การวิเคราะห์ความไวในการตรวจคัดกรองของโรคออร์โธเร็กเซียเนอร์โวซา โดยการใช้แบบทดสอบอิงตามสติ และสติในการรับประทานอาหาร ในผู้ใหญ่ในกรุงเทพมหานคร ประเทศไทย

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรศาสตรมหาบัณฑิต
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ปีการศึกษา 2566

SENSITIVITY ANALYSIS OF ORTHOREXIA NERVOSA (ON) USING MINDFUL ATTENTION AWARENESS SCALE (MAAS) AND MINDFUL EATING BEHAVIOR SCALE-TRAIT (MEBS-T) AMONG A SAMPLE OF ADULTS IN BANGKOK, THAILAND

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A Thesis Submitted in Partial Fulfillment of the Requirements
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Academic Year 2023

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ปริญญาวิทยาศาสตรมหาบัณฑิต

หัวข้อวิทยานิพนธ์ การตรวจคัดกรองและการวิเคราะห์ความไวของโรคออร์โธเร็กเซียเนอร์โวซา โดยการใช้แบบทดสอบอิงตามสติและสติในการรับประทานอาหาร ในกลุ่มตัวอย่างผู้ใหญ่ในกรุงเทพมหานคร, ประเทศไทย

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วันที่ 17 เดือน มิถุนายน พ.ศ. 2567

หัวข้อวิทยานิพนธ์	การวิเคราะห์ความไวในการตรวจคัดกรองของโรคออร์โธเร็กเซียเนอร์โวซาใช้แบบทดสอบอิงตามสติและสติในการรับประทานอาหารในผู้ใหญ่ในกรุงเทพมหานคร, ประเทศไทย
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ปีการศึกษา	2565

บทคัดย่อ

ความเป็นมา: นิยามของอาการคลั่งกินคลีนหรือ "Orthorexia Nervosa" (ON) คือการมีพฤติกรรมที่หมกมุ่นและการยึดมั่นในกฎระเบียบการรับประทานอาหารอาหารอย่างเข้มงวดที่มุ่งเน้นเฉพาะอาหารที่ดีต่อสุขภาพ การขาดความชัดเจนในอาการและเกณฑ์การวินิจฉัยอาการจึงทำให้ยังไม่มีรับการยอมรับอย่างเป็นทางการว่าเป็นโรคจิตเวชในกลุ่มโรคการกินผิดปกติใน DSM5 การค้นพบว่าว่ามีอาการเหล่านี้จึงอาจไม่เป็นที่สังเกตได้มากนัก แบบประเมินเกี่ยวกับออร์โทเร็กเซียของดุสเซลดอร์ฟ (Düsseldorf Orthorexia Scale-DOS) เป็นเครื่องมือประเมินที่ใช้กันอย่างแพร่หลายซึ่งเป็นเครื่องมือที่น่าเชื่อถือเพื่อจำแนกบุคคลที่มีอาการออร์โทเร็กเซีย ทั้งนี้แนวโน้มที่เพิ่มขึ้นเกี่ยวกับการตระหนักรู้ด้านสุขภาพในช่วงการระบาดของโรคโควิด19 ทำให้การสำรวจเครื่องมือคัดกรองอื่นๆนั้นมีประโยชน์มาก รวมถึงการใช้มาตรวัดสติตระหนักรู้สนใจจดจ่อ (The Mindful Attention Awareness Scale-MAAS) และมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัย (The Mindful Eating Behavior Scale-Trait-MEBS-T)เพื่อการคัดกรองเบื้องต้นและวางแผนการรักษาโดยใช้จิตบำบัดที่อิงสติเป็นพื้นฐาน (Mindfulness-based interventions-MBIs) เนื่องจากการมีสตินั้นส่งผลต่อทุกด้านของชีวิตมนุษย์ การคัดกรองและรักษาที่เกี่ยวเนื่องกับสติเป็นพื้นฐานจึงมีความสำคัญยิ่ง หากไม่ทำเช่นนั้นอาจนำไปสู่การขาดสารอาหารและส่งผลเสียในด้านการเข้าสังคมรวมถึงกระทบสุขภาพจิตของผู้มีอาการคลั่งกินคลีนได้

วัตถุประสงค์: ในการหาเครื่องมืออิงระดับของสติในการคัดกรองเบื้องต้นอาการคลั่งกินคลีน งานวิจัยนี้ศึกษาความแม่นยำของมาตรวัดสติตระหนักรู้สนใจจดจ่อและมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัยในการแปลผลอาการคลั่งกินคลีน โดยใช้แบบประเมินเกี่ยวกับออร์โทเร็กเซียของดุสเซลดอร์ฟเป็นเครื่องมืออ้างอิง

ระเบียบวิธีวิจัย: กลุ่มตัวอย่างวัยผู้ใหญ่จำนวน 250 คน เข้าร่วมงานศึกษาแบบตัดขวาง ด้วยการเก็บข้อมูลในรูปแบบของการตอบแบบสอบถามด้วยตนเอง ใช้มาตรวัดสติตระหนักรู้สนใจจดจ่อ มาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัย และแบบประเมินเกี่ยวกับออร์โทเร็กเซียของดุสเซลดอร์ฟ ซึ่งทุกเครื่องมือผ่านกระบวนการแปลและแปลกลับเป็นภาษาไทย โดยค่าสัมประสิทธิ์แอลฟ่า (Cronbach's alpha) อยู่ในช่วง 0.76 (DOS) ถึง 0.88 (MAAS) ใช้วิธีศึกษาการหาจุดตัด (cut-offs) ของมาตรวัดสติตระหนักรู้สนใจจดจ่อและมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัยในการแปลผลอาการ

คลั่งกินคลีน โดยใช้แบบประเมินเกี่ยวกับออร์โทเร็กเซียของดุสเซลดอร์ฟเป็นเครื่องมืออ้างอิง รวมถึงหา Sensitivity, Specificity และ Area Under the Curve (AUC) นอกจากนี้ยังได้ทำการเปรียบเทียบสมรรถภาพการคัดกรองระหว่าง มาตรวัดสติตระหนักรู้สนใจจดจ่อและมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัย รวมถึงประเมินประสิทธิผลของการใช้เครื่องมือใดเครื่องมือหนึ่งหรือการใช้งานร่วมกันในการคัดกรองผู้มีอาการคลั่งกินคลีน

ผลการวิจัย: ที่เกณฑ์คะแนน (cut off score) 44 คะแนนสำหรับมาตรวัดสติตระหนักรู้สนใจจดจ่อ มี sensitivity 84.6% และ specificity of 91.9% ส่วนมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัยที่เกณฑ์คะแนน (cut off score) 16 คะแนนมี sensitivity 82.1% และ specificity of 88.2% ทั้งสองเครื่องมือมีประสิทธิภาพในการคัดกรองที่ดี มี AUCs 0.887 (95%CI 0.817, 0.957) และ 0.870 (95%CI 0.791, 0.949) ตามลำดับ โดยประสิทธิภาพในการคัดกรองไม่มีความแตกต่างกันอย่างมีสาระสำคัญ (P = 0.752) ในการประเมินประสิทธิผลของการใช้เครื่องมือร่วมกันในการคัดกรอง มี sensitivity 79.49% และ specificity 85.78% ซึ่งไม่ได้เพิ่มความแม่นยำให้แก่การคัดกรองผู้มีอาการคลั่งกินคลีน

สรุปผลการวิจัย: มาตรวัดสติตระหนักรู้สนใจจดจ่อ และมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัย มีคุณสมบัติที่ดีเพื่อช่วยในการคัดกรองผู้มีอาการคลั่งกินคลีน โดยการใช้เครื่องมือใดเครื่องมือหนึ่งให้ประโยชน์มากกว่าการใช้เครื่องมือทั้งสองคัดกรองร่วมกัน ในอนาคตการคัดกรองที่เกี่ยวเนื่องกับสติเป็นพื้นฐาน เช่น ใช้มาตรวัดสติตระหนักรู้สนใจจดจ่อและมาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัยจะมีประโยชน์อย่างมาก เพื่อนำไปสู่การคัดกรองเบื้องต้นที่รวดเร็วและวางแผนการรักษาโดยใช้จิตบำบัดที่อิงสติเป็นพื้นฐานต่อไป

คำสำคัญ: อาการคลั่งกินคลีน, ความเที่ยงตรง, สติ, ผู้ใหญ่

อาจารย์ที่ปรึกษาวิทยานิพนธ์ ดร. นายแพทย์ ภาวิต หน่อไชย

Thesis Title	SENSITIVITY ANALYSIS OF ORTHOREXIA NERVOSA (ON) USING MINDFUL ATTENTION AWARENESS SCALE (MAAS) AND MINDFUL EATING BEHAVIOR SCALE-TRAIT (MEBS-T) AMONG A SAMPLE OF ADULTS IN BANGKOK, THAILAND
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Academic Year	2022

ABSTRACT

Background: Orthorexia Nervosa (ON) is characterized by obsessive-compulsive tendencies and the adoption of restrictive eating habits centered around healthy food choices. The lack of clear symptoms and diagnostic criteria for ON has prevented its official recognition as a psychiatric eating disorder in the DSM5, potentially leading to its unnoticed presence. The Düsseldorf Orthorexia Scale (DOS) is a widely used assessment tool with strong psychometric properties to identify individuals with ON. Due to the increased emphasis on health awareness during the pandemic, it is advantageous to investigate alternate screening utilities, such as mindfulness-based tools including Mindful Attention Awareness Scale (MAAS) and Mindful Eating Behavior Scale-Trait (MEBS-T) for early detection and incorporating mindfulness-based interventions (MBIs) into their treatment plans. Mindfulness encompasses all aspects of life, ensuring an accurate screening and treatment protocol is crucial, as failing to do so can lead to malnutrition and social and psychological damage.

Aims: This diagnostic accuracy study aims to examine the potential of the Mindful Attention Awareness Scale (MAAS) and the Mindful Eating Behavior Scale-Trait (MEBS-T) as screening instruments for orthorexia nervosa (ON) by examining their sensitivity and specificity. The Düsseldorf Orthorexia Scale (DOS) was used as the standard reference for ON diagnosis.

Methods: A sample of 250 adults participated in the cross-sectional study, using self-administered tools - MAAS, MEBS-T, and DOS. The instruments underwent a translation and back translation process to the Thai version, resulting in Cronbach's alpha scores ranging from 0.76 (DOS) to 0.88 (MAAS). We established the cut-offs for MAAS and MEBS-T through the comparison with the standard cut-off point of The Düsseldorf Orthorexia Scale (DOS) for ON screening. We also examined the performance of sensitivity and specificity according to Area Under the Curve (AUC). Furthermore,

we conducted a performance comparison between MAAS and MEBS-T and finally evaluated the effectiveness of using either one or both tools to identify participants with ON.

Results: The cut-off score for MAAS is 44, achieving a sensitivity of 84.6% and a specificity of 91.9%. The MEBS-T cut-off score is 16, exhibiting a sensitivity of 82.1% and a specificity of 88.2%. Both MAAS and MEBS-T were found to be effective screening tools with AUCs of 0.887 (95%CI 0.817, 0.957) and 0.870 (95%CI 0.791, 0.949), respectively. We found no significant difference in performance between MAAS and MEBS-T (P = 0.752). As for the results of the two tools combined, it was found that the obtained sensitivity was 79.49% and the specificity was 85.78%. which does not improve the diagnostic accuracy of people with ON.

Conclusions: It was concluded that both MAAS and MEBS-T are effective tools for screening people with ON. Our study revealed that using either tool provides more benefits than using both tools to screen together. In the future, mindfulness-based screening such as MAAS or MEBS-T would be useful as a quick and effective screening instrument for ON, which could be used to plan treatment using mindfulness-based psychotherapy.

Keywords: Orthorexia Nervosa, Diagnostic Accuracy, Mindfulness, Adults

อาจารย์ที่ปรึกษาวิทยานิพนธ์ ดร. นายแพทย์ ภาวิต หน่อไชย

ACKNOWLEDGEMENTS

Working on this thesis has been an incredibly fulfilling experience thanks to the invaluable advice, support, encouragement, and inspiration I have received from a multitude of wonderful individuals throughout the journey. I would like to express my gratitude and admiration for all those who contributed to making this achievement a reality.

I am grateful to my advisor, Phawit Norchai, MD, PhD., and my co-thesis advisor Asst. Prof. Pansak Sukraroek, MD, for their guidance and supervision during the thesis development process. This would not be possible without their dedication and hard work. I am incredibly grateful for the support and guidance I received from Asst.Prof. Mart Maiprasert, M.D, Assist.Prof. Dr. Patana Teng-umnuay, Asst.Prof. Dr. Akkarach Bumrungpert and the members of the examination committee. Their valuable feedback and support greatly contributed to improving the quality of my writing.

I would also like to express my gratitude to all of my classmates. It has truly been a delightful journey to embark on this adventure together. I am extremely grateful to Charnsiri Segsarnviriya, MD for the unwavering support he provided me with, from the very beginning of my classes until the moment I finished writing my thesis.

There are also a few exceptional individuals whose work should never be overlooked. I am deeply grateful, Mommy and Daddy, for your unwavering faith in me. Your support has been truly invaluable to me, and I am incredibly grateful for it. Finally, I want to express my heartfelt appreciation to Cherry for all that she has done. Her kindness and generosity will always hold a special place in my heart.

I deeply appreciate all of your kindness.

Tanita (Noon) Watprasong, PhD.

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LIST OF ABBREVIATIONS

Abbreviation	Full Term
α	Cronbach's alpha
AN	Anorexia Nervosa
AUC	Area Under Curve
BN	Bulimia Nervosa
BOT	Bratman's Orthorexia Test
CAMS	Cognitive and Affective Mindfulness Scale
χ^2	Chi-square
df	Degrees of Freedom
DOS	Düsseldorf Orthorexia Scale
DSM-5	Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition
EHQ	Eating Habits Questionnaire
FFaMES	Four Facet Mindful Eating Scale
FFMQ	Five-Facet Mindfulness Questionnaire
FMI	Freiburg Mindfulness Inventory
KIMS	Kentucky Inventory of Mindfulness Skills
MAAS	Mindful Attention Awareness Scale
M	Mean
MEBS	Mindful Eating Behavior Scale
MEBS-T	Mindful Eating Behavior Scale-Trait
MEI	Mindful Eating Inventory
MEQ	Mindful Eating Questionnaire
MES	Mindful Eating Scale
n	Number of Subjects
OCD	Obsessive-Compulsive Disorder
ON	Orthorexia Nervosa
p	p-value
ROC	Receiver Operating Characteristic
SD	Standard Deviation
STARD 15	Standards for Reporting Diagnostic Accuracy 2015
TMS	Toronto Mindfulness Scale

CHAPTER 1
INTRODUCTION

Following the COVID-19 epidemic, the pandemic had a negative impact on mental health globally, with eating disorder sufferers suffering the most. The global burden of eating disorders, although initially concentrated in high-income countries, has exhibited a notable increase in various regions, particularly in East and South Asia.[1] Specifically, the pandemic may be associated with an increased susceptibility to orthorexia nervosa (ON), an eating disorder characterized by an excessive preoccupation with healthful food consumption.[2] Due to the complex nature of eating disorders and their profound impact on physical, psychological, and social aspects of human life, they are one of the most fatal mental illnesses and are associated with various medical, psychological, and dietary comorbidities. While the prevalence and impact of eating disorders span across diverse age groups and demographics, they pose a significant challenge. The utilization of assessment, intervention, and collaborative therapy has been shown to effectively mitigate risk factors and enhance the process of recovery.[3] Therefore, it is crucial to accurately diagnose in order to strategically plan for effective treatment and intervention.

According to the complexity for testing the diagnostic accuracy of a specific rating scale, the aim of the Standards for Reporting Diagnostic Accuracy 2015 (STARD 15)[4] initiative was to enhance the precision and comprehensiveness of studies focused on diagnostic accuracy. The guideline is a 25-item checklist, and this thesis addresses most of these items.

1.1 Background of The Study

Orthorexia Nervosa (ON) exhibits signs of obsessive-compulsive traits, as well as the adoption of harmful dietary restrictions and addictive behaviors associated with the consumption of healthy food. Although these factors can be considered valid criteria for classifying ON as a medical condition. Nevertheless, the lack of clear symptoms and diagnostic criteria for ON has prevented its official recognition as a psychiatric eating disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).[5] ON is a condition that can result in rigid eating patterns, ranging from a strong focus on consuming organic and raw foods to completely avoiding foods considered harmful. Moreover, extreme dieting often leads to a decrease in the pleasure derived from food and requires spending a lot of time preparing

meals. It is important to promptly and accurately diagnose ON, as failing to do so can lead to malnutrition, social and psychological damage.[6]

There is a growing body of research that suggests a connection between mindfulness and mindful eating with different facets of eating disorders, which include Orthorexia Nervosa (ON).[7] Mindfulness-based treatments are most effective for addressing binge eating, emotional eating, and eating triggered by environmental cues. Mindfulness is an engagement in the observation of individual immediate experiences with an open and non-judgmental attitude. Mindful eating is a specific form of mindfulness that centers on the act of eating. There are the effects of mindful eating interventions on the transition from external to internal motivations, which are associated with the adoption of healthier eating behaviors. Practicing mindfulness and engaging in mindful eating techniques can assist individuals in addressing and resolving their food-related challenges and that may be especially important for understanding ON.[7-8]

Early identification and treatments for eating disorders are crucial in the domains of psychological and nutritional well-being. Early detection of people at risk of developing ON before it fully manifests is of utmost importance, or it may develop into another actual eating disorder. It enables the deployment of early therapies and greatly enhances the prognosis for individuals affected.

Self-report measures are essential in this context, providing a less intrusive yet efficient technique for both screening and planning treatment. The value of self-reporting resides in its capacity to connect the personal challenges of individuals at risk with the clinical understanding necessary for prompt intervention. The majority of self report rating scales were employed in various contexts, including community samples for the aim of screening and research, as well as in clinical settings for with the goal of therapeutic management[9].

The Mindful Attention Awareness Scale (MAAS)[10] and the Mindful Eating Behavior Scale-Trait (MEBS-T)[11] are two rating scales of the assessment instruments utilized to evaluate the degree of mindfulness and mindful eating, correspondingly. While there is existing evidence that supports the effectiveness of these measures in assessing mindfulness in general and mindful eating, there is a lack of comprehensive research on their diagnostic accuracy in identifying orthorexia nervosa (ON).

The Düsseldorf Orthorexia Scale (DOS)[12] is an established instrument that is often utilized for the purpose of diagnosing Orthorexia Nervosa (ON). The study quantifies obsessive

behaviors and attitudes associated with healthy eating and has been shown to have good internal consistency and validity in multiple studies.[13–15] Therefore, DOS is widely considered the standard for ON diagnosis.

This thesis primarily focuses on comparing the diagnostic accuracy of MAAS and MEBS-T using this established scale, DOS. The objective of this study is to address the existing research gap by examining the sensitivity and specificity of MAAS and MEBS-T in the detection of ON, with DOS serving as the reference standard.

1.2 Statement of The Problem

Orthorexia Nervosa (ON), an eating disorder centered around healthy eating, currently lacks precise diagnostic tools.[16] The Düsseldorf Orthorexia Scale (DOS) is a widely used diagnostic tool that may not fully consider the importance of mindfulness, which is a crucial aspect of eating pathology.[12,17] Mindfulness and mindful eating can be employed as a complement approaches for assessing orthorexia scales, in order to gain a comprehensive understanding of the patient's pathology.[17]

The potential for detecting ON can be seen in two mindfulness-centered tools, namely the Mindful Attention Awareness Scale (MAAS)[10] and the Mindful Eating Behavior Scale-Trait (MEBS-T).[12-13] The objective of this study is to determine the most effective cut-off points for MAAS and MEBS-T and assess their sensitivity and specificity in comparison to DOS. Despite the promise of MAAS and MEBS-T, the optimal cut-off points have not been clearly defined, and there is a lack of comprehensive comparisons to DOS. This thesis addresses this gap by focusing on enhancing early detection of ON in order to lay the foundation for developing a treatment plan, especially mindfulness-based intervention for ON.

1.3 Significance of The Study

Orthorexia Nervosa (ON) is a growing area of research within the field of eating disorders. While ON is not currently recognized in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), it has been increasingly observed in clinical settings.[16] As a result, there is a growing need for efficient diagnostic tools.

The Mindful Attention Awareness Scale (MAAS)[10] and the Mindful Eating Behavior Scale-Trait (MEBS-T)[11] are two possible utilities for identifying ON. With a specific focus on MAAS, to quantify the level of dispositional mindfulness needed to indicate a potential risk or presence

of ON, and MEBS-T, to contribute to expanded knowledge of how mindful eating behaviors can indicate a transition from healthy eating habits to pathological eating patterns.

This thesis conducts an analysis to compare the sensitivity and specificity of these tools with the Düsseldorf Orthorexia Scale (DOS)[13], which is currently used as a benchmark for detecting Orthorexia Nervosa (ON). The comparison has the potential to provide valuable insights into the potential effective utilities in identifying ON. However, it is necessary to further validate these tools and establish specific cut-off points in order to accurately detect ON. The main significance of this study is its potential to improve the accuracy of diagnostic instruments using mindfulness-based tools, which can help detect and intervene in individuals with ON at an earlier stage.

In addition, similar to individuals with anorexia nervosa (AN), individuals with ON may experience significant medical consequences due to their behavior. However, unlike those with AN, they do not have concerns about their weight or body shape. Traditional treatments for eating disorders, such as anorexia, may not be effective for individuals with ON.[18] Understanding and accurately diagnosing ON is essential in order to establish a solid foundation for developing targeted mindfulness-based interventions for ON in the near future.

As far as our knowledge goes, there have been no studies conducted on ON in Thailand. The conclusions and findings of this study have the potential to make a significant contribution to the existing literature on mindfulness and mindful eating scales as it relates to screening for ON. Our research findings have the potential to inform clinicians and health professionals in their diagnostic process by enhancing the diagnostic accuracy of MAAS and MEBS-T. This, in turn, could potentially result in enhanced medical results for patients.

1.4 Purpose of The Study

The purpose of this study is to improve the understanding of how accurate mindfulness-related instruments are in diagnosing Orthorexia Nervosa (ON). ON is a condition where individuals have an excessive focus on eating healthy foods, which can have negative effects on their health and well-being.[16] Further investigation is required to thoroughly assess the diagnostic effectiveness of various promising tools.[19] This is crucial in order to achieve accurate diagnosis of ON, which is essential for timely and efficient mindfulness-based treatment.

The findings of this study have the potential to greatly contribute to the existing literature. Specifically, they can establish validated cut-off points for MAAS and MEBS-T in detecting ON.

Furthermore, this study also includes a comparative analysis with DOS in order to gain valuable insights regarding the effectiveness of these tools. This information will be valuable for the application in both clinical practice and research.

1.5 Research Questions

The research questions have been proposed as follow:

1.5.1 Primary Research Question

(1) What are the suitable cut-off points for the Mindful Attention Awareness Scale (MAAS) to accurately identify Orthorexia Nervosa (ON) in adults? Furthermore, how do the sensitivity and specificity of the MAAS, when utilizing these cut-off points, compare to those of the Düsseldorf Orthorexia Scale (DOS)?

1.5.2 Secondary Research Question

(1) What are the most effective cut-off points for the Mindful Eating Behavior Scale-Trait (MEBS-T) in accurately identifying Orthorexia Nervosa among adults? Furthermore, how do the sensitivity and specificity of MEBS-T, when utilizing these cut-off points, compare to those of the Düsseldorf Orthorexia Scale (DOS)?

These research questions will guide the data collection and analysis processes of the study. The study's findings will contribute to improving the detection and management of ON and may also offer valuable insights for developing more effective diagnostic tools.

1.6 Research Objectives

This research's objectives are in line with the primary and secondary research questions.

1.6.1 Primary objectives

(1) To determine the optimal cut-off points for the Mindful Attention Awareness Scale (MAAS) in detecting Orthorexia Nervosa (ON) among adults in Bangkok, Thailand.

(2) To assess the sensitivity and specificity of the MAAS (Determinant) by using the Düsseldorf Orthorexia Scale (DOS) as the reference standard (End Point) in this observational cross-sectional study.

1.6.2 Secondary objectives

(1) To determine the appropriate cut-off points for the Mindful Eating Behavior Scale-Trait (MEBS-T) in order to effectively identify cases of Orthorexia Nervosa (ON) in the adult population of Bangkok, Thailand.

(2) To evaluate the sensitivity and specificity of the MEBS-T (Determinant) by comparing it to the Düsseldorf Orthorexia Scale (DOS), which is considered the reference standard (End Point). This assessment will be conducted using an observational cross-sectional design.

In summary, this thesis aims to explore the potential of two index tests as diagnostic tools for ON compared to the reference standard, with the goal of improving our understanding and early detection of this potential eating disorder. Each of these objectives aligns with the guidelines of STARD 2015[4] for diagnostic accuracy studies; the objectives incorporate the necessary elements, such as the study domain, determinant, end point, time interval, and study type.

1.7 Research Hypothesis

This research's hypotheses are in line with the primary and secondary objectives.

1.7.1 Primary Hypotheses

(1) The Mindful Attention Awareness Scale (MAAS) has an optimal cut-off point to determine Orthorexia Nervosa among adults in Bangkok, Thailand.

(2) In an observational cross-sectional study, the MAAS demonstrated a high level of sensitivity and specificity in identifying Orthorexia Nervosa, particularly as in comparison to the Düsseldorf Orthorexia Scale (DOS).

1.7.2 Secondary Hypotheses

(1) The Mindful Eating Behavior Scale-Trait (MEBS-T) has a defined cut-off point that accurately detects those with Orthorexia Nervosa within the adult population in Bangkok, Thailand.

(2) In an observational cross-sectional study, the MEBS-T shows a high level of sensitivity and specificity to identify Orthorexia Nervosa. The study uses the Düsseldorf Orthorexia Scale (DOS) as a reference standard.

