



UNIVERSIDADE ESTADUAL DE CAMPINAS  
FACULDADE DE ENFERMAGEM

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MÉTODOS PARA AVALIAR A AMBIVALÊNCIA EM RELAÇÃO À COMIDA E À  
ALIMENTAÇÃO: UMA REVISÃO DE ESCOPO

METHODS TO ASSESS AMBIVALENCE TOWARDS FOOD AND DIET: A SCOPING  
REVIEW

CAMPINAS

2022

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ALIMENTAÇÃO: UMA REVISÃO DE ESCOPO

Dissertação apresentada à Faculdade de Enfermagem da Universidade Estadual de Campinas como parte dos requisitos exigidos para a obtenção do título de Mestre em Ciências da Saúde, na Área de Concentração: Cuidado e Inovação Tecnológica em Saúde e Enfermagem.

ORIENTADOR: Marilia Estevam Cornélio

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# **BANCA EXAMINADORA DA DEFESA DE MESTRADO**

**DAISUKE HAYASHI NETO**

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**ORIENTADOR: MARILIA ESTEVAM CORNÉLIO**

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Programa de Pós-Graduação em Enfermagem da Faculdade de Enfermagem da Universidade Estadual de Campinas.

A ata de defesa com as respectivas assinaturas dos membros da banca examinadora encontra-se no SIGA/Sistema de Fluxo de Dissertação e na Secretaria de Pós-graduação em Enfermagem.

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## **RESUMO**

### **Objetivo**

Esta revisão de escopo visou mapear e descrever os diferentes métodos e ferramentas usados em estudos para avaliar, mensurar ou classificar a ambivalência de participantes em relação a objetos de atitude relacionados à comida e à alimentação, bem como relatar a frequência com a qual estas ferramentas e métodos foram empregados.

### **Introdução**

As pessoas comumente apresentam avaliações simultaneamente positivas e negativas, sentimentos conflitantes e indecisão em relação aos alimentos e comportamentos alimentares, o que pode dificultar a adoção de uma alimentação saudável. A avaliação da ambivalência em relação a objetos de atitude relacionados à comida e à alimentação pode ser importante ao estudar determinantes dos comportamentos alimentares ou ao planejar intervenções comportamentais.

### **Critérios de inclusão**

Incluímos estudos revisados por pares que avaliaram a ambivalência de participantes de qualquer idade, sexo ou grupo sociodemográfico em relação à comida e à alimentação. Excluímos estudos que não detalharam os métodos usados para avaliar a ambivalência ou que avaliaram a ambivalência em relação a métodos agrícolas ou de cultivo ou métodos de preparo ou produção de alimentos.

### **Métodos**

Esta revisão foi conduzida de acordo com a metodologia da JBI para revisões de escopo. Buscamos estudos revisados por pares nas bases de dados MEDLINE, CINAHL, PsycINFO, Web of Science, FSTA e Food Science Source. Dois revisores independentes fizeram a triagem dos artigos. Relatamos todas as informações relevantes extraídas como tabelas e um resumo descritivo dos resultados.

## Resultados

Incluímos um total de 38 estudos publicados entre 1992 e 2021. Esses estudos foram realizados com participantes de 16 países diferentes, a maioria de países europeus ( $n = 32$ ) e dos Estados Unidos ( $n = 5$ ). A maioria dos estudos incluiu apenas participantes acima de 18 anos ou estudantes universitários ( $n = 32$ ), enquanto alguns foram limitados a crianças ( $n = 1$ ) ou adolescentes ( $n = 2$ ). Identificamos um total de 24 objetos de atitude diferentes nos diferentes estudos, sendo os mais frequentes a carne bovina ou vermelha ( $n = 8$ ), a comida ou o ato de comer ( $n = 6$ ), o chocolate ( $n = 6$ ), o consumo de uma dieta pobre em gordura ( $n = 5$ ), e frutas e verduras ( $n = 5$ ). Onze estudos empregaram métodos para avaliar a ambivalência que eram específicos para objetos relacionados à comida e à alimentação e 30 estudos empregaram métodos também utilizáveis para avaliar a ambivalência em outros contextos não relacionados à comida ou alimentação. Os estudos empregaram métodos para avaliar diferentes formas de ambivalência, sendo estes: ambivalência potencial ( $n = 21$ ), ambivalência sentida ( $n = 17$ ) e ambivalência cognitivo-afetiva ( $n = 3$ ).

## Conclusão

Embora não haja consenso acerca da melhor maneira de avaliar a ambivalência, há vários métodos e ferramentas disponíveis na literatura para avaliar diferentes tipos de ambivalência. Esta revisão de escopo fornece aos autores de futuros estudos uma gama de opções para escolher quando se planeja avaliar, medir ou classificar a ambivalência dos participantes de estudos em relação a objetos relacionados à comida e à alimentação, e mapeia quais são os mais frequentemente empregados.

Descritores (DeCS): Comportamento Alimentar; Atitude; Ciências do Comportamento; Alimentos, Dieta e Nutrição.



## **ABSTRACT**

### **Objective**

The objective of this scoping review is to map and describe the different methods and tools employed in studies to assess, measure, or classify the ambivalence of participants towards food and diet-related attitude objects, as well as to report how frequently each of these tools and methods was employed.

### **Introduction**

People often hold simultaneously positive and negative evaluations as well as feelings of conflict and indecisiveness towards foods and eating behaviors, which can make it challenging to adopt a healthier diet. Therefore, the assessment of ambivalence towards food and diet-related objects can be important when studying determinants of eating behaviors or planning behavioral interventions.

### **Inclusion criteria**

We included peer-reviewed studies that assessed the ambivalence of participants of any age, sex, or sociodemographic group, towards food and diet. We excluded studies that didn't detail the methods they used to assess ambivalence, or that assessed ambivalence towards agricultural and farming methods or methods of food production and preparation.

### **Methods**

This review was conducted in accordance with JBI methodology for scoping reviews. We retrieved peer-reviewed studies from MEDLINE, CINAHL, PsycINFO, Web of Science, FSTA, and Food Science Source. Two independent reviewers screened the articles. We report all relevant extracted information as tables and a descriptive summary of the findings.

### **Results**

We included a total of 38 studies published between 1992 and 2021. These studies were conducted with participants from 16 different countries, mostly from European countries (n = 32) and the United States (n = 5). Most studies only included participants above the age

of 18 or university students ( $n = 32$ ), while some were limited to children ( $n = 1$ ) or adolescents ( $n = 2$ ). We identified a total of 24 different attitude objects across studies, and the most frequent were beef or red meat ( $n = 8$ ), food or eating ( $n = 6$ ), chocolate ( $n = 6$ ), eating a low-fat diet ( $n = 5$ ), and fruits and vegetables ( $n = 5$ ). Eleven studies employed methods to assess ambivalence that were specific for food and diet-related objects, and 30 studies employed methods also usable to assess ambivalence in other contexts unrelated to food or diet. The studies employed methods to assess different forms of ambivalence, i.e., potential ambivalence ( $n = 21$ ), felt ambivalence ( $n = 17$ ), and cognitive-affective ambivalence ( $n = 3$ ).

### Conclusion

Although there isn't a consensus about the best way to assess ambivalence, there are several methods and tools available in the literature to assess different types of ambivalence. This scoping review provides authors of future studies with an array of options to choose from when planning to assess, measure, or classify the ambivalence of study participants towards food and diet-related objects, and maps which ones are most frequently employed.

Keywords: Feeding Behavior; Attitude; Behavioral Sciences; Diet, Food, and Nutrition.

## **LISTA DE ABREVIATURAS E SIGLAS**

EM - Entrevista motivacional

MEDLINE - *Medical Literature Analysis and Retrieval System Online*

FSTA - Food Science and Technology Abstracts

CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior

CINAHL - Cumulative Index to Nursing and Allied Health Literature

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

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## INTRODUÇÃO

A qualidade da dieta de um indivíduo é um dos fatores relacionados ao seu estilo de vida que mais impactam sua saúde cardiometabólica, e um dos mais desafiadores do ponto de vista da mudança comportamental <sup>1-3</sup>.

Cada escolha alimentar impacta a qualidade da dieta de forma positiva ou negativa, e recomendações prescritivas feitas por profissionais ou o fornecimento de conhecimento científico sobre o padrão alimentar ideal não necessariamente promovem mudanças de comportamento quando isolados <sup>4</sup>. Diversos outros fatores podem afetar os comportamentos alimentares das pessoas, como, por exemplo, percepções sobre as consequências do comportamento, atitudes e crenças acerca desse, nível de habilidades culinárias, autoeficácia para a prática do comportamento desejado, fatores físicos e ambientais, e nível de motivação para realizar mudanças no estilo de vida <sup>5</sup>.

