KU LEUVEN

FACULTY OF ECONOMICS AND BUSINESS

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# Balancing Body and Mind

*Importance of a balanced body and mind in eating behavior*

MASTER IN DE TOEGEPASTE ECONOMISCHE WETENSCHAPPEN

Herlinde Aerts

0302398

Thesis submitted to obtain the degree of

**Major Marketing**

Promoter: Prof. Dr. L. Warlop
Co-promoter: Prof. Dr. W. Vanhouche

Academic year 2015-2016

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## *Importance of a balanced body and mind in eating behavior*

*This study investigates the relationship between intuitive eating and body-mind practice, and the potential mediating roles of body awareness and body responsiveness. Based on a resource perspective, this study hypothesized a positive relationship between body-mind practice and intuitive eating, mediated by body awareness and body responsiveness. As a result, we expected body-mind practitioners to have a healthier BMI and a positive impact of frequency and extent of practice on intuitive eating. An online questionnaire was designed to examine intuitive eating, body awareness and body responsiveness in body-mind practitioners and two control groups. One group of participants who take aerobic classes and another group who don't take any classes. Results confirmed the hypothesized positive relationship between body-mind practice and intuitive eating. Furthermore, more frequent practice and a higher level of proficiency were associated with a higher level of intuitive eating. Body-mind practice was also related to a healthy BMI. The mediating role of body awareness and body responsiveness was not supported. Implications and limitations of the study are discussed.*

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# General Introduction

According to many cultural theorists, Western culture is strongly shaped by the dualistic construction of the human mind and body, postulated by René Descartes. In particular, the body is placed inferior to the mind, this duality creates a binary in which the body is denigrated because of its capacity for temptation and weakness.
Lakoff and Johnson (1999), claim that because of this premise we identify ourselves too strong with our mind and we tend to distance ourselves from our bodies. As a result, we have a distort sense of self because we may frame our experiences as subjectively happening through the mind. As a consequence we treat our body as an object.
In line with Lakoff, recent research showed that holding dualistic beliefs leads people to perceive their body as a mere 'shell', something that needs to be managed by the mind (Forstmann, Burgmer and Mussweiler, 2012). Prior research has shown that on the long run, such rigid cognitive and behavioral controls of the body may undermine body awareness, defined as the ability to correctly and confidently identify one's physical sensations as well as link these to emotions. Moreover, it may impede the extent of a person's responsiveness to these bodily sensations (Gast and Hawks, 1998).

This concept can be applied to eating behavior. Babies cry when they are hungry and push away food when they are full. Based on this observation prior research has argued we all have an inborn quality to be able to regulate our food intake in a healthy manner: eating what and when we want, beginning when we are depleted and stopping when we are saturated (e.g. Gast & Hawks, 1998; Schwartz, 1982). However, living in a society with an abundance of food, busy lifestyles and social pressure, many people get inhibited in this quality and start eating for other reasons than physiological hunger and satiety cues. For instance, environmental cues, such as media and marketplace emphasis on the perfect body, social cues, such as peer pressure, and emotional cues, such as stress release, influence eating behavior (Spence et al., 2013). Although, consumers are exposed to vast amounts of information about what and when one should be eating to stay healthy, weight related disease are still rising at a staggering pace.

Based on the above-mentioned assumption that the body intrinsically 'knows' the quantity and type of food to eat to maintain both nutritional health and an appropriate weight, the intuitive eating paradigm exists. The basic premise of intuitive eating is that people become overweight or obese because they eat in response to other cues than physiological hunger and satiety cues. When individuals eat intuitively, they generally consume more nutritious foods that help their bodies function well and view taste as only one factor involved in food choice. In addition, they are able to maintain a weight that is

healthy for their height and sex (Eneli, Crum, & Tylka, 2008), while at the same time avoiding overeating, obsessive food consumption and harmful dieting (e.g., Schwartz, 1982).

This study looks at the relationship between body-mind practice, such as Yoga, Tai Chi and Pilates, and intuitive eating. While engaging in poses that trigger balance, practitioners get to an internally-oriented awareness of the body as opposed to an externally oriented awareness of the body. Research found that body-mind practice increases body-awareness and body-responsiveness (eg. RANI and RAO, 1994; Daubenmier, 2005). Greater awareness of one's feelings and bodily desires may increase the self-confidence necessary to make balanced decisions that feel right (Shiffmann, 1996). Based on the idea that body-mind practice cultivates this internally-oriented awareness rather than looking objectively from the outside in, this study hypothesizes a positive relationship between intuitive eating and body-mind practice. Moreover, this study investigates the mediating role of body awareness and body responsiveness between body-mind practice and intuitive eating. Furthermore, based on the idea that intuitive eating leads to a healthy BMI, this study hypothesizes that body-mind practice leads to a healthy BMI. Lastly, this study looks at the impact of frequency and extent of practice on intuitive eating.

# 1. Literature Review

This first chapter will provide an overview of the current state of research. The first section of the literature review will explore body-mind connection, body-mind practice and the importance of balance in balancing body and mind. The second section will provide more insight into the intuitive eating paradigm and its four dimensions.

## 1.1. Body-Mind

### 1.1.1. Body-Mind Connection

#### *1.1.1.1. History*

The body-mind connection has been a topic for debate since ancient times. Most ancient philosophers were convinced that the mind and the body were strongly connected, big thinkers like Hippocrates thought good health depends on a balance of mind, body, and environment. In 16th century influential thinkers like René Descartes claimed the opposite, they argued that there is an inherent division between the mind and the body and the sense of self. Western culture is strongly shaped by this premise, we have two distinct programs of research: one for the body, which undertook our medicine, and another for the mind, which undertook our psychology. It could be argued that this view limits our understanding of human reality and undermines our ability to comprehend fundamental aspects of human being.

Over the past decades, cognitive neuroscience has witnessed a shift from predominantly disembodied and computational views of the mind, to more embodied and situated views of the mind. In 1964, psychiatrist George Solomon began to investigate the impact emotions had on inflammation and the immune system in general. He noticed that people with rheumatoid arthritis got worse when they were depressed. More understanding of the mind-body link came in 1987, when psychologist Robert Ader showed that mental and emotional cues could affect the immune system.

A French phenomenological philosopher of 20th-century who recognized this body-mind connection was Merleau-Ponty. He is one of the few Western thinkers to postulate that our understanding of the world is founded on the body's perception of its surroundings and situations. According to Merleau-Ponty (1962), "the only way we can access this world is through our lived bodies. We can experience and understand our body in two ways: as a perceiving subject and as a perceived object." On the perceived side, we can reflect cognitively on our body, from the outside, as a physical and biological object for example when we see ourselves in a mirror or when we weight ourselves. On the

perceiving side, we can feel our body from the inside, as an object of direct perception, for example when we feel our body moving or when balancing our body. He argued that the world and sense of self are emergent phenomena in an ongoing and continuing interaction between environment and body, therefore the body is neither subject nor object, but an ambiguous third party (Merleau-Ponty, 1965, p. 108).

