Spring 2021

Interoception Awareness and Intuitive Eating

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By

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This thesis is submitted in fulfillment of the requirements
for the Elizabethtown College Honors Program

May 1, 2021

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Honors Senior Thesis
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April 19th, 2021

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Abstract

Background: College is a time where students are required to nourish themselves independently. Weight loss and weight maintenance can be difficult for many, as students are more likely to turn to external methods to lose weight, which are not successful and sustainable long term. Students may be more likely to turn to external mechanisms to lose weight because the have poor interoception awareness, which is the ability to make meaning and sense of hunger and fullness cues. This study aims to discover if interoception awareness is a requirement for intuitive eating, which is an eating approach that uses the body as a guide to make food choices.

Hypothesis: Students who have poor interoceptive awareness rely on external mechanisms to lose weight, as interoceptive awareness may be a foundational skill for intuitive eating.

Methods: A case study design was used to compare data results of two surveys related to interoceptive awareness and dieting.

Results: Students who had poorer interoceptive awareness skills and hyporesponsivity to hunger and fullness cues were more likely to use external tools to lose weight, which are hard to sustain long-term.

Conclusion: The study found that college students with poorer interoceptive awareness are more likely to rely on external tools to lose weight. The findings suggest that interoceptive awareness may be a foundational skill for intuitive eating. The findings support the need for interoceptive awareness interventions, as interoceptive awareness interventions may enhance intuitive eating.

Introduction

College is a time in which students have to learn how to nourish themselves in a healthy way. For many, this can include trying to lose weight to better their health. This issue is that many students use external tools to lose weight, such as calorie counting apps, diet programs, and measuring/weighing food. External tools are often used because students may have poor interoceptive awareness, which is our body's innate ability to understand and make meaning of internal hunger and fullness cues (Mahler, 2021; Tribole & Resch, 2020). Because interoceptive awareness may be a requirement to become an intuitive eater, interoceptive awareness interventions could set the foundation for helping students use internal mechanisms to lose weight (e.g., listening to hunger/fullness signals), which are more successful long term (Tribole & Resch, 2020).

Review of Literature

Interoception and Intuitive Eating

The relationship between interoception and intuitive eating has been an interesting topic for researchers over the last ten years. Interoception is a "body-to-brain" process that allows individuals to sense feelings of hunger and fullness, thus, those who report higher interoceptive awareness tend to be better intuitive eaters (Tribole et al, 2020; Quadt et al., 2018). In addition, research has shown that poor interoception has been linked to concerns in body image, which can result in disordered eating patterns (Quadt et al., 2018). Similar to Quadt et al. (2018)., Herbert et al. (2019) explains that interoceptive signals guide our eating behaviors, which can impact our ability to eat intuitively. For example, if certain individuals have a challenging time eating intuitively, sensitivity to interoceptive signals may be impaired. Impairment in interoceptive sensitivity and awareness can stem from multiple factors, which include: pressure to be thin, increased emphasis on body shape and appearance, restrained eating, weight stigma from healthcare policy and/or culture (Herbert et al, 2019). The mind and body can often get confused by this, because they are forced to focus on external methods (e.g., calories, points, exchanges, macros, special containers) instead of honoring the beauty of internal responses. Intuitive eating has also been shown to "enhance interoceptive awareness or remove the obstacles to perceiving and responding to felt sensations in the body" (Tribole et al., 2020, p. 4). This shows that interoceptive awareness and intuitive eating are connected.

To explore the relationship between interception and intuitive eating, Herbert et al. (2013) had one-hundred and twenty female college participants complete the Intuitive Eating Scale (IES) and a heart rate perception test. Based on the outcome measures from the IES and the

heart rate perception test, researchers found that participants who scored higher on the IES scale had perceived their heart rate more accurately than those who scored lower on the IES (Herbert et al., 2013). This study offers valuable insight because it shows that those who were better at perceiving physiological functions of their body (e.g. higher interoception) were more adept to acknowledge physical hunger and satiety cues (Herbert et al., 2013). While there is current debate about the validity and reliability of the heart rate perception test, this study offers preliminary evidence about interoception and how it may be a prerequisite for intuitive eating.

Similar to the study design described in Herbert et al. (2013), Richards et al. (2019) examined the relationship between heart rate perception and intuitive eating in 120 female patients with anorexia nervosa (AN) that were receiving in-patient treatment. As compared to healthy controls, researchers found that patients with AN initially scored lower in intuitive eating because interoceptive awareness was low; however, as patients recovered and gained more weight, interoceptive awareness was enhanced. This ultimately enhanced the patients' ability to eat intuitively. This study is relevant because it verifies that there is an important connection between interoceptive awareness and intuitive eating. While the authors note that more research needs to be done in this area, this study offers preliminary evidence and shows that interoception may be required to become an intuitive eater.

In attempts to examine the connection between interoceptive awareness and intuitive eating further, Oswald et al. (2017) sent out a detailed survey to 200 female college women --- based on the researchers' analysis, they found that intuitive eaters had more interoceptive awareness and body appreciation as compared to non-intuitive eaters (Oswald et al, 2017). Additionally, Oswald et al. (2017) found that the reliance on hunger and satiety cues via interoceptive awareness enhanced body appreciation and intuitive eating. These results are

significant because it shows that interoceptive awareness can enhance intuitive eating, thus, individuals are more likely to focus on internal cues rather than external cues. These results classify as preliminary evidence though, since more studies need to determine if interoceptive awareness is required for intuitive eating.

In addition to Oswald et al. (2017), Cadena Schlam et al. (2015) noted the important relationship between interoceptive awareness and intuitive eating. Cadema Schlam and colleagues (2015) critically appraised eight RCT research articles that focused on Intuitive Eating interventions for individuals struggling with obesity. From analyzing all the studies, they found that dieting disrupts interoceptive awareness which can decrease the likelihood individuals are able to trust their internal signals and become an intuitive eater. This study is significant and informs the healthcare industry that we need a paradigm shift: instead of telling people what they should eat/weigh, individuals should be given the tools needed to enhance their own interoceptive awareness. In return, higher interoceptive awareness can help an individual become a more efficient intuitive eater.

Intuitive Eating, Interoception, and Obesity

Some health practitioners and professionals argue that overweight patients cannot eat intuitively, as they may have poor interoceptive awareness (Bacon et al., 2014). To test this belief and theory further, Salvo et al. (2018) tested two mindful eating-based programs for overweight patients. The goal was to see if a mindfulness-based intervention would be superior to treatment as usual and diet-based approaches. In the study, 240 overweight females in primary care were randomized to one of three groups: treatment as usual (TAU), Mindfulness-Based Health Promotion (MBHP), or Mindfulness-Based Eating Awareness (MB-EAT). MB-EAT

focused specifically on listening to hunger and fullness cues while MBHP focused on giving mindful activity suggestions (e.g. body scan, mindful breathing). Because diet-based interventions have been shown to decrease self-acceptance and are not sustainable long-term, mindful eating offers a promising alternative to weight loss/maintenance without the need of calories, carbohydrates, or points (Salvo et al., 2018). While both mindful eating-based interventions showed promising results compared to TAU, MB-EAT has the most significant impact on participants. These results are promising for the healthcare field because it shows that mindful eating practices are more sustainable long-term than standard diet plans (Salvo et al., 2018). While mindfulness-based interventions, rather than an interoceptive awareness intervention was used for this study, this information is important for future research. For example, if a mindfulness-based intervention helped individuals tune into their bodies better, then we know an interoceptive awareness intervention will really help individuals become better intuitive eaters (Salvo et al., 2018). Mindful eating involves being aware of sensation, but interoceptive awareness allows individuals to understand and make meaning of internal cues.