Muitas vezes, as percepções de um indivíduo sobre um determinado comportamento alimentar são conflitantes, e oscilam entre uma atitude positiva e uma negativa que coexistem e competem entre si. Por exemplo, ao considerar comer um pedaço de chocolate, o desejo de usufruir de seus prazerosos aspectos sensoriais e a expectativa acerca de seus efeitos positivos sobre o humor podem existir concomitantemente com preocupações acerca de seu valor nutricional altamente calórico, rico em açúcares e gorduras, e sentimentos de culpa antecipada. Sendo assim, o consumo de chocolate, assim como tantos outros comportamentos alimentares, caracteriza-se como uma experiência ambivalente <sup>6,7</sup>.

A ambivalência é um conceito oriundo da psicologia social que, apesar de ser definido de diversas maneiras na literatura, é mais comumente descrito como a existência simultânea de avaliações positivas e negativas que compõem a atitude de um indivíduo perante um objeto <sup>8-10</sup>.

Níveis elevados de ambivalência em relação a um comportamento podem dificultar a realização de mudanças comportamentais, visto que podem enfraquecer a relação entre as atitudes perante um comportamento e as intenções de mudar, conforme demonstrado no contexto da teoria do comportamento planejado <sup>10</sup>, e em evidências de

que fazer escolhas sobre as quais se sente ambivalente está associado a maiores níveis de desconforto psicológico <sup>11</sup>.

A busca da resolução da ambivalência é um conceito central da entrevista motivacional (EM), estilo de comunicação colaborativa e centrado na pessoa que visa ampliar a motivação intrínseca para a mudança através da exploração e resolução da ambivalência <sup>12</sup>. Uma das principais hipóteses acerca de sua eficácia, já demonstrada para diversos contextos da mudança de comportamentos em saúde, é a *conflict resolution hypothesis*. Essa atribui os desfechos de mudança comportamental mediante ao uso da EM à exploração e resolução da ambivalência, por meio da diminuição ou perda da saliência de argumentos contrários à mudança e aumento das motivações para mudar <sup>13</sup>.

Todavia, ainda não há consenso acerca da resolução da ambivalência sobre a mudança ser a via causal da eficácia da EM, apesar de evidências apontarem que o fortalecimento de falas em direção da mudança e diminuição das falas de sustentação (contra a mudança) por parte do paciente ser associada com os desfechos positivos da abordagem. Um dos principais fatores que dificultam a compreensão dos mecanismos exatos pelos quais a EM funciona e o papel da resolução da ambivalência é a dificuldade de avaliar a ambivalência <sup>14,15</sup>.

Considerando a relevância da ambivalência no processo de mudança comportamental e como conceito central na EM, acompanhada do desafio de sua avaliação, é importante ressaltar que diversos métodos foram propostos para avaliar a ambivalência nos mais diversos contextos ao longo das décadas <sup>16</sup>.

Um dos métodos de avaliar a ambivalência mais amplamente citados na literatura é o método de Kaplan, que foi uma modificação da escala semântica diferencial criada para mensurar a ambivalência de forma objetiva por meio de duas escalas independentes, uma positiva e uma negativa. A combinação dessas escalas permite avaliar o quão ambivalente uma pessoa está diante de um objeto com base na presença simultânea de atitudes positivas e negativas <sup>9</sup>. De forma semelhante, outros autores propuseram fórmulas matemáticas capazes de avaliar a ambivalência de forma objetiva, combinando escalas unipolares de atitudes positivas e negativas <sup>17,18</sup>.

Outros autores adotaram abordagens diferentes na avaliação da presença de ambivalência, propondo medidas de avaliar a ambivalência de forma subjetiva,

utilizando escalas capazes de medir o quão conflitantes são as reações de uma pessoa acerca de um objeto, ao invés de utilizar escalas independentes de positividade e negatividade <sup>17</sup>. A literatura também dispõe de *softwares* capazes de avaliar de forma dinâmica e simultânea as atitudes positivas e negativas <sup>19</sup>, ou de inferir a ambivalência a partir da forma que um indivíduo movimenta o cursor do *mouse* ou o tempo que leva para fazer um julgamento ao ser apresentado com um objeto <sup>20-22</sup>.

Há também trabalhos publicados que relatam formas pouco convencionais de avaliar a ambivalência, como um que usou a metodologia *Facial Actions Coding System* (FACS) aplicada a gravações em vídeo para avaliar a ambivalência por meio da presença de expressões faciais simultaneamente positivas e negativas <sup>23</sup>, e estudos com abordagens qualitativas, definindo como ambivalentes indivíduos que, uma vez decodificadas transcrições de suas entrevistas, apresentaram falas positivas e negativas em relação a um tratamento <sup>24,25</sup>.

Em meio a tantas metodologias distintas propostas para avaliar um construto de tão grande impacto no processo de mudança comportamental como a ambivalência, mapear e compreender as formas utilizadas na literatura para avaliar, mensurar ou classificar a ambivalência demonstra-se como um desafio científico a ser superado, em especial no campo da mudança de comportamento alimentar, visto que vivemos numa era de constante exposição a informações conflitantes, culpa, preocupação e indecisão quanto ao consumo de alimentos - em especial os altamente palatáveis <sup>26</sup>.

Dentre as metodologias disponíveis para a síntese de conhecimentos, as revisões de escopo, também chamadas de revisões de mapeamento, são uma metodologia relativamente nova que permite mapear a literatura disponível acerca de um tema de forma sistemática e rigorosa sem a finalidade de estimar efeitos de intervenções. Por sua natureza exploratória e descritiva, elas são particularmente úteis ao avaliar campos da literatura ainda sem revisões abrangentes ou de natureza heterogênea e complexa, nos quais não cabe uma revisão sistemática tradicional, cujo foco é explanatório ou analítico. Além disso, revisões de escopo são destacadas como capazes de auxiliar no processo de tomada de decisões ao prover informações quanto a natureza de um conceito ou um panorama sobre como ele vem sendo estudado na literatura ao longo do tempo <sup>27-29</sup>.

De forma resumida, as orientações mais recentes do *Joanna Briggs Institute* acerca de revisões de escopo orientam adotar a metodologia ao invés de uma revisão sistemática tradicional quando o objetivo de sua revisão for um dos seguintes: a) anteceder uma revisão sistemática; b) identificar os tipos de evidência disponíveis em certo campo; c) identificar e analisar lacunas de conhecimento; d) esclarecer conceitos-chave e definições na literatura; e) examinar como pesquisas são conduzidas num certo campo ou tema; f) identificar fatores ou características-chave associados a um conceito <sup>29</sup>.

Sendo assim, a metodologia proposta para revisões de escopo mostra-se ideal para atingir os objetivos do presente estudo, que visa examinar como pesquisas são conduzidas num certo campo ou tema. Portanto, o presente estudo consiste em uma revisão de escopo acerca dos métodos utilizados na literatura para avaliar a ambivalência em relação à comida (alimentos específicos) e à alimentação (padrões e comportamentos alimentares), visando mapear e compreender as diferentes ferramentas e abordagens adotadas em estudos na área do comportamento alimentar para avaliar, mensurar ou classificar a ambivalência de participantes, bem como a frequência com a qual tais métodos são adotados.

O presente estudo, além de inédito, possui grande relevância devido a seu potencial de direcionar estudos futuros. Ele visa oferecer a pesquisadores um direcionamento ao definir qual ferramenta usar ao avaliar a ambivalência como variável em estudos transversais e intervenções.

## **OBJETIVO**

O objetivo do estudo é mapear as diferentes formas usadas na literatura para avaliar a ambivalência acerca da comida (alimentos específicos) e alimentação (padrões e comportamentos alimentares), por meio de uma revisão de escopo.



## MÉTODOS

Foi conduzida uma revisão de escopo seguindo as orientações do *Joanna Briggs Institute* para conduzir revisões sistemáticas de escopo <sup>27,29</sup>. Para tanto, foram cumpridas as seguintes etapas: desenvolvimento de protocolo de revisão; elaboração da pergunta de pesquisa; estabelecimento de critérios de elegibilidade; busca em diferentes bases de dados; avaliação de títulos e resumos por avaliadores independentes; avaliação de textos completos; elaboração de formulário de mapeamento de evidência; caracterização da literatura usando o formulário de mapeamento de evidência; apresentação dos resultados por meio de tabelas, diagramas ou modelo descritivo; elaboração de diagrama de fluxo descrevendo o processo decisório, resultado da busca inicial, resultados da seleção, estudos adicionais obtidos pela busca de referências e número final de estudos incluídos; e identificação das implicações do estudo para pesquisas futuras. O protocolo da presente revisão de escopo foi publicado no periódico *JBIR Evidence Synthesis*, de modo a promover maior transparência e rigor metodológico <sup>30</sup>, e a redação desta revisão de escopo foi feita de acordo com as diretrizes da *checklist* PRISMA for Scoping Reviews <sup>31</sup>.

Pergunta de pesquisa: A pergunta de pesquisa que guiou a presente revisão de escopo foi “quais os métodos descritos na literatura para avaliar, mensurar ou classificar ambivalência na área do comportamento alimentar do ser humano, e quais deles são usados mais frequentemente?”. Ela foi definida com base no interesse do autor em na operacionalização da ambivalência em relação à comida e à alimentação, levando a uma busca manual que evidenciou a falta de um padrão para sua avaliação, trazendo a necessidade de mapear a literatura disponível a fim de auxiliar a tomada de decisão sobre a maneira de avaliar a ambivalência em estudos futuros.