#### *1.1.1.2. Impact on Western Culture*

As stated before Western culture is strongly shaped by the thought of a separate mind and body. The body is positioned inferior to the mind. Lakoff and Johnson (1999), claim that because of this premise we identify ourselves too strong with our mind and we tend distance ourselves from our bodies. As a result, we have a distort sense of self because we may frame our experiences as subjectively happening through the mind and as a consequence we perceive our body as an object. This object status is part of our culture and becomes clearly evident when we refer to the body as something to be investigated, trained, slimmed, in order to serve other purposes. It may be a matter of aesthetics, efficiency or productivity. The body is experienced more via glances, on the weighing scales, in the mirror and by thoughts about being judged by others, than by living and feeling one's own body.

Forstmann, Burgmer and Mussweiler, (2012) investigated the relationship between dualistic beliefs and health behaviors. They theorized that holding dualistic beliefs leads people to perceive their body as a mere 'shell' and, thus, to neglect how it feels. Supporting this hypothesis, their results showed that participants who were primed with dualism reported less engagement in healthy behaviors and less positive attitudes toward such behaviors than did participants primed with physicalism.

New technologies make it easier than ever to gather and analyze personal data on a person's state, actions and performance using wearable technology or mobile applications. The result is a decorporalized body, a 'quantified self'. This activity is known as self-tracking (Lupton, 2013). Using self-tracking technologies encourages people to think about their bodies and their selves through numbers. Studies have shown these new technologies are promising, but as Einstein once wrote "Not everything that can be counted counts, and not everything that counts can be counted". If the numbers show someone is exercising enough, is sleeping enough, … these numbers create a virtual healthy body, regardless of how well an individual might actually feel. Moreover, numbers are not neutral. The way we count and interpret the numbers is implicated in our culture and there are different ways of seeing.

In the light of the alarmingly high levels of obesity and disordered eating behaviors in Western societies, these tracking technologies are widely used to maintain, gain or lose

weight (e.g., Mintz & Betz, 1988). Herman and Polivy (1985) argue that when individuals exert cognitive control over their internal cues, by limiting or increasing what, when, and how much they eat in line with their dietary restrictions, such rigid cognitive and behavioral controls may undermine individuals' understanding of internal cues and may cause negative outcomes, such as weight cycling, increased risk of eating disorders and a dysfunctional relationship with food on the long run.

Babies cry when they are hungry and push away food when they are full. Therefore, this study suggests we all have a natural mechanism within ourselves that is giving us the perfect information what our body needs, we just got to listen to the signals it is giving us and tap into it. Thus, this study sought insight into the literature on how to practice a healthy body-mind connection, how to be more aware of our individual unique needs and how this can help us make more balanced decisions.

### 1.1.2. Body-Mind Practice

Body practices focus on how emotional states, psychological stress, and mental and behavioral dispositions can affect health. Due to prominence of dualistic beliefs in western culture there is a considerable difference in how the West thinks of body practices as irrelevant to analyzing states of consciousness and how other cultures make direct links between these practices and the shaping of consciousness.

The Japanese philosopher Yuasa studied the shaping influence of the difference in sense of body-mind. He found that there were ideas in Japanese thought that did not quite parallel Western thought. He summarized the differences between the Eastern and Western approach to the body-mind relationship:

> “One of the characteristics of Eastern body-mind theories is the priority given to the questions, ‘How does the relationship between the mind and the body come to be through cultivation?’ or ‘What does it become’. The traditional issue in Western theories, on the other hand is ‘What is the relationship between the mind-body?’ In other words, in the East one starts from the experiential assumption that the mind-body modality changes through the training of the mind and body by means of cultivation or training. Only after assuming this experiential ground does one ask what the mind-body relation is. That is, the mind-body issue is not simply a theoretical speculation, but it is originally a practical, lived experience, involving the mustering of one's whole mind and body. The theoretical is only a reflection on this lived experience” (Yuasa and Kasulis, 1987, p.18).

The Eastern view takes consciousness as a quality that emerges and grows more articulate and expansive from experiences of seeing, hearing, feeling, walking, talking, as

a person comes slowly to a sense of where he or she is. To grow this quality, they practice the process of becoming reflectively attentive to bodily sensations and sensory experiences. These are called body-mind practices; all these practices have their own intrinsic complex bodies of theory.

In the past century, Western culture has begun the process of rebalancing its materialistic perspective and related methodologies by reexamining more embodied and situated views of the mind (Dacher, 2014). Although the gaps in understanding between researchers and practitioners may be still hindering scientific efforts to assess therapies, recent studies have shown promising results. Mind-body practices are found to be beneficial for stress reduction (eg. Nosaka and Okamura, 2015; Arora and Bhattacharjee, 2008), cognitive decline (Lam et al., 2010), self-regulation (Chambers, Gullone and Allen, 2009), addiction treatment and prevention (Khanna and Greeson, 2013), reduction for inattentional blindness (Schofield, Creswell and Denson, 2015). However, there is currently no overarching framework to understand the potential beneficial effects of body-mind practice. This dissertation focuses on the cultivation of awareness through movement and focuses on the sensation of balance in Eastern mind-body therapies such as Yoga, Qigong, and Tai Chi and modern western versions such as postural yoga, BodyBalance, and Pilates.

### 1.1.3. Balance Practice to Balance Mind and Body

Human balance is an act that connects mind and body, by immersing oneself into the subtle sensations of the body. Balance is the platform for all human movement and keeps our nervous system functioning at a high level. Training balance ultimately means training the nervous system, since skeletal muscles will not contract unless they receive a signal from the nervous system. Body-mind practices, use this technique to cultivate a mind and body connection. Engaging in poses that trigger balance brings people to an internally-oriented awareness of the body as opposed to an externally oriented awareness of the body. In body-mind classes participants are instructed to attend to felt-bodily sensations before, during, and after a pose. Practitioners learn to value and listen to their body's sensations and feedback in order to move within a zone of comfort while still providing a physical challenge to the body (Shiffmann, 1996). Research found that body-mind practices increases body-awareness and body-responsiveness (eg. RANI and RAO, 1994; Daubenmier, 2005).

The term body awareness has been used across multiple health topics. Although a clear definition is rarely provided, body awareness involves the ability to correctly and confidently identify one's physical sensations as well as link these to emotions (Mehling et al., 2009). Body awareness contrasts with the external awareness required for physical

exercises that rely on external cues, such as loud music and imitation of an instructor for bodily movement in aerobic classes.

Body responsiveness is the extent of a person's responsiveness to these bodily sensations. Greater awareness of one's feelings and bodily desires may increase the self-confidence necessary to make decisions that feel right (Shiffmann, 1996).

Thus, this study predicts that emphasis on developing body awareness and body responsiveness supports making balanced decisions in eating behavior. An eating paradigm based on this body-mind connection is intuitive eating. The fundamental premise behind intuitive eating is that, if listened to, the body intrinsically 'knows' the quantity and type of food to eat to maintain both nutritional health and an appropriate weight (Van Dyke and Drinkwater, 2013). The next section will provide more insights on this paradigm.