The hypotheses propose that employing the mindfulness-based utilities to detect ON may lead to improved diagnostic accuracy. The study aims to test these hypotheses and enhance the overall understanding of ON. Studying this disorder will ultimately help in effectively detecting and managing it. The findings presented can be used as a basis for future studies aimed at improving diagnostic procedures and mindfulness-based intervention approaches.

1.8 Definition of Terms

1.8.1 Orthorexia Nervosa (ON)

Orthorexia nervosa (ON) is a condition where individuals have an excessive preoccupation with healthy eating, based on their own personal standards. This can manifest as a strong focus on consuming organic and biologically pure foods, as well as a reliance on dietary supplements. An individual with ON is characterized by an obsession with their health, which has a negative impact on their quality of life. This is evident through their inflexible dietary choices, difficulty in long-term planning, and tendency to make destructive food choices.[13]

1.8.2 Dispositional Mindfulness (DM)

Dispositional Mindfulness is defined as the state of being attentive and aware of the present moment, while also recognizing and respecting the natural variations in individuals' mindfulness levels. The term is a widely discussed attribute of consciousness that has been closely associated with well-being.[10]

1.8.3 Mindful eating (ME)

Mindful eating involves applying the principles of mindfulness when it comes to experiences with food. It means intentionally focusing on the present moment and adopting a non-judgmental and accepting attitude.[20]

1.8.4 Mindful Attention Awareness Scale (MAAS)

The Mindful Attention and Awareness Scale (MAAS) is used to measure an individual's tendency to pay attention to present-moment experiences while engaging in everyday tasks. Individuals who score higher on the MAAS demonstrate a greater level of awareness and receptiveness towards their inner experiences that also exhibit a higher degree of mindfulness towards their behavior. MAAS is presently regarded as one of the extensively employed tools in research for dispositional mindfulness. [10]

1.8.5 Mindful Eating Behavior Scale-Trait (MEBS-T)

The Mindful Eating Behavior Scale-Trait (MEBS-T) is used to assess trait mindfulness in relation to food experiences. Those who score higher on MEBS-T exhibit a higher level of mindfulness in their eating habits.[11]

1.8.6 Düsseldorf Orthorexia Scale (DOS):

The Düsseldorf Orthorexia Scale (DOS, English version) is a tool used to study orthorexic eating behavior. The score range spans from 10 to 40, with a cut-off score of 30 or higher indicating the presence of ON. DOS is currently one of the most widely used tools in research for this purpose.[13]

1.8.7 Diagnostic Accuracy Research

Studies evaluating the precision of a diagnostic utility in detecting the existence; sensitivity or nonexistence; specificity of a specific disease or condition.[21]

1.8.8 Sensitivity

Sensitivity, also known as positivity in disease, is the measure of the proportion of individuals who have the target condition (reference standard positive) and receive positive test results.[22] In the context of diagnostic testing, sensitivity refers to the test's capacity to accurately detect individuals who have the particular disease.[21]

1.8.9 Specificity

Specificity in health refers to the proportion of individuals who do not have the target condition and receive negative test results.[22] In the context of diagnostic testing, specificity refers to the test's capacity to accurately identify individuals who do not have the particular disease.[21]

1.8.10 Cut-off Point

In the setting of diagnostic testing, the cut-off point refers to a pre-established threshold on a test. Results that fall above or below this threshold are interpreted as indicating the presence or absence of the condition being investigated.[22]

1.8.11 ROC curves

ROC curves are a graphical representation that shows the relationship between true positives and false positives at different cut-off points. They are useful for determining the most suitable cut-off point for clinical purposes.[22]

1.8.12 Adult

The present study establishes a definition for adults, encompassing individuals from young adulthood to late adulthood, specifically within the age range of 20 to 65 years based on American Psychological Association (APA) Dictionary.[23]

1.9 Limitation and Delimitation

1.9.1 Limitation

(1) This study aims to focus on early screening for orthorexia nervosa. Rating scales may have limitations in identifying psychiatric disorders due to their lack of coverage of additional diagnostic criteria. Evaluating the self-report instrument alongside the Classification Criteria for Orthorexia Nervosa is essential for diagnosing ON and determining the severity and quantity of symptoms in people in general.

(2) The scope of this research is limited to adults residing in Bangkok, Thailand. Moreover, thus study does not include clinical population with a background in relating to eating disorders. Therefore, the findings may not be applicable to other populations or geographical areas. The prevalence and characteristics of ON may be influenced by cultural factors and regional variations in eating behaviors, which could result in different cut-off points for other populations.

(3) The study's cross-sectional design allows for a snapshot of the situation at a specific moment in time. The design of this study limits the ability to make inferences about the causality or changes in the prevalence or severity of ON over time.

(4) The use of self-reported questionnaires in data collection might lead to bias as a result of social desirability or imperfect memory recall. Respondents may provide inaccurate information regarding certain behaviors, potentially impacting the accuracy of the findings.

(5) Given that ON is not formally recognized as an eating disorder, there are no conclusive DSM-IV diagnoses that are regarded as the gold standard. Research examining the validity and reliability of diagnoses may be compromised as a result.

1.9.2 Delimitation

(1) The study focuses specifically on adults, so the results may not be relevant for younger populations, such as adolescents who may also experience ON.

(2) This thesis utilizes three diagnostic tools: MAAS, MEBS-T, and DOS. The study does not consider other potentially relevant utilities or methods.

(3) The study will consist of participants who choose to participate voluntarily. Individuals with a documented history of psychiatric disorders that may impact eating behaviors will not be included.

The finding of this thesis should be acknowledging and takes into account the limitations and delimitations, which are then considered when interpreting and generalizing the findings. Future research should focus on addressing the limitations mentioned and expanding the study's scope to improve the comprehension and identification of ON.

CHAPTER 2
LITERATURE REVIEW

Orthorexia Nervosa (ON) is primarily driven by an unhealthy fixation on eating healthily, rather than being solely influenced by any specific dietary beliefs.[24] The study of ON has progressed over time due to an increasing amount of research available. The absence of a standardized diagnostic criterion for ON requires the examination of various diagnostic tools in order to more precisely identify individuals affected by this disorder.[16] The purpose of this chapter is to examine the complexity and conceptualization of ON and its diagnostic methods.

The initial focus of this part examines its definitions, various ways ON presents itself, and the diagnostic methods currently in use. One particular area of interest will be the Düsseldorf Orthorexia Scale (DOS), a well-established and reliable tool utilized for evaluating orthorexic tendencies. The concept of mindfulness and its application in the context of eating disorders is subsequently reviewed, with a focus on two specific utilities: the Mindful Attention Awareness Scale (MAAS) and the Mindful Eating Behavior Scale-Trait (MEBS-T). The role of these tools is emphasized. Finally, the existing literature on the diagnostic accuracy of mindfulness-based tools in identifying ON is discussed.

This literature review focuses on the intersections of ON, dispositional mindfulness, mindful eating and diagnostic accuracy. Its purpose is to establish the groundwork for this research, which aims to assess the sensitivity and specificity of MAAS and MEBS-T in detecting ON by using DOS as a reference standard for the evaluation. The literature will be thoroughly examined to establish a strong foundation and contextual comprehension for the empirical study.

2.1 Understanding of Orthorexia Nervosa: Clinical Features, Prevalence, and Current Diagnostic Methods

2.1.1 Understanding of Orthorexia Nervosa (ON)

According to Shafique et al. (2017)[25], Benjamin Franklin famously asserted that an excessive preoccupation with one's health can have negative consequences for one's well-being, and that aforementioned statement remains valid for individuals who are categorized as Orthorexia Nervosa (ON). The term “Orthorexia Nervosa” originated by Bratman[26] to describe a situation where individuals become excessively obsessed and dysfunctional in their

pursuit of eating only healthy food. It is derived from the Greek words "orthos," which means "right," and "orexis," which means "appetite."[27] According to Dunn and Bratman, an Italian study by Donini et al. (2004) was the first to characterize orthorexia nervosa as an extremist obsession with healthy foods in a peer-reviewed journal, which led to a notable condition. The concept of ON has evolved from a conceptual idea to a practical notion that merits scientific examination.[18]

ON is separate from merely adhering to a nutritious eating plan. The disorder is not caused by the particular diet itself, but rather by the excessive preoccupation with maintaining dietary purity and the negative impact it has on one's life. There are various theories of healthy eating, including veganism, the paleo diet, raw foods, and the Mediterranean diet etc. However, these theories, despite their significant differences in recommendations, are not directly linked to the onset of ON. Instead, ON is caused by an excessive emphasis on the quality of one's diet, to the point where this preoccupation becomes clinically challenging leading to stress, social isolation, and occasionally malnutrition.[24]

2.1.2 Clinical features

More than a decade ago, Orthorexia nervosa (ON) as a new food routine was introduced, which focuses on consuming healthy, pure, and mostly unprocessed foods. This regimen has gained popularity in this current era of tension. According to Bratman & Knight, (2000),[26] the person who originally coined the term Orthorexia, the characteristics of individuals with ON can be described as follows:

1) “They spend a significant amount of time, more than 3 hours per day, thinking about, shopping for, and preparing healthy food.

2) They may feel superior to those who have different eating habits.

3) They strictly adhere to a specific health-food diet and may engage in compensatory restriction to make up for any dietary indiscretions.

4) Their self-esteem is tied to their ability to stick to the diet, leading to feelings of guilt and self-loathing when they stray and self-satisfaction when they comply.

5) They prioritize eating properly above other personal values, relationships, previously enjoyed activities, and sometimes, ironically, their own physical health”.

Differentiating between an eating behavior that is simply unusual and occasionally extreme, and one that is considered clinically significant, is highly important in this area of study.[19] ON is a condition used to refer to a clinical behavior related to eating disorders

characterized by an excessive preoccupation with healthy eating, leading to inadequate diets and potential health complications.[28] Considerable research interest has been focused on studying the clinical features of ON, according to a study by Koven and Abry (2015)[16], individuals with ON display inflexible dietary regulations, heightened preoccupation with the quality of their food, and experience social seclusion as a result of their eating behaviors. Similarly, Bustamante and Darussalam (2012)[29] mentioned that ON becomes problematic when individuals impose strict dietary restrictions on themselves, leading to significant negative effects on human functioning. These effects can include malnutrition, social isolation, and impairment in carrying out everyday tasks.

Despite the growing body of research and interest in ON, the absence of well-defined symptoms and diagnostic criteria has hindered its formal inclusion as a psychiatric eating disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).[5] Orthorexia shares similarities with anorexia nervosa (AN) and bulimia nervosa (BN), but it is more strongly associated with obsessive-compulsive disorders (OCD).[30] Unlike AN and BN, weight loss is not a primary motivation in ON.[24] Moreover, instead of prioritizing adequate nutrition, they focus on finding the "healthiest" food. ON, despite lacking the most common signs of AN and BN, is not a new eating disorder. However, ON should be regarded as a condition characterized by atypical eating patterns associated with obsessive-compulsive symptoms, stemming from an excessive fixation on consuming only healthy food and prioritizing food quality.[30] Please refer to Figure 2.1 for the diagram illustrating the distinct and shared characteristics of ON, AN, and OCD[16]. In addition to being related to eating disorders, ON is also classified by Donini et al. (2004)[31] as a behavioral and personality disorder due to the excessive focus that orthorexics place on consuming healthy food. They become preoccupied with this pursuit for extended periods of time and may encounter negative consequences in their daily lives.

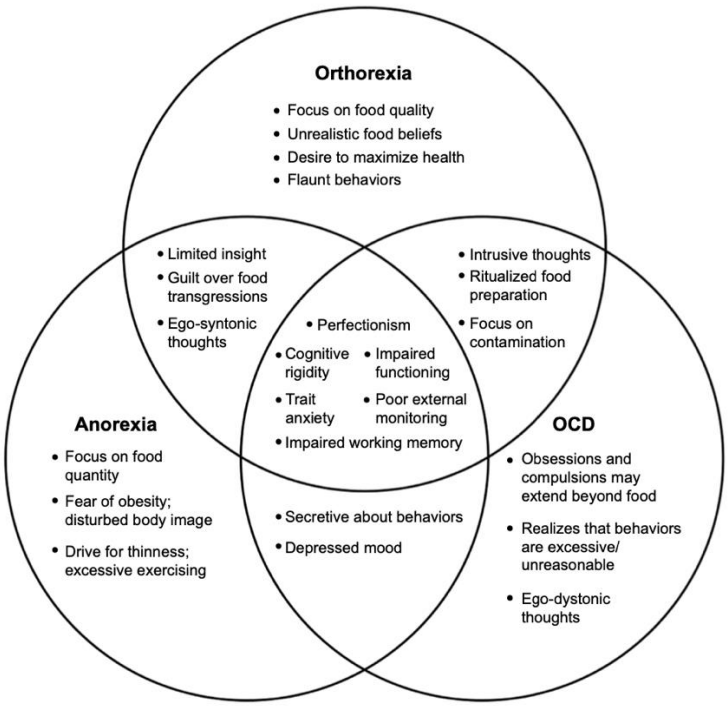

Figure 2.1 The diagram comparing Orthorexia, Anorexia, and OCD[16]

Despite multiple research have mentioned potential criteria for ON, but the first diagnostic criteria in the refereed literature were introduced by Moroze et al. in 2015.[28] (See Table 2.1). In their recent work, Dunn and Bratman (2016) have presented updated conceptualizations of ON with the aim of deepening our comprehension of this phenomenon and incorporating weight loss aspects into the new criteria.[18] (See Table 2.2).

While there are already established criteria, it is important to view the proposed-ON criteria as working criteria that may undergo revisions and modifications in the future. These criteria should not only be seen as definitive proof that ON is distinctly different from anorexia nervosa.[32]

Table 2.1 Initial Proposed Orthorexia Nervosa (ON) Diagnostic [28]

Diagnostic Criteria	Details
Criterion A: Obsessional preoccupation with eating "healthy foods," focusing on concerns regarding the quality and composition of meals. (Two or more of the following.)	1. Consuming a nutritionally unbalanced diet due to preoccupying beliefs about food "purity."
	2. Preoccupation and worries about eating impure or unhealthy foods and the effect of food quality and composition on physical or emotional health.
	3. Rigid avoidance of foods believed by the patient to be "unhealthy," which may include foods containing any fat, preservatives, food additives, animal products, or other ingredients considered by the subject to be unhealthy.
	4. For non-food professionals, excessive time (3 or more hours per day) spent reading about, acquiring, and preparing specific types of foods based on their perceived quality and composition.
	5. Guilty feelings and worries after transgressions where "unhealthy" or "impure" foods are consumed.
	6. Intolerance to other's food beliefs.
	7. Spending excessive amounts of money relative to one's income on foods because of their perceived quality and composition.
Criterion B: The obsessional preoccupation becomes impairing by either of the following	1. Impairment of physical health due to nutritional imbalances, e.g., developing malnutrition because of an unbalanced diet.
	2. Severe distress or impairment of social, academic, or vocational functioning due to obsessional thoughts and behaviors focusing on patient's beliefs about "healthy" eating.
Criterion C: The disturbance is not merely an exacerbation of the symptoms of another disorder such as obsessive-compulsive disorder or schizophrenia or another psychotic disorder.	
Criterion D: The behavior is not better accounted for by the exclusive observation of organized orthodox religious food observance or when concerns with specialized food requirements are in relation to professionally diagnosed food allergies or medical conditions requiring a specific diet.	

Table 2.2 Updated Classification Criteria for Orthorexia Nervosa[18]

Criteria	Description
Criterion A: Obsessive focus on ‘‘healthy’’ eating, defined by a dietary theory or set of beliefs whose specific details may vary; marked by exaggerated emotional distress in relation to food choices perceived as unhealthy. Weight loss may ensue as a result of dietary choices, but this is not the primary goal. As evidenced by the following:	A1. Compulsive behavior and/or mental preoccupation regarding affirmative and restrictive dietary practices believed by the individual to promote optimum health.
	A2. Violation of self-imposed dietary rules causes exaggerated fear of disease, sense of personal impurity and/or negative physical sensations, accompanied by anxiety and shame.
	A3. Dietary restrictions escalate over time, and may come to include elimination of entire food groups and involve progressively more frequent and/or severe ‘‘cleanses’’ (partial fasts) regarded as purifying or detoxifying. This escalation commonly leads to weight loss, but the desire to lose weight is absent, hidden or subordinated to ideation about healthy eating.
Criterion B: The compulsive behavior and mental preoccupation becomes clinically impairing by any of the following:	B1. Malnutrition, severe weight loss or other medical complications from restricted diet.
	B2. Intrapersonal distress or impairment of social, academic or vocational functioning secondary to beliefs or behaviors about healthy diet.
	B3. Positive body image, self-worth, identity and/or satisfaction excessively dependent on compliance with self-defined ‘‘healthy’’ eating behavior.

Although the criteria for ON have been previously defined, the prevalence of this condition remains ambiguous.

2.1.3 Prevalence of orthorexia nervosa (ON)

Estimating the prevalence of orthorexia nervosa (ON) poses challenges due to several factors. These include the absence of a consensus on diagnostic criteria, variations in assessment tools, variations in subgroup populations, and cultural differences in people's perceptions of healthy eating habits.

The prevalence of ON has been a subject of varying estimates in different studies. As highlighted in the review conducted by Dunn and Bratman (2016)[18], rates of ON have been reported to range from less than 6% to as high as 88.7% in specific subpopulations. Since this thesis emphasizes the adult population in Bangkok, a similar study conducted in Italy discovered that Orthorexia had a prevalence of 57.6% among adult subjects from the general population.[33] In the Asian context, the prevalence of Chinese undergraduate students had a substantially lower rate of 7.8%[15], while Ashtanga yoga practitioners in Spain showed a prevalence as high as 86%.[34] Interestingly, gender differences could potentially influence the prevalence of ON. The study from Turkey discovered that medical male students showed a higher level of focus on consuming nutritious food compared to medical female students. In addition, a notable percentage (43.6%) of those medical students demonstrated orthorexic behaviors.[35] Further exploration should be conducted on this aspect.

In conclusion, the true prevalence of ON remains unknown due to variations in population-based factors such as gender, culture, the present absence of standardized diagnostic criteria, and the use of different diagnostic methods.

2.1.4 Current diagnostic methods for Orthorexia Nervosa (ON)

As mentioned earlier in this chapter, it is important to note that Orthorexia Nervosa (ON) is not included as an officially recognized eating disorder in the DSM-5. Therefore, ON does not have a standardized diagnostic criterion. Numerous instruments have been developed to evaluate behaviors and attitudes to detect ON, these methods are capable of evaluating orthorexic behavior in various populations.

Four self-report scales commonly used to measure orthorexia nervosa are Bratman's Orthorexia Test (BOT), the ORTO-15, the Düsseldorf Orthorexia Scale (DOS) and the Eating Habits Questionnaire (EHQ).

In 2000, Bratman and Knight[26] created the first self-report assessment to identify behaviors and attitudes related with orthorexia nervosa, a term Bratman used to indicate a preoccupation with healthy or correct eating. The Bratman Orthorexia Test (BOT) includes ten

yes/no questions to measure a health-food obsession. Meal preparation time, mental energy, dietary regulations, self-esteem, and whether a balanced diet impacts personal relationships or various diets are covered. It worthwhile to note that the BOT is a basic tool, it does have its limitations. The binary response style of the assessment might not accurately represent all behaviors and perspectives related to orthorexia.[36] Therefore, the BOT should be utilized for screening purposes rather than for making diagnoses.

The ORTO-15 is a frequently utilized tool consisting of 15 items self-report inventory, developed by Donini et al. (2005),[37] measures obsessiveness in choosing, purchasing, prepping, and eating nutritious meals. Orthorexic behaviors increase with lower ORTO-15 scores. Its psychometric qualities have been addressed since the recent study found ORTO15 to be a poor tool for assessing orthorectic inclinations and moderately reliable and consistent.[38]

The recent and important for studying orthorexia is the Düsseldorf Orthorexia Scale (DOS), a 10 items self-report tool. DOS was developed by Barthels et al. (2015)[12] and has an English version made available by Chard et al. (2019).[13]

The longer 21-item DOS was initially created in German and is composed of 3 subscales. The Orthorexic Eating Behavior subscale gave rise to the unidimensional ten-item Düsseldorf Orthorexia Scale. The other two subscales revolve around being the Avoidance of Additives subscale and the Supply of Minerals subscale. The DOS evaluation was conducted on a sample of 1,340 test subjects from the general population. The reliability of the data was found to be high, with a Cronbach's α coefficient of 0.84. Additionally, the test-retest reliability showed a strong correlation of 0.79.[12,15] For the English version, the process of translation and back-translation involved converting the 10-item German version of DOS into English. No item was dropped off. The sample consists of 384 university students from the United States. The assessment of internal consistency and reliability was conducted using Cronbach's alpha and intra-class correlation coefficients. The Eating Habits Questionnaire (EHQ) and Eating Disorders Inventory were utilized to assess either conceptual or discriminant validity. The factor structure underwent testing through primary and confirmatory factor analyses. The English (E)-DOS and EHQ exhibited a robust association ($r = 0.76$, $p < .001$), indicating a high level of construct validity. The Cronbach's alpha coefficient was 0.88, indicating a strong level of internal consistency.[13]

Compared to ORTO 15, the study of the DOS has been conducted in various cultures in a more comprehensive manner, revealing good reliability and validity in identifying orthorexic behaviors.[39] Therefore, DOS has been suggested as a benchmark for ON.

Another utility is the Eating Habits Questionnaire (EHQ)[40], it is a self-report questionnaire consisting of 21 items. It was developed by Gleaves, Graham, & Ambwani in 2013 and is widely used to assess orthorexic behaviors. The EHQ has strong reliability and validity when it comes to psychometric properties. The instrument consists of three aspects of orthorexic behavior: "problems related to healthy eating, knowledge of healthy eating, and positive attitudes towards healthy eating".

It is important to note that, BOT, DOS, and EHQ are reliable instruments for measuring orthorexic eating behavior. Nevertheless, the study suggests that the ORTO-15 is not a suitable tool for assessing orthorexia nervosa, particularly when employing the scoring procedure initially proposed.[39]

These findings suggest that the DOS has the potential to be a valuable diagnostic tool in both clinical and research settings. The DOS, use as a reference standard for this study, is considered to be an effective tool for measuring orthorexia nervosa. The tool demonstrates a strong model fit, exhibits high internal reliability, shows a significant correlation with other reliable tools, and outperforms the ORTO-15. The validity of DOS is discussed further in this chapter.

Furthermore, as previously discussed in the Classification Criteria for Orthorexia Nervosa (ON), introduced by Dunn and Bratman in 2016 (Table 2.2). Both the DOS[13] and the Dunn & Bratman criteria[18] are used in orthorexia research; however, their predominance may vary depending on the research context or clinical scenario. The DOS provides a quantifiable measure through the use of a questionnaire, which is frequently employed in empirical research that needs statistical analysis. Conversely, the Dunn & Bratman criteria may be more appropriate for clinical diagnosis and defining a uniform definition of ON.

DOS is a measurement tool used to assess orthorexia which the testing have demonstrated that the scale is both valid and reliable for assessing orthorexic actions and attitudes. The DOS exhibits a clear and coherent framework, consistently displaying robust internal consistency and construct validity across multiple experiments. Unlike a measuring scale, the Classification Criteria for Orthorexia Nervosa (ON), introduced by Dunn and Bratman in 2016, offer a specific set of diagnostic criteria. The criteria were developed to offer a uniform

approach for diagnosing ON and to facilitate further research and recognition of the disease within the DSM-5 framework.

Due to the nature of this diagnostic accuracy research, statistical analysis is necessary. The research utilizes the validated DOS and its cut-off point. Therefore, it is not suitable to use the Classification Criteria for ON proposed by Dunn and Bratman in 2016, as it does not align with the research objectives. Hence, the aforementioned DOS should be taken into consideration for implementation.

In conclusion, this study utilizes DOS as a reference standard to achieve its objectives. While the diagnosis of ON still poses complications due to the lack of universally established diagnostic criteria. Therefore, it is essential to explore further in this research area. By conducting this study, we can enhance our knowledge and improve our capability to diagnose and treat this condition effectively.

2.2 Associations Between Dispositional Mindfulness, Mindful Eating, and Orthorexia Nervosa

This section will discuss the literature pertaining to the factors influencing Orthorexia Nervosa that are examined in this study.

2.2.1 Dispositional Mindfulness (DM)

The concept of mindfulness is commonly associated with the 2500-year-old tradition of Buddhism. However, its origins can be traced back to contemplative practices in the East and it is deeply rooted in Buddhist psychology.[41] The study of mindfulness traces its roots back to the ancient term "Sati" in Pali, which translates to "to remember." This term signifies the practice of being fully present and maintaining awareness and concentration in one's state of mind.[42]

According to Jon Kabat-Zinn, Mindfulness has been considered as “awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment”.[43] The interpretation could be explained as the propensity to pay attention to the "here and now" moment without forming any preconceived notions about those present situations. Mindfulness can be categorizing into two simple categories: dispositional mindfulness (DM, trait mindfulness), and state mindfulness. Dispositional mindfulness is an individual's consistent quality or habitual way of behaving that occurs at variable levels among the population regardless of mindfulness practice (e.g., mindfulness meditation, mindfulness-based intervention). While the levels of

awareness in the present moment, context, or circumstance are considered “state mindfulness”. It is a temporary condition that can be strengthened by the meditation practice. However, engaging in the practice of mindfulness meditation can also contribute to the enhancement of dispositional mindfulness as well.[44] In this study, the focus is on DM.