Critérios de elegibilidade: a fim de mapear as diferentes formas utilizadas na literatura para avaliar a ambivalência em relação à comida e alimentação, foram incluídos estudos que: a) avaliaram, mensuraram ou classificaram a ambivalência de participantes em relação a algum alimento específico; a algum comportamento alimentar ou dieta; em relação a realizar mudanças em seu padrão alimentar; ou acerca de receber atendimento/aconselhamento profissional para mudança de hábito alimentar;

e b) que foram publicados em revistas acadêmicas indexadas nas bases de dados incluídas nesta revisão.

Foram incluídos estudos publicados em português, inglês, espanhol ou francês que avaliaram a ambivalência de participantes nos contextos descritos acima independentemente da definição de ambivalência utilizada pelos autores, ou do uso de ferramentas anteriormente identificadas para sua avaliação, podendo ser estudos de abordagem quantitativa ou qualitativa. Tal abrangência se deu com a finalidade de mapear as possíveis divergências presentes na literatura ao abordar o construto da ambivalência, permitindo que pesquisas futuras contem com um levantamento amplo e detalhado acerca de sua avaliação.

No presente estudo, não houve limitações quanto a sexo, faixa etária, ou qualquer outro fator sociodemográfico da população trabalhada nos estudos incluídos como fontes de evidência, o que apesar de atípico em revisões sistemáticas convencionais, está em pleno acordo com as diretrizes mais recentes do *Joanna Briggs Institute*, que afirmam que nem sempre uma revisão de escopo precisa detalhar os tipos de participantes incluídos, em especial, quando o objetivo é descrever detalhes sobre desenhos de pesquisa numa determinada área de estudo <sup>29</sup>, como é o caso da presente revisão. Adicionalmente, optou-se por não aplicar tal critério no presente estudo visto que a pergunta encontra-se bem delimitada quanto ao âmbito da comida e alimentação, e restringir a uma população (como faixa etária específica) limitaria a abrangência dos achados. As diferenças em populações dos estudos será discutida ao mapear a evidência.

Critérios de exclusão: foram excluídos estudos nos quais os métodos utilizados para avaliar a ambivalência foram descritos sem clareza nem citaram fonte bibliográfica que detalhasse o método, de forma a não permitir que estes sejam reproduzidos. Também foram excluídos estudos que avaliaram a ambivalência de participantes em relação a métodos de produção agropecuária (por exemplo, produção orgânica, livre de gaiolas, convencional) ou de produção e preparo de alimentos (por exemplo, kosher e halal), ao invés de avaliarem a ambivalência em relação ao consumo do alimento em si.

Estratégia de busca: A estratégia de busca a ser utilizada foi elaborada com apoio do serviço da biblioteca da Faculdade de Ciências Médicas da UNICAMP e foi revisada por pesquisadora colaboradora experiente na condução de revisões

sistemáticas. Os termos de busca consistem em termos livres para a ambivalência e combinações de descritores e palavras-chave para a comida e alimentação, e estão disponíveis no anexo 1. Não será definido um limite de datas de publicação, visto que medidas para a avaliação da ambivalência desenvolvidas a décadas continuam relevantes e sendo utilizadas na literatura.

Bases de dados: As bases de dados consultadas e o respectivo número de artigos oriundos de teste preliminar com a estratégia de busca, realizado em outubro de 2020, foram: MEDLINE (352 resultados, busca realizada via plataforma PubMed); PsycINFO (389 resultados); Web of Science (595 resultados); Food Science Source, FSTA, CAPES FSTA full text collection e CINAHL (todos consultados na plataforma EBSCOHOST, com, respectivamente, 124, 123, 107 e 170 resultados), totalizando 1,860 resultados antes da exclusão de duplicidades.

Avaliação em pares: Os resultados obtidos pela busca foram exportados para as plataformas Mendeley e Rayyan, para exclusão de duplicidades e avaliação de títulos e resumos feitas por pares independentes, seguido de avaliação em pares independentes de textos completos, busca de potenciais artigos para serem revisados nas listas de referência dos estudos incluídos, seguida de extração das informações com base em um formulário de mapeamento de evidência elaborado pelos pesquisadores. Nos casos em que ocorreu divergência entre avaliadores, seja na avaliação de títulos e resumos ou de textos completos, tais divergências foram resolvidas por meio de discussão entre os avaliadores. Os resultados do processo de avaliação e seleção de estudos foi reportado utilizando as recomendações do manual e *checklist PRISMA for Scoping Reviews* <sup>31</sup>.

Mapeamento de evidências: O formulário de mapeamento de evidência, usado para extrair informações relevantes e caracterizar a literatura, foi elaborado de forma a incluir informações sugeridas pelo instituto Joanna Briggs, cabíveis à pergunta de pesquisa do presente estudo, como: 1) autor; 2) ano de publicação; 3) origem ou país de origem da fonte de evidência; 4) objetivos ou finalidade do estudo; 5) população do estudo e tamanho amostral (se aplicável); 6) metodologia; 7) forma de mensuração de variáveis; e 8) achados principais que se relacionam com a pergunta da revisão. Os dados extraídos foram então organizados na forma de tabelas e um resumo descritivo dos achados alinhados à pergunta da revisão.

A presente dissertação foi escrita sob o modelo alternativo adotado pela Faculdade de Enfermagem da UNICAMP, portanto, seus resultados são apresentados na forma de artigo científico, que será aprimorado conforme os comentários da banca da defesa e então enviado para publicação.

## **RESULTADOS (FORMATO ALTERNATIVO - ARTIGO)**

### **Measuring bittersweetness: a scoping review of methods to assess ambivalence towards food and diet**

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#### **Abstract**

#### **Objective**

The objective of this scoping review is to map and describe the different methods and tools employed in studies to assess, measure, or classify the ambivalence of participants towards food and diet-related attitude objects, as well as to report how frequently each of these tools and methods were employed.

#### **Introduction**

People often hold simultaneously positive and negative evaluations as well as feelings of conflict and indecisiveness towards foods and eating behaviors, which can make it challenging to adopt healthier eating behaviors, making it important to resolve diet-related ambivalence. The findings of this review may provide authors with an array of options of tools and methods to assess ambivalence towards food and diet in future studies.

#### **Inclusion criteria**

We included peer-reviewed studies that assessed the ambivalence of participants of any age, sex, or sociodemographic group, towards food and diet. We

excluded studies that didn't detail the methods they used to assess ambivalence, or that assessed ambivalence towards agricultural and farming methods or methods of food production and preparation.

### **Methods**

This review was conducted in accordance with JBI methodology for scoping reviews. We retrieved peer-reviewed studies from MEDLINE, CINAHL, PsycINFO, Web of Science, FSTA, and Food Science Source. Two independent reviewers screened the articles. We report all relevant extracted information as tables and a descriptive summary of the findings.

**Keywords:** attitudinal ambivalence; diet; eating behavior; food

### **Introduction**

Changing unhealthy dietary behaviors, which are among the most important contributors to the striking rise in the incidence of an array of non-communicable chronic diseases (NCDs) in recent decades worldwide <sup>1</sup>, is a complex public health challenge that requires more than providing knowledge and science-based recommendations regarding what people should eat <sup>2</sup>. It requires understanding and addressing the determinants of these behaviors, including the barriers people face when attempting to change them <sup>3</sup>.

People are constantly making decisions about food that impact the quality of their diets. What, how, and when to eat, with whom, what items to purchase and where to get them, what portion size to consume, whether to prepare a meal from scratch, to use frozen ingredients or to eat out are just some examples of the type of choices we make as part of our daily lives <sup>4</sup>.

On top of being influenced by cultural, social, economic, demographic, political, and environmental factors, such as level of access, exposure to food marketing, and other food cues <sup>5-9</sup>, our choices to eat or to avoid specific foods are determined by how positively, or negatively, we evaluate their flavor, texture, appearance, affordability, convenience, nutritional value, and effects on our physical and emotional well-being <sup>10</sup>. These evaluations, however, frequently compete against each other and lead to feelings of conflict, like those arising from the incompatibility

between long-term health-related goals and the hedonic drive for short-term rewards in the form of highly palatable foods <sup>11–13</sup>. As a consequence, striving to make healthier food choices and the process of changing dietary habits are often bittersweet experiences associated with high levels of ambivalence <sup>14,15</sup>.

Evidence shows that elevated levels of ambivalence are an important barrier to changing health behaviors, as it might make it harder for individuals to translate their positive attitudes towards the favored behavior into intentions to adopt it <sup>16,17</sup>. This idea is supported by experimental evidence showing that, although ambivalence per se does not lead to feelings of discomfort, having to make decisions or commit to a choice when feeling ambivalent triggers psychological discomfort, which favors the maintenance of the status quo <sup>18</sup>.