## 1.2. Intuitive Eating

### 1.2.1. What Is Intuitive Eating?

Intuitive eating is defined as a strong connection with the body and understanding of internal cues and to use these to guide eating behavior, coupled with a low preoccupation with food (Tribole & Resch, 1995; Tylka, 2006). A premise of intuitive eating is that people become overweight or obese because they eat in response to external cues rather than internal cues (Gast and Hawks, 1998).

In accordance with the approach of positive psychology (Seligman & Csikszentmihalyi, 2000) that examines adaptive behaviors contributing to and maintaining psychological health, a number of studies have argued that all individuals have a natural mechanism within themselves that tells them what it needs, avoiding food consumption for emotional, social, or environmental cues, being mindful of the body's satiety level (e.g. Gast & Hawks, 1998; Schwartz, 1982). From this perspective, individuals are thought to be able to regulate their food intake in a healthy manner, eating what they want, when they want it, beginning when they are depleted, and stopping when they are saturated.

When individuals eat intuitively, they generally consume more nutritious foods that help their bodies function well and view taste as only one factor involved in food choice. In addition, they are able to maintain a weight that is healthy for their height and sex (Eneli, Crum, & Tylka, 2008), while at the same time avoiding overeating, obsessive food consumption and harmful dieting (e.g., Schwartz, 1982). Research has supported the adaptive properties of intuitive eating, as it was positively associated with self-esteem, life

satisfaction, proactive coping, and optimism and negatively associated with body image disturbance and disordered eating among college women (Tylka, 2006).

Intuitive eating consists of four dimensions, unconditional permission to eat, eating for physical reasons, reliance on internal hunger and satiety cues, and body-food choice congruence (Tribole & Resch, 2003; Tylka & Kroon Van Diest, 2013; Tylka, 2006).

### 1.2.2. Unconditional Permission to Eat

The first dimension, unconditional permission to eat (UPE), describes the willingness to eat according to internal physiological hunger signals and the food desired (Tylka, 2006). Individuals high in UPE do not follow dieting rules, nor do they categorize food into 'bad' or 'good'. A growing body of evidence indicates that restraint eating, which may include unhealthy eating practices such as an extreme restriction of caloric intake or avoiding certain types of food, may disrupt intuitive eating processes (e.g. Neumark-Sztainer et al., 2012; Avalos and Tylka, 2006). Herman and Polivy (1985) argue that when individuals are on a diet, they have to exert cognitive control over their internal cues and limit what, when, and how much they eat in line with their dietary restrictions (classifying food into acceptable and non-acceptable categories). On the long run, such rigid cognitive and behavioral controls may undermine individuals' understanding of internal cues. Moreover, it disrupts their ability to know what they want to eat, leading them to eat more in response to external cues and inhibits intuitive eating. Mann et al. (2007) suggests that food restriction works for short but not long-term weight loss. They reviewed 14 longitudinal studies, in which participants were asked to record their weight before participating in a restrictive diet, immediately after the diet, and at specific follow- up points for at least 4 years. On average, participants reported a 31-pound (14 kg) weight loss immediately following the restrictive diet, but most participants gained back all but 6 pounds (2,7 kg) at final follow-up. In addition, approximately 40% of the participants weighed more at final follow-up than at baseline. To conclude, food restriction does not produce long-term weight loss and inhibits signals of the body.

### 1.2.3. Eating for physical reasons

The second dimension, is termed eating for physical rather than emotional reasons (EPR), and refers to the inclination to use food to satisfy physical hunger signals, rather than to regulate emotions (Tribole & Resch, 1995). Herman and Polivy (1983) addressed the relations between emotions and eating behaviors. Individuals who endorse in frequent dieting tend to show disinhibited eating when coping with emotions (Herman & Polivy, 1983), probably in an effort to provide comfort and distraction from adverse emotions. In

line with these findings, EPR has been shown to be negatively associated with disordered eating (Tylka & Wilcox, 2006).

### 1.2.4. Reliance On Internal Hunger and Satiety Cues

The third dimension is referred to as reliance on internal hunger and satiety cues to determine when and how much to eat (RHSC) and represents awareness of internal hunger and satiety cues and the tendency to trust these signals to guide food intake (Tribole & Resch, 2003; Tylka, 2006). The idea behind this factor is that everybody is born with an intrinsic knowledge of the quantity and type of food to eat to remain healthy and maintain weight, 'body wisdom'. (Gast & Hawks, 1998). Today we live in an environment where people are bombarded with messages about what and when one should be eating and some people even track their food intake, these external rules can override our innate body wisdom (Gast & Hawks, 1998; Van Dyke & Drinkwater, 2014). Previous findings suggest that individuals who do not eat according to their internal hunger and satiety cues are more likely to experience dietary restraint, weight gain, and emotional eating (Tylka & Kroon Van Diest, 2013).

### 1.2.5. Body-Food Choice Congruence

The last dimension, body-food choice congruence (B-FCC) is the extent to which individuals match their food choices with their bodies' needs. It is based on the concept of 'gentle nutrition' defined by Tribole and Resch (2003) as 'the tendency to choose foods, that are nutritious and honour health and body functioning, as well as taste good'. Based on prior experience individuals can learn how certain food makes them feel and use this information to guide their future food choices, but not in a rigid way (Tylka & Kroon Van Diest, 2013).

By linking these concepts, this study expected that body-mind practice is positively associated with intuitive eating, through the process of body awareness and body responsiveness.

## 2. Hypotheses

To capture the effect of body-mind practice, a comparison of three subgroups was made. One group of body-mind classes, one group of aerobic classes and one control group to get baseline values. A higher score on intuitive eating was predicted for the body-mind group.

> H1a: Participants who take body-mind classes score higher on IES than participants who take aerobic classes or who don't take any classes

Moreover, based on prior research, it was predicted that body-mind practitioners would have greater body awareness and body responsiveness (eg. Rani and Rao, 1994; Daubenmier, 2005).

> H2a: Participants who take body-mind classes have greater BA than participants who take aerobic classes or who don't take any classes

> H2b: Participants who take body-mind classes have greater BR than participants who take aerobic classes or who don't take any classes

These expected differences were predicted to account for the difference in intuitive eating.

> H3a: BA and BR mediate the relationship between body-mind practice and intuitive eating

Based on the idea that intuitive eating leads to a healthy BMI, it was predicted that body-mind practitioners have a higher percentage of practitioners with a healthy BMI than aerobic practitioners.

> H4: Body-mind practitioners have a healthier BMI than aerobic practitioners or participants who don't take any classes

Furthermore, an in-group comparison was made by looking at the frequency and extend of body-mind practice. A positive association of these variables with IES, was expected.

> H5a: The higher the frequency of body-mind practice, the higher the scores on IES

> H5b: The higher the extent of body-mind practice, the higher the scores on IES

# 3. Method

## 3.1. Research Design

An online questionnaire was designed for this study incorporating Likert-type and multiple-choice questionnaires, to examine intuitive eating, body awareness and body responsiveness in body-mind practitioners and two control groups. One group of participants who take aerobic classes and another group who don't take any classes.

