by disposition.

The 26.38% ( $N=57$ ) were students who practiced recreational sport regularly as running and fitness (at least twice per week); 24.53% ( $N=53$ ) university athletes who practice competitive sport, training 3 h per day; 22.68% ( $N=49$ ) yoga practitioners who practice yoga at least three times per week; and the 26.38% ( $N=57$ ) persons suffering obesity, recruited from obesity clinic.

### *Instruments*

First, participants were asked about their socio-demographic, clinical data and eating related habits. From these findings, we calculated the body mass index by the formula:  $\text{weight}/\text{height}^2$ .

To evaluate the level of eating awareness it was used the Mindful Eating Questionnaire (MEQ) elaborated by Framson et al. (2009). The questionnaire contains 28 items using a 4-point Likert type scale, and it has an internal consistency of .64. The scale contains five factors: disinhibition, consciousness, external factors, emotional response and distraction.

To evaluate the binge eating, the Binge Eating Scale, was used (BES; Gormally, Black, Datson, & Rardin, 1982). The questionnaire has 16 items using a 3 or 4-point Likert type scale depending on the item. Validated in Mexican population for Zúñiga and Robles (2006).

To measure the affect it was used the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988), which has 20 items and two factors: positive and negative affect, using a 5-point Likert type scale. Internal consistency for the positive affect is .85 and for the negative affect .80. For this investigation, it was used only the negative affect and the Spanish version (Sandín et al., 1999).

And the anxiety was measured by Anxiety Inventory of Beck (BAI; Beck, Epstein, Brown, & Steer, 1988). It has 21 items using a 4-point Likert type scale and its internal consistency is .75. Validated in Mexican population for Robles, Varela, Jurado, and Páez (2011).

### *Procedure*

First of all, this investigation was approved by an ethic committee of the Psychological area from the University. The sample was non probabilistic because the participants were choose based on their characteristics. After the informed consent from participants was obtained, they completed the questionnaires.

### *Data analysis*

Statistical analyses included descriptive statistics of the variables under study, Pearson correlation to describe the relation between anxiety, negative affect and binge eating with mindful eating, ANOVA to describe the differences between the four groups, and multiple regression. To evaluate the results the *Statistical Package for the Social Sciences* was used (SPSS) version 23.

## **Results**

### *Sample characteristics*

As it was said, the sample consisted on 216 participants, 56.94% women ( $N=123$ ) and 43.05% ( $N=93$ ) men, with an average of 22.46 years ( $SD=3.161$ ). The 75.46% ( $N=163$ ) were student of university and 24.53% ( $N=53$ ) active workers.

Yoga practitioners had an average of body mass index (BMI) of 22.74 ( $SD=3.520$ ); obesity group had 34.26 BMI

(SD = 3.782); university athletes had 23.27 BMI (SD = 2.981); and students who practice regular sport had 23.06 BMI (SD = 2.248).

#### *Mindful eating between groups*

First of all, Levene's test confirmed homoscedasticity and ANOVA showed that there are significant differences in the four groups ( $F = 105.37$ ,  $gl = 3$ ,  $p \leq .05$ ). The mean of mindful eating for the yoga practitioners was 15.26 points (SD = 1.245); for the group with obesity 10.23 (SD = 1.187); for University athletes 12.22 (SD = 2.038) and for student recreational athletes 11.75 points (SD = 1.291). Post hoc analysis using Tukey's test showed significant differences between groups ( $p \leq .01$ ). This suggests that people suffering from obesity demonstrate less mindful eating than people who practice sport or yoga.

#### *Correlational analysis*

Results showed a significant and negative relationship between mindful eating and body mass index ( $r = -.544$ ,  $p \leq .01$ ). This indicates that people with higher levels of body mass index have less mindful eating.

The correlation between mindful eating and binge eating measured by BES was significant and negative ( $r = -.456$ ,  $p \leq .01$ ). People demonstrating lower levels of mindful eating present more episodes of uncontrolled eating habits and binge eating. Moreover, it was observed a significant and negative correlation between mindful eating and anxiety ( $r = -.252$ ,  $p \leq .01$ ). People with higher levels of anxiety demonstrate less mindful eating. Our results also revealed a significant and negative correlation between mindful eating and negative affect ( $r = -.272$ ,  $p \leq .01$ ). This establishes that people who have higher level of negative affect exhibit less mindful eating.

#### *Predictive analysis*

To obtain the results of this objective, a multiple regression analysis was realized using as dependent variable the binge eating. As independent variables are mindful eating, body mass index, anxiety and negative affect.