Effectively identifying and addressing ambivalence is a core competency for healthcare professionals trained in Motivational Interviewing (MI), a directive client-centered collaborative communication style that focuses on amplifying intrinsic motivation to change by exploring and resolving a person's ambivalence <sup>19</sup>. According to the conflict resolution hypothesis, the efficacy of MI when helping clients change problematic behaviors might be explained by its focus on exploring and resolving ambivalence, thus helping clients to leave a state of behavioral inertia towards positive changes <sup>20,21</sup>. Likewise, motivational Communication (MC), another growing evidence-based communication style used by health care providers to help patients adopt healthy behaviors and manage NCDs also lists the ability to respond to ambivalence as one of its essential skills <sup>22</sup>, further highlighting the importance of ambivalence in the context of behavior change.

Although ambivalence is considered a construct of immense relevance in the process of behavior change, defining and operationalizing it can be challenging <sup>17,21</sup>. Multiple definitions for ambivalence can be found in the literature, and it is most often referred to as the simultaneous presence of positive and negative attitudes (i.e., attitudinal ambivalence) towards an attitude object <sup>16,23–25</sup>. Studies further distinguish between three forms of attitudinal ambivalence, namely, potential ambivalence, felt ambivalence, and cognitive-affective ambivalence <sup>26,27</sup>.

Potential ambivalence, which is also referred to as objective or structural ambivalence, represents a psychological state of being aware of the coexistence of

positive and negative evaluations towards an object. It is usually measured using mathematical formulas that combine unipolar scales (also called split semantic differential scales) meant to separately assess to which extent an individual perceives an object of attitude as positive or negative (expressed as either positive and negative aspects of the object, or as adjectives that describe desirable or undesirable characteristics, or approach and avoidance inclinations), emphasizing the similarity and the intensity of the two evaluations <sup>14,24,27–29</sup>.

The conflicting mix of feelings that arise from the presence of competing evaluations of an object of attitude is referred to as felt ambivalence (also called subjective ambivalence or experienced ambivalence, depending on the author). Its measurement typically consists of self-reported questionnaires that assess the subjective experience of attitudinal ambivalence or mixed attitudes towards a specific object (e.g., feeling torn, conflicted, indecisive, or having mixed feelings) <sup>25,26,29–31</sup>.

The third form of ambivalence most typically distinguished in the literature, cognitive-affective (or affective-cognitive) ambivalence, refers specifically to a mismatch between one's cognitive beliefs and their emotions towards an object. Similar to potential ambivalence, it can be assessed using formula-based measurements that combine either unipolar or bipolar measures of affective and cognitive evaluations, but instead of focusing on general positivity and negativity of attitudes, it taps a conflict between the affective and the cognitive components of attitude <sup>26,27</sup>.

Some authors have used less conventional approaches that do not rely on scales or self-reported questionnaires to measure or assess the ambivalence of individuals towards an array of attitude objects. Some methods include using software capable of assessing positive and negative evaluations in a simultaneous and dynamic manner <sup>32</sup>, and inferring ambivalence based on the latency or on the trajectory of the mouse before participants make an evaluation about an attitude object <sup>30,33,34</sup>. Others have classified participants as ambivalent by coding transcriptions of interviews <sup>35,36</sup> or by analyzing videos and identifying the simultaneous occurrence of facial expressions associated with positive and negative emotions <sup>37</sup>.

Among such a variety of methods available in the literature to assess, measure, and classify different forms of ambivalence within contexts where behavioral inertia might undermine the promotion of healthy behaviors, systematically mapping



and understanding these methods remains a scientific challenge to be overcome. This is particularly relevant within the realm of human eating behavior, as we live in an era where people are constantly exposed to conflicting messages, aggressive marketing, and false claims about food and nutrition, which can lead to conflicting attitudes towards eating, accompanied by confusion and inertia when presented with sound dietary recommendations<sup>38–40</sup>.

Scoping reviews are the most appropriate methodology to systematically map the existing literature using an exploratory and descriptive approach when aiming to examine how research is conducted on a specific topic or field<sup>41,42</sup>. Therefore, they are the ideal type of systematic review to map and describe the methods employed in the literature to assess ambivalence towards food and diet.

In this review, we identified and described the tools and methods employed within the field of human eating behavior to assess, measure, or classify the ambivalence of participants. Our findings may provide researchers and healthcare providers with an array of options to choose from when interested in investigating the ambivalence of study participants and patients towards foods and diet.

### **Review question**

How do studies available in the literature assess, measure, or classify the ambivalence of individuals towards food and diet, and how frequently are these tools and methods employed?

### **Inclusion criteria**

#### **Participants**

This scoping review considered published peer-reviewed studies. There were no limitations regarding sociodemographic factors, like sex or age, or the presence of illness and disease in the population of studies included in this review.

#### **Concept**

In this review, we examined the tools and methods used to assess, measure, or classify the ambivalence of study participants towards i) certain foods or beverages;

ii) specific eating behaviors; iii) any particular dietary pattern; iv) changing dietary behaviors, and v) receiving professional dietary counseling for changing dietary habits.

We excluded studies in which the description of the methods used to assess ambivalence wasn't detailed or didn't provide enough information for it to be reproduced. We also excluded studies that assessed ambivalence towards methods of food production and preparation (eg., Kosher and Halal) or towards agricultural and farming methods (e.g., conventional, cage-free, organic). We had to slightly modify the exclusion criteria described in the protocol for this scoping review<sup>43</sup> to also studies that didn't employ any methods that were designed or aimed to assess ambivalence. That was necessary because, while screening full-texts, we realized that even if an author provided enough information to make their methods reproducible, some of them used the word "ambivalence" when describing their findings without employing any method or tool designed to assess ambivalence. The reasons for the exclusion of full-text studies that did not meet the inclusion criteria were recorded and presented in Appendix II.

### Context

We considered for this review scientific literature from any country or sociocultural setting.

### Types of sources

This scoping review considered for inclusion peer-reviewed literature and preprints of experimental and quasi-experimental study designs, including randomized controlled trials, non-randomized controlled trials, interrupted time-series studies, and before and after studies, and analytical observational studies, such as prospective and retrospective cohort studies, analytical cross-sectional studies, and case-control studies. We also considered descriptive observational study designs, such as individual case reports, case series, and descriptive cross-sectional studies.

In addition to that, we considered qualitative studies with a focus on qualitative data, including, but not limited to, designs such as grounded theory, ethnography, phenomenology, qualitative description, feminist research, and action research. We excluded literature reviews of all types and designs, books, commentaries, conference abstracts, and editorials.

## **Methods**

We conducted this scoping review following the methodological guidance provided by the Joanna Briggs Institute (JBI) for conducting scoping reviews <sup>41,42</sup>. We also published a protocol for this scoping review to promote greater transparency of our methodology <sup>43</sup>.

### **Search strategy**

Our search strategy (Appendix I) was created with the assistance of the library services of the School of Medical Sciences at the University of Campinas for MEDLINE (PubMed), Web of Science, Food Science Source (EBSCO), PsycINFO, FSTA (EBSCO), and CINAHL (EBSCO).

We extracted the search terms from the titles and abstracts of relevant articles we identified during an initial and limited search on CINAHL (EBSCO), MEDLINE (PubMed), and PsycINFO. These terms included a combination of keywords and headings for food and diet and free-text terms for ambivalence.

We considered studies published in English, Portuguese, and French, within any timeframe.

### **Study screening and selection**

Following the search, we collated and uploaded all identified citations into Mendeley v.1803 (Mendeley Ltd., Elsevier, Netherlands) and removed duplicates. We uploaded the resulting list of citations to Rayyan (Qatar Computing Research Institute, Doha, Qatar), where we used the “possible duplicates” function to remove the remaining duplicates that weren’t automatically identified by Mendeley. Before screening the titles and abstracts of studies, we conducted a pilot test with 100 studies in order to certify that the two independent reviewers had a precise understanding of the inclusion criteria, which resulted in an agreement rate of 100%. The same two independent reviewers then assessed the remaining titles and abstracts against the inclusion criteria, resulting in an agreement rate of 95.86%.

The full texts of potentially relevant sources were retrieved manually and, once again, the same two reviewers conducted a pilot assessment of 10 full-texts to guarantee consistency in the understanding of the inclusion criteria, which resulted in an agreement rate of 90%. The remaining full-texts were assessed independently by the reviewers, with an agreement rate of 76.19%. The reviewers discussed and resolved all disagreements that resulted from the assessment of full-texts, whereas any study that was included by at least one reviewer during the screening of titles and abstracts was included for full-text assessment, regardless of disagreements.

### **Data extraction**

Relevant data from papers included in this scoping review were extracted by one of the reviewers following a pilot extraction of 10% of the sources of evidence that was then assessed by a second reviewer who checked the extracted data for precision and completeness. That step was conducted to certify that there was a proper understanding of the information to be extracted and the data extraction tool (Appendix III), which was developed by the reviewers based on the standardized JBI extraction instrument template for scoping reviews <sup>44</sup>.