### 3.2. Data and participants

Body-mind classes were compared with aerobic classes. The decision to make this comparison is based on the ability to easily compare exercise frequency (most classes take 45-60min.) and level of proficiency and to control for class environment. This comparison was based on a comparison used in a study that investigated the relationship of yoga, body awareness, and body responsiveness to self-objectification and disordered eating by Daubenier (2005). She compared women who take yoga classes to aerobic classes. This current study broadens yoga to all kinds of body-mind classes because all of them contain postures that trigger balance. Furthermore, this study includes men. Most prior research about body awareness and body responsiveness was linked to female objectification, therefore men were often neglected. This study assumes the effect of balance training is beneficial for both men and women.

Thus, in this current study men and women over 18 years old, were eligible for inclusion and completed an online questionnaire. The rationale behind the age constraint is the possibility to have more freedom in own food choices. Participants were recruited from yoga studios and fitness centers in Belgium, through in-class announcements, email and social media. A total of 250 people participated in this study. Participants who started but did not complete the survey, as well as individuals who completed the survey in less than 5 minutes, were removed from the data set. After cleaning the data, 163 participants remained and were included in the final data set. The final data set included 38 males and 129 females.

Three groups were constructed out of the whole sample (N=163). First a group that consists of people who take body-mind classes (n=40), second a group of people who take aerobic classes (n=50), third a group who don't take any classes to get baseline values (n=73).

Most yoga and fitness centers offer a wide range of classes under different attractive names. Most centers offer a body-mind class that includes a mixture of yoga, Pilates and Tai Chi or an aerobic class that includes dancing, stepping, … To define a category strictly we used most popular classes in Belgian yoga and fitness centers and looked at the engagement in postures that trigger a balance sensation to categorize them in three categories:

***Body-Mind participants (n=40),*** were defined as men or women who are currently participating in a yoga (hatha, bikram, vinyasa, asthanga, power, yin), yogilates, Pilates, Tai Chi, or a mixture of these like BodyBalance or Body and Mind. This group might also be practicing aerobic classes at the same time.

***Aerobic participants (n=50),*** were defined as men or women who are currently participating in aerobic classes, such as aerobics, zumba, … This group may not be following any kind of body and mind classes.

***Control group (n=73),*** to make a baseline comparison we defined a control group as men or women who haven't taken any classes in the last 2 years.

## 3.3. Measures

### 3.3.1. Demographic questions

Participants were asked their ***age, gender, height and weight***. BMI (BMI, kg/m2) was calculated. To get insight into there ***daily activity levels***, they were asked how they would describe their normal daily activities (a) sedentary (spend most time of the day sitting eg. desk job), (b) lightly activity (spend a bid part of the day on your feet eg. doctor, teacher), (c) active (spend a big part of the day doing physical activity eg. waitress, mailman) (d) very active (spend most time of the day doing heavy physical activity eg. plumber carpenter) Furthermore, participants were asked how many days a week they exercised and how many minutes per day exercising, both on average. We calculated total ***minutes of exercise a week*** (days of exercise x minutes per exercise day, min/week).

### 3.3.2. Form of exercise participation

Participants were asked to chose the category that applied to them, if both (1) and (2) suited to them they had to go with (1).

(1) I take mind body classes like yoga (hatha, bikram, vinyasa, asthanga, power, yin),

yogilates, Pilates, Tai Chi or a mixture of these like BodyBalance.

(2) I take aerobic classes like Zumba, Body Attack, step, BBB, spinning.

(3) I haven't taken any group classes in the past year.

Only participants that indicated to be in (1) or (2) had to answer 3.3.3 and 3.3.4

### 3.3.3. Frequency of exercise participation

Participants were asked for ***how many classes per week*** they participated on average.

### 3.3.4. Extent of exercise participation

Participants were asked for ***how many months or years they had regularly practiced*** their exercise and how they would rate their ***level of proficiency*** (a) beginning, (b) beginning–intermediate, (c) intermediate, (d) intermediate–advanced, (e) advanced. Based on the idea that the objective reachable level is different for everybody, because every body has its own limitations and some can reach levels others never will, the levels aren't explained in detail. As a result participants have to rely on their own subjective judgement, as this subjective feeling is more important in trusting your body and relying on it.

### 3.3.5. Intuitive Eating Scale (IES)

The IES (Tylka, 2006) is a 23-item instrument containing four subscales, which assess the components of intuitive eating: (a) Unconditional Permission to Eat (9 items; e.g., "If I am craving a certain food, I allow myself to have it"), (b) Eating for Physical Rather Than Emotional Reasons (6 items; e.g., "I stop eating when I feel full [not overstuffed]"), (c) Reliance on Internal Hunger and Satiety Cues (6 items; e.g., "I trust my body to tell me how much to eat") and (d) Body-Food Choice Congruence. Participants rate items on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). An overall score is computed by taking the mean of all subscales, with higher scores indicating indicating higher levels of intuitive eating. (see Appendix1)

### 3.3.6. Body Awareness Questionnaire (BAQ)

The BAQ (Shields, Mallory, & Simon, 1989), is a 18-item scale that measures awareness of responses or changes in the body process, bodily reaction, the sleep-wake cycle, and onset of illness. Items are rated on a 7-point Likert-type scale (1 = Not at all true about me, 7 = Very true about me). An overall score is computed by taking the mean of all 18 items,

with higher scores indicating greater body awareness. The scale has been shown to have good convergent and discriminant validity (Shields et al., 1989). (see Appendix 2)

### 3.3.7. Body Responsiveness Scale (BRS)

The BRS (Daubenmier, 2005), is a 7-item scale that measures responsiveness to bodily sensations. Items are rated on a 7-point Likert-type scale (1 = Not at all true about me, 7 = Very true about me). An overall score is computed by taking the mean of all 7 items, with higher scores indicating greater body responsiveness. The scale has been shown adequate internal reliability (alpha = .83) (Daubenmier, 2005). (see Appendix 3)

### 3.3.8. Statistical Analysis

Data were analyzed using Stata (Stata/SE 12.0 for Mac 2011). All hypothesis tests were two-sided and the probability of committing a type I error was set at 0,05, however more stringent results were reported. Descriptive statistics were run across the entire sample, between groups and in-groups. One-way ANOVA was computed to determine group differences on BMI, IES, BA and BR. Post hoc Turkey analysis was run to see which pairwise comparison was significant. A mediation analysis was conducted, to check the hypothesized mediating role of BA and BR between group (body-mind, aerobic or control) and intuitive eating. To determine whether BA and BR had a mediating role a series of requirements must be met (1) the initial predictor is associated with the outcome (path IV-> DV), (2) the initial predictor variable is associated with the proposed mediator (path IV->MV), (3) the mediator is associated with the endpoint of interest (path MV->DV), and finally (4) the initial predictor loses (or substantially diminishes) its effect on the endpoint once the mediator is added as a second predictor in a regression model (path IV→ DV|MV) (fig.1) .To know whether covariates needed to be added in the model, Pearson correlations between IES and demographic variables were calculated. The mediation model was then tested with an alternate statistical approach (Sobel test; Preacher & Hayes, 2004) which evaluates the significance of the indirect effect of the mediator. Pearson correlations were computed to explore the relationship between BMI and body-mind practice. Linear regression analysis was computed to determine whether body-mind practice predicted BMI.