Presently, the significance of empowering individuals to take responsibility for their own well-being is even more important. Since previous research suggested that psychopathological symptoms (e.g., depression, eating disorder), cognitive processes (e.g., rumination), and emotional factors (e.g., well-being) all demonstrated correlations with DM. In stressful or unpredictable circumstances, DM may be a useful tool for facilitating adaptation strategies to support individuals’ wellness.[45]

There have been numerous research studies conducted on DM in various clinical settings. For example, according to a study conducted by Carlson and Brown (2005)[46], DM has an impact on the psychological well-being of cancer patients, regardless of whether they are compared to nonclinical controls or not. Another study was conducted on clinical samples, which found a negative correlation between DM and the severity of dependence among adults who were seeking treatment for substance use disorders.[47]

The purpose of this chapter is to explore the impact of DM on Orthorexia nervosa, a topic that will be further discussed in the following sections.

2.2.2 Mindful Eating (ME)

The term "mindful eating" can be seen as a subset of the broader concept of mindfulness. It focuses specifically on the act of eating and the various emotions, thoughts, and motivations that are associated with it.[48] The concept is relatively new but has garnered significant interest in multiple disciplines, including nutrition, psychology, and neuroscience.

While there is currently no standardized operationalization, Mantzios defines mindful eating behavior as "the sustained attention to a sensory element of the eating experience (e.g., the taste) and a non-judgmental (or non-evaluative) awareness of thoughts and feelings that are incongruent to the sensory elements of the present eating experience".[49]

ME promotes the idea of individuals relying on their bodies to determine their eating choices, including what, when, and how much to consume. This skill is crucial for practicing intuitive eating (adaptive eating style), which is closely connected to ME. ME also related with gratitude and an understanding of the interconnectedness between all living beings on earth, during the meals.[50]

Although ME has the potential to offer numerous benefits, it is important to acknowledge that there are several challenges associated with it. For example, there is a lack of extensive empirical studies on mindful eating practices, along with methodological concerns. Additionally, there is a need to address the challenge of effectively implementing and sustaining mindful eating practices in diverse populations.[8]

2.2.3 Dispositional Mindfulness (DM) and Orthorexia Nervosa (ON)

Dispositional Mindfulness (DM) draws the individual's attention back to their food being consumed. Not only have eating disorders found a negative correlation with DM, but interestingly, DM has also been considered one of the tools in an innovative lifestyle medicine strategy for lifestyle modification. Increasing food-awareness skills is adopted as part of the mindfulness approach, which aims to have individuals make more deliberate food choices.[45,51]

Based on the results of the study from Annameier et al. (2018)[52], it was observed that adolescent girls at risk for type 2 diabetes (T2D) who exhibited higher levels of dispositional mindfulness had a tendency to consume fewer calories during the Eating in the Absence of Hunger (EAH) paradigm. This indicates that mindfulness may have the potential to prevent excessive eating when not experiencing hunger, thus influencing eating habits in a manner that could be advantageous for managing or preventing T2D and obesity. Another research has found that the use of mindfulness, was effective in promoting improvements of body image and weight loss. However, it did not result in more favorable outcomes compared to the standard treatment on its own. This study also suggests that although mindfulness is applicable in addressing eating disorders and body image concerns, it might not necessarily improve the efficacy of current behavioral weight loss treatments.[53] Additional investigation is suggested to examine the possible benefits of including mindfulness, in interventions for body image and weight management.

According to recent study from Kalika et al. (2023)[7], people who have higher levels of mindfulness tend to engage in fewer orthorexic behaviors. Individuals with ON often face significant distress and engage in self-punishment when they deviate from their rigid dietary rules. Individuals who possess higher levels of mindfulness tend to approach their behaviors with less judgment and greater acceptance, thereby reducing their distress. On the other hand, individuals with ON also tend to exhibit diminished levels of "acting with awareness," a crucial aspect of mindfulness. This suggests that those with ON may not be completely present or consciously aware during their eating behaviors.

Moreover, orthorexia nervosa has been found to be related to anorexia nervosa (AN). Some studies conducted to study the connection between DM and AN can provide a better understanding of the relationship between DM and ON. For example, study examined the mindfulness levels of individuals with eating disorders, specifically AN. These disorders are recognized for their primary characteristic of body-image disturbance. The study indicates that both body experience and mindfulness play crucial roles in promoting good health, safety, and comfort, as well as fostering personal growth and development in patients with AN.[54]

Although there have been previous studies conducted in this field attempting to understand the relationship between DM and ON, it is important to note that the study of those two areas is still relatively new. Therefore, there are limitations in fully comprehending its relevance.

2.2.4 Mindful eating (ME) and Orthorexia Nervosa (ON)

Mindful eating (ME) has the potential of successfully tackling problematic eating behaviors.[8] Mindful eating practices may be consider as one of a strategy to encourage individuals, to make healthier food choices that are beneficial to their overall health and well-being to obtain optimal health.[55] ME was also found to be able to change unhealthy eating patterns and even lower fasting blood glucose[56]

Different studies have yielded varying results regarding the association involving mindful eating and orthorexia nervosa (ON). Recent research has found no evidence of a connection between ME and ON. One reason for the variation in the results regarding ME could be attributed to the investigation of a vegan-only population.[6] However, others have found a negative connection between mindful eating and ON. As a study from Kalika et al. (2023)[7] suggested that ON has been linked to a negative impact on ME. Individuals with orthorexic tendencies tend to prioritize the quality of their food, which can have adverse effects on normal human function.

Existing literature suggest that eating mindfully may help people make healthier decisions about food consumption (e.g., higher diet quality). An individual's mindful eating habits result in a predisposition to comply with a healthy dietary profile. Where food choice lies in the physical dimension of wellness, rigidity on extreme food choices (one of the characteristics of ON) may be viewed as a preventive means of promoting positive individual holistic health benefits.[55,57]

Recent study from Thorn et al. (2023) suggested that guilt and shame are found to have significant negative relationships with ME, as well as with hunger, satiety, and eating with awareness. The study concluded that feelings of guilt and shame could hinder the acceptance of mindful eating habits. This could potentially lead to a cycle where strict dietary control, limited ME, and elevated guilt and shame continuously reinforce each other.[58] The practice of ME, which involves heightened awareness and attention to bodily signals, may help alleviate some of the obsessive tendencies observed in individuals with ON.[32]

In summary, emerging research indicates a link between mindfulness and mindful eating with various aspects of eating disorders, including Orthorexia Nervosa. The next section aims to explain the rationale for using the standard scale of Dispositional Mindfulness (MAAS) and Mindful Eating (MEBS-T) as Diagnostic Tools for Orthorexia nervosa.

2.3 Rationale for Utilizing Dispositional Mindfulness and Mindful Eating as Diagnostic Tools for Orthorexia Nervosa

Rooted in ancient meditation traditions and increasingly integrated into psychological therapies, mindfulness has demonstrated potential for improving different aspects of life, including eating behaviors. One's approach to life can have a profound effect on eating habits, cognitive functions, emotional reactions, and behaviors associated with food intake and food choices[45,51]. Therefore, mindfulness and mindful eating may be valuable screening tools for eating disorders, with a particular focus on orthorexia nervosa in this study. Healthcare professionals have the potential to detect early signs of disordered eating patterns by evaluating an individual's level of mindfulness and mindful eating before they progress into full-blown eating disorders.

The use of standardized rating scales as initial screening instruments is a common practice in order to facilitate the process of reaching a final diagnosis. Maximizing sensitivity in rating scales to encompass probable subjects is crucial.[9]

This thesis is expanding the review to include the domain of mindfulness, specifically in relation to the treatment of mental health disorders, which include eating disorders. It is in response to the increasing popularity of mindfulness-based interventions.[59] In this study, our main focus will be on two measures related to mindfulness: the Mindful Attention Awareness Scale (MAAS) and the Mindful Eating Behavior Scale-Trait (MEBS-T). This chapter will explore how these measures could potentially be useful in diagnosing ON.

The objective of this thesis is to examine the diagnostic accuracy of two standardized questionnaires as the index tests, the Dispositional Mindfulness Questionnaire (MAAS)[10] and the Mindful Eating Questionnaire (MEBS-T)[11], for the detection of Orthorexia Nervosa (ON), while utilizing the Düsseldorf Orthorexia Scale (DOS)[13] as the reference standard. This study aims to make a valuable contribution to the field by enhancing diagnostic procedures and enhancing early detection of the disorder. Which adheres to the guidelines of the Standards for Reporting of Diagnostic Accuracy Studies 2015 (STARD 15).

The primary objective is to determine the optimal cut-off points for MAAS in order to enhance the accuracy of detecting Orthorexia Nervosa in adults, by maximizing both sensitivity and specificity. This thesis aims to evaluate and describe the sensitivity and specificity of the MAAS in comparison to DOS, which serves as the reference standard.

The secondary objective is to conduct another similar analysis, but with a specific emphasis on MEBS-T. This thesis intends to determine the optimal cut-off points for MEBS-T in accurately diagnosing ON in adult individuals. The study aims to describe and evaluate the sensitivity and specificity of the MEBS-T in comparison to the DOS, as well as the approach taken with the MAAS. A well-established and reliable tool utilized in this study has been discussed as follows:

2.3.1 Düsseldorf Orthorexia Scale (DOS); Reference Standard

The Düsseldorf Orthorexia Scale (DOS)[12] is used to study orthorexia nervosa, which entails an intense concern with healthy eating that can impair human functions. Even though the DOS requires more validation and could be subject to self-perception and social desirability biases, due to its strong psychometric properties, it remains a trustworthy and effective instrument for understanding orthorexia nervosa in research and clinical contexts.

Its development, validation, and use as a diagnostic tool for Orthorexia Nervosa

The development of Düsseldorf Orthorexia Scale (DOS), validation, and use as a diagnostic tool for Orthorexia Nervosa are discussed separately as follows:

<u>The development of Düsseldorf Orthorexia Scale (DOS)</u>

The Düsseldorf Orthorexia Scale (DOS) is a tool used to measure Orthorexia Nervosa (ON), which can be described by a great deal of concern with healthy diet and maintaining a nutritious a healthy eating. The DOS is a questionnaire based on self-report that was originally created in German by Barthels, Meyer, and Pietrowsky in 2015.[12] Its English version's psychometric evaluation had been carried out by Chard et al. in 2019.[13] The DOS has been

widely utilized and has become popular among various cultural backgrounds, for a recent study, Italian version[60], Spanish version[61] Chinese version[15] and a Polish version[14] were developed.

The DOS is an instrument for self-report that consists of 10 items. Each item is specifically designed to evaluate obsessive behavior and thoughts related to maintaining a healthy diet. This scale specifically examines the cognitive and behavioral aspects of orthorexia nervosa. Each item is evaluated using a 4-point Likert scale, ranging f from 1 (does not apply to me) to 4 (applies to me). Example of the question include “I have certain nutrition rules that I adhere to” and “I feel upset after eating unhealthy foods”. The item scores are added up to determine the total score where higher scores indicate a greater inclination towards orthorexic behavior.

The Validation of Düsseldorf Orthorexia Scale (DOS)

The Düsseldorf Orthorexia Scale (DOS) is a valid and reliable tool used to determine those who have an excessive preoccupation with healthy eating, to the point where it negatively impacts their everyday routine. The preliminary validation study conducted by Barthels et al. (2015)[12] found that the DOS showed strong internal consistency. This was evident from a Cronbach's alpha coefficient of 0.84, which suggested that all scale items consistently assessed the same construct. Additionally, this study also demonstrated excellent test-retest reliability (r = .79), indicating that the measure remains stable over time.The DOS has demonstrated a strong correlation with assessments of related pathological eating habits, suggesting its good validity.

Chard et al. (2019)[13] aimed to validate the Düsseldorf Orthorexie Scale (DOS)[12] by utilizing a sample of students who speak English from the United States. The investigators are able to demonstrate that the scale is psychometrically robust. Furthermore, numerous studies have consistently verified the reliability and validity of this measure among diverse populations and languages, thereby strengthening its overall applicability.

An example illustrating such studies is the investigation carried out in China. The China version of DOS demonstrated strong internal consistency(α=0.80). Additionally, it exhibited good test-retest reliability(r=0.77). Moreover, the DOS exhibited strong construct validity, as it showed significant correlations with established measures of disordered eating behavior.[15] Another study was conducted on Spanish-speaking populations to translate and validate the Spanish version of the DOS. The tool exhibited that internal consistency is high, as indicated

by the Cronbach's alpha coefficient of 0.84. Furthermore, the analyses provided support for the scale's original unidimensional structure.[61] Consistent with another study that established DOS in the Polish version, this study indicated strong internal consistency with a Cronbach's alpha of 0.84. In addition, the Polish version of DOS showed strong correlation with all subscales of Eating Habits Questionnaire (EHQ).[14] A recent study has developed the Italian Version of DOS, which demonstrates a unidimensional structure and high internal consistency (α = 0.88). Additionally, the study provides evidence demonstrating the criterion validity of the scale.[60]

Even though DOS is valid and reliable to detect ON, however, like many other scientific fields, additional research and validation are necessary to support these findings and enhance the diagnosis of orthorexia nervosa. As suggested by Barthels et al. (2015)[62], although it is evident that orthorexic eating behavior falls under the category of eating disorders, it remains uncertain whether it should be classified as a distinct mental illness or if it is distinct from anorexia nervosa, As well as the discussion of whether it is possible to identify potential treatment approaches that could be effective in addressing these issues. Despite some limitations, the DOS is still considered a reliable and valid tool for measuring orthorexia nervosa in clinical and research settings.

The use of Düsseldorf Orthorexia Scale (DOS) as a diagnostic tool for Orthorexia Nervosa

To determine the diagnostic accuracy of the index tests for determining those who have orthorexia nervosa, we can compare the outcomes of the MAAS and MEBS (the index tests) with the Düsseldorf Orthorexia Scale (DOS; the reference standard). This comparative analysis will assist us in comprehending the intersection between orthorexia nervosa (ON) and the psychological constructs of dispositional mindfulness (DM) and mindful eating ME).

The DOS is considered to be the most effective tool presently in use for evaluating ON.[63] At the time of this writing, the psychometric properties, including validity and reliability, of the German and English versions of the DOS have been demonstrated to be satisfactory for assessing ON.[15] As mention earlier in this chapter, DOS has been extensively used in previous studies to detect ON[64], and has demonstrated strong psychometric properties. Therefore, it was considered appropriate to use the DOS as the reference standard for diagnosing orthorexia nervosa in this study.

While there are several widely used tools available for detecting ON, such as BOT, the ORTO-15, EHQ, including DOS, it is important to note that not all of these tools are equally

effective. According to Meule ei al. (2020)[39], the ORTO-15 tool is considered unsuitable and unreliable for assessing orthorexia nervosa. Moreover, this tool may have difficulty differentiating between normal healthy eating and excessively healthy eating that is pathological.[15] While BOT, EHQ, and DOS are commonly regarded as reliable instruments for measuring orthorexic eating behavior[39], it is important to also consider the length of the questionnaire as part of the reason to choose the most appropriate tool in the study.

The length of the questionnaire is also taken into account when deciding on its utility in this study. There has been ongoing discussion regarding the challenges that lengthy questionnaires present in clinical settings.[65] In the context of measuring individuals with communication challenges and energy limitations in a clinical setting, previous research suggests that researchers should consider the trade-off between reliability and validity properties while also taking into account the response burden when selecting an appropriate instrument length.[66] Moreover, some investigations even indicate that using a single item may be more beneficial for reducing response burden in therapeutic practice. It is advantageous to consider the length of the questionnaire as it helps to decrease the amount of effort required to respond and also reduces the expenses associated with conducting research.[67]

As previously mentioned, the DOS is a more effective tool for detecting orthorexia nervosa (ON) compared to the most commonly used questionnaire. The DOS is also a shorter version of the questionnaire that maintains a proper length while still exhibiting good psychometric properties.

In summary, the length of DOS is appropriate, and previous studies have extensively utilized DOS and have found it to possess robust psychometric properties. Additionally, it is worth noting that there is currently no existing assessment tool in the Thai language specifically designed for evaluating ON. Thus, the decision to utilize the DOS as the reference standard for diagnosing orthorexia nervosa in this research was deemed suitable. The English version of DOS[13] is used as a reference standard in this study.

2.3.2 The Dispositional Mindfulness Scale (MAAS); Index Test

The Mindful Attention Awareness Scale (MAAS) is a tool used to measure dispositional mindfulness, which refers to the innate human ability to be fully present in the moment without passing judgment. The MAAS scale, developed by Brown and Ryan in 2003,[10] is a tool consisting of 15 items. Its purpose is to evaluate fundamental aspects of dispositional

mindfulness, including being open and receptive toward one's circumstances and having a focused awareness of the present moment.

The MAAS tool is extensively utilized in psychological research and clinical settings, and it has shown excellent psychometric properties. These properties include robust internal consistency and reliable test-retest reliability. The application is well-known for its simplicity and ability to provide deep insights into an individual's mindfulness level.[68]

Its development, validation, and its relevance to eating disorders and ON

A number of tools have been established in recent years that are used to assess mindfulness. These include the Toronto Mindfulness Scale (TMS)[69], the Freiburg Mindfulness Inventory (FMI)[70], the Cognitive and Affective Mindfulness Scale (CAMS)[71], the Kentucky Inventory of Mindfulness Skills (KIMS)[72], the Five-Facet Mindfulness Questionnaire (FFMQ)[73] and The Mindful Attention Awareness Scale (MAAS)[10].

MAAS is one of the most commonly used tools to assess Dispositional mindfulness. This thesis utilized MAAS as the tool for evaluation based on its appropriate questionnaire length and strong psychometric properties. This makes it an appropriate option for use in this study. The development of MAAS, validation, and its relevance to eating disorders and ON are discussed separately as follows:

<u>The development of the Dispositional Mindfulness Scale (MAAS)</u>

Dispositional Mindfulness Scale (MAAS) was created by Brown and Ryan (2003)[10] as a self-report tool for evaluating individual's level of innate mindfulness level as a personal characteristic. Dispositional mindfulness, employed in this study refers to the state of being receptive and open to current experiences, while also being aware of individual's thoughts and emotions without becoming entangled in them.

The process of developing the instrument was guided by various theoretical and empirical literature. In their study, Brown and Ryan (2003) aimed to develop a measurement tool that accurately represents the core aspects of mindfulness as defined in psychological research. The MAAS rates each item on a 6-point Likert scale, which ranges from 1 (almost always) to 6 (almost never), created to evaluate how often individuals experience mindful states in their everyday lives. Example of the question include “I might experience an emotion without being aware of it until later” and “I struggle to maintain focus on the current moment”. The items on the scale are first reverse scored and then sum up in order to

calculate a mindfulness score. A higher score signifies higher levels of dispositional mindfulness.

The validation of the Dispositional Mindfulness Scale (MAAS)

The MAAS tool is extensively utilized in psychological research and clinical settings, where it has shown to possess strong psychometric properties. These properties include robust internal consistency and test-retest reliability. The application is well-known for its simplicity and ability to provide deep insights into a person's mindfulness level.

In their initial study, Brown and Ryan (2003)[10] validated the MAAS in college students, adults, and cancer patients. They found that the scale had high internal consistency, with Cronbach's alpha ranging from 0.82 to 0.87 across the different samples. Additionally, they observed good test-retest reliability. The scale exhibited significant associations with well-being, self-esteem, and neuroticism.

After Brown and Ryan (2003) developed the Mindful Attention Awareness Scale (MAAS), multiple investigations have confirmed its psychometric features. In a recent systematic review, it has been demonstrated that the MAAS possesses sufficient validity, internal consistency, and test-retest reliability for assessing trait mindfulness.[74] Another example of a relevant study MacKillop and Anderson conducted in 2007. The findings of this study indicate that the MAAS is a reliable and valid measure of mindfulness. However, the study also suggests that meditative experience does not necessarily related to dispositional mindfulness. The confirmatory factor analysis provided confirmation of the unidimensional factor structure of the MAAS.[75] Several studies have confirmed the validity of the MAAS in clinical settings. One such study conducted by Carlson and Brown (2005) found that the MAAS is a suitable tool for investigating the impact of mindfulness in clinical settings. The study also demonstrated that the MAAS has strong psychometric properties, with a high level of validity and reliability (α=0.87).[46] Furthermore, Multiple studies have consistently confirmed the reliability and validity of this measure across various populations and languages, thus enhancing its overall application. An example of such a study includes the establishment of the MAAS Spanish version. A study indicated that the Spanish version of the MAAS has been found to be valid and reliable (alpha 0.88) for use in research related to exercise psychology, sports, and health.[76]

However, the MAAS does have certain concerns and challenges. Previous study suggested that MAAS as self-reports in psychological research have the potential to degrade, distort, and trivialize the concept of "mindful awareness." This, in turn, could pose challenges to the effectiveness of mindfulness-based interventions. To incorporate a comprehensive and advanced Buddhist understanding of the mind into positivist Western psychology paradigms, it is essential to have a deep understanding of mindfulness and engage in long-term mindfulness practice.[77]

To summarize, the MAAS is an evaluation of trait mindfulness that has been thoroughly validated and is commonly utilized. The development and validation of MAAS have made a valuable contribution to the existing literature on mindfulness and its impact on mental health. Despite its limitations, the tool serves as a valuable instrument for evaluating dispositional mindfulness in numerous categories of population.

Relevance of MAAS to eating disorders and ON

The study and treatment of eating disorders has seen a growing interest in mindfulness, which involves being attentive and aware of present moment experiences without judgment. The Mindful Attention Awareness Scale (MAAS) is commonly used as a tool to measure dispositional mindfulness. Multiple studies have shown the importance and usefulness of MAAS in relation to eating disorders and especially, orthorexia nervosa.

The utilization of the MAAS in a study from Annameier et al. (2018)[52], offers significant observations regarding the impact of mindfulness on eating behaviors and its potential connection to eating disorders, obesity, and type 2 diabetes. This study proposes that incorporating mindfulness-based interventions could be a beneficial approach in assisting at-risk adolescents to cultivate healthier eating habits, specifically by decreasing instances of eating when not hungry. Moreover, previous research emphasizes the utilization of the MAAS in their research aids in comprehending the connection between mindfulness and the enhancement of eating disorders, body image concerns, and weight management.[53]Similar in another study, the utilization of the MAAS to assess mindfulness in this particular context highlights the significance of mindfulness in comprehending and tackling eating disorders such as Anorexia Nervosa and Bulimia Nervosa. There is a strong argument for including mindfulness-based interventions in the treatment of these conditions, in addition to standard therapeutic approaches. However, additional research is necessary to ascertain the most effective

methods of implementing mindfulness in this particular context and to assess the long-term results of these interventions.[54]

Despite some studies have been done in the field of dispositional mindfulness and eating disorder. There is currently limited understanding of dispositional mindfulness and orthorexia nervosa (ON). To the best of my knowledge, this thesis is the first to investigate the relevance of the use of MAAS for detecting ON using DOS.

2.3.3 The Mindful Eating Behavior Scale-Trait (MEBS-T); Index Test

Over the years, researchers have developed various tools to measure mindful eating, each possessing its own unique strengths and weaknesses. The Mindful Eating Behavior Scale-Trait (MEBS-T) considers relatively new tools, which is the superior is because it is a simple tool and cost effective to assess mindful eating, a concise overview of MEBS-T is as follow:

Its development, validation, and relevance to eating disorders and Orthorexia Nervosa

Over time, researchers have evaluated mindful eating using various assessment tools, each with its own strengths and limitations. In 2009, Framson et al. introduced the Mindful Eating Questionnaire (MEQ)[48]. However, the MEQ has received criticism for not fully capturing the core principles of mindfulness. In order to examine this issue, Hulbert-Williams et al. (2014) created the Mindful Eating Scale (MES)[78]. The MES, although it aimed to align with mindfulness theories, however, incorporated assessments for routine and unstructured eating, deviating from the core principles of mindfulness. Later, the study from Winkens et al. (2018) introduced the Mindful Eating Behavior Scale (MEBS)[79] as a tool to evaluate eating-related decision-making. However, the MEBS differed from conventional mindfulness practices, leading to some confusion. Leading to recent study from, Peitz et al. (2021) introduced the Mindful Eating Inventory (MEI)[50] as a way to address previous limitations. However, their interpretations of the results were not consistent with established mindfulness literature. Then, Carrière et al. (2022) developed the Four Facet Mindful Eating Scale (FFaMES)[80] as an attempt to overcome the limitations of the MEI. However, similar to the original MEQ, the FFaMES also included aspects related to emotional eating, which can be considered as a drawback. Lastly, the recently developed tool is Mindful Eating Behavior Scale-Trait (MEBS-T) from Mantzios in 2022[11], which we will discuss further in the following section. In summary, the precision of psychometric tools for mindful eating and the development of this field is still lacking. The use of existing

psychometric tools to assess mindful eating raises questions about their impact on overall health outcomes and behavioral change.[49] The development of the MEBS-T, validation, and its relevance to eating disorders and ON are discussed separately as follows:

The development of The Mindful Eating Behavior Scale-Trait (MEBS-T)

Due to a need to underscore the importance of simplicity in this field. The development of (MEBS-T) would enable a more accurate comprehension and assessment of mindful eating, enhancing the effectiveness of research and clinical application. In 2022, Mantzios introduced a tool, MEBS-T, that considers cost-effectiveness and ease of implementation. This tool follow a proposed new definition for Mindful Eating Behavior (MEB): "the sustained attention to a sensory element of the eating experience (e.g., the taste) and a non-judgmental (or non-evaluative) awareness of thoughts and feelings that are incongruent to the sensory elements of the present eating experience".[11] MEBS-T emphasizes the sensory experience of eating and encourages non-judgmental awareness of thoughts and feelings that may arise while eating. It is in line with the principles of mindfulness.

The study initially created a tool consisting of a 10-item self-report questionnaire. This questionnaire was designed to measure two factors: sensory attention and non-judgmental awareness. The revised version proposes the utilization of an 8-item validated unidimensional scale to measure the trait-mindful eating behavior.[11] Example of the question include "I fully taste what I am eating" and "I notice thoughts and/or feelings that are unrelated to my eating, but I redirect my attention to the food and the experience of eating." Higher levels of mindful eating behavior are indicated by a higher score of MEBS-T.