### **Data analysis and presentation**

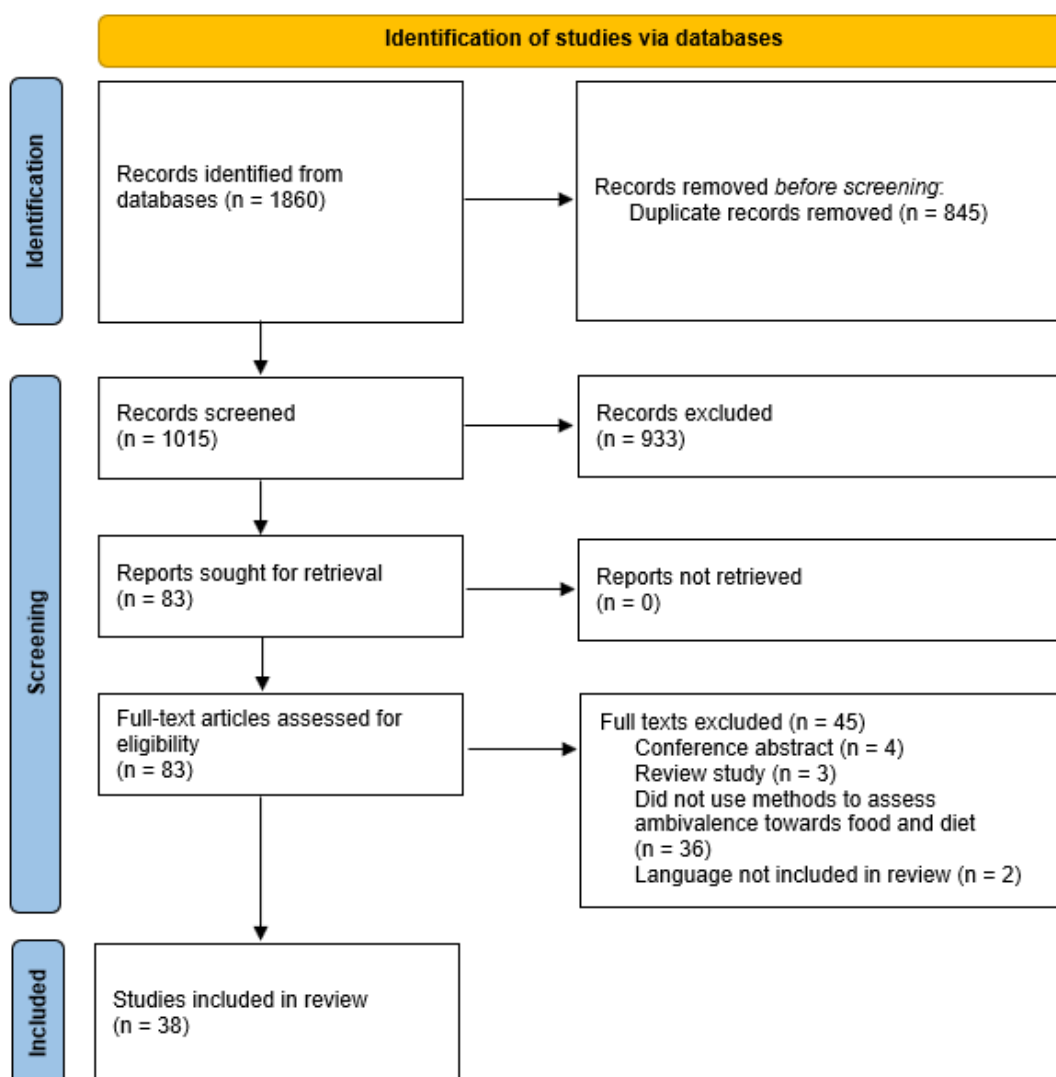
In this scoping review, we provide tables with quantitative and qualitative characteristics of studies describing their population, study design, the object of ambivalence, methods, and tools used to assess, measure, or classify ambivalence, and whether the authors assessed the reliability and validity of the method. We also provide additional information about methods and tools identified across studies, including how frequently they were employed among studies included in this review, the type of ambivalence they assess, their object of ambivalence, their method of delivery, and if their use is limited to a specific population.

## Results

### Study inclusion

We detail the results of our search and the study inclusion process in a flow diagram (Figure 1), in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for Scoping Reviews (PRISMA-ScR) <sup>45</sup>. We retrieved a total of 1860 records from our databases, and 1015 remained after we removed all the duplicates. After screening titles and abstracts, we excluded 933 records and considered 83 studies for full-text review. We then excluded 45 studies, resulting in a total of 38 sources of evidence included in this scoping review (Table 1).

**Figure 1: Flow diagram detailing search results and study inclusion process** <sup>46</sup>



**Table 1: Studies included after full-text screening and their characteristics**

<b>Study</b>	<b>Language</b>	<b>Country of participants</b>	<b>Study participants (not every study provided age ranges. No specific demographics unless stated otherwise)</b>	<b>Object of ambivalence</b>	<b>type(s) of ambivalence assessed</b>	<b>Details on psychometric validation</b>
Auzoult & Salès-Wuillemin, 2020	French	France	65 university students	Insect-based foods	Felt	Not reported
Altintzoglou et al., 2016	English	Norway and Japan	902 participants from Norway and 897 from Japan	Sushi and sashimi	Felt	Not reported
Armitage & Arden, 2007	English	England	187 adolescents (age range: 16 to 17)	Eating a Low-Fat Diet	Potential and felt	Reliability
Armitage et al., 2003	English	England	299 participants (age range: 9 to 91)	Eating a low-fat diet and eating five portions of fruit and vegetables per day	Potential	Not reported
Batista & Lima, 2013	Portuguese	Portugal	140 university students (age range: 17 to 34)	French fries and apples	Potential	Not reported
Batista, Lima, Pereira & Alves, 2013	English	Portugal	123 university students (age range 17 to 46)	Potato chips	Potential	Not reported
Berndsen and Pligt, 2004	English	Netherlands	110 university students	Consuming meat	felt	Reliability
Broemer, 2002	English	Germany	80 male university students	Eating a low-fat diet	Felt	Reliability
Buttler & Walther, 2018	English	Germany	64 participants (age range: 18 to 46)	Meat-based and plant-based dishes	Other (mouse trajectory)	Not reported
Buttler & Walther, 2019	English	Germany	166 participants (age range: 18 to 46)	Meat and plant-based foods	Other (reaction time before pressing key)	Not reported
Cong et al., 2013	English	Vietnam	487 participants above the age of 18	Food and Fish	Felt	Validity
Conner et al., 2002	English	England	282 participants (age range: 18 to 91) 361 hospital workers (age range: 20 to 64)	Eating a low-fat diet and eating 5 portions of fruits and vegetables per day	Potential	Validity
Conner et al., 2003	English	England	232 participants	20 different components of healthy eating	Potential and felt	Validity

Conner et al., 2021	English	England	282 participants	Eating a low-fat diet or five portions of fruits and vegetables per day	Cognitive-affective	Not reported
Cornil et al., 2014	English	France	84 schoolchildren 115 adult university students 116 adults	Carrots, chocolate, chips, low-fat chips	Potential	Not reported
Durkin et al., 2012	English	Scotland	84 female participants (age range: 17 to 63)	Chocolate	Potential	Reliability
Dwan & Miles, 2018	English	England	167 participants (age range: 17 to 74)	Red meat	Potential	Not reported
Honkanen & Olsen, 2009	English	Spain	100 participants (age range: 18 to 60)	Farmed fish	Felt	Reliability
Jonas, Broemer, Diehl, 2000	English	Germany	248 university students	Eating fast-food, meat, chocolate, drinking alcohol, drinking coffee	Felt	Not reported
Keller & Hartmann, 2016	English	Switzerland	2781 participants	Eating	Felt	Reliability
Keller & Horst, 2013	English	Switzerland	1388 participants	Eating	Felt	Not reported
Keller & Seagrist, 2015	English	Switzerland	2733 adult participants	Eating	Felt	Reliability
Keller et al., 2016	English	Switzerland	2781 participants	Eating	Felt	Reliability
Norris et al., 2019	English	United States	209 adult participants	Images of healthy and unhealthy foods	Potential	Not reported
Olsen, Prebensen, Larsen, 2009	English	Norway	1154 participants	Convenience foods / ready meals	Felt	Not reported
Papies et al., 2009	English	Netherlands	100 university students	Palatable high-fat foods	Potential	Reliability
Povey, Wellens, Conner, 2001	English	England	111 participants (age range: 21 to 93)	Meat, vegetarian diet, vegan diet	Potential	Validity
Ran & Yamamoto, 2015	English	United States	496 college students	Junk food	Potential, felt, and cognitive-affective	Not reported
Reinders et al., 2020	English	Netherlands	797 participants (age range: 18 to 75)	Using personalized nutrition advice	Felt	Validity and reliability
Rodgers et al., 2011	English	France	254 female participants (age range: 17 to 32)	Chocolate	Potential	Validity