The model obtained was significant ( $F = 43.022$ ,  $p < .001$ ) and its predictive capacity through *R square* corrected was .51. This means that the model predicts a 51% of binge eating from mindful eating, body mass index, negative affect and anxiety.

Analyzing the capacity of prediction of every variable, results showed that binge eating is predicted by anxiety ( $\beta = .355$ ,  $p < .01$ ), negative affect ( $\beta = .230$ ,  $p < .01$ ), mindful eating ( $\beta = .213$ ,  $p < .01$ ) and body mass index ( $\beta = .150$ ,  $p < .01$ ). So, it indicates that people who have high body mass index, high levels of anxiety and negative affect, and low mindful eating, will have more possibilities to have binge eating.

### **Discussion and conclusions**

As demonstrated, mindful eating is a complex process that relates to how we consume food – from our everyday eating

habits to binge eating – and its potential association with emotions such as anxiety and negative affect.

The first hypothesis was that people suffering from obesity exhibit less mindful eating than people who practice yoga or sport at a professional or recreational level. The results reveal different degrees of mindful eating between yoga practitioners, university athletes, students who practice sport and those suffering from obesity. This is consistent with previous investigations (Dalen et al., 2010; Daubenmier et al., 2011; Framson et al., 2009; Hulbert-Williams et al., 2014; Kristal et al., 2005). To practice sport, and above all yoga, increases body awareness and mindful eating. In contrast, people suffering from obesity have less mindful eating, so it is important for the obesity treatment to attend to body awareness.

The second hypothesis was that people with binge eating habits exhibited less mindful eating, and mindful eating was negatively related to anxiety and negative affect. In fact, it was found that people with poor levels of mindful eating had higher levels of uncontrolled eating and in some cases binge eating. These results are thus consistent with those of other authors (Jordan et al., 2014; Mauler et al., 2006). It was observed too that people with high levels of anxiety and negative affect had less mindful eating; a finding consistent with other investigations (Davenport et al., 2012; Hearon et al., 2013; Levitan & Davis, 2010; Lindeman & Stark, 2001). Negative emotions affect the capacity to observe the own body, its necessities and healthy eating habits.

And finally, the third hypothesis was that binge eating could be predicted by mindful eating. This hypothesis was partially validated because, for one hand, it was observed that mindful eating predicts binge eating but there are other variables that are predicting it too, like negative affect and anxiety. So, until the hypothesis is consistent with other studies (Cohen, 2008; Jordan et al., 2014; Kristeller et al., 2014; Mauler et al., 2006; Rodin, 1981; Wansink, 2010), it is necessary more study about it. In this point is important to say that this study provides new information about the relationship between mindful eating and binge eating but, it is necessary to investigate it more careful and to discover if mindful eating is mediating between anxiety, negative affect and binge eating or in contrast, if it is an precedent variable in this relation.

The study has some limitations. First, the questionnaire used explores the physical symptoms associates with anxiety rather than one that focuses more on the thoughts and feelings related to anxiety. Second, it is necessary to better investigate the obesity group and to divide it into those with lower or higher levels of anxiety. This will allow future research to discover whether anxiety is mediating factor between mindful eating and obesity. And third, a cross-sectional design was used and it could limit the results.

Finally, it can be observed that mindful eating is associated with obesity, binge eating, anxiety and negative affect. But, is mindful eating a variable that can moderate binge eating? Is anxiety a mediating factor that operates between mindful eating and obesity? The next step of this study is thus to further explore these questions by creating a model through structural equations that explains in greater details the relationship between

emotions, binge eating and mindful eating, especially in relation to the obesity group. If we can explain how these variables are related, we could propose mindful eating training to treat obese patients more effectively; a treatment that relates to their emotions, behaviors, thoughts and most importantly, their body awareness.

In conclusion, mindful eating is related to body mass index, binge eating, anxiety and negative affect and it is important to consider it because it can be useful to promote healthy eating and to prevent obesity.

### Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

### Informed consent

Informed consent was obtained from all individual participants included in the study.

### Authors' contribution

SP participated in theoretical framework, data analysis, elaboration of the paper; PS contributed in theoretical framework, application of tests and review of paper. For further information about this research contact Sheila Pintado.

### Conflict of interest

Sheila Pintado-Cucarella declares that he/she has no conflict of interest. Paulina Rodríguez-Salgado declares that he/she has no conflict of interest.

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