Within the last year, Nogue et al. (2019) found that intuitive eating was associated with weight loss after individuals had bariatric surgery. Specifically, in the study, 401 women who recently had bariatric surgery were administered the Intuitive Eating Scale (IES-2). Unlike people who implemented diet-based approaches after surgery, scholars found that those implementing intuitive eating were more successful in losing weight (Nogue et al., 2019). While researchers note that there still is a gap in research, those who had higher interoceptive awareness after bariatric surgery may have been more efficient intuitive eaters than others in the group. The results of this study are significant, but there is still a noticeable gap in the research: we need to understand if interoceptive awareness is required for intuitive eating.

While very few studies examine the connection between interoceptive awareness and intuitive eating, Simmons et al. (2017) shed some more light on this topic---the researcher found interoception to be an important component of consideration when working with individuals with obesity. For example, researchers found that obesity was associated with either *hypersensitivity* or *insensitivity* to interoceptive hunger cues (Simmons et al., 2017). The results signify that more attention needs to be brought to interoception's role in hunger. When interoceptive signals are addressed in interventions for obesity, better health outcomes (e.g., healthier eating habits, self-acceptance, intuitive eating, etc.) occur (Simmons et al., 2017). One limitation of this study is that it failed to determine if interoceptive awareness is needed for an individual to become an intuitive eater. Future research needs to understand if an interoceptive awareness intervention will help individuals who struggle with obesity eat intuitively--- this, in return, could help with weight management.

Similar to what Simmons et al. (2017) found, Herbert et al. (2014) found that interoceptive signals were lower in 75 obese patients (both women and men) as compared to normal controls. Since interoceptive signals were found to be lower in those with a higher body mass index, researchers discovered that obese patients have a more difficult time detecting hunger signals. Because intuitive eating and interoception are key factors in food intake regulation and satiety, this explains why overweight patients may have a harder time understanding when they are hungry and full (Herbert et al., 2014). While each person has their own individual story and needs, this research shows that interoceptive signaling is an important factor to consider when treating clients with obesity.

Intuitive Eating, Interoception, and Emotional Eating

In the *Intuitive Eating* book written by Evelyn Tribole and Elyse Resch, principle seven explains the importance of coping with your emotions without using food. While Tribole and Resch (2020) explain that it is a normal part of life to eat in response to anxiety, stress, anger, depression, and/or boredom, turning to food each time someone feels these emotions can become problematic. Eating due to emotions, rather than listening to what our bodies truly need can disrupt our interoceptive signals. If interoceptive awareness skills are lacking, an individual may ignore what their body is truly telling them and instead, let their emotions guide them. More research certainly needs to be done, but emotional eaters may have poor interoceptive awareness. This can inhibit one's ability to eat intuitively.

While it is obvious that emotional eating looks different for everyone, Sokol et al. (2016) found that in general, emotional eaters (e.g., In this study, it was undergraduate females enrolled in a college class) were less likely to have interoceptive awareness. When emotions are coupled with a decrease in hunger signaling cues, many people may turn to emotional eating as a result. The researchers also brought another important thought to mind: emotional eating encompasses both emotional awareness and appetite awareness. While this may seem like common knowledge to many, it is important to consider that emotions are not the primary reason why people overeat; interoceptive signals involved with appetite play a role too.

Intuitive Eating, Interoception, and Weight Stability

Because intuitive eating (IE) focuses on allowing individuals to eat in accordance with their hunger and fullness cues, oftentimes, people who practice it are more likely to be weight stable and fall within their setpoint weight range (Bacon et al., 2014; Tylka et al., 2020). To

observe the relationship between intuitive eating and weight, Tylka et al. (2020) administered questionnaires to a community of women and men to see if intuitive eating was associated with weight stability. Similar to what they hypothesized, researchers found that those who scored higher on the Intuitive Eating Questionnaire were more weight stable than others who frequently dieted (Tylka et al., 2020). While this study offers useful evidence, more research needs to done on the relationship between intuitive eating and interoceptive awareness in this context. For example, this study shows that intuitive eating (IE) was associated with weight stability, but did individuals who practiced it have better interoceptive awareness? There is a gap in research here: it is still unknown if high levels of interoceptive awareness will allow an individual to be a more efficient intuitive eater.

While it is not surprising that each person may experience interoceptive cues in a different way, a recent study found that genetic differences, home environment differences (e.g., parent feeding practices, etc.), and psychiatric differences affected the way individuals responded and evaluated their own hunger cues (Stevenson et al., 2015). In terms of genetics, both Stevenson et al. (2015) and Bacon et al. (2014) agree that genetics play a primary role in our hunger cues too. This study does shed light on the topic of interoceptive awareness because it reminds researchers that our environmental circumstances can impact our ability to tune into our bodies and understand our hunger, fullness, and thirst. While research still needs to link the connection between interoception and intuitive eating together, it is important to consider that life circumstances can inhibit one's ability to practice interoceptive awareness. If interoceptive awareness is lacking, intuitive eating skills may also be lacking.

Intuitive Eating, Interoception, and College Students

Multiple studies have confirmed that college is a time of life where young adults are at risk for encountering attunement disruptors when it comes to eating. As an example of an attunement disruptor, calorie-counting and frequent weighing of oneself can spiral into disordered eating behaviors, especially in vulnerable college students (Romano et al., 2018). When Romano et al. (2018) observed students in the college setting and compared frequent calorie counters to those who practiced intuitive eating (IE), they found that those who implemented more IE principles into their life were less likely to have disordered eating patterns. While not specifically observed in this study, it may be hypothesized that those who spiraled into disordered eating habits had poor interoceptive awareness skills. Research needs to continue to connect these two topics together. It may be possible that those who have high interoceptive awareness are more likely to understand their hunger and fullness needs.

Limited studies have evaluated the connection between interoception and intuitive eating in college students. Although this is a noticeable gap, a recent study found that interoceptive awareness changes over the lifespan, especially in late adolescence/early adulthood. For example, young adults are going through multiple changes throughout this stage of life (e.g. identity changes, hormone changes, physical changes, cognitive changes, etc.) which is believed to occasionally disrupt interoceptive awareness and sensitivity (Murphy et al., 2017). Murphy et al. (2017) admits that future research needs to examine the connection between childhood experiences (e.g., parent feeding practices), puberty, emotional changes, and interoceptive awareness changes in young adults. Changes in interoceptive awareness could change one's ability to eat intuitively.