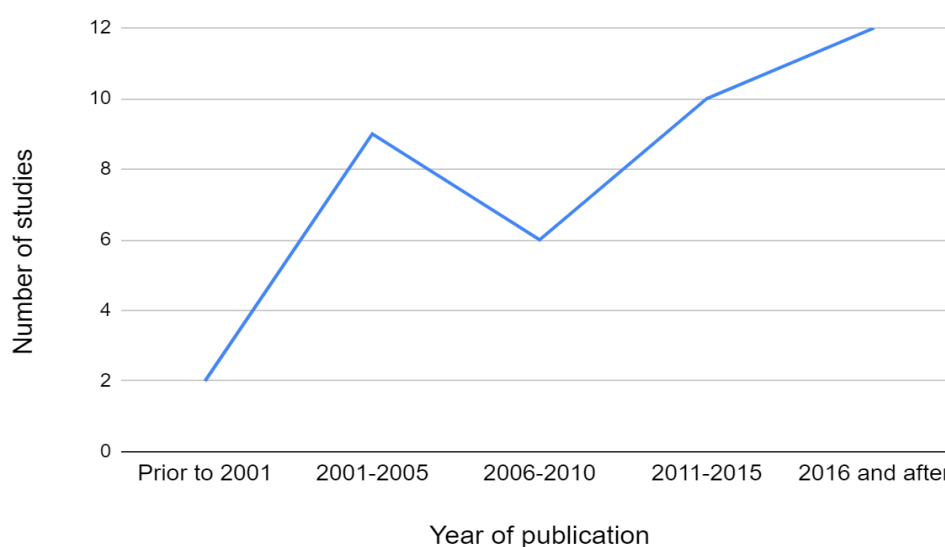
Ruby, Alvarenga, Rozin, Kirby, Richer, Rutzstein, 2016	English	Argentina, Brazil, France, USA	304 university students from Argentina  583 university students from Brazil  441 university students from France	Beef	Potential	Not reported
Sparks et al., 2001	English	England	325 adult participants	Chocolate and meat consumption	Potential	Reliability
Sparks, Hedderley & Shepherd, 1992	English	England	173 participants above the age of 18	Wholemeal bread (healthy food) and sweet biscuits (treat)	Cognitive-affective	Reliability
Stritzke & Cartwright, 2008	English	Australia	312 university students	Chocolate	Potential	Not reported
Stroebe, et al., 2008	English	Netherlands	116 female university students	Eating	Potential and felt	Not reported
Urland & Ito, 2005	English	United States	84 female university students	High fat foods, high carbohydrate foods, desserts and candies, fruits and vegetables, and meats	Potential	Not reported
Videbæk & Grunert, 2020	English	Denmark	975 participants	Eating insects (entomophagy)	Potential	Reliability
Yan, 2014	English	United States	256 university students	Eating junk food	Potential	Not reported

## Characteristics of the included studies

### Year of publication

The publication dates of studies included in this scoping review span from 1992 to 2021. Figure 2 shows the number of included studies divided into yearly intervals.



**Figure 2: Number of included papers published by period**

### Study participants

There was a greater prevalence of studies that assessed the ambivalence of people living in England ( $n = 9$ )<sup>16,27,47–53</sup>, the USA ( $n = 5$ )<sup>26,54–57</sup>, France ( $n = 4$ )<sup>54,58–60</sup>, Germany ( $n = 4$ )<sup>61–64</sup>, Netherlands ( $n = 4$ )<sup>29,65–67</sup>, and Switzerland ( $n = 4$ )<sup>68–71</sup>. Some studies included participants from more than one country. Most studies included in this review included participants aged 18 and above, and university students (Table 2).

**Table 2: Demographic characteristics of study participants**

Study population	Number of studies	Percentage of studies ( $n = 38$ )
People aged 18 and up of any sex (not limited to university students)	16	42.11%
University students of any sex	12	31.58%
People of any sex (age range not specified, not limited to university students)	3	7.89%
University students (female only)	3	7.89%
People aged 17 and up of any sex (not limited to university students)	2	5.26%

Adolescents of any sex	1	2.63%
Children of any sex	1	2.63%
People aged 9 and up of any sex (not limited to university students)	1	2.63%
University students (male only)	1	2.63%

### Objects of ambivalence

Table 3 details the different attitude objects towards which the ambivalence of participants was assessed in studies included in this review. The most common objects of attitude towards which authors assessed the ambivalence of participants across included studies were beef, meat, or red meat ( $n = 8$ )<sup>48,50,54,56,61–63,67</sup>, food or eating ( $n = 6$ )<sup>29,68–72</sup>, chocolate ( $n = 6$ )<sup>14,49,59,60,73</sup>, low-fat diets ( $n = 5$ )<sup>27,47,51,52,64</sup>, fruits and vegetables ( $n = 5$ )<sup>16,27,47,51,56</sup>, and fast-food or junk food ( $n = 3$ )<sup>26,57,63</sup>. Some studies included multiple attitude objects.

**Table 3 - Objects of ambivalence**

Object of ambivalence	Number of studies	Percentage of studies ( $n = 38$ )
Beef or red meat	8	21.05%
Food or eating	6	15.79%
Chocolate	6	15.79%
Low-fat diet	5	13.16%
Fruits and vegetables	5	13.16%
Fast-food or junk food	3	7.89%
Desserts, candies, and sweets	2	5.26%
Fish	2	5.26%
Foods high in fat	2	5.26%
Healthy foods	2	5.26%
Insect-based foods	2	5.26%
Plant-based foods or vegetarian/vegan diets	2	5.26%
Potato chips	2	5.26%

Alcoholic beverages	1	2.63%
Apples	1	2.63%
Carrots	1	2.63%
Coffee	1	2.63%
Convenience foods or ready meals	1	2.63%
Foods high in carbohydrates	1	2.63%
French fries	1	2.63%
Sushi and sashimi	1	2.63%
Unhealthy foods	1	2.63%
Using personalized nutrition advice	1	2.63%
Whole grain foods	1	2.63%

## **Review findings**

### **Definition of ambivalence**

The definitions of ambivalence provided by different studies included in this review were consistent across each other, most of them referring to the simultaneous presence of positive and negative evaluations towards an attitude object, with some authors emphasizing the similarity of the intensity of these evaluations <sup>16,27,47–51,56,57,60,62,64–69,72,74,75</sup>. Similarly, the definitions provided by other studies focused on aspects like the lack of consistency within the individual, the state of holding mixed feelings, or the contradictions experienced in individual attitudes, beliefs, or preferences towards an attitude object <sup>29,76–78</sup>.

Some authors also provided definitions for different types of ambivalence, differentiating between potential, felt, and/or cognitive-affective ambivalence <sup>26,52,55</sup>. Others didn't provide a definition for ambivalence, and one particular article described a definition specific to ambivalence towards foodstuffs, as the presence of motivational conflicts, for example, when food is tempting but also sparks concerns about its calorie content <sup>73</sup>.

### **Description of methods and tools employed to assess ambivalence towards food and diet**

Table 4 describes key characteristics of the methods and tools employed by authors of studies included in this review to assess, measure, or classify the ambivalence of participants. We identified studies that employed previously existing methods to assess ambivalence that were either usable in multiple contexts (n = 27)<sup>16,26,27,29,47–52,55–58,60–62,65–67,72,74–79</sup> or specific to assessing ambivalence towards food and diet (n = 8)<sup>14,59,62,68–71,73</sup>. Likewise, there were studies that proposed new methods to assess ambivalence that were either specific for food and diet-related objects (n = 2)<sup>29,54</sup> or usable in other contexts (n = 3)<sup>53,63,64</sup>.

Even if some authors did not mention the type of ambivalence assessed by the methods they employed, we classified them as potential, felt, cognitive-affective, or other, according to their characteristics, based on definitions available in the literature<sup>26,27</sup>. We considered that methods assessed potential ambivalence when they combined independent scales of positive and negative evaluations (n = 21)<sup>14,16,26,29,47–52,54–57,59,60,65,73–75,78</sup>, felt ambivalence when they assessed the subjective experiences of feeling conflicted (n = 17)<sup>16,26,29,52,58,63,64,66–72,76,77,79</sup>, and cognitive-affective ambivalence when they employed a combination of independent scales that were specifically designed to contrast between cognitive and affective evaluations (n = 2)<sup>27,53</sup>. Methods that didn't consist in any of these approaches and also didn't specify the type of ambivalence they assessed, but instead, inferred ambivalence from non-semantic measures of indecisiveness or conflict, like mouse trajectories (n = 2)<sup>61,62</sup>, or reaction time before making an evaluation (n = 1)<sup>62</sup>, were labeled as “other”.

Most studies employed paper-based questionnaires (n = 21)<sup>14,16,47,49–53,57–59,64,67–71,73–75,77</sup> or either online or offline computer-based questionnaires (n = 12)<sup>26,27,29,48,54–56,65,66,76,78,79</sup> as their method of delivery of the tools and methods to assess ambivalence.