In summary, The MEBS-T evaluates fundamental aspects related to innate mindful eating levels that are in line with mindful eating behavior and mindfulness theory. To be precise it refers to the degree of being fully present and aware of both physical and emotional sensations while eating or in a food-related environment. MEBS-T offers a comprehensive approach to evaluating the trait aspect of mindful eating behaviors.

The validation of The Mindful Eating Behavior Scale-Trait (MEBS-T)

As mentioned by Mantzios (2022)[11] MEBS-T is valid and reliable tool, with Cronbach's alpha of 0.85. It is an appropriate instrument to assess mindful eating behavior. Other validation studies are still lacking due to the limitations of the recently developed MEBS-T.

Relevance of MEBS-T to eating disorders and ON

Due to its recent development, the MEBS-T is the tool that still being studied. There is a lack of studies that have utilized MEBS-T as a measurement to assess mindful eating in relation to eating disorders and orthorexia nervosa.

In this chapter, we have already discussed the connection between mindful eating and eating disorders, including orthorexia nervosa. The MEBS-T, in its short and simple form, has the potential to serve as an effective tool for evaluating mindful eating in this study. Even though, several studies have been conducted in this specific field of mindful eating. At present, our knowledge about mindful eating and orthorexia nervosa is limited. To the best of my knowledge, this thesis is the first to investigate the importance of utilizing MEBT-S for the detection of ON through the use of DOS.

CHAPTER 3

RESEARCH METHODOLOGY

The objective of this thesis is to examine the diagnostic accuracy of two index tests, the Mindful Attention Awareness Scale (MAAS)[10] and the Mindful Eating Behavior Scale-Trait (MEBS-T), for the detection of Orthorexia Nervosa (ON)[9], while utilizing the Düsseldorf Orthorexia Scale (DOS)[10] as the reference standard. This chapter is to comprise five sections as follow:

1. Research Design 2. Participants, 3. Measures, 4. Data collection procedure and 5. Statistical analysis.

3.1 Research Design

This study is a cross-sectional observational study that follows the Standards for Reporting of Diagnostic Accuracy Studies (STARD) 2015 guideline. Its purpose is to assess the diagnostic accuracy of the Mindful Attention Awareness Scale (MAAS) and Mindful Eating Behavior Scale-Trait (MEBS-T) in identifying Orthorexia Nervosa among adult residents of Bangkok, Thailand.

The Düsseldorf Orthorexia Scale (DOS) is used as a reference standard to assess the sensitivity and specificity hypotheses of MAAS and MEBS-T. The study involves six hypotheses that aim to determine the optimal cut-off point for both scales in order to identify Orthorexia Nervosa. Furthermore, the objective of the study is to evaluate and compare the performance of these scales with the DOS, while also assessing their diagnostic accuracy within a specific time period.

This study will employ purposive sampling, which is a non-probability sampling technique, to select individuals who exhibit a significant interest in health, as it directly relates to the research topic. The participants then will be requested to fill out the MAAS, MEBS-T, and DOS questionnaires. All responses to the questionnaire will be gathered and analyzed within a designated time period. The data of each participant will be anonymized in order to maintain ethical standards.

The objective of this evaluation is to determine the cut-off points, sensitivity, and specificity of the MAAS for Orthorexia Nervosa. This will be achieved by comparing it to the DOS. The study will compare the diagnostic accuracy of the MAAS and the DOS within a

specific time frame. Similarly, in this study, also determine the cut-off points, sensitivity, and specificity of the MEBS-T. This thesis will also compare its performance to that of the DOS.

For this study, data was collected on the participants' age, gender, education level, dietary preference, and physical activity. The information, along with scores from the MAAS, MEBS, and DOS tests, was utilized to analyze the demographic profile and evaluate the effectiveness of these tests. The sensitivity and specificity of the MAAS and MEBS in correctly identifying individuals with Orthorexia Nervosa were analyzed by comparing them to the DOS as a reference. The diagnostic ability of the tests was evaluated by measuring the area under the ROC curve. Finally, a series of hypotheses were examined to determine the statistical significance of the observed results. A p-value of less than 0.05 was used as the threshold for determining significance.

In summary, the aim of this thesis is to evaluate the effectiveness of the MAAS and MEBS-T as diagnostic tools for Orthorexia Nervosa using DOS as a reference standard.

3.2 Conceptual Framework

Determinants

X1: the scores derived from the Mindful Attention Awareness Scale (MAAS) as a potential predictor of Orthorexia Nervosa (ON) prevalence within the adult population based in Bangkok.
X2: The Mindful Eating Behavior Scale-Trait (MEBS-T) scores are utilized as a predictive measure for the occurrence of Orthorexia Nervosa (ON) prevalence within the adult population based in Bangkok.

Outcomes

Y1: the optimal cut-off points, which refer to the threshold values of MAAS and MEBS-T scores that effectively differentiate between the presence and absence of ON.
Y2: Sensitivity refers to the capacity of both the MAAS and MEBS-T to accurately detect individuals with ON, specifically in terms of true positive identification. And the capacity of MAAS and MEBS-T to accurately detect individuals who do not have ON, also known as true negatives, is referred to as specificity.

The Düsseldorf Orthorexia Scale (DOS) is widely recognized as a reference standard for assessing ON, which is used as a comparison for evaluating the accuracy of MAAS and MEBS-T in this study.

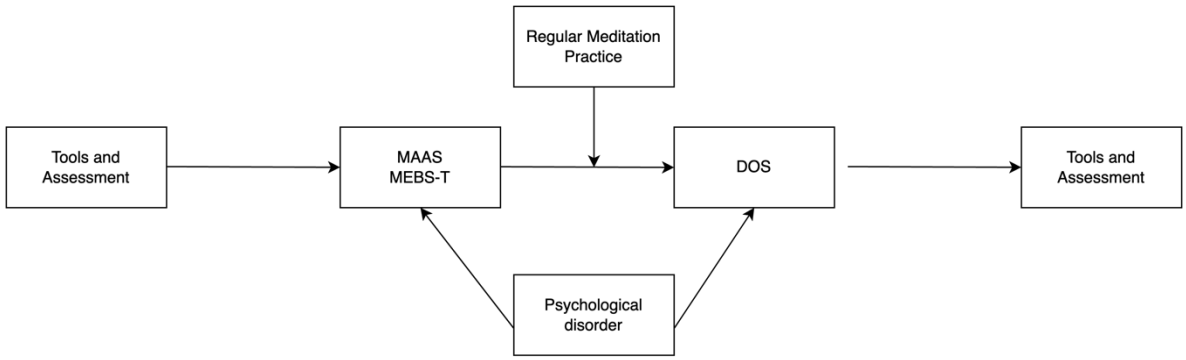

Figure 3.1 Conceptual Framework Diagram

The conceptual framework diagram for this research (Figure 3.1) illustrates the relationship between the DOS as the reference standard and MAAS and MEBS-T as index tests. The study also highlights the important factors that can affect the scores of both the index tests and the reference standard, which include experience with regular meditation practice.[8] Given the early stage of research on the relationship between Orthorexia nervosa, mindfulness, and mindful eating, there is still limited literature available, so there is an inadequate amount of information and a lack of concrete evidence for other confounders. This study focuses on diagnostic accuracy research in proposals rather than diagnostic prediction research. Therefore, the current purpose of the study does not involve examining the confounding factors. However, further investigation into this area could be considered.

Occurrence relation

Test performance of Y (DOS) = f(determenant : MAAS,MEBS-T)

3.3 Participants

3.3.1 Eligibility Criteria

To be eligible for the study, participants needed to meet these following criteria:

(1) The inclusion criteria

(1.1) The participants are willing to participate in this research.

(1.2) Participants exhibit a voluntary inclination to partake in the research activities and possess the capacity to provide informed consent.

(1.3)Participants should possess the capacity to adhere to the study prerequisites, including completing the questionnaires.

(1.4) Participants had to be adults who were 20-65 years of age.

(1.5) Participants had to be able to read and comprehend Thai, which was the language used in the questionnaires.

(1.6) There were no limitations based on gender, race, or socioeconomic status.

(2) The exclusion criteria

Individuals who reported having any form of psychiatric disorder were not eligible to participate in the study. The reason for excluding them is that their symptoms tend to overlap with those of other disorders[16]. This measure was taken to ensure that the conditions did not have any influence on the results of the questionnaires. This exclusion group includes individuals with

(2.1) Obsessive-compulsive disorder (OCD)

(2.2) Obsessive-compulsive personality disorder (OCPD)

(2.3) Somatic symptom disorder

(2.4) Illness anxiety disorder

(2.5) Psychotic spectrum

(3) Withdrawal criteria

(3.1) Participants in the research project have the freedom to withdraw at any point, without being obligated to provide a justification.

(3.2) Participants' decision to cancel their participation will not have any negative impact on their entitlements or benefits in the future.

3.3.2 Sample Size

Identifying the number of participants needed for the current study used 8.8% for sensitivity and 94.3% for specificity, according to a previous study from Halit et al. (2022).[81] While using 57.6% for prevalence, this thesis focuses on the adult population in Bangkok, and a similar study conducted in Italy found that orthorexia had a prevalence rate of 57.6% among adult individuals in the general community.[33]

The formular used to find the sample size for estimating sensitivity[82] is as follows:

$$n_{Se} = \frac{z^2_{1-\frac{\alpha}{2}} Se(1-Se)}{d^2(Prev)}$$

Z(0.975) = 1.96,

Sensitivity (Se) = 0.088,

Prevalence (Prev) = 0.576,

d = 0.05

n(Se) = 214.11

Thus, sample size = 215

The formular used to find the sample size for estimating specificity[82] is as follows:

$$n_{Sp} = \frac{z^2_{1-\frac{\alpha}{2}} Sp(1-Sp)}{d^2(1-Prev)}$$

Z(0.975) = 1.96,

Specificity (Sp) = 0.943,

Prevalence (Prev) = 0.576,

d = 0.05

n(Sp) = 194.8

Thus, sample size = 195

According to the formula, the maximum sample size suggested is 215. However, the final sample size, totaling 300, was determined to be the largest sample size utilized in this study. In studies 1 and 2, a total of 250 participants were collected for data analysis. Additionally, another 50 participants were collected twice, with a 7-day interval, for The test-retest reliability analysis.

3.4 Measures

In this study, a cross-sectional research design was employed to examine the two utilities, namely the Dispositional Mindfulness Questionnaire (MAAS)[15] and the Mindful Eating Behavior Scale-Trait (MEBS-T)[11], in identifying Orthorexia Nervosa. The Düsseldorf Orthorexia Scale (DOS)[13] was used as the reference standard for comparison. In addition, there are some demographic questions included in the assessment.

The participants were given clear instructions to answer the MAAS, MEBS-T and DOS items based on their everyday experiences, without overanalyzing their responses. They were reassured that there were no correct or incorrect answers, and they were reminded to respond with utmost honesty. Moreover, they were given clear instructions through the online platform to ensure that they fully understood and successfully completed the scale.

3.4.1 Index Tests

This research utilizes two index tests, specifically the Mindful Attention Awareness Scale (MAAS) and the Mindful Eating Behavior Scale-Trait (MEBS-T). The self-report

standardized questionnaires were chosen based on their established reliability and validity in assessing dispositional mindfulness and mindful eating, respectively.

(1) Administration of the Mindful Attention Awareness Scale (MAAS)

Measurement of Dispositional Mindfulness

The MAAS, developed by Brown and Ryan (2003) is a scale consisting of 15 items that have been specifically developed to evaluate fundamental aspects of dispositional mindfulness. These aspects include qualities like being open and receptive to an individual's internal and external experience, as well as being attentive to the present moment. Some example questions are “I find it difficult to stay focused on what’s happening in the present” and “I rush through activities without being really attentive to them.”

The measure is well-known for its strong psychometric properties and has undergone validation through an extensive number of studies. The MAAS is a measure that focuses on a single factor or dimension, indicating that all items are related to one specific: dispositional mindfulness. From that evidence, it is a reliable single-factor measurement.[68]

The MAAS has consistently shown strong internal consistency, validity and excellent internal consistency in terms of reliability. This is indicated by Cronbach's alpha coefficients consistently above 0.81.[10,68] These findings suggest that the items on the scale effectively measure a comparable fundamental construct of dispositional mindfulness.

Scale and Scoring System

The MAAS questionnaire requires participants to delve deeper about their daily experiences and rate how often they believe each statement applies to them using a 6-point Likert scale. The scale ranges from 1, which represents "Almost Always," to 6, which represents "Almost Never." Here is an explanation of what these scores represent:

1. *Almost Always*: A statement that is applicable to the participant for the majority of the time.
2. *Very Frequently*: The statement is applicable to those who engage on a regular basis, although not necessarily always.
3. *Somewhat Frequently*: The participant frequently agrees with the statement being made.
4. *Somewhat Infrequently*: The participant does not frequently relate to the statement.
5. Very Infrequently: The statement itself rarely is applicable to the participant.
6. *Almost Never*: This statement very rarely deploys to the participant.

Scoring and Interpretation

In order to derive the MAAS score, the scores of the 15 items are added together to calculate a total score is determined “after reverse scoring”. The individual's degree to which dispositional mindfulness increases as their score increases. The assessment of outcomes can offer valuable insights into the individual's level of mindful awareness, which is a crucial aspect of this study.

This thesis was utilized the Thai version (after the translation and back translation processes that will be discussed further in the following section) of the Mindful Attention Awareness Scale (MAAS) to evaluate the degree of dispositional mindfulness in adults between the ages of 20 and 65 residing in Bangkok, Thailand. The results will determine how sensitive and specific the MAAS is in identifying Orthorexia Nervosa, using the Düsseldorf Orthorexia Scale as a reference standard.

(2) Administration of the Mindful Eating Behavior Scale-Trait (MEBS-T)

Measurement of Mindful Eating

The MEBS-T is a comprehensive measure that has been developed and validated to assess mindful eating behavior. There are 8 items included in this assessment, which specifically measure the unidimensional construct of trait mindful eating behaviors. Some example questions are “I fully taste every bite that I am eating” and “When I am eating, I have thoughts and/or feelings, but keep refocusing on the food.”

The MEBS-T has consistently demonstrated strong internal consistency, validity, and reliability. Consistently high Cronbach's alpha coefficients above 0.85 have been observed in previous study.[11] These findings indicate that the items on the scale are effective towards measuring a similar core aspect of mindful eating behavior.

Scale and Scoring System

The MEBS-T requires participants to express their level of comprehension with specific statements based on their eating experiences. A 4-point Likert scale is utilized, with a range from 1 (Strongly Disagree) to 4 (Strongly Agree). The ratings indicate:

1. *Strongly Disagree:* The participant expresses a strong disagreement with the statement, suggesting a lack of mindfulness in their eating habits.
2. *Disagree:* The participant expresses disagreement with the statement, indicating a limited practice of mindful eating.

3. Agree: The participant expresses agreement with the statement while demonstrating a strong commitment to mindful eating.

4. Strongly Agree: The participant entirely concurs with the statement, demonstrating an elevated degree of mindfulness in their eating habits.

Scoring and Interpretation

The MEBS score is determined as the scores of the items are added together to calculate a total score. The level of mindful eating increases as the score increases. The results offer a measurement of a person's mindfulness when it comes to eating, providing useful understanding into their eating behavior indications.

For this thesis, the Thai version of the MEBS (after the translation and back translation processes that will be discussed further in the following section) will be utilized to assess mindful eating behavior in adults aged 20-65 residing in Bangkok, Thailand. The findings will establish the sensitivity and specificity of the MEBS for identifying Orthorexia Nervosa, with the Düsseldorf Orthorexia Scale as the reference standard.

3.4.2 Reference Standard

The reference test used in this study is the Düsseldorf Orthorexia Scale (DOS), which was developed and validated by Barthels et al.[12] and evaluated for its psychometric properties by Chard et al.[13] in an English-speaking population. Currently, this tool is widely regarded as one of the most widely used reliable methods to detect Orthorexia Nervosa.

(1) Administration of the Düsseldorf Orthorexia Scale (DOS)

Measurement of Orthorexia Nervosa (ON)

The DOS is an instrument for self-report that consists of 10 items that particular determine the unidimensional construct of ON. There are some examples of questions including “I have certain nutrition rules that I adhere to” and “If I eat something I consider unhealthy, I feel really bad”. Each item is specifically designed to evaluate obsessive behavior and thoughts related to maintaining a healthy diet.

The initial development of DOS took place in the German language[12], demonstrating favorable internal consistency and convergent validity. The English version[13] expanded its reach and widespread use while maintaining the original's internal consistency, concurrent validity, and structural coherence with the original version. It has been determined that the DOS demonstrates satisfactory reliability, as evidenced by a Cronbach's alpha of 0.88,

indicating strong internal consistency. This suggests that the Diagnostic Orthorexia Scale (DOS) is a reliable tool for assessing orthorexic eating behaviors.

Scale and Scoring System

The DOS comprises assess an individual's attitudes, behaviors, and emotions regarding the consumption of food that they consider to be healthy. Each item is scored on a 4-point Likert scale from 1 (does not apply to me) to 4 (applies to me). Participants are asked to indicate the degree to which each statement applies to them by selecting one of the four available responses. The rating system for the answers provided is as listed below:

1. *This does not apply to me:* The participant completely disagrees with the statement.
2. *This does rather not apply to me:* The participant has little identification with the statement.
3. *This does somewhat apply to me:* The participant has a moderate level of identification with the statement.
4. *This applies to me:* The participant fully agrees with the statement.

Scoring and Interpretation

The DOS score is calculated by adding up the responses for each item. A higher score on the DOS indicates a higher level of orthorexic thoughts and behaviors. A score of 30 or higher is used as an initial cut-off to indicate the presence of ON. A score between 25 and 29 indicates a potential risk of developing ON and a score of 24 or lower implies no ON is present. The DOS provides a useful way to assess individuals' orthorexic tendencies. It offers a relative measure of how fixated someone is on consuming only nutritious and healthy foods. By using the DOS, we can gain important understanding into individuals’ dietary behaviors. For this thesis, the Thai version of the DOS (after the translation and back translation processes that will be discussed further in the following section) will be utilized as the reference standard to assess Orthorexia Nervosa.

In summary, this study aims to evaluate the MAAS and the MEBS-T for identifying Orthorexia Nervosa using DOS as reference standard among adults aged 20-65 in Bangkok, Thailand.

3.4.3 Translation and Back-Translation Process of the Index Test and Reference Test

The index tests utilized in this study include the MAAS and the MEBS-T and the Düsseldorf Orthorexia Scale (DOS) as the reference test. All of the instruments have been developed and validated in English, so it is important to carefully translate them in order to ensure their proper utilization in the Thai context.

The translation and back translation process is as follows:

(1) Initial Translation

A bilingual translator, certified in both Thai and English, has been hired to translate the English versions of the MAAS, MEBS, and DOS into Thai. Great care is taken to ensure that the Thai version of the tests accurately reflects the psychological constructs they measure, thus maintaining the integrity and intent of the instrument.

(2) Face Validity Check

The translated versions are then reviewed for face validity by an author of this study, who is a bilingual Thai psychologist with a PhD, specializing in the field of mindfulness. The psychologist evaluates whether the items effectively measure their intended constructs within the Thai cultural context. She also assesses the clarity and appropriateness of the language used in the items. Any items or phrases that are unclear or open to interpretation are identified and discussed with the translators.

(3) Back translation

A second bilingual translator, who is not informed of the original English versions of the instruments and not previously participated in the first translation process, translates the Thai versions back into English. The purpose of back-translation is to verify the accuracy of the initial translation and to ensure that the psychological constructs of the assessments are maintained during the translation process.

(4) Comparison of Translated and Back-Translated Versions

A native English-speaking psychologist with dual PhDs in Linguistics and Psychology proceeds to compare the back-translated English versions of the MAAS, MEBS, and DOS with their original English versions. Identifying any inconsistencies in meaning, tone, and content.

(5) Index of Item Objective Congruence (IOC)

This research involves three linguistic analysts and experts in both the source and target languages during the validation phase of our questionnaire translation. Each questionnaire item had to be thoughtfully assessed using the quantitative Index of Item

Objective Congruence (IOC). The IOC assesses the quality of each translated item to ensure that the instrument accurately captures the necessary data for this study.

Experts reached a unanimous agreement on an IOC score of nearly 1 for every item on all questionnaires, except for item 6 of MAAS, which scored 0.67, showing good congruence (Table 3.1). The complete agreement indicated that every item was considered to be well-aligned with the research goals, accurately conveying the intended meanings and subtleties of the original language in the translation.

Despite the high level of agreement, the experts suggested minor adjustments to enhance the aesthetics of the Thai language. It is crucial to note that these recommendations did not tackle the content or significance of the questionnaire items. They improved the linguistic term to guarantee that the translation accurately conveyed the intended meaning and resonated more with local Thai speakers.

Table 3.1 Index of Item Objective Congruence (IOC)

Questionnaire	Items	Expert 1	Expert 2	Expert 3	IOC	Interpretation
MAAS	1	1	1	1	1	Satisfy
MAAS	2	1	1	1	1	Satisfy
MAAS	3	1	1	1	1	Satisfy
MAAS	4	1	1	1	1	Satisfy
MAAS	5	1	1	1	1	Satisfy
MAAS	6	1	0	1	0.67	Satisfy
MAAS	7	1	1	1	1	Satisfy
MAAS	8	1	1	1	1	Satisfy
MAAS	9	1	1	1	1	Satisfy
MAAS	10	1	1	1	1	Satisfy
MAAS	11	1	1	1	1	Satisfy
MAAS	12	1	1	1	1	Satisfy
MAAS	13	1	1	1	1	Satisfy
MAAS	14	1	1	1	1	Satisfy
MAAS	15	1	1	1	1	Satisfy
MEBS-T	1	1	1	1	1	Satisfy
MEBS-T	2	1	1	1	1	Satisfy
MEBS-T	3	1	1	1	1	Satisfy
MEBS-T	4	1	1	1	1	Satisfy
MEBS-T	5	1	1	1	1	Satisfy
MEBS-T	6	1	1	1	1	Satisfy

Table 3.1 (Cont.)

Questionnaire	Items	Expert 1	Expert 2	Expert 3	IOC	Interpretation
MEBS-T	7	1	1	1	1	Satisfy
MEBS-T	8	1	1	1	1	Satisfy
DOS	1	1	1	1	1	Satisfy
DOS	2	1	1	1	1	Satisfy
DOS	3	1	1	1	1	Satisfy
DOS	4	1	1	1	1	Satisfy
DOS	5	1	1	1	1	Satisfy
DOS	6	1	1	1	1	Satisfy
DOS	7	1	1	1	1	Satisfy
DOS	8	1	1	1	1	Satisfy

(6) Revision and Finalization

The process requires translators and psychologists to engage in discussions and potentially repeat the steps until the final Thai versions of the tests meet the desired level of satisfaction. Revisions have been implemented to the Thai versions based on the comparison and identified inconsistencies. Moreover, they integrated suitable improvements in response to the perceptive comments from three experts, according to the IOC assessment. The alterations respected the original content and preserved its significance. Improving the language to enhance reader friendliness greatly increased the quality and effectiveness of the questionnaires.

(7) Pretest for Index Tests and Reference Test

A pilot study was conducted with 50 Thai adults, native speaking participants to evaluate the comprehension and suitability of the questionnaire. The participants were asked about the difficulty of understanding each item and the ease of fully comprehending the questions, moreover, they will be asked to complete all of the instruments. The final version of all utilities uses in the result of this.

(8) Administration of Index Tests and Reference Test

As part of the cross-sectional observational study, the adult participants aged 20-65 in Bangkok, Thailand, will be administered the finalized Thai versions of the MAAS, MEBS, and DOS. The methodology of this study follows the STARD 2015 guidelines, which ensures

that the translation process, as well as the administration of the index tests and reference test, are conducted in an appropriate way.

Inconclusion, the described process includes several steps: forward translation, expert panel review, back translation, harmonization, proofreading and comprehension, and preparation of the final version[83]. By employing those approaches, we can ensure that the outcomes of the study are dependable and effectively represent the diagnostic precision of the MAAS and MEBS To detect ON using DOS as a reference standard, within the Thai context.

3.5 Data Collection Procedure

The process of collecting data was carefully planned and executed, which consists of the following steps:

3.5.1 Recruitment process

The recruitment procedure for this study focuses on ensuring that participants have all the necessary information to make an informed decision about their involvement.

(1) Recruitment and Informed Consent

The recruitment strategy used in this study includes announcing to find research participants who are adults between the ages of 20 and 65 based in Bangkok through various online platforms. The announcement for participants will be broadcast on popular online platforms in Thailand. This includes popular social media platforms such as Facebook, Line, and Twitter. Interested participants will contact the author of the research via phone call or email address as stated in the Research Participant Announcement Leaflet to initiate the process and gather relevant information. Direct communication allows potential participants to receive detailed information about the research.

The purpose and duration of the research will be explained to participants. They will be informed about the study's objectives, its significance, and the estimated time commitment. The research methods will be explained clearly, with a focus on the questionnaire format, a comprehensive discussion of the potential risks, side effects, and benefits associated with participation. Lastly, participants will be informed that they have the freedom to withdraw at any point without the need to provide an explanation.

Individuals who willingly choose to participate in research activities, could give informed consent and met the required eligibility criteria were given a consent form to sign

electronically. Subsequently, the researcher transmits the hyperlink for questionnaire access to the participants through their respective email addresses.

To ensure the safety and ethical adherence of obtaining electronic consent forms and completing online questionnaires, researchers are considering implementing specific procedures.

(1.1) Strict access controls will be implemented to guarantee that access to the data is limited to the researcher. Implementing user authentication systems that only authorize access based on authenticated credentials will help achieve this.

(1.2). In order to access the data, the researcher must generate a robust and distinct password. The password ought to be intricate, comprising a combination of lowercase and capital letters, digits, and special characters. Avoid combinations of common words or those that are simple to predict.