Intuitive Eating and Interoception Intervention Studies

A recent research study completed by Boucher et al. (2016) found that a web-based intuitive eating program ("Mind, Body, Food") increased intuitive eating behaviors and decreased binge eating behaviors in middle-aged women. Although this study focused on only women and individuals who were in middle adulthood, this study has significant implications for all ages. The "Mind, Body, Food" program has twelve modules with educational videos and practice skill problems that helped participants learn to focus on their own body's needs, rather than external factors (Boucher et al., 2016). While not directly addressed, the "Mind, Body, Food" program may have increased the participants' interoceptive awareness. This may explain why many of the participants were able to eat more intuitively after the internet-based program was completed. Future research should continue to connect the dots between interoceptive awareness and intuitive eating to determine if interoceptive awareness is required for an individual to eat intuitively. This specific research study offers preliminary evidence but does not inform the readers if the ability to eat intuitively was easier (or harder) for individuals who had higher levels of interoceptive awareness.

Application and Summary

Within the field of occupational therapy, weight management and health behavioral change is a current topic of interest. Health management and weight management changes throughout the lifespan. The transition to college, and increased independence appears to be a time period that requires individuals to learn to figure out how to nourish themselves in healthy way. Tribole & Resch (2020) say that weight management techniques include external mechanisms (calorie counting, point systems, etc.) and internal mechanisms (acknowledging hunger and satiety signals). The success of weight loss long term is of much debate and is a

lifelong struggle for many. Internal mechanisms (i.e., Intuitive Eating) appears to have more success long term (Tribole & Resch, 2020). Intuitive Eating, although it has long term success appears, to be quite challenging for many.

According to Tribole & Resch (2020), interoceptive awareness occurs when an individual processes, perceives, and tries to make meaning of an internal sensation. When interoceptive awareness is cultivated, it is believed that people can be more in touch with the physical sensation of hunger (Tribole & Resch, 2020). If one cannot recognize hunger or satiety, it is questioned whether Intuitive Eating is even possible. When interoceptive awareness, particularly of hunger and satiety are impaired, it is questioned whether individuals attempting to manage weight need to use external tools (such as calorie counting, etc.). For other students, they may have high interoceptive awareness, which means they do not need certain tools to tell them when and what to eat, since they use their body signals to guide them. External methods do not have the same long term success rate as Intuitive Eating (Tribole & Resch, 2020).

Interoception awareness and intuitive eating matters for college students because Romano et al. (2018) says that young adults who use calorie counting or engage in dieting behaviors (e.g., calorie counting) are more susceptible to disordered eating patterns. Disordered eating could negatively affect daily life occupations and could cause even more dysfunction in interoceptive awareness processing (Tribole & Resch, 2020). This could ultimately end of affecting one's ability to eat intuitively (Romano et al., 2018). Murphy et al. (2017) explains this further by saying college is a time where interoceptive awareness can drastically change, since students are in a brand-new environment and are required to make meaning and sense of their internal signals in a brand-new place. Because attunement disruptors can impact one's ability to make meaning

of internal cues (via interoception awareness), this can ultimately impact the way a student eats (Tribole & Resch, 2020, Murphy et al., 2017; Romano et al., 2018).

While each college student has their own unique story related to weight, specifically for overweight individuals, Salvo et al. (2018) says mindfulness-based interventions can help a person tune into their body more efficiently. This allows for a better understanding of hunger and fullness cues, which can aid in enhancing interoceptive awareness (Salvo et al., 2018). Because interoception awareness may be the solution to becoming an intuitive eater, which is most successful long-term, the research completed by Salvo et al. (2018) provides an important foundation for future research (Tribole & Resch, 2020). Nogue et al. (2019) also provides information on this topic by saying that intuitive eating has been linked to long-term and sustainable weight loss after bariatric surgery. While the population of this study was not college students, this provides important information because the research shows that intuitive eating is more effective than dieting methods for weight loss (Nogue et al., 2019). But to get one to that point, they may need to make meaning and sense of their own hunger and fullness cues first.

Emotional eating can be another problem that college students struggle with. Emotional eating can interrupt interoceptive signaling, which can inhibit the process of making sense of internal hunger and fullness cues (Tribole & Resch, 2020). Sokol et al. (2016) found that college students who eat for emotional reasons tend to tune out what their internal signals are truly telling them, which is why it is more difficult to eat intuitively.

Recent research by Tylka et al. (2020) linked intuitive eating to weight stability. This is because with intuitive eating, individuals are using interoceptive awareness cues to understand and make meaning of when/what to eat, versus using external tools and mechanisms to dictate eating patterns (Tylka et al., 2020). Because weight cycling from dieting can have negative

implications on health and psychological well-being, intuitive eating is a better solution (Bacon & Aphramor, 2014; Tylka et al., 2020). But, to eat intuitively, interoception awareness may be a prerequisite (Tribole & Resch, 2020).

The purpose of the study was to see if there is a correlation between Interoceptive Awareness and weight management success using internal vs. external tools. The implication for the research lays the possible groundwork to consider using interventions to improve interoceptive awareness as part of a weight management program, as there is limited research that aims to understand the role of interoceptive awareness in weight management.

Methods

Research Design

A case study design was used to compare data results of two surveys related to interoceptive awareness and dieting. Interpretations were developed from the External vs. Internal Tools Survey and Interoceptive Awareness Interview© that were completed by the participants.

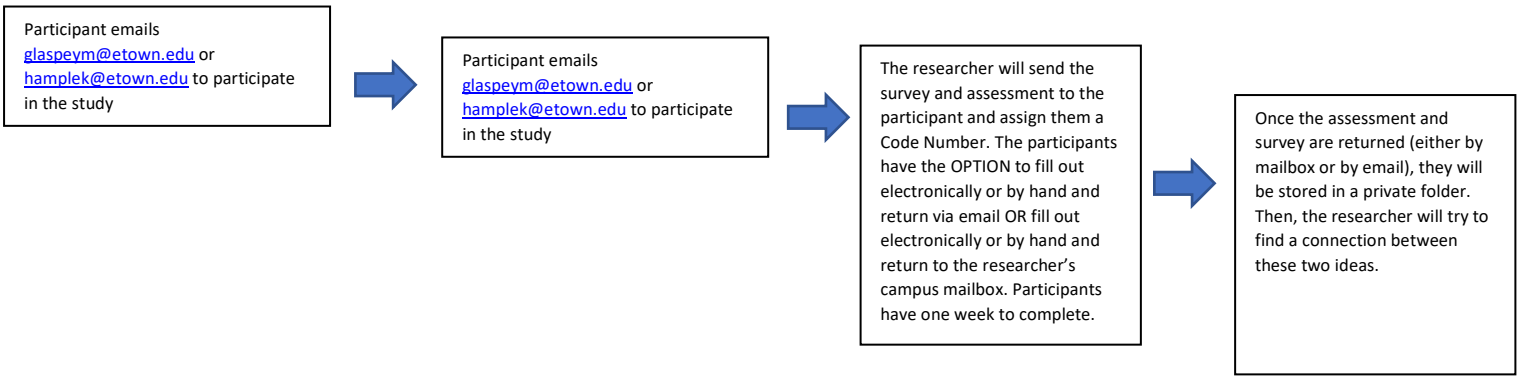
Participant Recruitment and Selection

Before data collection from participants occurred, The Elizabethtown College IRB approved the research study. Figure A describes the process of participant recruitment. To recruit participants who had lost five to ten pounds within the last two years, a description of the research study was posted on the Elizabethtown College "Jays App". This is an application that posts important announcements and information for the entire student body and staff at Elizabethtown College. Because only a few participants were identified this way, a description of the research study was sent to the Honors Program and Occupational Therapy Department at

Elizabethtown College. Other departments were contacted but denied forwarding the research study information to their students.