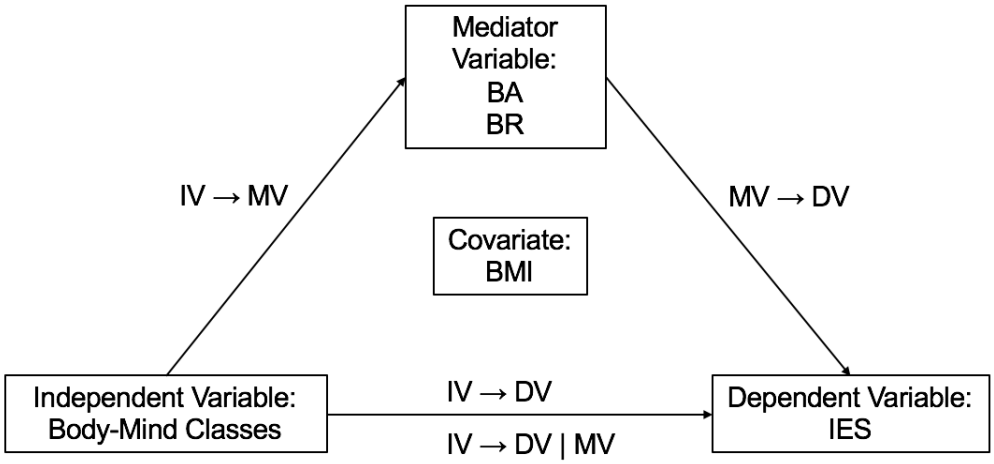


**Figure 1 Mediation Model**

# 4. Results

## 4.1. Sample Characteristics

Participants age ranges from 18 to 65 years old (table 1).

**Table 1 Demographic Characteristics**

| *Age* | *Male* | | *Female* | |
|---|---|---|---|---|
| | n | (%) | n | (%) |
| *18-25 years* | 12 | 7,4 | 39 | 23,9 |
| *26-34 years* | 5 | 3,1 | 28 | 17,2 |
| *35-54 years* | 17 | 10,5 | 46 | 28,2 |
| *55-64 years* | 3 | 1,2 | 13 | 8,0 |
| *65 years or over* | 0 | 0 | 0 | 0 |
| **Total** | **37** | **22,7** | **126** | **77,3** |

(%) is percentage of all the participants (N=163)

To get insight into participant's daily activity levels, they were asked how they would describe their normal daily activities (1) sedentary (spend most time of the day sitting e.g. desk job), (2) lightly activity (spend a bid part of the day on your feet e.g. doctor, teacher), (3) active (spend a big part of the day doing physical activity e.g. waitress, mailman) (4) very active (spend most time of the day doing heavy physical activity e.g. plumber carpenter). We split the control group in two subgroups, people who exercise and people who don't exercise. The overall mean was 1,77 and significant differences between groups were found $F(3,159) = 3,25$ and $p=0,023$ (table 2).To see which pairs of means were significantly different, Tukey's method was used. The aerobic group significantly differed from the body-mind group and the nothing group. Other differences were not significant.

Furthermore, participants were asked to report how many days a week they exercised and how many minutes per exercising day, both on average. Total minutes of exercise a week (= days of exercise x minutes per exercise day, min/week) was calculated. On average, participants exercised 210 minutes a week. Significant group differences were

found F(3,159)=28,93 and p=0.000 (table3). Tukey's analyses showed this difference was caused by the nothing group, other differences between groups were not significant.

**Table 2 Average Daily Activity Level and Standard Error of the Mean (SEM)**

| | *Body-Mind Classes* | *Aerobic Classes* | Exercise | Nothing | F | p-value |
|---|---|---|---|---|---|---|
| *Daily Activity Levels* | 1,60 | 2,06 | 1,75 | 1,59 | 3,25 | 0,023 |
| | (0,11) | (0,14) | (0,15) | (0,12) | | |

**Table 3 Average Minutes of Exercise a Week and Standard Error of the Mean (SEM)**

| | *Body-Mind Classes* | *Aerobic Classes* | *Exercise* | *Nothing* | *F* | *p-value* |
|---|---|---|---|---|---|---|
| *Minutes of Exercise a week* | 270,78 | 307,80 | 248,59 | 0,00 | 28,93 | 0,000 |
| | (27,76) | (27,19) | (39,39) | (0,00) | | |

## 4.2. Analysis between groups

The body-mind group practiced an average of 2,2 hours a week (SD=1,63) and an average of 12-24 months (SD=1.45). The aerobic group participated an average of 2,64 hours a week (SD=2,15) and an also an average of 12-24 months (SD=1,71). This difference in exercise participation was not significant. Both groups did also not differ in self-reported level of proficiency. The self-reported level of proficiency was intermediate (M=3,29;SD=1,03) in the body-mind group and also intermediate (M=3,46;SD=1,34) in the aerobic group. One-way ANOVA was computed to determine whether there are any significant differences between the mean scores on the intuitive eating scale and subscales (table 4).

Overall, there was a difference in IES-score between the groups, with F(2,160)=4,95 and p=0,008. Furthermore, a significant difference was found on the RHSC subscale

F(2,160)= 4,10 and p=0,018 and the B-FCC subscale F(2,160)= 7,73 and p=0,000. There was no significant difference on the UPE and EPR subscale (table 4).
Additionally, a significant difference in means on BA was found F(2,160)=10,536 p=0,000<0,01. However, the difference in means on BR was not significant. F(2,160)=2,585 p=0,079 (table 5).

**Table 4 Comparison of average IES-Score and variance in Body-Mind Classes, Aerobic Classes and Control Group**

| *Scale* | *Body-Mind Classes* | *Aerobic Classes* | *Control Group* | *F* | *p-value* |
|---|---|---|---|---|---|
| *IES* | 3,51 | 3,22 | 3,30 | 4,95 | 0,008 |
| | (0,17) | (0,17) | (0,24) | | |
| *UPE* | 3,20 | 3,07 | 3,32 | 2,24 | 0,109 |
| | (0,37) | (0,25) | (0,53) | | |
| *EPR* | 3,46 | 3,23 | 3,23 | 1,55 | 0,215 |
| | (0,30) | (0,53) | (0,60) | | |
| *RHSC* | 3,70 | 3,29 | 3,37 | 4,10 | 0,018 |
| | (0,41) | (0,40) | (0,60) | | |
| *B-FCC* | 3,90 | 3,37 | 3,37 | 7,73 | 0,000 |
| | (0,47) | (0,69) | (0,50) | | |

IES= Intuitive Eating Scale; UPE=Unconditional Permission to Eat; EPR= Eating for Physical Rather Than Emotional Reasons; RHSC= Reliance on Internal Hunger and Satiety Cues; B-FCC=Body-Food Choice Congruence

**Table 5 Comparison of BA and BR in Body-Mind and Aerobic Classes**

| *Scale* | *Body-Mind Classes* | *Aerobic Classes* | *Control Group* | *F* | *P-value* |
|---|---|---|---|---|---|
| *BA* | 4,55 | 3,83 | 4,38 | 10,536 | 0,000 |
| | (0,70) | (0,78) | (0,52) | | |
| *BR* | 4,48 | 4,13 | 4,29 | 2,585 | 0,079 |
| | (0,33) | (0,65) | (0,55) | | |

BA=Body Awareness; BR=Body Responsiveness

Post hoc comparison according to Tukey showed that body-mind classes lead to a higher IES score than aerobic classes (p=0,007) and a higher score than the control group (p=0,049). The difference between the aerobic group and the control group was not significant. Likewise, the body-mind group scored significantly higher than the aerobic group (p=0,021) and the control group (p=0,049) on RHSC and again no significant difference was found between the aerobic group and control group. Moreover, body-mind group scored significantly higher on B-FCC than aerobic group (p=0,003) and the control group (p=0,001). The difference between aerobic group and control group on B-FCC was not significant. Tukey analysis confirmed that there was no significant effect of group on UPE and EPR.