Although scoping reviews are not analytical in nature, and focus on mapping the literature<sup>42</sup>, we also extracted information on whether the authors of studies report data (either original or from other authors) on the validity and reliability of the methods employed to assess ambivalence so that future researchers can consult the original studies and make their judgment regarding the values provided by authors

when making decisions on methods to use. Although the majority of included studies don't report any data on psychometric properties of their methods used to assess ambivalence, a significant number of authors reported data on the reliability of their scales or tools ( $n = 12$ )<sup>49,52,53,64,65,67,69–71,73,76,78</sup>, their validity ( $n = 5$ )<sup>16,50,51,59,72</sup>, or both ( $n = 1$ )<sup>66</sup>.

**Table 4 - characteristics of methods employed to assess ambivalence**

<b>Whether the method is new or pre-existing, and if it is specific to food and diet-related objects</b>	<b>Number of studies</b>	<b>Percentage of studies (n = 38)</b>
Employed a new method specific to food and diet	3	7.89%
Employed a new method not specific to food and diet	3	7.89%
Employed a pre-existing method specific to food and diet	8	21.05%
Employed a pre-existing method not specific to food and diet	27	71.05%
<b>Type of ambivalence assessed</b>	<b>Number of studies</b>	<b>Percentage of studies (n = 38)</b>
Potential (objective, structural)	21	55.26%
Felt (subjective, experienced)	17	44.74%
Other	3	7.89%
Cognitive-affective	2	5.26%
<b>Method of delivery</b>	<b>Number of studies</b>	<b>Percentage of studies (n = 38)</b>
Paper-based questionnaire	21	55.26%
Computer-based questionnaire (either online or offline)	12	31.58%

Computer-based task	3	7.89%
Questionnaire-based interview	1	2.63%
Does not specify	1	2.63%
<b>Whether authors provide information on validity and reliability</b>	<b>Number of studies</b>	<b>Percentage of studies (n = 38)</b>
Authors provide data on both validity and reliability	1	2.63%
Authors only provide data on validity	5	13.16%
Authors only provide data on reliability	12	31.58%
Authors report no data on psychometric properties	20	52.63%

Across the 38 studies included in this review, we identified a total of 16 different methods to assess ambivalence that were either specific for food and diet-related attitude objects or applicable to other contexts. The majority of included studies reported using one or more of 10 pre-existing measures of ambivalence, while in 6 studies, authors proposed their own original method. We considered a method as original when the authors of the study either stated employing a self-constructed method or when they didn't provide a citation to another study as a source of the method they used. Likewise, we considered methods as pre-existing when the authors cited another study as its source.

#### **Studies that employed pre-existing methods to assess ambivalence towards food and diet**

Although not specifically developed as a measure of ambivalence, the Orientation to Chocolate Questionnaire (OCQ)<sup>80</sup>, was used by three studies included in this review to assess potential ambivalence towards chocolate, as it includes scales of approach, avoidance, and guilt associated with the consumption of chocolate<sup>14,59,73</sup>.

Likewise, the disgust and interest subscales of a previously developed ten-item scale of attitudes towards entomophagy (that wasn't developed to assess ambivalence)<sup>81</sup> was used in one of the studies included in this review<sup>78</sup> to measure potential ambivalence towards eating insects. They calculated a measure of ambivalence from these subscales by combining them with the use of two mathematical formulas originally published by Scott,  $S^2 / L$  “where S is the smaller sum of positives or negative ratings, and L is the larger of these sums”, and  $2S + 1 / S + L + 2$ <sup>82</sup>. They also used a formula called the “Griffin index”<sup>28</sup>, which is applicable to any kind of attitude object and consists in subtracting the absolute difference between the positive (P) and the negative (N) from the average of the two components,  $(P + N) / 2 - |P - N|$ , thus capturing the intensity and the similarity between positive and negative evaluations.

Including the aforementioned study, the Griffin Index<sup>28</sup> was employed in a total of 15 studies included in this review<sup>16,26,29,47–52,56,57,65,74,75,78</sup> to measure potential ambivalence based on independent scales of positive and negative evaluations, usually using the split-semantic differential measure proposed by Kaplan<sup>24</sup>. Alternatively, it also allows researchers to measure cognitive-affected ambivalence by changing the variables in the formula from positive and negative evaluations to cognitive and affective evaluations (C and A, respectively), resulting in the formula  $(C + A) / 2 - |C - A|$ , an approach that was also used in two studies included in this review<sup>26,27</sup>.

One study in our review<sup>60</sup> reported using the similarity-intensity model, or SIM, as a measure of potential ambivalence. As described by Priester & Petty<sup>25</sup>, the SIM refers to a simplified representation of the Griffin index<sup>28</sup>, written as the equation  $A = 3C - D$ , where A is ambivalence, C is the conflicting reaction (the smaller sum of positive or negative evaluations), and D is the dominant reactions (the larger of these sums).

That same paper by Priester & Petty<sup>25</sup> that simplified the equation of the Griffin index also provided the Subjective Ambivalence Questionnaire, a three-item scale of felt ambivalence employed in four studies included in this review<sup>26,47,66,67</sup> that prompts participants to rate their feelings of conflict, mixed reactions, and indecision towards an attitude object. A similar three-item measure that included statements about having mixed feelings, conflicted thoughts, and the simultaneous presence of positive and negative thoughts was proposed by Conner & Sparks<sup>31</sup> and was reported in two

studies included in this review <sup>76,77</sup>, plus a third one that, though not providing a citation for it, employed a nearly identical measure <sup>79</sup>.

Among the methods and tools less commonly employed by studies included in this review to assess ambivalence, one study <sup>55</sup> used a previously-existing dynamic computer-based measure of potential ambivalence that allows for simultaneously assessing independent measures of positive and negative attitudes by moving the mouse on a square grid, the Evaluative Space Grid (ESG) <sup>32</sup>, to assess the ambivalence of participants elicited by images of healthy and unhealthy foods.

Two other studies <sup>61,62</sup> also employed methods that didn't rely on questionnaires and were based on a pre-existing mouse tracker paradigm <sup>83</sup>. In these studies, participants were prompted to move their mouse to one of two buttons with a positive or a negative evaluation of meat-based and plant-based foods or dishes, inferring ambivalence from the response time before picking an option and the deviation in the mouse trajectories. The authors based this approach on a previously published study <sup>30</sup>. Buttlar and Walther <sup>62</sup> also employed a different tool, that assessed implicit ambivalence based on the reaction time before participants made evaluations on a computer keyboard towards meat and plant-based foods.

### **Studies that proposed a new method to assess ambivalence towards food and diet**

Stroebe et al. <sup>29</sup> developed a questionnaire consisting of 12 statements related to conflicting feelings experienced by individuals towards eating rated on a 7-point scale that ranged from “not at all” to “very much” that was then employed in four other studies included in this review <sup>68-71</sup> as a measure of felt ambivalence towards eating.

Similarly, Ruby et al. <sup>54</sup> created a measure of potential ambivalence capable of classifying participants as having ambivalent, positive, negative, or neutral attitudes towards the consumption of beef based on the first three words that come to their mind when thinking about it, which are then classified as positive, negative, or neutral evaluations by the researchers.

Among the authors of included studies who proposed new methods applicable for a variety of attitude objects, not necessarily related to food and diet,



Sparks et al.<sup>53</sup> used a combination of four five-point semantic differential scales (two with a cognitive emphasis and two with an affective emphasis) adapted from the usual method to assess attitudes within the theory of reasoned action. This method allowed to measure a participant's cognitive-affective ambivalence based on the absolute difference between the sum of the cognitive and the affective semantic differential scales.

Additionally, Jonas et al.<sup>63</sup> developed four seven-point scales used to assess the felt ambivalence of study participants towards an array of diet-related behaviors, but that could also be applicable to other contexts, using sentences that expressed feelings of conflict between attitudes, thoughts, and feelings towards the object, rated on a scale from -3 to +3 and then averaged. This method was also replicated by another included study<sup>72</sup>. A similar original approach was employed by Broemer<sup>64</sup>, with a different set of sentences that could be adapted for a variety of health-related behaviors.

Another study included in our review<sup>58</sup> reported using a previously-existing set of three sentences communicating the presence of conflicting feelings or ideas, indecisiveness, and opinions towards insect-based foods, which they report having been originally developed by Krosnick et al.<sup>84</sup>. However, upon consulting the cited paper, it seems that it might have been used as theoretical guidance on the different dimensions of attitude by the authors of the study included in our review, rather than the original source of the method, as it doesn't seem to mention the scale used by the authors. Therefore, we considered this method as pre-existing, based on what the author claims, but raised the hypothesis that it might have actually been original.

## **Discussion**

In this review, we mapped the studies available in the literature and the methods they used to assess, measure, or classify the ambivalence of human participants towards food and diet-related attitude objects. Among the characteristics of the literature we were able to identify using our search strategy, the growth in the number of studies published between 2001 and 2005, and after 2011, when compared to the number of publications before 2001, suggests a growing interest in understanding the ambivalent attitudes of individuals towards food and diet-related objects among the scientific community. This is likely related to the growing awareness that poor dietary behaviors are one of the main culprits for increasing the risk of non-communicable chronic

diseases and are considered a cause of millions of deaths every year <sup>85</sup> and that eliciting behavioral change among clients who are reluctant, ambivalent, and not motivated to change is a major challenge for healthcare professionals <sup>86</sup>, making identifying and addressing ambivalence an important skill for clinicians when helping clients to change <sup>87</sup>.