Eleven students participated in the study and gave written consent prior to completing the research surveys. One female participant did not meet criteria as initial weight loss was a cause of a new health condition. Of the ten students that met the criteria, nine were female and one participant was a male. An excerpt about the study was sent out to the entire campus student body at Elizabethtown College to ensure participants met the inclusion criteria. Participants were not compensated.

Figure A: Participant Recruitment Process



Inclusion and Exclusion Criteria

When the research study was posted on the Elizabethtown College Jays App and sent to the Honors Program and Occupational Therapy departments, a description of the inclusion criteria was included. To participate, students had to be in college (between ages 18-25) and must have lost 5-10 pounds within the last two years. Participants could currently be losing weight, but to meet criteria, between 5-10 pounds must have already been lost. The first few questions on the External vs. Internal Tools survey asked participants if they lost five to ten pounds within the last two years, which also reinforced the inclusion criteria. One participant

was excluded from the study because weight loss was a symptom of a digestive health issue and not intentional.

Instruments

The Interoceptive Awareness Interview© and the External vs. Internal Tools survey were sent to participants to complete after the consent form was signed. The Interoceptive Awareness Interview© is an open-ended, eighteen-question, non-standardized measurement tool created by Kelly Mahler OTR/L (Shah, 2016). This tool is used to help individuals recognize how their body feels in certain situations, such as when they are hungry, full, thirsty, etc. The assessment is scored by either giving participants a one (1) or a zero (0) for each question. There is no sliding scale (e.g., a 0.5 score). A one (1) represents that the student was able to understand their internal cues about a particular feeling (e.g., angry, hungry, tired, etc.). A zero (0) was given when students did not give a rich description of how their internal cues made them feel. The tool is useful for understanding if individuals can generally understand how they feel, however, it does not mean that they are always able to make sense of those feelings unless noted. The External vs. Internal Tools survey was created by the primary researcher and reviewed by the faculty mentor/second researcher before being sent out to participants. The survey was piloted with an individual to detect changes needed before distribution. The questions were tailored to determine if participants used internal or external tools to manage their weight, as Tribole & Resch (2020) explain that internal methods are more successful long-term. Questions four through nine and question twenty targeted the use of external tools for weight loss. Questions ten through nineteen targeted the use of internal tools for weight loss. Each survey that was submitted was evaluated on a case-by-case basis.

Data Collection/Procedures

When participants volunteered to be part of the research study, the primary researcher sent a consent form through college email. Once participants signed the consent form, the Internal vs. External Tools Survey and The Interoceptive Awareness Interview© were sent via email to participants. The participants were given a code number. Subjects were asked to write the same code number at the top of the External vs. Internal Tools Survey and The Interoceptive Awareness Interview©. This code number kept the survey information confidential, so the researcher did not know who filled out the forms. Once the forms were completed, the participants had the option to send them back via email or place in the primary researcher's mailbox. Eight participants (not including the person who did not meet criteria) sent back the surveys via email and two participants returned the two surveys via campus mailbox. It took participants about a week to send back the surveys. For those who emailed their surveys, the primary researcher printed off the forms to keep the students' names confidential. The researcher could also see the code numbers, not names once the surveys were printed off from email.

Data Analysis

Both surveys that participants completed were returned to the researcher by email or by campus box. The code number given to participants (a number between 1-11) were written on the forms so that the primary and secondary researcher were unaware of who completed them. This helped to maintain confidentiality while analyzing the data.

Data analysis was completed by comparing scores on the External vs. Internal Tools survey and the total scores on the Interoceptive Awareness Interview©. For the Interoceptive Awareness Interview©, the highest number of points a person can receive is eighteen (since there are eighteen questions total in the assessment) (**See Figure 1**). Participants received a score of

one (1) if they were able to describe how they felt when experiencing different emotions/feelings. Participants received a score of zero (0) if they were not able to describe how they felt when experiencing different emotions/feelings. There is no sliding scale. For example, if participants gave a rich description of how they felt, they were given a one. If participants explained that they were not sure how they felt, they were given a zero. While each participant was analyzed on a case-by-case basis, most participants demonstrated the ability to understand basic biological responses to different emotions/feelings (e.g., hunger, thirst, etc.).

Additionally, when analyzing data from the Interoceptive Awareness Interview©, the researchers identified participants as either hyporesponsive, hyperresponsive, or normal. Hyporesponsive means that the student needed extra or amplified stimuli (e.g., intensive hunger cues) to understand when they were hungry or full. An example would be a participant that gets intense headaches or nausea when they became too hungry. Another example would be when a participant felt too full and then felt as though they may throw up. Hyperresponsive means the individual is very sensitive to hunger and fullness cues. The forms returned by participants were evaluated on a case-by-case basis to make interpretations on whether the students could make meaning of internal cues. While most students were able to understand hunger and fullness cues (e.g. receiving a high score on the Interoceptive Awareness Score), this does not mean that they were able to make meaning of those cues. The designation of hyperresponsive, normal, or hyporesponsive was used on a case-by-case basis to help understand which students had difficulty making meaning of internal body cues in response to a feeling/emotion. Examples of participant responses related to the feeling of fullness are listed below. The primary researcher and faculty mentor classified the responses as hyporesponsive because it took a lot of internal tools to trigger fullness.

Participant 8 said, “I feel like I am going to explode”.

Participant 6 said, “When I overeat, I feel I should throw up”.

Participant 4 said, “My stomach feels like a balloon…my stomach could burst”.

For the External vs. Internal Tools Survey, data analysis occurred on a case-by-case basis. Each student was evaluated separately, and it was determined whether a student used external tools or internal tools based on the consistency of their responses (See **Figure 2** for survey). For example, if one student utilized all external tools and no internal tools to lose weight, it was hypothesized that they relied on external mechanisms to control weight. As another example, if a student used a blend of external and internal tools to lose weight, but did have success and sustainability with internal methods, it was hypothesized that internal tools were more successful (and sustainable) long term. Responses from the External vs. Internal Tools Survey were evaluated separately for each participant.

After data was analyzed separately for each of survey, data was analyzed together. For example, if a participant had a lower interoceptive awareness score (e.g., a score of 15 versus 18), was considered hyporesponsive, and primarily used external tools for weight loss (and was unsuccessful with them), it was hypothesized that the student may not have the ability to understand internal hunger cues. As another example, if a student scored high on the Interoceptive Awareness Interview© (Score of 18), was normal, and primarily used internal tools to manage weight (and was successful), it was hypothesized that the student had the ability to understand their internal hunger and fullness cues. In return, this could mean weight loss was more sustainable because the student was able to use their body to guide their food choices for weight loss, rather than relying on external tools.