## 4.3. Relationship between body-mind classes, IES, BA and BR

To examine the relationship between body-mind classes, IES, BA and BR a mediation analysis was computed. To know whether covariates needed to be added in the model, correlations between IES and demographic variables, across the entire sample were calculated (table 6). Minutes of exercise a week was significantly correlated with daily activities (r=0,305, p=.001, N=163), this means that minutes of exercise a week increases with more daily activity. Furthermore, BMI was negatively correlated with IES (r=-0,287, p=.000, N=163), positively correlated with age (r=0,277, p=.000, N=163) and negatively correlated with minutes of exercise a week (r=-0,223, p=0,004, N=163).

**Table 6 Correlations of Demographic Variables Across Entire Sample (N=163)**

| | *IES* | *Age* | *Gender* | *Daily Activities* | *Min. Exercise/ Week* | *BMI* |
|---|---|---|---|---|---|---|
| *IES* | 1,000 | | | | | |
| *Age* | 0,012 | 1,000 | | | | |
| *Gender* | 0,009 | -0,004 | 1,000 | | | |
| *Daily Activities* | -0,008 | 0,013 | -0,117 | 1,000 | | |
| *Min. Exercise/ Week* | 0,148 | -0,040 | -0,002 | 0,305** | 1,000 | |
| *BMI* | -0,287** | 0,277** | -0,010 | -0,094 | -0,223** | 1,000 |

* if p-value is < 0,05
** if p-value is <0,01

**Table 7 Correlations, Means, Standard Deviations of Main Variables Across Entire Sample (N=163)**

| | *Mean* | *SD* | *IES* | *UPE* | *EPR* | *RHSC* | *B-FCC* | *BA* | *BR* |
|---|---|---|---|---|---|---|---|---|---|
| *IES* | 3,310 | 0,45 | 1,000 | | | | | | |
| *UPE* | 3,195 | 0,64 | 0,436** | 1,000 | | | | | |
| *EPR* | 3,261 | 0,73 | 0,776** | 0,025 | 1,000 | | | | |
| *RHSC* | 3,404 | 0,71 | 0,773** | 0,216** | 0,392** | 1,000 | | | |
| *B-FCC* | 3,478 | 0,77 | 0,415** | -0,139† | 0,215** | 0,307** | 1,000 | | |
| *BA* | 4,227 | 0,85 | 0,194** | 0,032 | 0,059 | 0,194* | 0,316** | 1,000 | |
| *BR* | 4,264 | 0,73 | 0,056 | 0,040 | 0,083 | 0,089 | 0,233** | 0,288** | 1,000 |

IES= Intuitive Eating Scale; UPE=Unconditional Permission to Eat; EPR= Eating for Physical Rather Than Emotional Reasons; RHSC= Reliance on Internal Hunger and Satiety Cues; B-FCC=Body-Food Choice Congruence; * if p-value is < 0,05; ** if p-value is <0,01

IES is significantly correlated with BMI, therefore BMI is added as a covariate in the mediation analysis. Furthermore, correlations between body-mind classes, IES, BA BR were calculated (table 6). All variables were positively correlated and significant relationships were found. Because, IES is not significantly correlated with BR across the entire sample (table 7) and also not in the body-mind group (r=0,041, p=0,801), a mediating role of BR was rejected. Following our hypothesis that BA mediates the association of exercise group to IES, exercise group was selected as the independent variable, IES as the dependent variable, and BA as the proposed mediator. The mediation model was then tested with an alternate statistical approach (Sobel test; Preacher & Hayes, 2004) which evaluates the significance of the indirect effect of the mediator by testing the null hypothesis of no difference between the total effect (path IV->DV) and the direct effect (path IV-> DV|MV). Because there are three groups, two sets of regressions were conducted. The first one for the body-mind and aerobic groups and the second for the body-mind and control groups (table 8).

**Table 8 Mediation Analysis Unstandardized Coefficients, and Estimates of Direct and Indirect Pathways (N=90)**

| *Raw Coefficient* | | *Direct Effect* | *Total Effect* | *Indirect Effect* | *Sobel Test* | |
|---|---|---|---|---|---|---|
| *IV->MV* | *MV->DV* | *IV -> DV \| MV* | *IV->DV* | | *z* | *p* |
| 0,716* | 0,041 | 0,197* | 0,227* | 0,03 | 0,816 | 0,414 |
| (0,192) | (0,049) | (0,095) | (0,088) | | (0,036) | |
| 0,121 | 0,084 | 0,147 | 0,157* | 0,010 | 0,700 | 0,484 |
| (0,153) | (0,056) | (0,090) | (0,091) | | (0,014) | |

IV = independent variable; MV = mediator variable; DV = dependent variable; MV→ DV = unique contribution of mediator variable to dependent variable when mediator is entered jointly; Direct effect IV→ DV|MV = relationship between IV and DV after controlling for indirect effects; Indirect effect = total effect – direct effect; Sobel test = significance of mediation; * if p-value is < 0,05

Body awareness did not mediate the relationship between exercise group and IES, after BMI was added as a covariate in the mediation analysis.

## 4.4. Relationship between body-mind classes and BMI

Participants were instructed to include their height and weight, body mass index BMI (kg/m2) was calculated. A healthy BMI ranges between 18,5-24,9, while anything below 18,5 is considered underweight, 25,0-29,9 is considered overweight, and 30 and above is considered obese. The overall mean BMI was 23,7 kg/m$^2$ (SD=5,39) and 70,4% of study participants were in the normal BMI range. The body-mind group reported the leanest mean BMI of 21,9 kg/m$^2$ (SD=2,69) and the least amount of participants out of the normal BMI range, 5% was categorized as underweight. The aerobic group reported an average BMI of 24,0 kg/m$^2$ (SD=4,32) and 30% out of the normal BMI range. The control group reported a BMI of 24,02 kg/m$^2$ (SD=3,65) and 42,46% with an unhealthy BMI.
One-way analysis of variance (ANOVA) was conducted to examine group differences. The analysis was significant, F(2,160)= 3,304 and p=0,039. Post hoc comparison according to Tukey showed that the body-mind group had a significant lower BMI than the aerobic group p=0,048 and than the control group p=0,032.