(1.3) The researcher will alter the password on a periodic basis (every month) in order to bolster security measures. Consistent updates play a crucial role in preventing unauthorized access, particularly in situations where a security violation is suspected.

(1.4) To access the data, the researcher uses a secure personal device. Implement encrypted and secure data storage systems to safeguard the gathered information; the data is physically stored on a secure hard drive.

(1.5) Maintain secure backups to guard against data loss due to hardware failure, theft, or other unforeseen circumstances. It is imperative that these backups are encrypted and fortified with robust passwords.

(1.6) Once the research is complete, the researcher will be equipped with a systematic and protected procedure for data disposal.

(2) Data Collection

The researcher offered participants an online questionnaire to complete three standardized questionnaires: the Dispositional Mindfulness Questionnaire (MAAS), the Mindful Eating Questionnaire (MEBS-T), and the Düsseldorf Orthorexia Scale. By implementing this approach, the tests were administered in an anonymous manner, using ID for **participant data de-identification,** and not using participants' personal information, which helped reduce potential biases.

(3) Confidentiality and Privacy

Strict privacy and confidentiality protections were implemented to safeguard the sensitive data gathered. Compliance with ethical guidelines for human research and secure data storage that is only accessible by the researcher were both guaranteed. The participants utilized the online platform to complete the MAAS, MEBS-T, and Düsseldorf Orthorexia Scale.

3.5.2 Questionnaire Administration

After giving their consent, participants were instructed to complete all surveys in one sitting. After receiving the signed consent form, the researcher emailed participants a link to the survey forms. The questionnaires have been ordered. The MAAS, MEBS-T, and DOS were presented in sequential order, with the DOS being the reference standard. The 15-item MAAS questionnaires typically require 10 to 15 minutes for completion. The participants proceeded to fill out the 8-item MEBS-T questionnaire. The questionnaire can be completed in 5-10 minutes. In addition, it would take approximately 10-15 minutes to complete the 10-item DOS questionnaire. Finally, participants take a few moments to complete a brief demographic questionnaire, which should take approximately 3-5 minutes.

The participants were instructed to remain calm and relaxed. They were motivated to respond to questions in a candid manner, free from any distractions, in order to maintain their focus and minimize external influences. The participants were given clear instructions to complete the questionnaires without taking any breaks in order to ensure consistency. Those who participated were advised that they could choose to discontinue their participation in the study at any time without facing any negative consequences. All responses were securely stored and utilized for this research in order to uphold confidentiality.

3.5.3 Timing of the Tests

The research project was specifically designed to collect data at a specific moment in time among adults in Bangkok, Thailand, following the principles of a cross-sectional study. To complete three standardized questionnaires, it would take approximately 25–40 minutes to finish all three questionnaires including the demographic questions.

3.5.4 Compensation

Participants will not be provided with monetary compensation for their involvement in the research. However, they will receive a gift as a kind of recompense for the time spent, potential income loss, and any difficulty or discomfort caused by completing the questionnaires. The present is a cold-storage water bottle, worth 150 baht, that will be sent to the address provided to the researcher.

3.5.5 Data Management

The responses of the participants were securely kept by the researcher, guaranteeing the integrity of the data. The dataset underwent a process where personal identifiers were removed prior for analysis. This step was taken to safeguard the confidentiality of the participants.

3.5.6 Quality Control

The researcher performed regular quality checks on the data, which involved examining for consistent patterns across multiple responses, assessing the completeness of the responses, and ensuring internal consistency. Responses that are incomplete or inconsistent will be excluded.

3.5.7 Ethical Considerations

The study protocol underwent a thorough review and received approval from the Institutional Review Board (IRB). Before participating in the study, all participants were required to provide informed consent, and their anonymity was guaranteed.

Research Ethical Considerations

The researcher will follow the ethical principles for human research or the Belmont Report, consisting of 3 principles:

(1). Respect for person

This research study has a process for requesting consent from those who are the target population of the research to participate as research volunteers. All volunteers will be fully informed about the research and will be allowed to make their own decisions. Without threats, force, or rewards. Before signing consent to participate in the research, the researcher will maintain the confidentiality of the volunteers. There will be no identifier in the questionnaire to identify the volunteers.

(2). Beneficence

The researcher has assessed the risks or dangers that may result from research and there is an evaluation of the benefits. Which this research study volunteers will receive benefits including, the participants in this study contribute to the advancement of research on eating disorders. Individuals assist researchers in gaining insights into the early screening of potential eating disorders. Volunteers contribute to the enhancement of societal health and well-being. Their engagement can enhance the promotion, education, and management of potential eating disorder awareness in the best interest of society. There may be a small risk

to the volunteer, time may be lost as a result of the participants' participation in the study. Engaging in the survey may necessitate a modest investment of time and attention, thereby constituting a potential minor inconvenience. Engaging in survey completion may engender sensations of weariness or boredom. Personal information and information obtained from the inquiries of all research participants/volunteers will be kept confidential. However, the results of the study and various relative factors may be disclosed to the public for academic benefit. The names of the research participants were not specified.

(3) Justice

This research study has a selection of subjects with clear inclusion and exclusion criteria, without bias, and with equal distribution of benefits and risks by random sampling method. And in organizing volunteers into study groups, they were randomly assigned to study groups without bias

Summary of Data Collection Procedure

In summary, the data collection procedure for this thesis was that initially, adults aged 20–65 based in Bangkok who expressed interest in joining the study were identified and recruited for the study. Their informed consent was obtained before proceeding. The participants utilized the secure online platform to successfully fill out three questionnaires (MAAS, MEBS-T, DOS, and demographic questions). Privacy was safeguarded through the implementation of rigorous data management protocols; responses were securely uploaded, and personal identifiers were removed prior to analysis. Data reliability was ensured through regular quality control checks for inconsistent or incomplete responses. Next, proceed with the statistical analysis process. The data collection procedure is shown as follows (Figure 3.2).

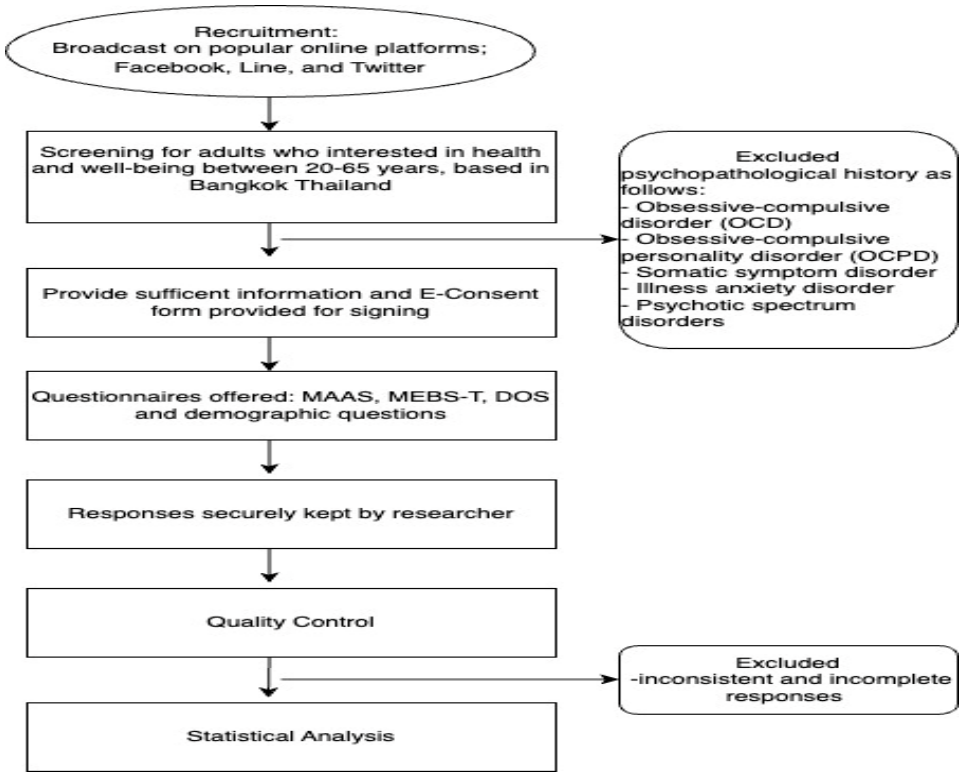

Figure 3.2 Data Collection Procedure

3.6 Statistical analysis

The purpose of the statistical analyses in this study is to evaluate the diagnostic accuracy of two scales, namely the Mindful Attention Awareness Scale (MAAS) and the Mindful Eating Behavior Scale (MEBS), in identifying Orthorexia Nervosa (ON). The Düsseldorf Orthorexia Scale (DOS) is used as a reference standard for comparison. The statistical analysis process is based on the following objectives and hypotheses:

Primary objectives

(1) To determine the optimal cut-off points for the Mindful Attention Awareness Scale (MAAS) in detecting Orthorexia Nervosa (ON) among adults in Bangkok, Thailand.

(2) To assess the sensitivity and specificity of the MAAS (Determinant) by using the Düsseldorf Orthorexia Scale (DOS) as the reference standard (End Point) in this observational cross-sectional study.

Secondary objectives

(1) To determine the appropriate cut-off points for the Mindful Eating Behavior Scale-Trait (MEBS-T) in order to effectively identify cases of Orthorexia Nervosa (ON) in the adult population of Bangkok, Thailand.

(2) To evaluate the sensitivity and specificity of the MEBS-T (Determinant) by comparing it to the Düsseldorf Orthorexia Scale (DOS), which is considered the reference standard (End Point). This assessment will be conducted using an observational cross-sectional design.

Primary Hypothesis:

(H1) Null Hypothesis 1: There is no specific cut-off point on the Mindful Attention Awareness Scale (MAAS) that can effectively identify Orthorexia Nervosa in the adult population of Bangkok, Thailand.

Alternative Hypothesis 1: The MAAS (Mindful Attention Awareness Scale) is capable of accurately identifying Orthorexia Nervosa within the adult population in Bangkok, Thailand, by utilizing a specific cut-off point.

(H2) Null Hypothesis 2: There is no significant evidence to suggest that the MAAS has high sensitivity and specificity in identifying Orthorexia Nervosa when compared to the Düsseldorf Orthorexia Scale (DOS).

Alternative Hypothesis 2: The Mindful Eating Awareness Scale (MAAS) demonstrates a high level of sensitivity and specificity in accurately identifying Orthorexia Nervosa, as compared to the Düsseldorf Orthorexia Scale (DOS).

Secondary Hypotheses

(H3) Null Hypothesis 3: The Mindful Eating Behavior Scale-Trait (MEBS-T) lacks a specific cut-off point that accurately identifies Orthorexia Nervosa within the adult population in Bangkok, Thailand.

Alternative Hypothesis 3: The MEBS-T effectively identifies Orthorexia Nervosa among the adult population in Bangkok, Thailand, using a specific cut-off point.

(H4) Null Hypothesis 4: The MEBS-T does not exhibit a significant level of sensitivity and specificity in detecting Orthorexia Nervosa, with the Düsseldorf Orthorexia Scale (DOS) as the benchmark.

Alternative Hypothesis 4: The MEBS-T exhibits a high level of sensitivity and specificity in detecting Orthorexia Nervosa, with the DOS serving as a reference.

There are 2 interconnected studies in this research; Study 1: Investigate the psychometric properties of the measures in the Thai context and Study 2: The statistical analysis based on the objectives and hypotheses. Each study undertook separately and targeting to achieve specific objectives. The details for each study will be elaborated further in this chapter.

Study I

3.6.1 Study 1: Investigate the psychometric properties of the measures in the Thai context

This study aims to enhance the evidence base on the use of translated instruments in Thai populations by employing a well-established, concise, and professional translation and back-translation method, along with statistical analysis. The objective of this study is to perform a comprehensive statistical analysis on the validity and reliability of the translated questionnaires in a Thai context.

(1) Step 1: Descriptive Analysis

The data collected from the finalized Thai versions of the MAAS, MEBS-T, and DOS will be processed and analyzed. Descriptive statistics, including Baseline Characteristics of Participants, mean and standard deviation will be calculated for each item in the questionnaires to provide a comprehensive description of the study participants' overall performance.

(2) Step 2: Internal consistency

The study involves utilizing Cronbach's alpha to assess the internal consistency of the questionnaires and employing additional statistical tests to establish their validity.

(3) Step 3: Correlation Analysis

The Düsseldorf Orthorexia Scale (DOS) will be utilized as a reference test for validating the Thai versions of the MAAS and MEBS-T. A correlation analysis using Spearman’s rank correlation coefficient will be conducted to compare the scores obtained from the MAAS and MEBS-T with those of the DOS. Strong correlations indicate that the translated questionnaires are effectively measuring the intended construct, thereby providing evidence for their validity.

Study II

3.6.2 Study 2: The statistical analysis based on the objectives and hypotheses

(1) Step 1: Determining the Cut-off Points

In order to achieve the primary objective (1) and the secondary objective (1) and provide an initial test of the first and fourth null hypotheses, this study conducts an analysis using a Receiver Operating Characteristic (ROC) curve. This technique can be used to determine the most effective cut-off points for both the MAAS and MEBS in order to accurately detect ON.

(2) Step 2: Sensitivity and Specificity Calculation

Once the cut-off points have been established, this study proceed to calculate the sensitivity and specificity of both MAAS and MEBS, with respect to the DOS cut-off score of 30, to address the primary objective (2) and the secondary objective (2) and provide a test of the second and fifth null hypotheses. The sensitivity of a test refers to its accuracy in correctly identifying positive cases, while specificity refers to its accuracy in correctly identifying negative cases.

(3) Step 3: Comparative Analysis

This study compares the performances of MAAS and MEBS to DOS in terms of sensitivity, specificity, and area under the ROC curve (AUC). This comparative analysis using DeLong's test. DeLong's test offers a robust statistical approach to comparing the AUCs of two diagnostic tests, considering the correlation between the tests when they are obtained from the same participants. The accuracy of correlation contributes to its being the preferred option to quantitatively compare the diagnostic performance of different tests. The aim is to evaluate the extent to which MAAS and MEBS can outperform DOS in diagnosing ON in order to address primary objective (3) and secondary objective (3) and test our third and sixth null hypotheses.

(4) Confidence Intervals and Statistical Significance Assessment

In all of the analyses conducted, calculate 95% confidence intervals among all estimates, a p-value lower than 0.05 will be regarded as statistically significant. If a p-value is less than 0.05, the corresponding null hypothesis will be rejected and the alternative hypothesis will be accepted, indicating a statistically significant result. Statistical software such as SPSS will be used for all statistical analyses.

In simple terms, this chapter has provided a comprehensive methodological approach for 1) investigating the psychometric properties of the measures and 2) testing the hypotheses and achieving the research objectives. The aim is to conduct a study in Bangkok, Thailand, to evaluate the sensitivity and specificity of MAAS and MEBS in diagnosing Orthorexia Nervosa among adults. This study is conducted in a cross-sectional observational setting with the goal of obtaining clear and insightful findings.

CHAPTER 4

RESULT

In this chapter, the study results are discussed, focusing on assessing the diagnostic accuracy of two index tests; the Dispositional Mindfulness Questionnaire (MAAS) and the Mindful Eating Questionnaire (MEBS), in identifying individuals with orthorexia nervosa, with the Düsseldorf Orthorexia Scale serving as the reference standard. This study was conducted in compliance with the Standards for Reporting Diagnostic Accuracy Studies (STARD) 2015 guidelines.

This chapter provides the results and interpretation of three interconnected studies: Study 1: Psychometric Properties of The Scale and Study 2: Diagnostic accuracy research analysis. The objectives for each study of the present research consist of the following:

4.1 Study 1: aims to investigate the psychometric properties of the assessment tools employed in this study, including MAAS, MEBST, and DOS, using an adult population in Bangkok, Thailand.

4.2 Study 2: consists of 4 objectives as follow:

Primary objectives

(1) To determine the optimal cut-off points for the Mindful Attention Awareness Scale (MAAS) in detecting Orthorexia Nervosa (ON) among adults in Bangkok, Thailand.

(2) To assess the sensitivity and specificity of the MAAS (Determinant) by using the Düsseldorf Orthorexia Scale (DOS) as the reference standard (End Point) in this observational cross-sectional study.

Secondary objectives

(1) To determine the appropriate cut-off points for the Mindful Eating Behavior Scale-Trait (MEBS-T) in order to effectively identify cases of Orthorexia Nervosa (ON) in the adult population of Bangkok, Thailand.

(2) To evaluate the sensitivity and specificity of the MEBS-T (Determinant) by comparing it to the Düsseldorf Orthorexia Scale (DOS), which is considered the reference standard (End Point). This assessment will be conducted using an observational cross-sectional design.

This chapter aims to present the results of the analysis and emphasize improving the field of screening for orthorexia nervosa by focusing on mindfulness screening. It provides a thorough evaluation of the diagnostic accuracy of two index tests, MAAS and MEBS-T, using DOS as a reference standard.

4.1 Study I

Study 1 (Psychometric Properties of The Scale)

After providing an introduction of the participants, this chapter continues to examine the results of the first study, aimed to investigate the psychometric properties of the assessment tools employed in this study which seeks to establish the validity and reliability of the three instruments used in the Thai context. This comprises the test for reliability and validity, applying statistical tools including Cronbach's alpha, test-retest correlation, and a correlation analysis between the MAAS, MEBS-T, and DOS. This phase is crucial as it allows for the measures to remain intact after translation, making them suitable for implementing with Thai participants. The abbreviations and interpretations of standardized scales used in this study are presented in Table 4.1.

Table 4.1 Abbreviations and Interpretation of Standardized Scales

Standardized Scale	Abbreviations	Number of Items	Rating Scale	Min Score	Max Score	Interpretation of Higher Score
Mindful Attention Awareness Scale	MAAS	15	1 (Almost always) to 6 (Almost never)	15	90	The individual's degree to which dispositional mindfulness increases as their score increases
						Higher score is interpreted as more in the present moment, more attentive or aware.

Table 4.1 (Cont.)

Mindful Eating Behavior Scale-Trait	MEBS-T	8	1 (Strongly Disagree) To 4 (Strongly Agree)	8	32	Higher scores reflect higher trait mindful eating behavior.
The Düsseldorf Orthorexia Scale	DOS	10	1 (does not apply to me) to 4 (applies to me)	10	40	30 or higher is interpreted as the presence of ON.
						25 - 29 is interpreted as the risk of developing ON
						24 or lower is interpreted as no ON is present.

Pre-Test of the Questionnaires

Prior to beginning Study 1, a pretest was conducted using a convenient sampling method. All participants were requested to fill out an online survey in Thai, which included six demographic questions and 33 items from three distinct instruments. The study included 50 Thai adults aged 20–65 based in Bangkok, Thailand. The feedback received indicated that the readability and comprehensibility of all instruments were deemed satisfactory. The reported time needed to complete all instruments was less than 15 minutes. No significant concerns were reported. Internal consistency for the MASS, MEBS-T and DOS was 0.92, 0.85 and 0.70, respectively. The results of the pretest study were satisfactory, allowing for the validation of the measurement instruments in Study 1. Nevertheless, it is crucial to acknowledge that the findings of the pretest study are subject to limitations because of the small sample size.

Data Collection Procedure and Participants

A total of 300 participants were involved in this study. In studies 1 and 2, a total of 250 participants were gathered for data analysis. In addition, an additional 50 participants were collected twice, with a 7-day interval, for test-retest analysis in Study 1.

Baseline Characteristics of Participants

This chapter initially presents the baseline characteristics of the study participants, offering background information for the subsequent analyses. This encompasses demographic data along with associated clinical attributes.

The study included 259 participants, but nine were excluded due to a psychological history. Upon analyzing the baseline characteristics of 250 participants, it was observed that the ratio of females to males was 1.1:1. The majority of participants were in the age group of 30-39 years, making up 37.0% of the total. This was followed by the 20–29-year-old age group at 25.6% and the 40–49-year-old age group at 24.8%. The majority of individuals (80%) had a bachelor's degree level of education. In terms of nutrition awareness, 30.8% reported following a low-fat diet, followed by 29.2% with no specific regime, and 21.2% with a ketogenic diet, respectively. A majority of participants engaged in less than 150 minutes of exercise per week (51.2%), while 47.6% incorporated meditation into their routine. The median MASS score was 60 (IQR 48 to 66), the MEBS-T score was 23 (IQR 16.75, 26), and the DOS score was 23 (IQR 20, 28). Orthorexia Nervosa was found in 15.6% of the participants, while 27.6% showed signs of being at risk for Orthorexia Nervosa, and 56.8% did not exhibit signs of Orthorexia Nervosa.

When comparing baseline characteristics among individuals with present, at-risk and absent Orthorexia Nervosa (ON), differences in nutritional awareness were found, resulting in statistically significant differences in ON occurrence at the 0.05 level (P=0.009). In the pairwise comparison result, it was found that there were statistically significant differences in nutritional awareness between the ON present and ON absent groups at the 0.05 level (P=0.016). Moreover, differences in exercise frequencies resulted in varying occurrence of ON, with statistical significance at the 0.05 level (P=0.029). Based on the pairwise comparison result, it was discovered that there were significant differences in exercise between the ON at-risk and ON absent groups at a significance level of 0.05 (P = 0.008). Nevertheless, there were no notable differences in the

occurrence of ON based on factors involving gender, age, education level, and meditation practice.

Following analyzing the scores of the MASS, MEBS-T, and DOS assessments in individuals with different levels of ON, a significant difference in MASS scores was found among the groups at the 0.05 level (P<0.001). Specifically, the ON present group had lower scores compared to both the ON at-risk group and the ON absent group. In addition, the ON at-risk group exhibited lower scores compared to the ON absent group, and this difference was statistically significant at the 0.05 level (P<0.05).

Similarly, the MEBS-T scores differed significantly among the groups at the 0.05 level (P<0.001). In particular, the ON present group had lower scores compared to both the ON at-risk group and the ON absent group. Additionally, the ON at-risk group had lower scores than the ON absent group, with statistical significance at the 0.05 level (P<0.05).

Although there were significant differences in the DOS scores among the groups at the 0.05 level (P<0.001). However, the score showed a reverse pattern when compared to the analyses of MAAS and MEBS-T. In terms of scores, the ON present group had higher scores compared to both the ON at-risk group and the ON absent group. Additionally, the ON at-risk group had higher scores than the ON absent group, with statistical significance at the 0.05 level (P<0.05), as show in Table 4.2

Table 4.2 The Occurrence of Orthorexia Nervosa (ON) by Baseline characteristic (n=250)

Baseline characteristic	Total (n=250)	ON present (n=39, 15.6%)	ON at risk (n=69, 27.6%)	ON absent (n=142, 56.8%)	P-value
Gender, n(%)					
Male	110 (44.0)	14 (35.9)	25 (36.2)	71 (50.0)	
Female	116 (46.4)	18 (46.2)	36 (52.2)	62 (43.7)	0.088‡
Prefer not to say	24 (9.6)	7 (17.9)	8 (11.6)	9 (6.3)	
Age (years), n(%)					
20-29	64 (25.6)	9 (23.1)	11 (15.9)	44 (31.0)	
30-39	93 (37.2)	14 (35.9)	30 (43.5)	49 (34.5)	0.460†
40-49	62 (24.8)	10 (25.6)	19 (27.5)	33 (23.2)	

Baseline characteristic	Total (n=250)	ON present (n=39, 15.6%)	ON at risk (n=69, 27.6%)	ON absent (n=142, 56.8%)	P-value
50-59	29 (11.6)	6 (15.4)	8 (11.6)	15 (10.6)	
> 60	2 (0.8)	0 (0.0)	1 (1.4)	1 (0.7)	
Education, n(%)					
Under bachelor's degree	37 (14.8)	7 (17.9)	9 (13.0)	21 (14.8)	
Bachelor's degree	200 (80.0)	31 (79.5)	55 (79.7)	114 (80.3)	0.797†
Master's degree	12 (4.8)	1 (2.6)	4 (5.8)	7 (4.9)	
Doctoral degree	1 (0.4)	0 (0.0)	1 (1.4)	0 (0.0)	
Food regimen, n(%)					
Vegetarian	11 (4.4)	2 (5.1)[a]	3 (4.3)	6 (4.2)[a]	
Low-fat diet	77 (30.8)	12 (30.8)	26 (37.7)	39 (27.5)	
Intermittent fasting	36 (14.4)	12 (30.8)	9 (13.0)	15 (10.6)	0.009‡*
Ketogenic diet	53 (21.2)	4 (10.3)	19 (27.5)	30 (21.1)	
No specific regime	73 (29.2)	9 (23.1)	12 (17.4)	52 (36.6)	
Exercise, n(%)					
< 150 minute/week	128 (51.2)	21 (53.8)	26 (37.7)[a]	81 (57.0)[a]	0.029‡*
> to 150 minute/week	122 (48.8)	18 (46.2)	43 (62.3)	61 (43.0)	
Meditation, n(%)					
yes	119 (47.6)	15 (38.5)	31 (44.9)	73 (51.4)	0.312‡
no	131 (52.4)	24 (61.5)	38 (55.1)	69 (48.6)	
MASS score, median (IQR)	60 (48, 66)	38 (38, 40)[a,b]	50 (44.5, 57.5)[a,c]	65 (61, 68)[b,c]	<0.001¥*
MEBS-T score, median (IQR)	23 (16.75, 26)	13 (12, 15)[a,b]	19 (15, 23)[a,c]	25 (23, 27)[b,c]	<0.001¥*
DOS score, median (IQR)	23 (20, 28)	32 (31, 33)[a,b]	27 (25.5, 28)[a,c]	20 (19, 22)[b,c]	<0.001¥*

Data were analyzed with Chi-square test‡, Fisher's exact test†, Kruskal-Wallis test¥

[a,b,c] The same letters indicate statistically significant differences between groups at the 0.05 level, as determined by the Bonferroni correction

*Statistically significant at the 0.05 level (α=0.05)

Descriptive statistics of the instruments

Descriptive statistics of the MASS, MEBS-T, and DOS assessments revealed that the mean MAAS score was 56.42±11.57, with a median of 60 (IQR 48, 66) and an observed range of 48-66. The mean MEBS-T score was 21.42±5.25, with a median of 23 (IQR 16.75, 26) and an observed range of 11-29. The mean DOS score was 23.92±5.02, with a median of 23 (IQR 20, 28) and an observed range of 15-35, as show in Table 4.3.