Figure 1: The Interoceptive Awareness Interview© Questions

SECTION I Questions

1. Main Question: How does your body feel when you are relaxed/calm? Follow-up Questions or Prompts: How do you know when you are relaxed/calm? What makes you feel relaxed/calm? How does your body feel when you are doing_____(insert an answer from the previous question)?

2. Main Question: How does your body feel when you are angry? Follow-up Questions or Prompts: How do you know when you are angry? What makes you feel angry? How does your body feel when _____ (insert an answer from previous the question)?

3. Main Question: Does your body feel different when you are a little angry vs. really angry? Follow-up Questions: If so, please describe the differences.

4. Main Question: How does your body feel when you are nervous? Follow-up Questions or Prompts: How do you know when you are nervous? What makes you feel nervous? How does your body feel when _____(insert an answer from the previous question)?

5. Main Question: How does your body feel when you are sad? Follow-up Questions or Prompts: How do you know when you are sad? What makes you feel sad? How does your body feel when _____(insert an answer from the previous question)?

6. Main Question: How does your body feel when you are excited? Follow-up Questions or Prompts: How do you know when you are excited? What makes you feel excited? How does your body feel when _____(insert an answer from the previous question)?

7. Main Question: How does your body feel when you are distracted? Follow-up Questions or Prompts: How do you know when you are distracted? What makes you feel distracted? How does your body feel when _____(insert an answer from the previous question)? Do other people tell you to 'pay attention' frequently?

8. Main Question: How does your body feel when you are embarrassed? Follow-up Questions or Prompts: How do you know when you are embarrassed? What makes you feel embarrassed? How does your body feel when _____(insert an answer from the previous question)?

9. Main Question: How does your body feel when you are sleepy? Follow-up Questions or Prompts: How do you know when you need to go to bed? How do you feel when you are falling asleep?

10. Main Question: How does your body feel when you are hungry? Follow-up Questions or Prompts: How do you know when you are hungry? Do you ever go for long periods of time without eating? Do other people need to remind you to eat? 1

11. Main Question: How does your body feel when you are full? Follow-up Questions or Prompts: How do you know when you are full? How do you know when to stop eating? Do you ever eat a large amount of food and not feel full? Do you ever eat too much to the point of pain or getting sick?

12. Main Question: How does your body feel when you are thirsty? Follow-up Questions or Prompts: How do you know when you are thirsty? Do you ever go for long periods of time without a drink? Do other people need to remind you to drink?

13. Main Question: How does your body feel when you have to go to the bathroom? Follow-up Questions or Prompts: How do you know when it is time to go to the bathroom? Does your body feel different when you have to pee as compared to when you have to poop? If so, please describe. Do you ever have accidents or last-minute emergency trips to the bathroom? Does the feeling of needing to pee/poop come out of nowhere?

14. Main Question: How does your body feel when you do a lot of exercise (physical activity)? Follow-up Questions and Prompts: How do you know when your body needs a break when exercising? Do you ever over-do-it when exercising and suddenly realize you are beyond the point of exhaustion?

15. Main Question: Can you easily feel or describe the specific way your body feels when you are sick (e.g. symptoms)? Follow-up Questions and Prompts: Have you ever been sick and not realized? When you are sick, can you easily figure out what is wrong (e.g. sore throat, belly ache)?

16. Main Question: Have you ever been injured and not felt pain? If so, please describe. Follow up Questions and Prompts: Do you seem to be able to handle more or less pain than most people? Do you have a really high or low pain tolerance?

17. Main Question: How does your body feel when you have had ‘too much’ (e.g. too much sound, too much bright light, too much talking, too much smell, etc.)? Follow-up Questions and Prompts: How do you know when you have had ‘too much’? What do you do when you have had ‘too much’?

18. Main Question: How does your body feel when you need to take a break? Follow-up Questions and Prompts: How do you know when you need to take a

break? What do you do during breaks? How does (insert answer from previous question) make your body feel?

Figure 2: External vs. Internal Tools Survey

External vs. Internal Tools Survey

Code Number:

Age:

Gender:

Race/Ethnicity:

Major:

Year (Junior, Senior, etc.):

SURVEY

1. Do you currently have to lose weight?	___YES___NO
2. In the past, have you had 5-10 pounds to lose?	___YES___NO
3. Have you lost 5-10 pounds in the last 2 years?	___YES___NO
4. Are you currently trying to lose weight?	___YES___NO
5. Do you have a medical condition that made you lose weight without trying?	___YES___NO

Please Indicate if You Have Used the Following Strategies to Lose Weight

6. Used measuring cups/utensils to portion food	___YES___NO
a. If YES, did you have success with this??	___YES___NO
b. If YES, how long did you have success with this?	____1 month ___6 months ____1 year ____ 1+ years
c. Was this difficult to sustain?	___YES___NO

7. Have you counted calories?	___YES ___NO
d. If YES, did you have success with this??	___YES ___NO
e. If YES, how long did you have success with this?	____1 month ___6 months ____1 year ____ 1+ years
f. Was this difficult to sustain?	___YES ___NO

8. Ate low-calorie or diet foods	___YES ___NO
g. If YES, did you have success with this??	___YES ___NO
h. If YES, how long did you have success with this?	____1 month ___6 months ____1 year ____ 1+ years
i. Was this difficult to sustain?	___YES ___NO

9. Have you removed certain foods from your diet?	___YES ___NO
j. If YES, did you have success with this??	___YES ___NO
k. If YES, how long did you have success with this?	____1 month ___6 months ____1 year ____ 1+ years
l. Was this difficult to sustain?	___YES ___NO

Which foods (e.g. dairy, alcohol, etc.)? _____

10. Listened to my hunger to tell me WHEN to eat, rather than following a certain meal plan	___YES ___NO

m. If YES, did you have success with this??	___YES ___NO
n. If YES, how long did you have success with this?	____1 month ___6 months ____1 year ____ 1+ years
o. Was this difficult to sustain?	___YES ___NO

11. Listened to my hunger to tell me WHAT to eat, rather than following a certain meal plan	___YES ___NO
p. If YES, did you have success with this??	___YES ___NO
q. If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
r. Was this difficult to sustain?	___YES ___NO

12. Listened to my hunger to tell me HOW to eat, rather than following a certain meal plan	___YES ___NO

s. If YES, did you have success with this??	___YES ___NO
t. If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
u. Was this difficult to sustain?	___YES ___NO

13. Listened to my body to tell me when I was full, rather than following a strict plan	___YES ___NO
v. If YES, did you have success with this??	___YES ___NO
w.If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
x. Was this difficult to sustain?	___YES ___NO

14. Listened to my hunger to tell me WHAT to eat	___YES ___NO
y. If YES, did you have success with this??	___YES ___NO

z. If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
aa. Was this difficult to sustain?	___YES ___NO

15. Waited until I experienced hunger symptoms, such as a rumbling tummy, mood change, headache, etc. to eat	___YES ___NO
bb. If YES, did you have success with this??	___YES ___NO
cc. If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
dd. Was this difficult to sustain?	___YES ___NO