**Table 9 Distribution of BMI among groups**

| | *Average BMI* | *Underweight* | *Normal* | *Overweight* | *Obese* |
|---|---|---|---|---|---|
| | Kg/m2 | n | n | n | n |
| *Body-Mind Classes* | 21,9 | 2 | 38 | 0 | 0 |
| *Aerobic Classes* | 24,0 | 1 | 37 | 8 | 4 |
| *Control* | 24,0 | 7 | 42 | 16 | 8 |
| ***Total*** | **23,7** | **9** | **120** | **22** | **12** |

To explore what causes this significant difference in BMI, a regression was computed. Daily activities, minutes of exercise a week, IES, BA, BR were selected as independent variables and gender and age were added as control variables (table 10). Significant effects were found F(7,155)= 7,34 and R^2= 0.0754 and p-value=0,000. The greatest significant effect on BMI was caused by IES, participants with a better score on IES have a lower BMI (β=-2,942, t=-3,4, p=0,001). This effect is greater than the significant effect of minutes of exercise a week (β=-0,004, t=-2,15, p=0,033). Furthermore, the regression analysis indicates that participants who score higher on BR, have a higher BMI (β=1,679, t=3,06, p=0,003). Age did have a positive effect on BMI (β=1,532, t=4,02, p=0,000). This means BMI increases significantly with age. The effect of BA, daily activities and gender was not significant.

**Table 10 Regression analysis BMI (N=163)**

| *BMI* | *Coefficient* | *SE* | *t* | *P-value* |
|---|---|---|---|---|
| *IES* | -2,942** | 0,865 | -3,4 | 0,001 |
| *BA* | -1,125 | 0,487 | -2,31 | 0,220 |
| *BR* | 1,679** | 0,549 | 3,06 | 0,003 |
| *Daily Activities* | -0,404 | 0,478 | -0,85 | 0,398 |
| *Minutes of Exercise a Week* | -0,004* | 0,002 | -2,15 | 0,033 |

| | | | | |
|---|---|---|---|---|
| *Gender* | -0,634 | 0,918 | -0,69 | 0,491 |
| *Age* | 1,532** | 0,381 | 4,02 | 0,000 |

* if p-value is < 0,05; ** if p-value is <0,01;

## 4.5. Deeper understanding of the link between extend of exercise, exercise frequency and level of proficiency and IES, BA, BR in the body-mind group

To get a deeper understanding of the relationship between frequency of practice, extent of practice, self-reported level of proficiency, BA, BR and IES, correlations between scores were calculated (table 11). All relationships were positive correlated and significant correlations were found. IES is moderately significantly correlated with frequency of practice (r=0,261; p=0,09).

**Table 11 Correlations Between Exercise Extend, Frequency, Proficiency, BA, BR And IES In the Body-Mind Group (n=40)**

| | *Frequency of practice* | *Extent of Practice* | *Level of proficiency* | *Body Awareness* | *Body Responsiveness* | *IES* |
|---|---|---|---|---|---|---|
| *Frequency of practice* | 1 | | | | | |
| *Extent of Practice* | 0,347* | 1 | | | | |
| *Level of proficiency* | 0,307† | 0,670** | 1 | | | |
| *Body Awareness* | 0,235† | 0,272† | 0,378* | 1 | | |
| *Body Responsiveness* | 0,219 | 0,435** | 0,342* | 0,288** | 1 | |
| *IES* | 0,261† | 0,067 | 0,132 | 0,194* | 0,056 | 1 |

** if p-value is <0,01; * if p-value is < 0,05; † if p-value is <0,1

# 5. Discussion

## 5.1. Discussion of Results

This study investigated the relationship between body-mind practice and intuitive eating, as measured by the Intuitive Eating Scale (IES; Tylka, 2006). Moreover, the relationship and mediating contribution of body awareness, measured by the Body Awareness Questionnaire (BAQ; Shields, Mallory, & Simon, 1989) and body responsiveness, measured by the Body Responsiveness Scale (BRS; Daubenmier, 2005), between body-mind practice and IES has been measured. Furthermore, the link between body-mind practice and BMI has been examined. Lastly, the association between frequency of body-mind practice, as well as, experience in body-mind practice and IES has been investigated.

As to the first aim of this study, findings indicate participants who take body-mind classes score significantly higher on IES than participants who take aerobic classes or participants who don't take any classes. Looking into the subscales of IES, findings suggest practicing body-mind classes leads to a higher reliance on internal hunger and satiety cues and a better body-food choice congruence. There was no significant difference found in unconditional permission to eat and eating for physical reason.

Based on prior research (egg. Rani and Rao, 1994; Daubenmire, 2005), this study hypothesized that body-mind classes lead to a higher body awareness and body responsiveness in practitioners. It was predicted that these variables mediate the relationship between body-mind practice and IES. Results show that body-mind practitioners score significantly higher on body awareness and body responsiveness than aerobic practitioners. IES was significantly correlated with body awareness, but not with body responsiveness. A mediation analysis was computed to determine if body awareness mediated the relationship between body-mind practice and IES. Results did not support this hypothesis.

Third, this study confirmed that body-mind practice is associated with a healthy BMI. Although the aerobic group reported a higher level of daily activities, the body-mind group reported a leaner BMI (21,9 kg/$m^2$) than the aerobic group (24,0 kg/$m^2$) and than the control group (24,0 kg/$m^2$) . Furthermore, they have a higher percentage of practitioners in the healthy BMI range, 95 % compared to 74 % in the aerobic group and 57% in the control group. Lastly, regression analysis showed that body-mind classes had a stronger effect on BMI than minutes of exercise a week.

Finally, this study examined the relationship between frequency of body-mind practice as well as extent of body-mind practice and self-reported level of proficiency and IES, BA and BR. All relationships were positive correlated and significant correlations were found. IES is moderately significant correlated with extent of practice.

## 5.2. Study Limitations

First, there was an unequal level of participation of men and women in this study. Although results didn't show a significant difference in gender, generalization to the whole population should be done carefully. Second, the cross-sectional research design does not allow for any causal or directional inferences to be made from the study results. It might be that the classes itself don't increase intuitive eating, but people who tend to take body-mind classes already are, before any class, more intuitive eaters. However, the found associations can be helpful in generating hypotheses for future longitudinal or repeated cross-sectional research. Third, the results are limited by the reliability of the scales that are used to determine intuitive eating, body awareness and body responsiveness. Furthermore, the exclusive use of self-reports of the studied model variables is limiting, as it relies on participants' accurate reporting of their current attitudes and behaviors. Social desirability and perceptions may have influenced responses on the measures.

## 5.3. Implications

Despite the above limitations, these findings may have interesting implications for research in weight management, health policy analysis, treatment of eating disorders, research in consumer behavior and the use of self-tracking devices.

The association found between body-mind practice, intuitive eating, body awareness and a healthy BMI, are interesting for research in weight management and well-being. Whereas, most studies focus on how to control or manage a healthy weight by applying external mechanisms, such as a food schedule, this study highlights the importance of balance to get awareness of physiological hunger and satiety signals in maintaining a healthy weight. The study found a positive relationship between doing body-mind practice and the inborn quality of human beings to eat intuitively and showed that score on intuitive eating had a bigger impact on BMI than minutes of exercise a week. Further research should look at the causality of this relationship and make it clear if intuitive eating can be redeveloped and maintained by doing body-mind practice.