Table 4.3 Descriptive statistics of the mindful attention awareness scale (MAAS), the mindful eating behavior scale-trait (MEBS-T), and the Düsseldorf Orthorexia Scale (DOS) (n=250)

Descriptive statistics	MAAS	MEBS-T	DOS
Mean±SD	56.42±11.57	21.42±5.25	23.92±5.02
Median (IQR)	60 (48, 66)	23 (16.75, 26)	23 (20, 28)
Observed range	48 – 66	11 – 29	15 – 35
Possible range	15 – 90	8 – 32	10 – 40

IQR: Interquartile range

Internal Consistency Analysis

The analysis for reliability (Cronbach alpha) is conducted with a sample size of 250, while the test-retest analysis is performed with a sample size of 50. The results are as follows,

The reliability analysis of the MAAS, MEBS-T, and DOS in the Thai versions of the assessments found that the internal consistency reliability, as measured by Cronbach's alpha tests (α), for the MASS, MEBS-T, and DOS yielded values of 0.88, 0.86, and 0.76, respectively.

The test-retest reliability analysis (n=50), based on the correlation coefficient (r), for the MASS assessment yielded a value of 0.99 (P<0.001). For the MEBS-T, the correlation coefficient was 0.45 (P=0.001). Regarding the DOS, the correlation coefficient was 0.85 (P<0.001), as shown in Table 4.4.

Table 4.4 Reliability analysis for the Thai versions of MAAS, MEBS-T, and DOS (Total n=300)

Scale	Cronbach's Alpha (α) (n=250)	Test-Retest (r) (n=50)
MAAS	0.88	0.99 (P<0.001*)
MEBS-T	0.86	0.45 (P=0.001*)
DOS	0.76	0.85 (P<0.001*)

ICC: Intraclass correlation

**Statistically significant at the 0.05 level (α=0.05)*

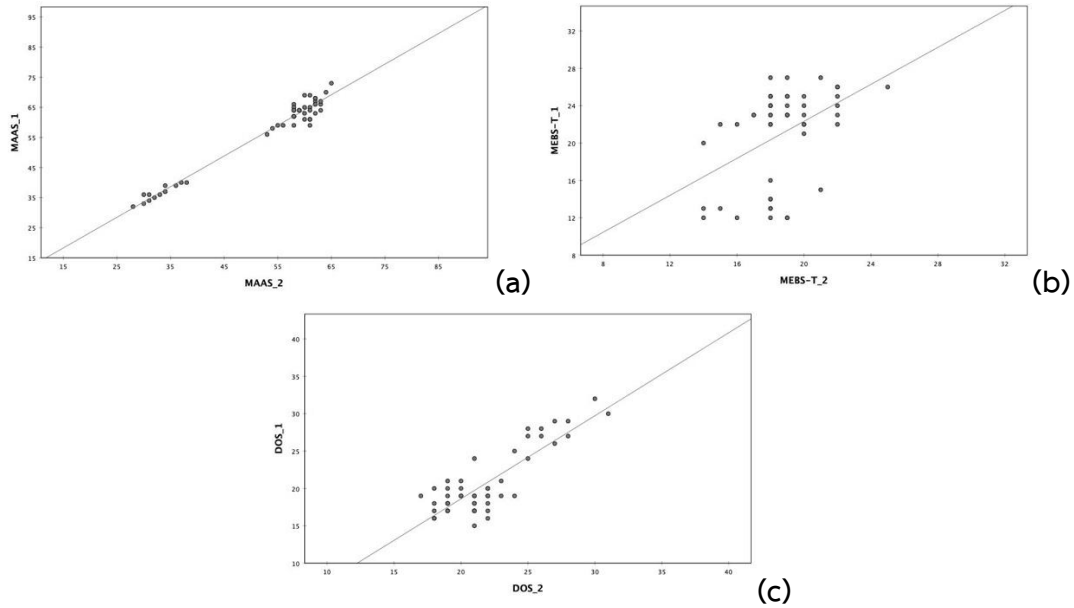

Figure 4.1 A scatter plot showed test-retest reliability of MAAS[(a)], MEBS-T[(b)], and DOS[(c)]

Correlation Analysis

Correlation analysis between the MAAS, MEBS-T, and DOS assessments found that in the MAAS and MEBS-T had a high positive correlation with statistical significance at the 0.05 level (r=0.707; P<0.001). MAAS and DOS had a moderate negative correlation with statistical significance at the 0.05 level (r=-0.690; P<0.001), and MEBS-T and DOS had a moderate negative correlation with statistical significance at the 0.05 level (r=-0.556; P<0.001), as show in Table 4.5.

Table 4.5 Correlation between MAAS, MEBS-T, and DOS (n=250)

Scale	MAAS	MEBS-T	DOS
MAAS	1		
MEBS-T	0.707 (P<0.001*)	1	
DOS	-0.690 (P<0.001*)	-0.556 (P<0.001*)	1

Data were analyzed with Spearman correlation

Statistically significant at the 0.05 level (α**=0.05)*

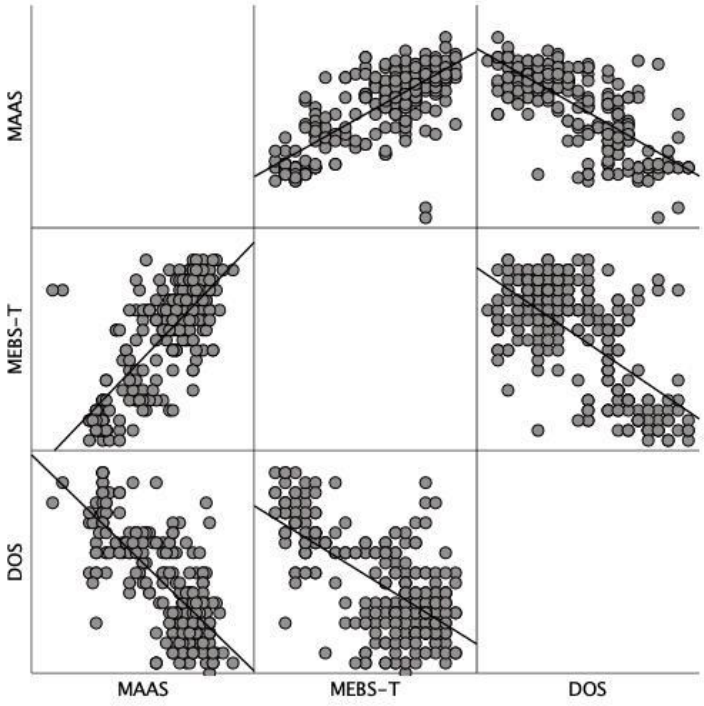

Figure 4.2 A scatter plot matrix between MAAS, MEBS-T, and DOS

4.2 Study II

Study 2 (Diagnostic accuracy research analysis)

After confirming the robustness of the instruments, this chapter proceeds to Study 2. At the foundation of this analysis lies the aim of finding the most effective cut-off points for both MAAS and MEBS-T. The identification of these thresholds is crucial in differentiating individuals with orthorexia nervosa (ON) from those who do not have the condition, using the mindfulness concept as a screening tool. In order to establish these points, the study utilizes the calculated Area Under the Curve (AUC) from Receiver Operating Characteristic (ROC) analyses for each scale and explores the sensitivity and specificity of both index tests using DOS as a reference standard.

The receiver operating characteristic curve analysis

The receiver operating characteristic curve analysis of the MAAS score and MEBS-T score in discriminate ON revealed that the AUC value of MAAS was 0.887 (95%CI 0.817, 0.957), which was slightly greater than the AUC for MEBS-T was 0.870 (95%CI 0.791, 0.949). However, there was no statistically significant difference (P=0.752). Both of assessment instruments showed a statistically significant difference from the reference line (P<0.001) (Figure 4.3). The optimal cut-off point for discriminating ON occurrence, determined by considering the maximum of the Youden index value (indicating better test performance), was 44 on the MAAS score and 16 on the MEBS-T score. Moreover While either MAAS and MEBS-T showed a statistically significant variation from the reference line, there was no statistically significant distinction found between the performance of MAAS and MEBS-T (P=0.752), as showed in Table 4.6.

Table 4.6 Area under the receiver operating characteristic curve of the MAAS and MEBS-T in predicted ON (n=250)

	AUC	95%CI	P-value	Optimal cut-off point	Maximum of Youden index
MAAS	0.887	0.817, 0.957	<0.001*	44	0.765
MEBS-T	0.870	0.791, 0.949	<0.001*	16	0.703
Δ MAAS & MEBS-T	0.017	-0.088, 0.122	0.752‡		

Statistically significant from reference line (AUC=0.5) at the 0.05 level (α**=0.05)*

Data were analyzed with DeLong test‡

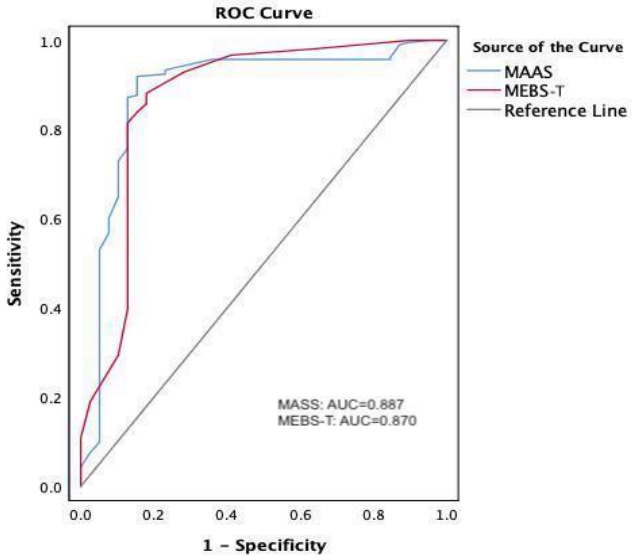

Figure 4.3 The ROC curve of the MAAS score and MEBS-T score for discriminate Orthorexia Nervosa.

Cut-Off Point, Sensitivity Analysis and Specificity Analysis

The diagnostic test of the MAAS and MEBS-T scores determined the optimal cut-off point for each. Regarding the performance of discriminate ON with a MAAS score at the 44 cut-off point, the sensitivity was 84.6%, the specificity was 91.9%, the PPV was 66.0%, the NPV was 97.0%, the accuracy was 90.8%, the LR+ was 10.5, the LR- was 0.17, and the odds ratio was 62.77. For the MEBS-T scores at the 16 cut-off point, the sensitivity was 82.1%, the specificity was 88.2%, the PPV was 56.1%, the NPV was 96.4%, the accuracy was 87.2%, the LR+ was 6.93, the LR- was 0.20, and the odds ratio was 34.01.

The division of the MAAS score into two groups (<44 and >44) resulted in a statistically significant difference in ON discrimination (ON and non-ON) at the 0.05 level (P<0.001). Similarly, a MEBS-T score of 16 points (<16 and >16) resulted in a statistically significant difference in ON discrimination (ON and non-ON) at the 0.05 level (P<0.001) as show in Table 4.7.

Table 4.7 Diagnostic test of the MAAS and MEBS-T (n=250)

Diagnostic test	MAAS			MEBS-T		
	Cut-off point	ON (n=39)	non-ON (n=211)	Cut-off point	ON (n=39)	non-ON (n=211)
Positive	< 44 (n=50)	33 (84.6%)	17 (8.1%)	< 16 (n=57)	32 (82.1%)	25 (11.8%)
Negative	> 44 (n=200)	6 (15.4%)	194 (91.9%)	> 16 (n=193)	7 (17.9%)	186 (88.2%)
P-value‡		<0.001*			<0.001*	
Sensitivity (95%CI)	84.6 (69.5, 94.1)			82.1 (66.5, 92.5)		
Specificity (95%CI)	91.9 (87.4, 95.2)			88.2 (83.0, 92.2)		
LR+	10.5 (6.53, 16.89)			6.93 (4.66, 10.29)		
LR-	0.17 (0.08, 0.35)			0.20 (0.10, 0.40)		
PPV (95%CI)	66.0 (54.7, 75.7)			56.1 (46.3, 65.6)		
NPV (95%CI)	97.0 (93.9, 98.5)			96.4 (93.1, 98.1)		
Accuracy (95%CI)	90.8 (86.5, 94.1)			87.2 (82.4, 91.1)		
Odds ratio (95%CI)	62.77 (23.06, 170.82)			34.01 (13.58, 82.19)		

Data were analyzed with Chi-square test‡

**Statistically significant at the 0.05 level (*α*=0.05)*

PPV: Positive predictive value; NPV: Negative predictive value

Considering the results of the combined diagnostic test between MAAS and MEBS-T, the sensitivity was 79.49%, the specificity was 85.78%, the PPV was 50.82%, and the NPV was 95.77%. Moreover, it was found that when Orthorexia Nervosa occurred, MAAS and MEBS-T yielded the same positive results (True positive), found in 12.4% of the participants. When Orthorexia Nervosa did not occur, MAAS and MEBS-T gave the same negative results (True negative), found in 72.4% of the participants. The occurrence of Orthorexia Nervosa, then MAAS and/or MEBS-T gave negative results (False positive), was found in 12.0% of the participants, while Orthorexia Nervosa not occurring resulted in MAAS and/or MEBS-T giving positive results (False negative) in 3.2% of the participants. In conclusion, MAAS and MEBS-T yielded 84.8% correct results and 15.2% incorrect results, as show in Table 4.8.

Table 4.8 Diagnostic test that considering both MAAS and MEBS-T combined

Diagnostic test	**MASS**	**MEBS-T**	**Outcome**	**(n=250)**
True positive	Positive (<44)	Positive (<16)	ON	31 (12.4)
True negative	Negative (> 44)	Negative (> 16)	Non-ON	181 (72.4)
False positive	Negative (> 44) and/or	Negative (> 16)	ON	30 (12.0)
False negative	Positive (<44) and/or	Positive (<16)	Non-ON	8 (3.2)
Diagnostic test	**Combined**	**Combined**		
Sensitivity	79.49%	95% CI [63.54, 90.70]		
Specificity	85.78%	95% CI [80.33, 90.20]		
PPV	50.82%	95% CI [41.70, 59.88]		
NPV	95.77%	95% CI [92.41, 97.68]		

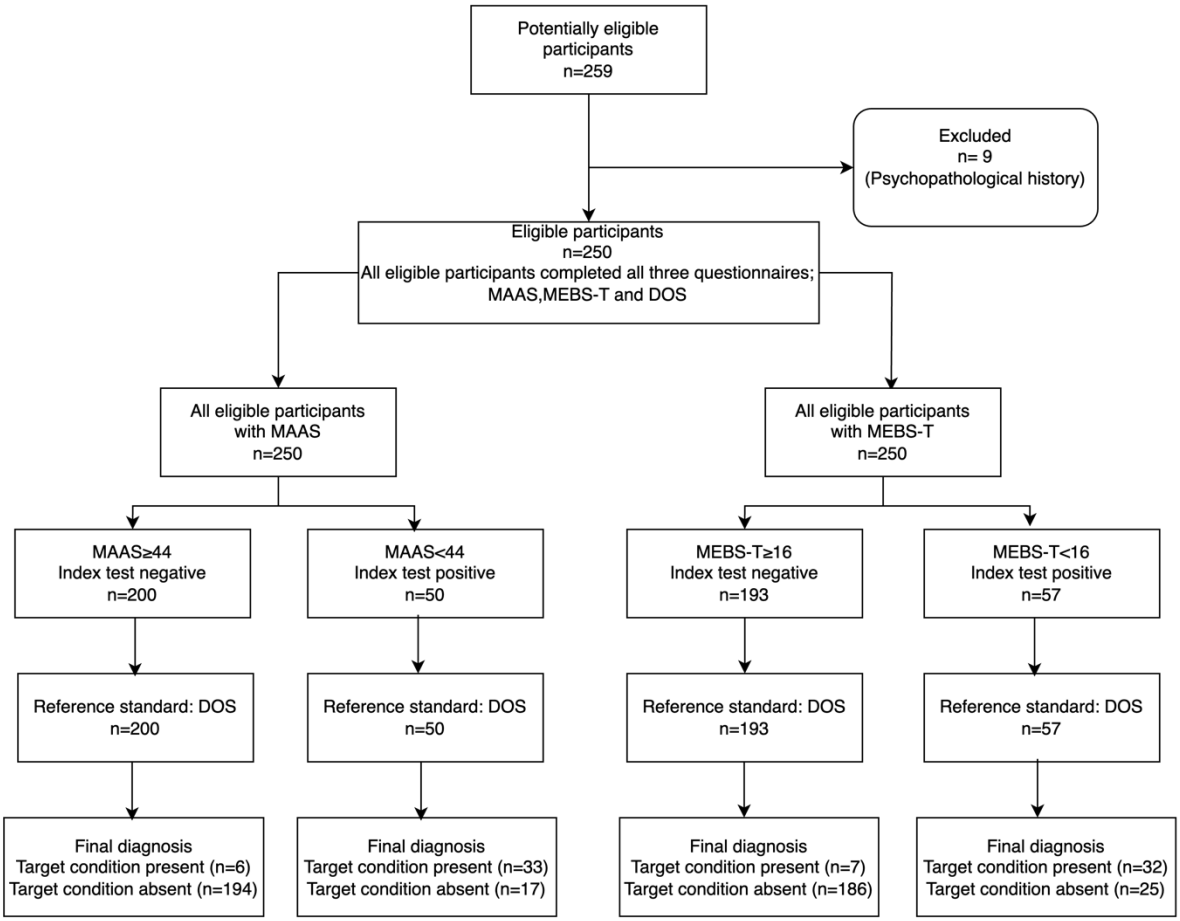

Figure 4.4 Flow Chart Diagram to Report the Flow of Participants Through the Study

4.3 Summary Of Hypotheses

The summary of research hypotheses in this study reveals that the test of research hypothesis 1 yielded a P-value <0.001, which is less than 0.05, hence rejecting the null hypothesis (Ho) and accepting the alternative hypothesis (Ha). The alternative hypothesis states that "The MAAS (Mindful Attention Awareness Scale) is capable of accurately identifying Orthorexia Nervosa within the adult population in Bangkok, Thailand, by utilizing a specific cut-off point." The MAAS has been found to be effective in discriminating Orthorexia Nervosa, with an area under the curve value of 0.887 and an optimal cut-off point of 44, which indicates statistical significance.

The test of research hypothesis 2 yielded a P-value <0.001, which is less than 0.05, hence rejecting the null hypothesis (Ho) and accepting the alternative hypothesis (Ha). The alternative hypothesis states that " The Mindful Eating Awareness Scale (MAAS) demonstrates a high level of sensitivity and specificity in accurately identifying Orthorexia Nervosa, as compared to the Düsseldorf Orthorexia Scale (DOS)." The MAAS assessment showed a sensitivity of 84.6% and a specificity of 91.9%, which were statistically significant.

The test of research hypothesis 3 yielded a P-value <0.001, which is less than 0.05, hence rejecting the null hypothesis (Ho) and accepting the alternative hypothesis (Ha). The alternative hypothesis states that " the Mindful Eating Questionnaire (MEBS-T) effectively identifies Orthorexia Nervosa among the adult population in Bangkok, Thailand, using a specific cut-off point." The MEBS-T has found to be effective in discriminating Orthorexia Nervosa, with an area under the curve value of 0.870 and an optimal cut-off point of 16, which indicates statistical significance.

Finally, the test of research hypothesis 4 yielded a P-value <0.001, which is less than 0.05, hence rejecting the null hypothesis (Ho) and accepting the alternative hypothesis (Ha). The alternative hypothesis states that " the Mindful Eating Questionnaire (MEBS-T) exhibits a high level of sensitivity and specificity in detecting Orthorexia Nervosa, with the DOS serving as a reference." The MEBS-T assessment showed a sensitivity of 82.1% and a specificity of 88.2%, which were statistically significant, as show in Table 4.9.

Table 4.9 Summary of research hypotheses (n=250)

Hypotheses	Null Hypothesis (Ho)	P-value
Hypothesis 1	Reject	<0.001*
Hypothesis 2	Reject	<0.001*
Hypothesis 3	Reject	<0.001*
Hypothesis 4	Reject	<0.001*

**Statistically significant at the 0.05 level (α=0.05)*

CHAPTER 5
DISCUSSION AND CONCLUSION

Orthorexia nervosa (ON) is a condition where the pursuit of a healthy diet becomes an unhealthy fixation. This eating behavior, characterized by a strong emphasis on a nutritious and beneficial diet, aims to promote optimal health. The main motive did not appear to be the desire to have a slim body shape, but rather the aspiration to maintain a healthy diet. Experiencing ON can lead to both physical and mental impairment. So far, ON has not received recognition in the Diagnostic and Statistical Manual, which means that there are currently no official diagnostic criteria available or the gold standard to detect ON.[84] Nevertheless, Düsseldorf Orthorexia Scale (DOS) takes into account the extensive utilization of standardized instruments for detecting ON.

Preventing the anticipated indicators of orthorexia nervosa, which could potentially progress into a full-fledged eating disorder such as Anorexia Nervosa, involves early screening as a crucial measure. Two mindfulness instruments, The Mindful Eating Awareness Scale (MAAS) and the Mindful Eating Questionnaire (MEBS-T), are used in this study. Screening with mindfulness self-report instruments is a non-invasive, cost-effective, short, and convenient process. It is even more important that, following a thorough evaluation, we can proactively implement mindfulness-based interventions to safeguard individuals who may be capable of facing ON. This thesis is regarded as the introductory investigation to incorporate mindfulness-based utilities for the purpose of screening orthorexia nervosa. This study has the potential to serve as the primary source of information, providing guidance for future research in both research and clinical settings.

This chapter is divided into the following sections: (1) Summary and discussion of findings; (2) Study limitations; (3) Clinical Implications and Implications for improved screening tools; (4) Research avenues; and (5) Conclusions. The purpose of this chapter is to interpret and discuss the results presented in Chapter IV Result of the study in relation to the main subject contribute of the thesis. The current study consists of two interconnected studies: Study 1: Psychometric Properties of the Scale and Study 2: Diagnostic Accuracy Research Analysis. The conclusion, interpretation, and discussion for each study are provided as follows:

5.1 Summary and Discussion of Findings

Study I

Study 1 examines the importance of rating scales related to mindfulness in assessing the mental well-being of the adult population. Given the focus on eating disorders, standardized instruments including rating scales have become crucial in identifying psychiatric disorders, in line with the principles of evidence-based medicine. Usually, clinical rating scales are tested to assess their internal consistency or relationship with other rating scales.[9] Thus, various methods of assessing reliability were explored to facilitate in the selection of a reliable test.

The main objective of Study 1 was to examine the internal consistency of the measures used in the current study among the adult population aged 20–65 years old in Bangkok, Thailand, carrying out with a sample size of 250 participants. Interestingly, the study reveals that individuals without ON tend to have no particular dietary plan and engage in less physical exercise per week, as indicated by their baseline characteristics. This study utilized three instruments: the Mindful Eating Awareness Scale (MAAS) and the Mindful Eating Questionnaire (MEBS-T) as the index tests, and the Düsseldorf Orthorexia Scale (DOS) as the reference standard.to measure Dispositional Mindfulness (DM), Mindful Eating (ME) and Orthorexia Nervosa (ON), respectively.

All of the instruments exhibited Cronbach's alpha values ranging from 0.76 to 0.88. The internal consistency values for MAAS, MEBST, and DOS were found to be 0.88, 0.86, and 0.76, respectively. Overall, all three assessments exhibited Cronbach's alpha values equal to or greater than 0.7, indicating that the MAAS, MEBS-T, and DOS assessments demonstrated internal consistency reliability at an acceptable level and were deemed adequate.

Moreover, the test-retest reliability analysis, conducted with a different sample size of 50, revealed an impressive correlation coefficient value of 0.99 ($P<0.001$) for the MASS assessment, while the correlation coefficient for the DOS was 0.85 ($P<0.001$). The analysis indicates excellent reliability for MAAS and good reliability for DOS, between the first and second assessments of each instrument. Surprisingly, the correlation coefficient for the MEBS-T was 0.45 ($P = 0.001$), indicating a concerning lack of reliability between the initial and subsequent assessments of the MEBS-T. However, after following consultation and deliberation with the expert team responsible for the translation and back translation of the

questionnaire, as well as the reevaluation of the index of item objective congruence (IOC), it was determined that the face validity of the translated questionnaire is acceptable. Furthermore, the internal consistency study conducted on the MEBS-T instrument demonstrates a notable degree of reliability. This implies that the unforeseen outcome may have been attributed to the constraints of the self-assessment instrument, potentially stemming from participant fatigue or lack of attentiveness during the administration of the questionnaire, given that it was the second attempt of these instruments. Moreover, one of the reasons might be that it is subject to limitations because of the small sample size (n=50). To the best of our knowledge, prior to this study, there was no translation or internal consistency analysis undertaken for the standardized MAAS, MEBS-T, or DOS in the specific context of Thailand. As a result, further investigation should be performed.