16. Ate the foods most satisfying to me, without cutting anything out	___YES ___NO
ee. If YES, did you have success with this??	___YES ___NO

ff.If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
gg. Was this difficult to sustain?	___YES ___NO

17. Used a "balanced plate approach": Making ½ plate fruit/vegetables, ¼ protein, ¼ grains, BUT, went back for seconds if needed	___YES___NO
hh. If YES, did you have success with this??	___YES___NO
ii. If YES, how long did you have success with this?	____1 month ___6 months ____1 year ____ 1+ years
jj. Was this difficult to sustain?	___YES ___NO

18. Became more mindful of my eating by limiting distractions	___YES ___NO

kk. If YES, did you have success with this??	___YES ___NO
ll. If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
mm. Was this difficult to sustain?	___YES ___NO

19. Used a hunger/fullness scale to check-in with my hunger level	___YES ___NO
nn. If YES, did you have success with this??	___YES ___NO
oo. If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
pp. Was this difficult to sustain?	___YES ___NO

20. Are there any other specific weight loss tools you utilized to control your weight? Please list the columns on the right.	___YES ___NO

qq. If YES, did you have success with this??	___YES ___NO
rr.If YES, how long did you have success with this?	____1 month ____6 months ____1 year ____ 1+ years
ss. Was this difficult to sustain?	___YES ___NO

Ethical Considerations

To minimize risks, participants were told their participation was voluntary. At any point if students felt uncomfortable, they were allowed to leave the study. Participants were also required to give consent before participation, which ensured that they understood the general procedures. Confidentiality was enforced by assigning participants a code number and giving the choice to return the surveys via email or mailbox. There were no physical or psychological risks identified in the research study. Elizabethtown College IRB reviewed methods to ensure risks were minimized.

Results

Demographics

Ten students completed the Interoceptive Awareness Interview© and the External vs. Internal Tools survey. An eleventh student did not meet criteria because weight loss was initially caused by another medical condition. All students were from a small, private college in Pennsylvania. There were nine female participants and one male participant. All participants

were Caucasian (Non-Latino). Nine participants were undergraduates, and one participant was a graduate student. The age range for participants was between nineteen and twenty-two years old. Most students were Occupational Therapy majors, and one participant was a Biochemistry/Molecular Biology major.

Interoceptive Awareness Interview© Results

Based on the scores from the Interoceptive Awareness Interview© (the lowest being a 15), most students seemed to know what their body felt like when they experienced various emotions, such as angry, nervous, hungry, thirsty, sleepy, distracted, sad, and excited. This could mean that in general, the students were able to decipher how their body signals differed when they were put in different circumstances and situations, although this does not mean that they always could make meaning of and/or honor those cues all the time. This is where hyposensitivity, hypersensitivity, or normal ratings come into play.

Specifically focusing on hunger in the Interoceptive Awareness Interview©, there were mixed responses. Some participants said they needed frequent reminders or schedules to eat. More than half the participants said that they experienced headaches when they were hungry, which could mean that it took too long for their body to make meaning of earlier hunger signals (Tribole & Resch, 2020). Some students felt nauseous when they were hungry, which could mean they waited too long to eat (Tribole & Resch, 2020). Other participants said they did not need reminders to eat and tuned into their bodies to decide when it was the best time to eat. Quote examples below (specifically from the hunger and fullness section) display a wide breadth of responses from participants.

10. Main Question: How does your body feel when you are hungry? Follow-up Questions or Prompts: How do you know when you are hungry? Do you ever go for long periods of time without eating? Do other people need to remind you to eat?

Participant 2: "It just sort of us has an emptiness feeling. No one needs to remind me when to eat".

Participant 4: "My stomach hurts and I lose energy. I can't finish my workout and my stomach starts making noises. Sometimes I get a headache".

Participant 6: "When I am hungry, my body feels unbalanced and agitated or weak and slow".

Participant 9: "When I am really hungry, I will get a headache that is difficult to get rid of" Sometimes I do forget to eat if I am not paying attention to my hunger cues".

Participant 10: "I rely on time cues or reminders from other people to stay on a consistent eating schedule".

11. Main Question: How does your body feel when you are full? Follow-up Questions or Prompts: How do you know when you are full? How do you know when to stop eating? Do you ever eat a large amount of food and not feel full? Do you ever eat too much to the point of pain or getting sick?

Participant 2: "I do eat large amounts of food and do not feel all the way full sometimes".

Participant 3: "I know I am full when I do not have the urge of hunger any longer. I find that if I take a smaller portion, I can get a better gauge on my hunger. When I have a large plate, I feel the need to eat everything on my plate and that makes me feel sick".

Participant 6: "My body feels recharged"

Participant 9: "I used to eat a lot of food and either not feel full or ignore those hunger signals"

Participant 10: "I do eat to the point of pain sometimes but that is when I have eaten too fast or am not paying attention to the cues my body gives me to finish eating"

Participant 11: "My body feels painful and very sick".

The responses show that students were able to know how they felt when they were extremely or generally hungry and full, however, some had increased difficulty acting fast enough in response to those signals. This is an example of being hyporesponsive. Some students had difficulty gauging how hungry or full they were and as a result, may have eaten too much. This also demonstrates hyperresponsiveness because interoceptive signals may have been delayed (See Table 1).

Table 1: Interoceptive Awareness Scores

Participant Code #	Interoceptive Awareness Interview© Scores	Responsivity
Participant 1	17	Hyporesponsive
Participant 2	18	Hyporesponsive
Participant 3	18	Normal
Participant 4	17	Hyporesponsive
Participant 5	15	Hyporesponsive
Participant 6	18	Hyporesponsive
Participant 7	Did not meet criteria	Did not meet criteria
Participant 8	18	Hyporesponsive
Participant 9	17	Hyporesponsive
Participant 10	17	Hyporesponsive
Participant 11	18	Hyporesponsive

External vs. Internal Tools Survey

Based on the scores from the Internal vs. External Weight Survey, which was created by the primary researcher (Table 2), a majority of students used external mechanisms (e.g., calorie counting, diets, etc.) to lose weight (Table 3). Most of the participants who employed external mechanisms to control their weight did not have success with weight loss long term (Table 4).

All of the students (100%) that implemented external tools also indicated that external methods were hard to sustain. Overall, for the participants that used internal mechanisms to lose weight, weight loss was successful and was not difficult to sustain. It was also noticed that the participants who had difficulty with hunger and fullness signals (e.g., eating past the point of fullness, eating to the point of pain, etc.) were more likely to try external mechanisms to control weight. This could mean that those students were unable to properly make meaning of their internal signals (via interoceptive awareness), which is why dieting (external) tools were utilized. Examples below display a wide breadth of answers from participants.

Participants 1, 2, 4, and 5: The participants did a diet program and/or counted calories to lose weight and did not use any internal tools to understand hunger and fullness cues. The participants had success with the diet program but said it was difficult to sustain.