Furthermore, this research is valuable for policy analysts, because in this world where weight related diseases are rising at a staggering pace, most public health campaigns are focused on rules about what and when to eat, like food pyramids, three meals a day, … These campaigns might actually backfire the goal by pressuring people and induce a disconnection from their internal experience. This may undermine individuals' understanding of internal cues and may cause negative outcomes, such as weight cycling, increased risk of eating disorders and a dysfunctional relationship with food. Furthermore, this study showed that just following aerobic classes or exercising is not enough to make balanced nutritious decisions. Campaigns and interventions that focus on cultivating a healthy balance between body and mind, through movement and the sensation of balance, might help people make healthy decisions that meet their unique nutritional needs to function well and increase well-being on the long run.

Moreover, the findings from this study also have implications for the development of intervention design for eating disorders. As we found a link between body-mind practice and intuitive eating, that is the opposite to eating disorders (Tylka and Wilcox, 2006), body-mind practice might be integrated in treatment for potentially life-threatening illnesses like anorexia nervosa, bulimia nervosa, binge-eating disorder and EDNOS.

Furthermore, research in consumer behavior might investigate whether body-mind practitioners rely less on external consumption cues, such as packaging heuristics and advertising that help them decide what and how much to eat, but rely more on embodied decisions, like buying food for physical needs.

Lastly, it could be argued that the upcoming markets in self-tracking devices, such as tracking consumption and bodily functions, aren’t always that healthy. This study showed the importance of a balanced mind and body in food decision making. By tracking and controlling what we eat, the mind may take over the body, and balance between mind and body could get lost. It should be investigated if self-tracking devices can undermine our natural ability to know how much to eat, walk, sleep, and if they actually are counterproductive on the long run by quantifying our internal experience and interpreting them ‘bodylessly’.

## General Conclusion

This study showed the importance of a balanced body and mind in eating behavior. A positive relationship between following body-mind classes and intuitive eating was found. Score on intuitive eating had a bigger impact on BMI than minutes of exercise a week. This means, just following aerobic classes or exercising is not enough to be able to use internal cues as a guide in eating behavior, meet our nutritional needs and have a healthy weight.

# Appendices

## *Appendix 1: Intuitive Eating Scale*

Intuitive Eating Scale-2 (23 items)

1. **I try to avoid certain foods high in fat, carbohydrates, or calories.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

2. **I have forbidden foods that I don't allow myself to eat.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

3. **I get mad at myself for eating something unhealthy.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

4. **If I am craving a certain food, I allow myself to have it.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

5. **I allow myself to eat what food I desire at the moment.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

6. **I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

7. **I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

8. **I find myself eating when I am lonely, even when I'm not physically hungry.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

9. **I use food to help me soothe my negative emotions.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

10. **I find myself eating when I am stressed out, even when I'm not physically hungry.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

11. **I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

12. **When I am bored, I do NOT eat just for something to do.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

13. **When I am lonely, I do NOT turn to food for comfort.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

14. **I find other ways to cope with stress and anxiety than by eating.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

15. **I trust my body to tell me when to eat.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

16. **I trust my body to tell me what to eat.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

17. **I trust my body to tell me how much to eat.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

18. **I rely on my hunger signals to tell me when to eat.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

19. **I rely on my fullness (satiety) signals to tell me when to stop eating.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

20. **I trust my body to tell me when to stop eating.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

21. **Most of the time, I desire to eat nutritious foods.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

22. **I mostly eat foods that make my body perform efficiently (well).**

23. **I mostly eat foods that give my body energy and stamina.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |

*Scoring Procedure:*

1. Reverse score Items 1, 2, 3, 7, 8, 9, and 10
2. *Total IES-2 Scale Score:* Add together all items and divide by 23 to create an average score.
3. *Unconditional Permission to Eat subscale:* Add together Items 1, 2, 3, 4, 5, and 6; divide by 6 to create an average score.
4. *Eating for Physical Rather than Emotional Reasons subscale:* Add together Items 7, 8, 9, 10, 11, 12, 13, and 14; divide by 8 to create an average score.
5. *Reliance on Hunger and Satiety Cues subscale:* Add together Items 15, 16, 17, 18, 19, and 20; divide by 6 to create an average score.
6. *Body-Food Choice Congruence subscale:* Add together Items 21, 22, and 23; divide by 3 to create an average score.

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## ***Appendix 2: Body Awareness Scale***

Body Awareness Questionnaire (Shields, Mallory & Simon, 1989) Instructions:

Listed below are a number of statements regarding your sensitivity to normal, nonemotive body processes. For each statement, select a number from 1 to 7 that best describes how the statement describes you and place the number in the box to the right of the statement.

1. I notice differences in the way my body reacts to various foods.

2. I can always tell when I bump myself whether or not it will become a bruise.

3. I always know when I've exerted myself to the point where I'll be sore the next day.

4. I am always aware of changes in my energy level when I eat certain foods.

5. I know in advance when I'm getting the flu.

6. I know I'm running a fever without taking my temperature.

7. I can distinguish between tiredness because of hunger and tiredness because of lack of sleep.

8. I can accurately predict what time of day lack of sleep will catch up with me.

9. I am aware of a cycle in my activity level throughout the day.

10.* I don't notice seasonal rhythms and cycles in the way my body functions.

11. As soon as I wake up in the morning, I know how much energy I'll have during the day.

12. I can tell when I go to bed how well I will sleep that night.

13. I notice distinct body reactions when I am fatigued.

14. I notice specific body responses to changes in the weather.

15. I can predict how much sleep I will need at night in order to wake up refreshed.

16. When my exercise habits change, I can predict very accurately how that will affect my energy level.

17. There seems to be a “best” time for me to go to sleep at night.

18. I notice specific bodily reactions to being overhungry.

Note: * indicates a reversed scored item.

## ***Appendix 3: Body Responsiveness Scale***

A 7-item scale was created to measure responsiveness to bodily sensations. The 7 items were: (a) “I am confident that my body will let me know what is good for me,” (b) “My bodily desires lead me to do things that I end up regretting” (reverse coded), (c) “My mind and my body often want to do different things” (reverse coded), (d) “I suppress my bodily feelings and sensations” (reverse coded), (e) “I ‘listen’ to my body to advise me about what to do,” (f) “It is important for me to know how my body is feeling throughout the day,” and (g) “I enjoy becoming aware of how my body feels.” Responses were measured on a 7-point scale ranging from 1 (not at all true about me) to 7 (very true about me). Higher scores reflect greater body responsiveness. Cronbach's a for this measure was .83.

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**FACULTY OF BUSINESS AND ECONOMICS**
Naamsetraat 69 bus 3500
3000 LEUVEN, België
tel. + 32 16 32 66 12
fax + 32 16 32 67 91
info@econ.kuleuven.be
www.econ.kuleuven.be