In addition to analyzing internal consistency, according to the correlation analysis of three instruments (MAAS, MEBS-T and DOS), the results showed a link between having orthorexia nervosa (ON), different levels of dispositional mindfulness (DM) and mindful eating (ME). The results indicated that both DM and ME align with each other, while higher levels of DM and ME correspond with lower levels of the presence of ON. The results provided were in line with prior studies that the concept of ME can be comprehended as a subset of DM[50]; hence, the correlation between these two variables is anticipated. Moreover, additional scientific evidence corresponds to the findings; a recent study conducted in 2023 found that there is a negative relationship between ON and mindfulness.[7] Interestingly, a more recent study in 2024 further emphasized the inverse correlation between mindful eating and ON.[85] However, the study conducted by Yardımcı (2021) revealed a contrasting outcome, indicating a positive correlation between mindful eating and ON.[86] It is noteworthy that all of the preceding studies utilized a different instrument in measuring mindful eating and ON compared to this current study. The investigation into the field of mindfulness in relation to orthorexia nervosa is still relatively new. Due to the ambiguous results, it is necessary to conduct further research.

Study II

The primary goal of Study 2 is to evaluate the accuracy of two mindfulness-related rating scales (MAAS and MEBS-T) in predicting ON with DOS as the reference standard in the adult population age range from 20-65 years old in Bangkok, Thailand. Having a clear understanding of the diagnostic accuracy of these mindfulness based rating scales may significantly enhance the effectiveness of psychiatric assessments as early screening tools for the population. In this case, experts can select the self-report instruments to assess the presence of ON. In addition, by implementing MAAS and/or MEBS-T, it is possible to reduce the length of the assessments and minimize costs. Furthermore, there are numerous mindfulness-based interventions that can greatly assist individuals dealing with ON, enabling them to receive treatment more effectively. By starting therapy earlier, individuals can receive timely support. Therefore, by reducing the time between the onset of the condition and seeking treatment and by adequately preparing for the treatment plan, the overall assessment and therapy plan will be enhanced. We are unaware of any previous research that has compared mindfulness-based instruments (MAAS, MEBS-T) to the gold standard (DOS) for detecting ON.

The diagnostic accuracy was assessed through the utilization of ROC analysis, facilitating the measurement of the area under the curve (AUC). The degree of proficiency in diagnosing can be categorized as inadequate (.50-.70), moderate to satisfactory (.70-.80), satisfactory (.80-.90), or outstanding (.90-1.00).[9] According to this exploratory research, the total scores of MAAS and MEBS-T as two index tests compared with DOS as the reference standard were found to effectively differentiate between individuals with orthorexia nervosa and those who do not have the condition. The performance of MAAS and MEBS-T demonstrated a satisfactory ability to differentiate between participants with and without ON.

By detecting ON with an area under the curve (AUC) of 0.887, the MAAS showed a decent level of diagnostic accuracy. In relation to the performance of discriminate ON with an MAAS score at the 44 optimal cut-off point indicating better test performance, the sensitivity was 84.6% and the specificity was 91.9%, with the PPV being 66.0% and the NPV being 97.0%. Moreover, according to the odd ratio, participants with an MASS score lower than 44 were 62.77 times more likely to experience ON occurrences compared to those with a MASS score of 44 or above.

Similarly, The MEBS-T demonstrated a satisfactory degree of diagnostic accuracy by detecting ON with an area under the curve (AUC) of 0.87. Regarding the performance of discriminate ON with a MEBS-T score at the optimal cut-off point of 16, it showed the test performance with a sensitivity of 82.1% and a specificity of 88.2%. The positive predictive value (PPV) was 56.1% and the negative predictive value (NPV) was 96.4%. In addition, based on the odd ratio, participants with an MEBS-T score lower than 16 were 34.01 times more likely to ON occurrence compared to those with a MASS score 16 or above.

While the AUC for the MAAS was only slightly higher than that of the MEBS-T, the diagnostic odds ratios showed significant differences. In fact, the odd ratio for the MAAS was nearly double compared to the MEBS-T. Furthermore, despite the similarity in the PPV and NPV of MAAS and MEBS-T, it was observed that the PPV of MEBS-T was 10% lower in comparison to MAAS. In addition, MAAS demonstrated a slightly higher level of specificity and intact sensitivity compared to MEBS-T. Although both MAAS and MEBS-T displayed a statistically significant difference from the reference line, it is worth noting that there was no statistically significant difference observed between the performance of MAAS and MEBS-T. Our research indicates that both MAAS and MEBS-T are effective in screening for ON, particularly in situations where high sensitivity is needed. The specificity of both instruments remained high even at high levels of sensitivity.

Although it was not the primary focus of this study, further analysis from this study indicates that the use of both screening instruments (the combination of MAAS and MEBS-T) for ON did not improve diagnostic accuracy; in fact, it slightly decreased performance. In addition, individuals may require additional time to complete multiple instruments. It is recommended to utilize either MAAS or MEBS-T exclusively for screening ON. As mentioned earlier, MAAS shows better performance in ON screening compared to MEBS-T, although the difference is not statistically significant. Using MAAS as the screening tool is advised given that mindfulness baaed interventions encompass more than just the practice of mindful eating, incorporating various aspects of being mindful. Therefore, utilizing the overall dimension of dispositional mindfulness for screening purposes provides greater accuracy when developing a treatment plan that incorporates a mindfulness-based intervention. However, if there are time constraints or a need for convenience in completing the screening, it is recommended to use MEBS-T. This tool is a shorter version with only 8 items, compared to MAAS which has 15 items.

To the best of our knowledge, this thesis represents the initial investigation that employs MAAS and MEBS-T as two index tests for the identification of ON, with DOS serving as the reference standard. Nevertheless, the utilization of mindfulness-based tools for psychiatric assessment is not a novel concept. Oppo et. al (2019) utilized the Italian adaptation of the Child and Adolescent Mindfulness (I-CAMM) questionnaire, a self-report instrument designed to evaluate mindfulness abilities, as a means to identify internalizing behaviors in children and adolescents compared with Youth Self—Report (YSR) as the reference standard. The outcome demonstrates that I-CAMM can precisely forecast approximately 80% of individuals exhibiting internalizing behaviors, which is one of the aspects of psychological symptoms.[87]

In a study that was similar to ours, the eating attitude concept was employed to assess for eating disorders. Conversely, the outcome is unfavorable. A prior study conducted by Siervo (2005), the researchers utilized the Eating Attitudes Test (EAT-26), a self-rating scale that assesses eating disorder risk by examining attitudes, feelings, and behaviors related to food intake. The test includes certain items that touch upon mindful eating aspects, such as "being aware of the calorie content of foods that I eat" or "giving too much time and thought to food."[88] Even though the EAT-26 is a valuable tool for identifying and assessing eating disorders, including anorexia nervosa, bulimia nervosa, and binge eating disorders, the result of the AUC analysis in this mentioned study had a relatively low value of 0.62, which may raise concerns regarding the suitability of the EAT-26 as a screening tool for eating disorders. So, it is not advisable to use it for this purpose.[89]

Despite the study's limitations, the current findings have the potential to support and promote the implementation of ON screening in resource-constrained settings. A number of people who struggle with eating disorders often experience negative impacts on their mental and physical well-being, which can greatly affect their overall quality of life and ability to carry out everyday responsibilities. Considering the growing body of research, utilizing a mindfulness-based rating scale for ON screening could be beneficial in identifying individuals who require early detection and preparing for mindfulness-based interventions in their treatment plans. Identifying eating disorders, in this case, ON, can be limited by various financial and administrative obstacles. This study presents strong support for promoting the incorporation of user-friendly and affordable instruments to detect ON. The findings suggest that further research should be conducted using the MAAS and MEBS-T, in addition to consulting experts on diagnostic criteria for ON, to improve the screening technique.

5.2 Study limitations

Firstly, consider the study's cross-sectional design, which provides a snapshot of the situation at a specific moment in time. The design of this study hinders the ability to draw conclusions about the causality or fluctuations in the occurrence or intensity of ON over time.

When examining the diagnostic accuracy of clinical rating scales, establishing a clear diagnostic reference standard is essential. As discussed in Chapter 2, there are no definitive DSM-IV diagnoses considered the gold standard due to ON not being officially classified as an eating disorder. Moreover, rating scales may have limitations in identifying psychiatric disorders due to their limited coverage of additional diagnostic criteria. Given the potential impact on the validity of studies focused on diagnostic accuracy, it is crucial to implement the findings of this investigation as solely an early detection technique for indications of ON.

Another limitation is the reliance on self-reported measurements, which may be influenced by the respondent's bias. Additionally, the issue of how to evaluate inconsistent information from self-report instruments remains uncleared. It is recommended that future studies incorporate a variety of data sources and attempt to reproduce our findings.

Lastly, this research focuses exclusively on adults living in Bangkok, Thailand, and the absence of a clinical population with a background in eating disorders while delivering MAAS and MEBS-T. Given the provided information, future research should consider involving a clinical population or a broader population, particularly teenagers affected by the increasing prevalence of eating disorders, and utilize these diagnostic instruments to assess and analyze the cut-offs identified in this study. In addition, Cultural factors and regional variations in eating behaviors may influence the prevalence and characteristics of ON, potentially leading to different cut-off points for other populations.

5.3 Clinical Implications and Implications for improved screening tools

According to our research, both MAAS and MEBS-T have been demonstrated to be effective in screening for ON. Implementing the findings of the study as an early detection technique for indications of ON is crucial. It is recommended to conduct this screening and undertake the classification criteria for ON with the guidance of experts or psychologists to ensure more accurate results. This study is centered on early screening for orthorexia nervosa employing mindfulness related self-report rating scales, those scales may be limited in their ability to identify psychiatric disorders because they do not cover all diagnostic criteria. In summary, it is important to assess the self-report tools in conjunction with the classification criteria for orthorexia nervosa to diagnose ON and gauge the severity and number of symptoms in the general population. In addition, it is advisable to employ MAAS as the screening instrument owing to its greater performance in comparison to MEBS-T for ON screeningl since the employment of both MAAS and MEBS-T failed to result in any improvement in diagnostic accuracy for ON screening. Nevertheless, for screening that requires prompt or convenient results, we suggest using MEBS-T instead of MAAS because of its shorter length.

On the other hand, to improve the efficacy of implementing rating scales, it would be beneficial to explore different assessment methods or other self-rating instruments apart from MAAS and MEBS-T that relate to mindfulness. This would help widely identify individuals who exhibit specific symptoms of ON, as outlined in the proposed diagnostic criteria.

Moreover, in order to accurately assess whether a self-report on mindfulness can serve as a screening tool for ON, it is crucial to look beyond the score on the rating scale. Collecting more information about the diagnostic criteria for mindfulness-related aspects or mindfulness related characteristics in individuals experiencing ON is of utmost importance such as different dimensions of mindfulness construct of people having ON.

5.4.Research avenues

Additional research is necessary to better understand the accuracy of diagnostic methods, given the growing significance of self-report instruments in identifying orthorexia nervosa and the need for treatment plans for those who may be vulnerable. Given the absence of a gold standard for detecting ON, it is imperative that future studies establish or evaluate alternative reference standards to serve as the benchmark. In addition, there is room for improvement in the validity of DSM diagnoses of ON, and it would be beneficial to provide more detailed criteria regarding the presence of symptoms. By defining the gold standard, it becomes feasible to obtain a more reliable and valid rating scale regarding the diagnostic accuracy of self-reported rating scale instruments to detect ON.

In addition, the findings of this study indicate that various factors, including diet and regular physical activity, can also impact the state of ON. Furthermore, given the finding that individuals without ON demonstrate a lack of adherence to a specific dietary regimen and engage in a comparatively lower level of physical exercise on a weekly basis, it would be interesting to further explore the relationship between health-related interest and knowledge, particularly in relation to various individual measures that impact the occurrence of ON. Additional investigation is warranted to delve deeper into these factors. Conducting diagnostic-added-value research that incorporates MAAS or MEBS-T, along with an investigation into dietary habits or weekly physical exercise levels or health-related interest or health-related knowledge, is advisable. Lastly, the connection between ON and anorexia nervosa (AN) and obsessive-compulsive disorder (OCD) suggests that exploring the use of MAAS or MEBS-T screening, along with self-reported screening for AN and OCD, could improve the detection of ON cases in eating disorder research. This diagnostic-added-value approach can improve the accuracy of screening for the presence of ON.

5.5 Conclusions

The earliest identification of ON is critical in order to facilitate effective interventions aimed at reducing or postponing the progression of a more severe symptom or associated eating disorder. In light of the common utilization of self-reported rating scales for the purpose of screening psychological disorders, our objective was to assess the discriminant ability of mindfulness-based instruments, specifically MAAS and MEBS-T, in identifying ON in comparison to DOS, a commonly employed screening tool that has a well-established cut-off point for detecting ON, serving as a reference standard. The diagnostic accuracy for diagnosing ON was found to be satisfactory for both MAAS and MEBS-T, as they fulfilled acceptable standards across all scoring categories. Hence, we propose the utilization of MAAS and MEBS-T as early screening instruments for ON. Nevertheless, we advise against employing the screening method in isolation for the detection of ON. Instead, we suggest integrating it with a comprehensive diagnosis and the expert-based criteria classification of ON.

Lastly, given that the utilization of both MAAS and MEBS-T did not enhance diagnostic accuracy in screening ON, it is advisable to exclusively employ either MAAS or MEBS-T for this purpose. According to this study, it is recommended to use MAAS as the screening tool due to its superior performance compared to MEBS-T in ON screening, even though the difference is not statistically significant. In addition, Mindfulness-based interventions encompass more than just mindful eating. Therefore, incorporating an assessment of dispositional mindfulness enhances the precision of mindfulness-based treatment plans. However, for time-sensitive or convenient screening, we recommend MEBS-T over MAAS due to its shorter length. MEBS-T includes 8 items, while MAAS has 15.

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APPENDIX

Appendix A

Research Company for Data Collection and Expert Panel for Instrument Translation

Appendix A

Expert Panel for Instrument Translation

1.Expert Panel for Instrument Translation:

Translation Process

(1) Ms. Walaipat Aksorndee

Certified Translator

Back-Translation Process

(1) Asst. Prof. Carina Chotirawe, Ph.D.

Certified Translator

2.Experts checking for Face Validity of instruments used in this study:

(1) Dr. Tanita Watprasong

Dr. Tanita Watprasong is the author of this thesis; she is a bilingual Thai psychologist, Ph.D., specializing in and certified in the field of mindfulness and mindfulness-based cognitive therapy (MBCT) from the Oxford Mindfulness Foundation in collaboration with the University of Oxford.

3.Experts comparison of Translated and Back-Translated of instruments used in this study:

(1) Dr. Davud Shahidi;

Dr. Davud Shahidi is an English-speaking psychologist with dual PhDs in linguistics, applied linguistics, and counseling psychology.

(2) Dr. Parvathy Varma

Dr. Parvathy Varma is Director of Graduate Programs in Counseling Psychology, Assumption University of Thailand. She is English-speaking psychologist with PhDs. in counseling psychology.

4. Experts for Index of Item Objective Congruence (IOC) assessment

(1) Asst. Prof. Bancha Rattanamathuwong

Certified Translator

(2) Asst. Prof. Darintip Chansit

Certified Translator

(3) Dr. Tanita Watprasong

Psychologist,Ph.D.

Appendix B

Instruments Used in the Current Study

เอกสารข้อมูลคำอธิบายสำหรับผู้เข้าร่วมในโครงการวิจัย

(Information Sheet for Research Participant)

ชื่อโครงการวิจัย

การตรวจคัดกรองและการวิเคราะห์ความไวของโรคออร์โธเร็กเซียเนอร์โวซา โดยการใช้แบบทดสอบอิงตามสติและสติในการรับประทานอาหาร ในกลุ่มตัวอย่างผู้ใหญ่ในกรุงเทพมหานคร, ประเทศไทย

[SCREENING TEST AND SENSITIVITY ANALYSIS OF ORTHOREXIA NERVOSA USING MINDFULNESS BASED UTILITIES AMONG A SAMPLE OF ADULTS IN BANGKOK, THAILAND]

ผู้สนับสนุนการวิจัย: ไม่มี

ผู้วิจัย

ชื่อ ดร. ธนิตา วาสประสงค์

ที่อยู่ 206/70 ถนน กัลปพฤกษ์ ตำบล/แขวง บางหว้า

อำเภอ/เขต ภาษีเจริญ จังหวัด **กทม.** รหัสไปรษณีย์ 10160

เบอร์โทรศัพท์ (ที่ทำงานและมือถือ) 089-2255966

ผู้วิจัยร่วม (ใส่ชื่อทุกคน)

ไม่มี

เรียน ผู้เข้าร่วมโครงการวิจัยทุกท่าน

ท่านเป็นบุคคลที่มีความสำคัญอย่างยิ่งต่อการให้ข้อมูลในการวิจัยครั้งนี้ ผู้วิจัยจึงขอความอนุเคราะห์จากท่านในการตอบแบบสอบถาม เพื่อประโยชน์ทางการศึกษาดังกล่าว โดยขอให้ท่านตอบตามความเป็นจริง ผู้วิจัยขอรับรองว่าจะเก็บรักษาข้อมูลในการตอบแบบสอบถามของท่านไว้เป็นความลับ และผลการวิจัยจะนำเสนอในลักษณะภาพรวม ไม่ระบุชื่อ/ ข้อมูลส่วนตัวของท่าน ซึ่งท่านได้รับเชิญให้เข้าร่วมในโครงการวิจัย เนื่องจากท่านมีอายุ 20-65 ปี อาศัยอยู่ในกรุงเทพมหานคร ตรงตามกลุ่มประชากรที่งานวิจัยนี้ให้ความสนใจ โดยมีจำนวนผู้เข้าร่วม 400 คน

แบบสำรวจถูกแบ่งออกเป็น 4 ส่วน คือการใช้มาตรวัดสติตระหนักรู้สนใจจดจ่อ (Mindful Attention Awareness Scale; MAAS) มาตรวัดพฤติกรรมการกินอย่างตระหนักรู้ด้านลักษณะนิสัย (Mindful Eating Behavior Scale-Trait; MEBS-T) มาตรวัดภาวะคลั่งกินคลีนแบบดุสเซลดอร์ฟ (Düsseldorf Orthorexia Scale; DOS) และข้อคำถามเกี่ยวกับข้อมูลส่วนตัว หรือข้อมูลภูมิหลัง) โดยตอบแบบสอบถามดังกล่าวสามารถทำเสร็จได้ในเวลาน้อยกว่า 20 นาที

ก่อนที่ท่านจะตัดสินใจเข้าร่วมในการศึกษาวิจัยดังกล่าว ขอให้ท่านอ่านเอกสารฉบับนี้อย่างถี่ถ้วน เพื่อให้ท่านได้ทราบถึงเหตุผลและรายละเอียดของการศึกษาวิจัยในครั้งนี้ หากท่านมีข้อสงสัยใดๆ เพิ่มเติม กรุณาซักถามจากผู้วิจัยหรือทีมงานของผู้วิจัย ซึ่งจะเป็นผู้สามารถตอบคำถามและให้ความกระจ่างแก่ท่านได้

ท่านสามารถขอคำแนะนำในการเข้าร่วมโครงการวิจัยนี้จากครอบครัว เพื่อน หรือแพทย์ประจำตัวของท่านได้ ท่านมีเวลาอย่างเพียงพอในการตัดสินใจโดยอิสระ ถ้าท่านตัดสินใจแล้วว่าจะเข้าร่วมในโครงการวิจัยนี้ ขอให้ท่านลงนามในเอกสารแสดงความยินยอมของโครงการวิจัยนี้

ผู้วิจัยหวังเป็นอย่างยิ่งว่าจะได้รับความร่วมมือจากท่านเป็นอย่างดี และขอขอบพระคุณเป็นอย่างสูงมา ณ โอกาสนี้ หากท่านมีข้อสงสัยเกี่ยวกับงานวิจัย โปรดติดต่อได้ที่ ดร. ธนิตา วาสประสงค์ โทรศัพท์ 0896652999

หากท่านมีปัญหาสงสัยเกี่ยวกับสิทธิของท่านขณะเข้าร่วมการวิจัยนี้ ต้องการทราบข้อมูลเพิ่มเติม โปรดสอบถามได้ที่ “สำนักงานคณะกรรมการจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยธุรกิจบัณฑิตย์” อาคารสำนักงานอธิการบดี 1 ชั้น 4 โทร. 02-9547300 ต่อ 632,128 ในวันทำการ(จันทร์-ศุกร์ เวลา 08.30 – 16.30 น.)

ขอขอบพระคุณอย่างสูง

ลงชื่อ.....

(ดร. ธนิตาวาสประสงค์)

วันที่ 13/9/2566

Informed Consent

โครงการวิจัยเรื่อง

การตรวจคัดกรองและการวิเคราะห์ความไวของโรคออร์โธเร็กเซียเนอร์โวซา โดยการใช้แบบทดสอบอิงตามสติและสติในการรับประทานอาหาร ในกลุ่มตัวอย่างผู้ใหญ่ในกรุงเทพมหานคร, ประเทศไทย

[SCREENING TEST AND SENSITIVITY ANALYSIS OF ORTHOREXIA NERVOSA USING MINDFULNESS BASED UTILITIES AMONG A SAMPLE OF ADULTS IN BANGKOK, THAILAND]

วันให้คำยินยอม วันที่.....เดือน.....พ.ศ.....

ข้าพเจ้า

ได้อ่านรายละเอียดจากเอกสารข้อมูลสำหรับผู้เข้าร่วมโครงการวิจัยวิจัยที่แนบมาฉบับวันที่ ..... และข้าพเจ้ายินยอมเข้าร่วมโครงการวิจัยโดยสมัครใจ

ข้าพเจ้าได้รับสำเนาเอกสารแสดงความยินยอมเข้าร่วมในโครงการวิจัยที่ข้าพเจ้าได้ลงนาม และ วันที่ พร้อมด้วยเอกสารข้อมูลสำหรับผู้เข้าร่วมโครงการวิจัย ทั้งนี้ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้รับการอธิบายจากผู้วิจัยถึงวัตถุประสงค์ของการวิจัย ระยะเวลาของการทำวิจัย วิธีการวิจัย อันตราย หรืออาการที่อาจเกิดขึ้นจากการวิจัย หรือจากยาที่ใช้ รวมทั้งประโยชน์ที่จะเกิดขึ้นจากการวิจัย และแนวทางรักษาโดยวิธีอื่นอย่างละเอียด ข้าพเจ้ามีเวลาและโอกาสเพียงพอในการซักถามข้อสงสัยจนมีความเข้าใจอย่างดีแล้ว โดยผู้วิจัยได้ตอบคำถามต่าง ๆ ด้วยความเต็มใจไม่ปิดบังซ่อนเร้นจนข้าพเจ้าพอใจ

ข้าพเจ้ารับทราบจากผู้วิจัยว่าหากเกิดอันตรายใด ๆ จากการวิจัยดังกล่าว ข้าพเจ้าจะได้รับการรักษาพยาบาลโดยไม่เสียค่าใช้จ่าย

ข้าพเจ้ามีสิทธิที่จะบอกเลิกเข้าร่วมในโครงการวิจัยเมื่อใดก็ได้ โดยไม่จำเป็นต้องแจ้งเหตุผล และการบอกเลิกการเข้าร่วมการวิจัยนี้ จะไม่มีผลต่อการรักษาโรคหรือสิทธิอื่น ๆ ที่ข้าพเจ้าจะพึงได้รับต่อไป

ผู้วิจัยรับรองว่าจะเก็บข้อมูลส่วนตัวของข้าพเจ้าเป็นความลับ และจะเปิดเผยได้เฉพาะเมื่อได้รับการยินยอมจากข้าพเจ้าเท่านั้น บุคคลอื่นในนามของบริษัทผู้สนับสนุนการวิจัย คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ อาจได้รับอนุญาตให้เข้ามาตรวจและประมวลข้อมูลของข้าพเจ้า ทั้งนี้จะต้องกระทำไปเพื่อวัตถุประสงค์เพื่อตรวจสอบความถูกต้องของข้อมูลเท่านั้น โดยการตกลงที่จะเข้าร่วมการศึกษานี้ข้าพเจ้าได้ให้คำยินยอมที่จะให้มีการตรวจสอบข้อมูลประวัติทางการแพทย์ของข้าพเจ้าได้

ผู้วิจัยรับรองว่าจะไม่มีการเก็บข้อมูลใด ๆ เพิ่มเติม หลังจากที่ข้าพเจ้าขอยกเลิกการเข้าร่วมโครงการวิจัยและต้องการให้ทำลายเอกสารและ/หรือ ตัวอย่างที่ใช้ตรวจสอบทั้งหมดที่สามารถสืบค้นถึงตัวข้าพเจ้าได้

ข้าพเจ้าเข้าใจว่า ข้าพเจ้ามีสิทธิ์ที่จะตรวจสอบหรือแก้ไขข้อมูลส่วนตัวของข้าพเจ้าและสามารถยกเลิกการให้สิทธิในการใช้ข้อมูลส่วนตัวของข้าพเจ้าได้ โดยต้องแจ้งให้ผู้วิจัยรับทราบ

ข้าพเจ้าได้ตระหนักว่าข้อมูลในการวิจัยรวมถึงข้อมูลทางการแพทย์ของข้าพเจ้าที่ไม่มีการเปิดเผยชื่อจะผ่านกระบวนการต่าง ๆ เช่น การเก็บข้อมูล การบันทึกข้อมูลในแบบบันทึกและในคอมพิวเตอร์ การตรวจสอบ การวิเคราะห์ และการรายงานข้อมูลเพื่อวัตถุประสงค์ทางวิชาการ รวมทั้งการใช้ข้อมูลทางการแพทย์ในอนาคตหรือการวิจัยทางด้านเภสัชภัณฑ์ เท่านั้น

ข้าพเจ้าได้อ่านข้อความข้างต้นและมีความเข้าใจดีทุกประการแล้ว ยินดีเข้าร่วมในการวิจัยด้วยความเต็มใจ จึงได้กด ยอมรับ ในการแสดงความยินยอมนี้ และดำเนินการต่อไป

แบบฟอร์มยินยอมสำหรับการเข้าร่วมการวิจัย

ก่อนที่คุณจะเข้าร่วมการสำรวจนี้โปรดอ่านข้อความต่อไปนี้อย่างละเอียด:

การรักษาความลับ: คำตอบของคุณจะถูกเก็บเป็นความลับ จะไม่มีการส่งต่อข้อมูลส่วนบุคคลใดๆ ให้กับบุคคลที่สาม หรือใช้เพื่อวัตถุประสงค์อื่นนอกเหนือจากการวิจัย

การปกป้องข้อมูล: เรามุ่งมั่นที่จะปกป้องข้อมูลของผู้ตอบแบบสอบถาม ขั้นตอนกระบวนการเก็บข้อมูล จะเป็นไปตามหลักมาตรฐานและการปกป้องข้อมูลสูงสุด

การไม่เปิดเผยตัวตน: การรวบรวมคำตอบและการแสดงผลของผู้ตอบแบบสอบถาม จะไม่มีการแสดงผลที่บ่งบอกถึงตัวบุคคล แต่ละท่านจะแสดงเป็นหมายเลข ID ที่ไม่ระบุตัวตน

การเข้าร่วมโดยสมัครใจ: การเข้าร่วมในแบบสำรวจนี้เป็นไปโดยสมัครใจ คุณมีสิทธิ์ที่จะถอนตัวได้ตลอดเวลาโดยไม่มีผลกระทบใด ๆ

การคลิก "**ยอมรับ**" หมายถึงคุณยินยอมข้อตกลงในการเข้าร่วมแบบสำรวจนี้ และได้ทำความเข้าใจข้อกำหนดที่กล่าวถึงข้างต้น

- ยอมรับ
- ไม่ยอมรับ

Instruments Used in the Current Study

The Mindful Attention Awareness Scale (MAAS); Original Version

Instructions: The questionnaire provided below is designed to evaluate your daily experiences. Please utilize the provided scale to indicate the frequency of your current experiences. Please provide answers based on your actual experience rather than what you believe your experience should be. Please treat each item individually, without considering any other items. This survey is about your personal experience, so try to avoid what you think you should do or what others do.