Participant 6: The student used a combination of internal and external tools to lose weight. The student had difficulty sustaining and having success with external methods. Except for two internal tools, the participant did not have difficulty sustaining and having success long term with all other internal mechanisms. One internal tool that the participant had difficulty sustaining was listening to hunger symptoms (Question fifteen). This question focuses on listening to internal hunger sensations, such as rumbling tummy, mood change, headache, etc., to tell when/what one should eat. Based on this response, this could mean the participant had difficulty sustaining this specific internal mechanism because interoceptive awareness was impaired. The student may not have been able to make meaning and sense of the hunger and fullness cues, which made it more difficult to understand what the body wanted when hungry.

While the other internal mechanisms worked, the student may have not been able to make sense of basic hunger cues, especially because they were hyporesponsive.

Participant 3 and 9: Like Participant 6, Participant 3 and 9 used a blend of internal and external tools to lose weight. The participants had success with the internal and external tools that were employed, however, an important thing to note was that the internal mechanisms were not difficult to sustain. The external mechanisms were very difficult for the students to put into practice. Both individuals seemed to have high interoceptive awareness, which is why internal mechanisms may have helped the person lose weight.

Table 2: Internal vs. External Weight Management Tools

External Cues Survey Questions	Internal Cues Survey Questions
• Used measuring cups/utensils to portion food • Counted calories • Diet apps/Diet programs • Ate low-calorie foods • Have removed certain foods from diet	• Listened to hunger to tell WHEN, WHAT, and HOW MUCH to eat • Listened to fullness rather than a strict meal/diet plan • Listened to hunger symptoms (e.g. mood change, rumbling tummy, headache) • Ate satisfying foods without cutting out certain food items • Hunger/Fullness Self Check-in and/or Mindful Eating
4 total questions asking about external methods, 1 open ended about other external tools used that were not mentioned in survey	9 total questions asking about internal methods

Table 3: Internal vs. External Cue Usage

Participant Number	Number of External Cues Used	Number of Internal Cues Used
1	3	0
2	4 ***Plus, extra methods indicated on open ended question	0
3	4	9
4	4 ***Plus other methods indicated on open ended question	1
5	4 ***Plus other methods indicated on open ended question	0
6	3	5
7	Did not meet criteria	Did not meet criteria
8	2 ***Plus other methods indicated on open ended question	8
9	4	6
10	3	5
11	4 ***Plus other methods indicated on open ended questions	4

Table 4: Success and Ability to Sustain: Internal vs External Cues

Participant Number	**External Cues**	**Internal Cues**
1	Had success with external tools Difficult to sustain	N/A
2	Had success with external tools Difficult to sustain	N/A
3	Had success with external tools Difficult to sustain	Had success with internal tools Not difficult to sustain
4	Had success with external tools Not difficulty to sustain short-term	Did not have success with internal cues
5	Did not have success with external methods Difficulty to sustain external methods	N/A
6	Did not have success with external tools Difficult to sustain	Had success with internal tools Not difficult to sustain, **besides** listening to hunger cues
7	Did not meet criteria	Did not meet criteria
8	Had success with two external tools, but only for one month Difficult to sustain	Had some success with internal tools, but not all
9	Had success with external tools Difficulty to sustain	Had success with internal cues Not difficult to sustain
10	Had success with external tools Difficulty to sustain	Had success with internal tools Not difficult to sustain, **besides** listening hunger symptoms
11	Had success with 2 external methods	Had success with all internal tools

	Did not have success with 2 external methods Difficult to sustain	 Not difficult to sustain

Discussion

Interoceptive Awareness Interview©

The Interoceptive Awareness Interview© is a non-standardized measure. The purpose is to see individuals' perception on how the body feels in different situations (such as anger, sadness, upset, hunger, and fullness) (Mahler, 2021). Taking into account the students' open-ended responses on the assessment, it appears that students knew how they felt when they experienced various emotions. However, this does not mean that they can always make sense of them. For example, those who did not need reminders or a schedule to eat exemplified high levels of interoceptive awareness because they were able to understand when they needed to eat and stop eating. Students that felt nauseous or had headaches when they were hungry showed poorer interoceptive awareness skills (and hyperresponsivity) because nausea may be a late sign of hunger (Tribole & Resch, 2020). Two participants said when they were extremely hungry, they were tempted to eat faster and in larger quantities. This could mean that interoceptive awareness cues were either delayed or ignored.

External vs. Internal Tool Survey

The External vs. Internal Tool Survey revealed that all the participants (100%) used external mechanisms to lose weight (although some participants used internal mechanisms as well). This could mean that individuals are unable to listen to their body to tell them when and what to eat, which may be why external tools were utilized most frequently. Some students said

that external mechanisms were successful on a short-term basis (e.g., between 6-12 months), however, it was difficult to sustain. It could have been a challenge to use external mechanisms because dieting methods disrupt our body's natural hunger/fullness signals and have not been shown to work long-term (Tribole & Resch, 2020). Because external methods do not work long term and inhibit one's interoceptive signals, this could be the reason why those tools were difficult to sustain (Tribole & Resch, 2020). Other participants indicated that external methods were not successful or easy to sustain on a short-term basis (between 3-6 months), which reinforces that dieting is not helpful for losing weight long-term. For the students who used a blend of internal and external tools, it was evident that the internal mechanisms were easier to sustain and more successful long term. This also aligns with Tribole & Resch (2020) who note that internal mechanisms are more successful over a long period of time, since interoceptive awareness is one of the best resources for gauging hunger and fullness signals.

Both Surveys

The original hypothesis of the research study was that those who have poor interoceptive awareness rely on external mechanisms to lose weight, as interoceptive awareness may be a foundational skill for intuitive eating. Considering both surveys together, it is evident that those who had difficulty making meaning of their hunger signals (and were hyporesponsive) were more likely to try external mechanisms and neglect trying to use internal tools. For example, students who reported that they needed frequent reminders to eat and/or experienced nausea/headaches when hungry were more likely to try external methods for weight loss. For those who were able to describe their hunger and fullness in detail and not need reminders to eat, they were more likely to use a blend of internal and external methods. Students indicated that

internal methods were easier to sustain, which means that interoceptive awareness may be a foundation skill needed to follow intuition with eating. Recent research has identified that intuitive eating and interoception are related, however, there are limited studies that explain whether interoceptive awareness is a requirement for intuitive eating.

Limitations

A major limitation is that this research study only included students from a small, private college in Pennsylvania. The study was also not diverse, as there were nine female participants and one male. Students were all Caucasian and non-Latino. Nine out of ten participants were occupational therapy majors. The small sample size was a significant limitation.

In terms of survey use, a major limitation is that the External vs. Internal Tools survey and the Interoceptive Awareness Interview© were non-standardized. The External vs. Internal Tools survey also had more questions related to internal mechanisms of eating, which may have limited the researcher's ability to gain broader information about external mechanisms. Additionally, member checking did not occur.

Occupational Therapy Application

Within the last few years, there has been increased research that aims to discover occupational therapy's role in Interoception and in weight management/obesity for adults. Occupational therapy can play a significant part in enhancing interoceptive awareness. This can be completed by creating interventions that improve how individuals make meaning and sense of internal cues, which can ultimately aid in weight regulation and helping people become intuitive eaters. Occupational therapists can also play a large role in health promotion. This includes helping individuals manage their weight to prevent obesity. Because weight cycling has been

linked to overweight, occupational therapists can help identify healthy eating strategies that are successful over a long-term basis (Tribole & Resch, 2020).

Future Research

Future research should continue to understand if interoceptive awareness is a prerequisite and foundation for intuitive eating. Further research should also aim to examine if interoceptive awareness interventions are successful for helping individuals become more efficient intuitive eaters. Due to the small sample size and use of non-standardized assessments, the results may not be generalizable to all college students. It is also recommended that future research use more extensive surveys and measures to examine occupational therapy's role in helping individuals become intuitive eaters.

Conclusion

Research aiming to understand if interoceptive awareness is a foundational skill for intuitive eating is lacking. Research has shown that interoceptive awareness and intuitive eating are related, however, critical analysis about whether interoceptive awareness skills are a prerequisite for being intuitive with eating choices has yet to be understood. For this study, the initial hypothesis was generally supported: those with poorer interoceptive awareness are more likely to rely on external mechanisms/tools to lose weight. As individuals stray further away from understanding and making meaning of their internal hunger and fullness cues, they may turn to dieting mechanisms/external tools to manage their weight. The findings suggest that interoceptive awareness may be a necessary skill for intuitive eating. The study findings support the need for interoceptive awareness interventions, as this may enhance intuitive eating, however, more research needs to be done to understand this concept further.

References

Bacon, L., & Aphramor, L. (2014). Body respect: What conventional health books get wrong, leave out, and just plain fail to understand about weight. BenBella Books.

Bacon, L., Stern, J. S., Van Loan, M. D., & Keim, N. L. (2005). Size acceptance and intuitive eating improve health for obese, female chronic dieters. *Journal of the American Dietetic Association*, *105*(6), 929–936. https://doi.org/10.1016/j.jada.2005.03.011

Boucher, S., Edwards, O., Gray, A., Nada-Raja, S., Lillis, J., Tylka, T. L., & Horwath, C. C. (2016). Teaching intuitive eating and acceptance and commitment therapy skills via a web-based intervention: A pilot single-arm intervention study. *JMIR Research Protocols*, *5*(4), e180. https://doi.org/10.2196/resprot.5861

Cadena-Schlam, L., & López-Guimerà, G. (2014). Intuitive eating: an emerging approach to eating behavior. *Nutricion Hospitalaria*, *31*(3), 995–1002. https://doi.org/10.3305/nh.2015.31.3.7980

Herbert, B. M., & Pollatos, O. (2014). Attenuated interoceptive sensitivity in overweight and obese individuals. *Eating Behaviors*, *15*(3), 445–448. https://doi.org/10.1016/j.eatbeh.2014.06.002

Herbert, B. M., Blechert, J., Hautzinger, M., Matthias, E., & Herbert, C. (2013). Intuitive eating is associated with interoceptive sensitivity. Effects on body mass index. *Appetite*, *70*, 22–30. https://doi.org/10.1016/j.appet.2013.06.082

Herbert, B. M. (2014). Dieting vs. adaptive eating: Psychophysiological mechanisms of interoception and its relevance for intuitive eating. *Appetite*, *83*, 343. https://doi.org/10.1016/j.appet.2014.06.034

Mahler, K. (2021). What is Interoception? https://www.kelly-mahler.com/what-is-interoception/

Murphy, J., Brewer, R., Catmur, C., & Bird, G. (2017). Interoception and psychopathology: A developmental neuroscience perspective. *Developmental Cognitive Neuroscience*, *23*, 45–56. https://doi.org/10.1016/j.dcn.2016.12.006

Nogué, M., Nogué, E., Molinari, N. (2019). Intuitive eating is associated with weight loss after bariatric surgery in women. *The American Journal of Clinical Nutrition.* 110(1):10-15. DOI: 10.1093/ajcn/nqz046.

Oswald, A., Chapman, J., and Wilson, C. (2017). Do interoceptive awareness and interoceptive responsiveness mediate the relationship between body appreciation and intuitive eating in young women? *Appetite*, 109:66-72. PMID:27866989.

Quadt, L., Critchley, H. D., & Garfinkel, S. N. (2018). The neurobiology of interoception in health and disease. *Annals of the New York Academy of Sciences*, *1428*(1), 112–128. https://doi.org/10.1111/nyas.13915

Richard, A., Meule, A., Georgii, C., Voderholzer, U., Cuntz, U., Wilhelm, F. H., & Blechert, J. (2019). Associations between interoceptive sensitivity, intuitive eating, and body mass index in patients with anorexia nervosa and normal-weight controls. *European Eating Disorders Review: The Journal of the Eating Disorders Association*, *27*(5), 571–577. https://doi.org/10.1002/erv.2676

Romano, K. A., Swanbrow Becker, M. A., Colgary, C. D., & Magnuson, A. (2018). Helpful or harmful? The comparative value of self-weighing and calorie counting versus intuitive eating on the eating disorder symptomology of college students. *Eating and Weight Disorders: EWD*, *23*(6), 841–848. https://doi.org/10.1007/s40519-018-0562-6

Salvo, V., Kristeller, J., Montero Marin, J., Sanudo, A., Lourenço, B. H., Schveitzer, M. C., D'Almeida, V., Morillo, H., Gimeno, S., Garcia-Campayo, J., & Demarzo, M. (2018). Mindfulness as a complementary intervention in the treatment of overweight and obesity in primary health care: study protocol for a randomised controlled trial. *Trials*, *19*(1), 277. https://doi.org/10.1186/s13063-018-2639-y

Scritchenfield, R. (2016) Body Kindness. Transform your health from the inside out and never say diet again. Workman Publishing Company.

Shah, P. Interoception: The Eighth Sensory System: Practical Solutions for Improving Self-Regulation, Self-Awareness and Social Understanding of Individuals with Autism Spectrum and Related Disorders. *Journal of Autism and Developmental Disord*ers 46, 3193–3194 (2016). https://doi.org/10.1007/s10803-016-2848-8

Simmons, W. K., & DeVille, D. C. (2017). Interoceptive contributions to healthy eating and obesity. *Current Opinion in Psychology*, *17*, 106–112. https://doi.org/10.1016/j.copsyc.2017.07.001

Sokol, A., Goldbacher, E., McCLure, K., & McMahon, C. (2016). Interoceptive awareness and emotional eating: *The role of appetite and emotional awareness.* https://www.sbm.org/UserFiles/file/PaperSession4_Sokol.pdf

Stevenson, R. J., Mahmut, M., & Rooney, K. (2015). Individual differences in the interoceptive states of hunger, fullness and thirst. *Appetite*, *95*, 44–57. https://doi.org/10.1016/j.appet.2015.06.008

Tribole, E. & Resch, E. (2020). Intuitive Eating (4th Ed.): A revolutionary diet approach. St. Martin's Essentials; Illustrated Edition.

Tylka, T. L., Calogero, R. M., & Daníelsdóttir, S. (2020). Intuitive eating is connected to self-reported weight stability in community women and men. *Eating Disorders*, *28*(3), 256–264. https://doi.org/10.1080/10640266.2019.1580126

Appendix