Items	Almost Always (1)	Very Frequently (2)	Somewhat Frequently (3)	Somewhat Infrequently (4)	Very Infrequently (5)	Almost Never (6)
1. I could be experiencing some emotion and not be conscious of it until some time later.						
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.						
3. I find it difficult to stay focused on what's happening in the present.						
4. I tend to walk quickly to where I'm going without paying attention along the						

way.						
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.						
6. I forget a person's name almost as soon as I've been told it for the first time.						
7. It seems I'm "running on automatic" without much awareness of what I'm doing.						
8. I rush through activities without being really attentive to them.						
9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.						
10. I do jobs or tasks automatically, without being aware of what I'm doing.						

11. I find myself listening to someone with one ear, doing something else at the same time.						
12. I drive places on “automatic pilot” and then wonder why I went there.						
13. I find myself preoccupied with the future or the past.						
14. I find myself doing things without paying attention.						
15. I snack without being aware that I’m eating.						

The Mindful Attention Awareness Scale (MAAS); Thai Version

มาตรวัดสติตระหนักรู้สนใจจดจ่อ

คำสั่ง: แบบสอบถามต่อไปนี้มีวัตถุประสงค์เพื่อประเมินประสบการณ์ในชีวิตประจำวัน กรุณาใช้มาตรวัดด้านล่างในการบ่งชี้ว่าท่านพบเจอประสบการณ์ในแต่ละข้อบ่อยหรือไม่บ่อยมากน้อยเพียงใด กรุณาตอบตามประสบการณ์ที่เกิดขึ้นกับตัวท่านโดยไม่คำนึงถึงประสบการณ์ที่ควรจะเกิดขึ้น กรุณาพิจารณาแต่ละข้อโดยแยกจากข้ออื่น ๆ กรุณาตอบตามความจริงเนื่องจากไม่มีข้อใดถูกหรือผิด แบบสอบถามนี้ต้องการทราบถึงประสบการณ์ส่วนตัวของท่านดังนั้นพยายามเลี่ยงที่จะคิดว่าสิ่งที่ควรทำคืออะไรหรือสิ่งที่คนอื่นทำคืออะไร

ข้อ	แทบจะทุกครั้ง (1)	บ่อยมาก (2)	ค่อนข้างบ่อย (3)	ไม่ค่อยบ่อย (4)	ไม่บ่อยอย่างมาก (5)	แทบจะไม่เคยเลย (6)
1.ฉันอาจมีประสบการณ์ทางอารมณ์โดยไม่รู้ตัวเลยจนกระทั่งผ่านไปสักพัก						
2.ฉันทำของพังหรือทำอะไรหกด้วยความไม่ระวังหรือไม่ได้ใส่ใจหรือเผลอคิดเรื่องอื่น						
3.ฉันรู้สึกว่าการจดจ่อกับสิ่งที่เกิดขึ้น ณ ปัจจุบันขณะเป็นเรื่องยาก						
4.ฉันมักจะเดินมุ่งหน้าไปหาจุดหมายอย่างรวดเร็วโดยไม่ใส่ใจกับอะไรระหว่างทาง						
5.ฉันมักจะไม่สังเกตความรู้สึกตึงเครียดทางกายหรือความไม่สบายตัวจนกว่าอาการเหล่านั้นจะชัดเจน						

6.ฉันลืมชื่อคนแทบจะทันที หลังจากที่ได้ยิน/ได้รับรู้ชื่อ ในครั้งแรก						
7.เหมือนฉันเปิดโหมด อัตโนมัติทำอะไรไปแบบไม่ ค่อยรู้ตัว						
8.ฉันเร่งทำกิจกรรมต่างๆ โดยไม่ได้ใส่ใจนัก						
9.ฉันจดจ่อกับเป้าหมายที่ อยากทำให้สำเร็จจนลืมที่จะ รับรู้ถึงสิ่งที่กำลังทำ ณ ปัจจุบันเพื่อไปให้ถึง จุดหมายนั้น						
10.ฉันทำงานหรือจัดการ ธุระต่าง ๆ อย่างอัตโนมัติ โดยไม่ได้รับรู้ถึงสิ่งที่กำลังทำ						
11.ฉันมักจะฟังคนอื่นพูดไป และทำอย่างอื่นไปพร้อมกัน						
12.ฉันขับรถไปที่ต่างๆ โดย ไม่รู้ตัวและค่อยมานึกสงสัย ว่าฉันไปที่นั่นทำไม						
13.ฉันมักจะหมกมุ่นอยู่กับ อนาคตหรืออดีต						
14.ฉันมักจะทำสิ่งต่าง ๆ โดยไม่ใส่ใจ						
15.ฉันกินจุบจิบโดย ไม่รู้ตัวว่ากำลังกินอยู่						

The Mindful Attention Awareness Scale (MAAS); Back Translation Version

Instructions: The objective of this questionnaire is to examine how one leads their daily life. Please use the Attention Scale found below to indicate how often or not you encounter each of the experiences. Please give your answers based on what you yourself have experienced and not be concerned about the experience that you think should happen. Please consider each item separately from the other items. Kindly give your answers in accordance with the truth since there is no right or wrong answer. This questionnaire aims at finding out your personal experience so please try to avoid thinking about what should be done or what it is that others do.

Item	Nearly always (1)	Very often (2)	Rather often (3)	Not very often (4)	Extremely not often (5)	Hardly ever (6)
1.I might have an emotional experience without knowing it until a certain amount of time has passed.						
2.I break things or spill things on me because I am careless or wasn't paying attention or because my mind was on something else.						
3.I feel that concentrating on what is happening in the present is difficult for me.						
4.I usually walk straight toward my destination without paying attention to anything along the way.						

5.I usually do not notice any physical stress or discomfort until the signs manifest themselves clearly.						
6.I pratically forget people's names as soon as I have asked their names for the first time.						
7.It's like I've switched on my automatic mode and done things without really knowing it.						
8.I rush around with my activities without paying much attention.						
9.I concentrate on the goal I wish to achieve and then forget to show awareness of what I am doing in the present in order to get to that goal.						
10.I work or attend to various tasks automatically without any awareness of what it is I was doing.						
11.I often listen to other people talking and do something else simultaneously.						

12.I drive to all sorts of places without much awareness and later on wonder why it is that I had gone there.						
13.I am usually so caught up with the future or the past.						
14.I often do this or that without paying much attention.						
15.I snack or eat little by little without knowing what I am eating.						

The Mindful Eating Behavior Scale-Trait (MEBS-T); Original Version

Instructions: The statements below are about your experiences when you eat. Please indicate how often each statement applies to you by selecting the appropriate response for each item. Please answer honestly as there are no right or wrong answers. This survey is about your personal experience, so try to avoid what you think you should do or what others do.

Items	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
1. I fully taste what I am eating.				
2. I notice the smell, texture and/or colours of the food I am eating.				
3. I focus on what I am eating.				
4. I fully taste every bite that I am eating.				
5. I notice thoughts and/or feelings that are unrelated to my eating, but I redirect my attention to the food and the experience of eating.				
6. When I am eating, I have thoughts and/or feelings, but keep refocusing on the food.				
7. I hold my attention on what I am eating, despite recognising the occurrence of thoughts and/or feelings while I am eating.				
8. When I am eating, I overcome unrelated thoughts and/or feelings by focusing on the food and the sensation of eating.				

The Mindful Eating Behavior Scale-Trait (MEBS-T); Thai Version

มาตรวัดพฤติกรรมการรับประทานอย่างตระหนักรู้ด้านลักษณะนิสัย

คำสั่ง: ประโยคด้านล่างมีเนื้อความเกี่ยวกับประสบการณ์ที่เกิดขึ้นขณะที่คุณรับประทาน กรุณาระบุว่าแต่ละประโยคเป็นจริงสำหรับคุณบ่อยแค่ไหนโดยเลือกคำตอบที่เหมาะสมที่สุดในแต่ละข้อ กรุณาตอบตามความจริง เนื่องจากไม่มีข้อใดถูกหรือผิด แบบสอบถามนี้ต้องการทราบถึงประสบการณ์ส่วนตัวของคุณดังนั้นพยายามเลี่ยงที่จะคิดว่าสิ่งที่ควรทำคืออะไรหรือสิ่งที่คนอื่นทำคืออะไร

ข้อ	ไม่เห็นด้วยอย่างยิ่ง (1)	ไม่เห็นด้วย (2)	เห็นด้วย (3)	เห็นด้วยอย่างยิ่ง (4)
1.ฉันรับรู้ถึงรสชาติของสิ่งที่กำลังกินอย่างเต็มที่				
2.ฉันสังเกตถึงกลิ่น สัมผัส และ/หรือ สีของอาหารที่กำลังกิน				
3.ฉันจดจ่ออยู่กับสิ่งที่กำลังกิน				
4.ฉันรับรู้ถึงรสชาติของทุกคำที่กำลังกินอย่างเต็มที่				
5.ฉันสังเกตเห็นความคิดและ/หรืออารมณ์ที่ไม่เกี่ยวข้องกับการกินแต่จะเพ่งสมาธิกลับไปที่อาหารและประสบการณ์ในการกิน				
6.ขณะที่กำลังกิน จะมีความคิดหรืออารมณ์ผุดขึ้นมาแต่ฉันจะกลับไปจดจ่ออยู่กับอาหาร				
7.ฉันยังคงจดจ่ออยู่กับอาหารที่กำลังกิน แม้จะสังเกตเห็นความคิดหรืออารมณ์ผุดขึ้นมาในขณะที่ฉันกำลังกิน				
8.ขณะที่กำลังกิน ฉันผ่านพ้นความคิดและ/หรือความรู้สึกที่ไม่เกี่ยวข้องกับการกิน โดยการจดจ่อกับอาหารและสัมผัสจากการกิน				

The Mindful Eating Behavior Scale-Trait (MEBS-T); Back Translation Version

Instructions: The sentences below concern experiences that occur when you are eating. Please indicate the frequency of each sentence that is true for you by selecting the most appropriate answer in each item. Kindly give your answers in accordance with the truth since there is no right or wrong answer. This questionnaire aims at finding out your personal experience so please try to avoid thinking about what should be done or what it is that others do.

Items	Completely disagree (1)	Disagree (2)	Agree (3)	Completely agree (4)
1.I am extremely aware of the taste of what I am eating.				
2.I take note of the smell, touch and/or color of the food that I am eating.				
3.I concentrate on what I am eating.				
4.I am extremely aware of the taste of every mouthful of food that I am eating.				
5.I notice the thoughts and/or emotions that are not related to eating and I focus my attention on the food and the experience of eating that food.				
6.While eating, certain thoughts and emotions pop up but instead I am concentrating more on the food.				
7.I am still concentrating on the food that I am eating even though I notice that my thoughts and emotions have popped up while I am eating.				
8.While I am eating, I move away from unrelated thoughts and/or emotions by concentrating on the food and the sensations I get from eating.				

The Düsseldorf Orthorexia Scale (DOS); Original Version

Instructions: For the following statements, please indicate how much you agree with each one by selecting the option that best describes your situation. Remember, there are no right or wrong answers. Please answer honestly as per your experiences and beliefs.

Items	This does not apply to me (1)	This does rather not apply to me (2)	This does somewhat apply to me (3)	This applies to me (4)
1. Eating healthy food is more important to me than indulgence/enjoying the food				
2. I have certain nutrition rules that I adhere to				
3. I can only enjoy eating foods considered healthy				
4. I try to avoid getting invited over to friends for dinner if I know that they do not pay attention to healthy nutrition				
5. I like that I pay more attention to healthy nutrition than other people				
6. If I eat something I consider unhealthy, I feel really bad				
7. I have the feeling of being excluded by my friends and colleagues due to my strict nutrition rules				
8. My thoughts constantly revolve around healthy nutrition and I organize my day around it				
9. I find it difficult to go against my personal dietary rules				
10. I feel upset after eating unhealthy foods				

The Düsseldorf Orthorexia Scale (DOS); Thai Version

มาตรวัดภาวะคลั่งกินคลีนแบบดุสเซลดอร์ฟ

คำสั่ง:กรุณาอ่านข้อความด้านล่างและระบุว่าท่านเห็นด้วยมากน้อยแค่ไหนโดยเลือกคำตอบที่อธิบายสถานการณ์ที่เกิดขึ้นกับคุณได้ดีที่สุด แบบสอบถามนี้ต้องการทราบถึงประสบการณ์ส่วนตัวของท่าน กรุณาตอบตามความจริงเนื่องจากไม่มีข้อใดถูกหรือผิด

ข้อ	ไม่จริงสำหรับฉัน (1)	ค่อนข้างไม่จริงสำหรับฉัน (2)	ค่อนข้างจริงสำหรับฉัน (3)	จริงสำหรับฉัน (4)
1.สำหรับฉันการกินอาหารที่ดีต่อสุขภาพสำคัญมากกว่าความสุขในการกินอาหารนั้นๆ				
2.ฉันมีกฎทางโภชนาการบางอย่างที่ถือปฏิบัติ				
3.ฉันจะมีความสุขกับการกินเฉพาะแต่อาหารที่ดีต่อสุขภาพเท่านั้น				
4.ฉันพยายามเลี่ยงที่จะไม่ไปกินข้าวกับเพื่อนถ้ารู้ว่าเพื่อนคนนั้นไม่ใส่ใจเรื่องโภชนาการเพื่อสุขภาพ				
5.ฉันชอบที่ตัวเองใส่ใจกับโภชนาการเพื่อสุขภาพมากกว่าคนอื่น				
6.ถ้ากินอะไรที่ไม่ดีต่อสุขภาพ ฉันจะรู้สึกแย่มาก				
7.ฉันรู้สึกแปลกแยกจากเพื่อนและเพื่อนร่วมงานเพราะกฎการกินที่เคร่งครัดของตัวเอง				
8.ความคิดฉันวนเวียนอยู่กับเรื่องโภชนาการเพื่อสุขภาพและวางแผนชีวิตในแต่ละวันตามโภชนาการเหล่านี้				
9.ฉันรู้สึกลำบากใจที่จะไม่ทำตามกฎการกินของตัวเอง				
10.ฉันจะรู้สึกไม่สบายใจเมื่อกินอาหารที่ไม่ดีต่อสุขภาพ				

The Düsseldorf Orthorexia Scale (DOS); Back Translation Version

Instructions: Please read the sentences found below to indicate your agreement or disagreement by selecting the answers that best explain the situation that happened to you. This questionnaire aims at finding out your personal experience. Kindly give your answers in accordance with the truth since there is no right or wrong answer.

Items	Not true for me (1)	Not really true for me (2)	Rather true for me (3)	True for me (4)
1.For me, eating food that is good for my health is more important than the happiness derived from eating that food.				
2.I have certain dietary or nutritional rules that I adhere to.				
3.I will be happy with what I am eating only if that food is good for my health.				
4.I try to avoid going out to eat with friends if I know that the person doesn't pay attention to a healthy and nutritional diet.				
5.I like it that I pay more attention to a healthy and nutritional diet than others.				
6.I feel bad if I eat something that is bad for my health.				
7.I feel alienated from my friends and colleagues because of my strict eating regiment.				
8.My thoughts are centered around nutrition for health and I use that to plan my life each day.				
9.I feel disturbed if I don't follow the rules I have made about how I eat.				
10.I feel irritable whenever I eat any food that is bad for my health.				

Demographic Questions-English Version

INSTRUCTIONS: Please carefully read each question and select the option that most accurately represents your personal information. Rest assured that your responses will be kept confidential and will only be used for the specific purposes of this research study. Please feel free to ask any questions you may have about the survey at 089-2255966. Thank you for taking part.

1. AGE

Please specify your age:

☐ 18-29
☐ 30-39
☐ 40-49
☐ 50-59
☐ >=60

2. GENDER

What is your gender?

☐ Male
☐ Female
☐ Prefer not to say.

3. EDUCATION

What is the highest level of education you currently have achieved?

☐ Lower than Bachelor's degree
☐ Bachelor's degree
☐ Master's degree
☐ Doctoral degree

4. DIETARY PREFERENCE

Do you follow any specific dietary regime?

☐ Vegetarian

☐ Low fat diet

☐ Intermittent Fasting

☐ Ketogenic diet

☐ No specific regime

5. PHYSICAL ACTIVITY

How would you characterize your habits of physical activity?

☐ Less than 150 minutes per week

☐ At lease 150 minutes per week

6. Meditation Practice

Have you been regularly practiced any kind of meditation (at least twice per week)?-any forms of meditation are included; e.g., formal meditation practice, informal meditation, mantra meditation etc.

☐ Yes

☐ No

END OF SURVEY

Thank you for your time and cooperation. Your contribution to this study is greatly appreciated.

Demographic Questions-Thai Version

ข้อมูลส่วนบุคคล

คำแนะนำ: กรุณาอ่านคำถามในแต่ละข้ออย่างละเอียดและเลือกตัวเลือกที่ตรงกับข้อมูลส่วนบุคคลของคุณมากที่สุด คำตอบของคุณจะถูกเก็บเป็นความลับและจะถูกใช้เพื่อวัตถุประสงค์ของการวิจัยนี้เท่านั้น

1. อายุ

กรุณาระบุอายุของคุณ

☐ 20-29

☐ 30-39

☐ 40-49

☐ 50-59

☐ >=60

2. เพศ

กรุณาระบุเพศของคุณ:

☐ ชาย

☐ หญิง

☐ ไม่ประสงค์จะระบุ

3. การศึกษา

ระดับการศึกษาสูงสุดที่คุณสำเร็จคืออะไร

☐ ต่ำกว่าปริญญาตรี

☐ วุฒิปริญญาตรี

☐ วุฒิปริญญาโท

☐ วุฒิปริญญาเอก

4. การตระหนักทางโภชนาการ

คุณปฏิบัติตามแผนโภชนาการใดอยู่บ้างหรือไม่

☐ มังสวิรัติ /เจ

☐ รับประทานอาหารไขมันต่ำ

☐ อดอาหารเป็นช่วงๆ (IF)

☐ คีโตเจนิกไดเอท

☐ ไม่มีแผนโภชนาการเฉพาะ

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5. ระดับการออกกำลังกาย

คุณจะบรรยายระดับการออกกำลังกายของคุณอย่างไร

☐ น้อยกว่า 150 นาที ต่อสัปดาห์

☐ มากกว่าหรือเท่ากับ 150 นาที ต่อสัปดาห์

6. การฝึกสมาธิ

คุณฝึกสมาธิเป็นประจำ (อย่างน้อยสัปดาห์ละ 2 ครั้ง) เป็นการฝึกรูปแบบใดก็ได้ เช่น นั่งสมาธิ, ฝึกสติในการใช้ชีวิตประจำวัน, สวดมนต์ หรืออื่นๆที่เป็นรูปแบบการฝึกสมาธิของคุณ

☐ ใช่

☐ ไม่ใช่

สิ้นสุดแบบสอบถาม

ขอขอบคุณสำหรับเวลาและความร่วมมือของคุณ การสนับสนุนของคุณต่อการศึกษานี้มีความหมายเป็นอย่างยิ่ง

Appendix C

Research Participant Announcement Leaflet

Research Participant Announcement Leaflet

DPU DHURAKIJ PUNDIT UNIVERSITY มหาวิทยาลัยธุรกิจบัณฑิตย์ | สร้างธุรกิจ สร้างมืออาชีพ

รับสมัคร ผู้เข้าร่วมการวิจัย

การตรวจคัดกรองและการวิเคราะห์ความไวของโรคออร์โธเร็กเซียเนอร์โวซา โดยการใช้แบบทดสอบอิงตามสติและสติในการรับประทานอาหารในกลุ่มตัวอย่างผู้ใหญ่ในกรุงเทพมหานคร

จำนวน 300 คน
ตอบแบบสอบถามออนไลน์

คุณสมบัติผู้เข้าร่วม

- ผู้ที่มีอายุ 20-65 ปี ที่อาศัยในกรุงเทพมหานคร
- ไม่มีประวัติการรักษาโรคทางจิตเวช ดังนี้ โรคย้ำคิดย้ำทำ, บุคลิกภาพผิดปกติชนิดย้ำคิดย้ำทำ,ภาวะโซมาติก,โรควิตกกังวลกับความเจ็บป่วย,โรคจิตเภท
- สามารถใช้คอมพิวเตอร์และอินเตอร์เนตในการตอบแบบสอบถามออนไลน์ได้

- ผู้วิจัยรับรองว่าจะเก็บข้อมูลส่วนตัวของผู้เข้าร่วมเป็นความลับ
- ผู้เข้าร่วมมีสิทธิที่จะบอกเลิกเข้าร่วมในโครงการวิจัยเมื่อใดก็ได้โดยไม่จำเป็นต้องแจ้งเหตุผล

ติดต่อและสมัคร

เพื่อรับการอธิบายจากผู้วิจัยถึง
-วัตถุประสงค์ของการวิจัย
-ระยะเวลาของการทำวิจัย
-วิธีการวิจัย
-อันตรายที่อาจเกิดขึ้นจากการวิจัย
-ประโยชน์ที่จะเกิดขึ้นจากการวิจัย

สอบถามข้อมูลและสมัครได้ที่
ดร.ธนิตา วาสประสงค์ (นุ่น)
tanitawat@gmail.com /โทร 089-2255966

เพื่อเป็นแนวทางตัดสินใจแสดงความยินยอมในการตอบแบบสอบถามออนไลน์ในทำการวิจัยต่อไป

Biography

NAME Tanita Watprasong

EDUCATION

2016-2021	ASSUMPTION UNIVERSITY	Doctoral degree in Philosophy, in Counseling Psychology (GPA: 4.00), with 1,000 hour-internship
2016-2021	ASSUMPTION UNIVERSITY	18 credits and 100 hour-internship in Master of Counseling Psychology to meet minimum requirement for Ph.D. program
2011-2013	THAMMASART UNIVERSITY	Master of Science (Marketing)
2005-2009	THAMMASART UNIVERSITY	Bachelor of Accounting
2002-2005	TRIAM UDOM SUKSA SCHOOL	High School (German/Science)

CERTIFICATE

2020-2021	UNIVERSITY OF OXFORD	Trained Teacher Certificate of Mindfulness Based Cognitive Therapy (MBCT)
2020-2020	THAMMASART UNIVERSITY	Diploma in Clinical Sexology
2015-2015	YOUNG YOGA MASTER (CANADA)	Certified Children's Yoga Teacher
2013-current	YOGA TEACHER TRAINING	Various certificates for various style of Yoga and mindfulness teacher training

WORK EXPERIENCE

2019-Current -Psychologist (specialized in Mindfulness Based Cognitive Therapy, Sexology and Psychotherapy for Children and adolescents)

-Yoga and Mindfulness Instructor (offer private therapeutic class for corporate and general clients)

-Health and wellness Influencer and public speaker (founder of Facebook page: Yoga at noon; 86,000 followers)

2013-2019 -Health and Wellness Business Entrepreneur (owner of Mindgarden Yoga Studio)

-Operate family-owned business (Garment Factory)

-Yoga and Mindfulness Instructor and Health and wellness Influencer

2009-2011 -Auditor at KPMG THAILAND

ACTIVITY

-Invited Speaker for 26 Tapes of Mind and Body Therapy (ฟื้นฟูดูเฟร็ม), on air on ETV (Channel 52)

-Invited Speaker at Bangkok Asia Wellness Conference annually

-Invited Speaker for various TV show and magazine (Johjai; เจาะใจ, Praew Magazine, Now26 Channel, Rama Channel, Woman to Woman, Channel 3)

-Health and Wellness influencer for various Brands (Nike, DutchMill, Dhrama Bums,Lactasid etc.)

Published Dissertation

Watprasong, T. (2021). The Influence of Dispositional Mindfulness on Work Engagement: The Moderated Mediation Analysis of Workplace and Organizational Spirituality, Psychological Job Demands And Meditative Experience, among White Collar Employees in Bangkok, Thailand

Published Research

Watprasong, T., & Varma, P. (2022). The Influence of Dispositional Mindfulness on Work Engagement: The Mediation Analysis of Workplace Spirituality and Organizational Spirituality, among White Collar Employees In Bangkok, Thailand. Scholar: Human Sciences, 14(2), 585-585.