Our findings also provide examples of objects of attitude commonly employed when assessing ambivalence towards food and diet. The ones most frequently used in studies included in this review were chocolate, fast foods, desserts, and sweets, which tend to be highly palatable and tempting foods often labeled as “forbidden” by dieters <sup>88,89</sup>, making them interesting attitude objects when trying to elicit conflicting evaluations from participants. Similarly, beef or red meat are also good examples of attitude objects associated with competing evaluations, as people who eat an omnivorous diet often experience conflicting positive and negative attitudes regarding the enjoyment and nutritional value of meat-based products and the ethical implications of killing animals for food <sup>90</sup> and the harmful effects of excessive meat consumption to both human health and the environment <sup>91</sup>. Additionally, included studies also frequently employed healthy foods and dietary behaviors that are considered beneficial to human health, such as fruits and vegetables and eating a low-fat diet - although most current guidelines focus on reducing saturated fat, rather than eating an overall low-fat diet <sup>92</sup> -, which are also commonly associated with positive and negative evaluations, such as being healthy and beneficial, but also time-consuming to prepare or not as flavorful as foods higher in fat, sugar, and calories <sup>93</sup>. These findings suggest that authors of studies included in this review often picked foods and eating behaviors that were most likely to elicit ambivalence from participants due to cultural, ethical, and health-related aspects.

The definitions of ambivalence provided by authors of studies included in this review were largely consistent, and a recurrent topic was the contrast between types of ambivalence as separate constructs. Particularly, distinguishing between potential and felt ambivalence has been argued by Armitage and Arden <sup>52</sup> as important to understanding that even when individuals possess competing evaluations towards an attitude object (potential ambivalence), they might not be aware of it or experiencing the conflicting feelings that arise when facing the pros and cons of a given behavior (felt

ambivalence). The authors provide evidence that these are separate constructs by showing that there's only a moderate correlation between people's potential and felt ambivalence towards eating a low-fat diet when in the pre-contemplation, contemplation, and preparation stages of change <sup>94</sup>, which increase during the action and maintenance phases, suggesting that becoming aware of one's ambivalence toward a behavior (i.e., translating potential ambivalence into felt ambivalence) might be necessary in order to resolve it and change behaviors.

Although extracting data regarding psychometric properties is not part of the purpose of a scoping review, we identified that the majority of included studies didn't report or cite any information on the psychometric properties of the scales they employed, or only provided data on internal consistency. Considering how important it is to use valid and reliable measures when conducting behavioral research <sup>95</sup>, we believe it would be important for future studies to assess the validity and reliability of such scales. For instance, future studies could explore in more detail the convergent validity of measures of potential and felt ambivalence included in this review and the divergent validity between them <sup>96</sup>. Similarly, a systematic review and meta-analysis of psychometric properties of scales used to assess, measure, and classify ambivalence would be of great contribution in the future.

### **Strengths and limitations of the review**

This scoping review has a number of strengths that reinforced its ability to properly map and characterize the literature on methods to assess the ambivalence towards food and diet. For instance, the inclusion of sources of evidence regardless of publication dates or sociodemographic characteristics of study participants made it broad enough to scope a considerable number of studies that were peer-reviewed and ended up being included in this review. The multidisciplinary composition of the international team of researchers responsible for this scoping review, which included practicing dietitians, nurses, and a psychologist, plus professionals trained in both motivational communication and motivational interviewing, as well as specialists in behavioral science and systematic reviews, allowed for a combination of familiarity with the topic of ambivalence and human eating behavior and expertise in conducting knowledge synthesis studies.

At the same time, there are several limitations to this scoping review. The lack of resources to consider studies in languages other than English, French, Portuguese, and Spanish could have resulted in leaving relevant studies out of this scoping review. Similarly, there could have been relevant studies that were only retrievable from databases other than the six included in this review. On top of it, although the literature mentions qualitative methods to assess ambivalence based on interviews, none were identified in this review, which could either mean that these haven't been used in studies retrievable from the databases included in this review to assess ambivalence towards food and diet-related attitude objects, or that our search strategy somehow favored quantitative methods.

### **Conclusion**

Although there isn't a consensus about the best way to assess ambivalence, we identified 16 methods and tools available in the literature to assess different types of ambivalence, which appear to refer to a collection of different constructs. The most frequently employed methods across the literature identified in this review were the Griffin Index, the Subjective Ambivalence Questionnaire, and the Orientation to Chocolate Questionnaire. Ultimately, this scoping review mapped studies that employed such tools and methods to assess ambivalence towards food and diet that were either exclusive towards food and diet-related attitude objects or applicable in a variety of contexts, providing researchers with an array of interesting options to choose from when planning to assess, measure, or classify the ambivalence of study participants.

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## Appendix I: Search strategy

PubMed (MEDLINE)		
	Strategy	Results
1	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings")	6,638
2	((((((Eating[MeSH Terms]) OR (Eating[Title/Abstract] OR "Food Intake"[Title/Abstract] OR "Intake, Food"[Title/Abstract] OR Ingestion[Title/Abstract])) OR ((Food[MeSH Terms]) OR (Food[Title/Abstract] OR Foods[Title/Abstract])))) OR ((Diet[MeSH Terms]) OR (Diet[Title/Abstract] OR Diets[Title/Abstract])))) OR ((Feeding Behavior[MeSH Terms]) OR ("Feeding Behavior"[Title/Abstract] OR "Behavior, Feeding"[Title/Abstract] OR "Behaviors, Feeding"[Title/Abstract] OR "Feeding Behaviors"[Title/Abstract] OR "Eating Behavior"[Title/Abstract] OR "Behavior, Eating"[Title/Abstract] OR "Behaviors, Eating"[Title/Abstract] OR "Eating Behaviors"[Title/Abstract] OR "Feeding Patterns"[Title/Abstract] OR "Feeding Pattern"[Title/Abstract] OR "Pattern, Feeding"[Title/Abstract] OR "Patterns, Feeding"[Title/Abstract] OR "Food Habits"[Title/Abstract] OR "Food Habit"[Title/Abstract] OR "Habit, Food"[Title/Abstract] OR "Habits, Food"[Title/Abstract] OR "Eating Habits"[Title/Abstract] OR "Eating Habit"[Title/Abstract] OR "Habit, Eating"[Title/Abstract] OR "Habits, Eating"[Title/Abstract] OR "Dietary Habits"[Title/Abstract] OR "Dietary Habit"[Title/Abstract] OR "Habit, Dietary"[Title/Abstract] OR "Habits, Dietary"[Title/Abstract] OR "Diet Habits"[Title/Abstract] OR "Diet Habit"[Title/Abstract] OR "Habit, Diet"[Title/Abstract] OR "Habits, Diet"[Title/Abstract])))) OR ((Beverages[MeSH Terms]) OR (Beverages[Title/Abstract] OR Beverage[Title/Abstract]))))	1,483,076
1 AND 2	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings") AND (((((((Eating[MeSH Terms]) OR (Eating[Title/Abstract] OR "Food Intake"[Title/Abstract] OR "Intake, Food"[Title/Abstract] OR Ingestion[Title/Abstract])) OR ((Food[MeSH Terms]) OR (Food[Title/Abstract] OR Foods[Title/Abstract])))) OR ((Diet[MeSH Terms]) OR (Diet[Title/Abstract] OR Diets[Title/Abstract])))) OR ((Feeding Behavior[MeSH Terms]) OR ("Feeding Behavior"[Title/Abstract] OR "Behavior, Feeding"[Title/Abstract] OR "Behaviors, Feeding"[Title/Abstract] OR "Feeding Behaviors"[Title/Abstract] OR "Eating Behavior"[Title/Abstract] OR "Behavior, Eating"[Title/Abstract] OR "Behaviors, Eating"[Title/Abstract] OR "Eating Behaviors"[Title/Abstract] OR "Feeding Patterns"[Title/Abstract] OR "Feeding Pattern"[Title/Abstract] OR "Pattern, Feeding"[Title/Abstract] OR "Patterns, Feeding"[Title/Abstract] OR "Food Habits"[Title/Abstract] OR "Food Habit"[Title/Abstract] OR "Habit, Food"[Title/Abstract] OR "Habits, Food"[Title/Abstract] OR "Eating Habits"[Title/Abstract] OR "Eating Habit"[Title/Abstract] OR "Habit, Eating"[Title/Abstract] OR "Habits, Eating"[Title/Abstract] OR "Dietary Habits"[Title/Abstract] OR "Dietary Habit"[Title/Abstract] OR "Habit, Dietary"[Title/Abstract] OR "Habits, Dietary"[Title/Abstract] OR "Diet Habits"[Title/Abstract] OR "Diet Habit"[Title/Abstract] OR "Habit, Diet"[Title/Abstract] OR "Habits, Diet"[Title/Abstract])))) OR ((Beverages[MeSH Terms]) OR (Beverages[Title/Abstract] OR Beverage[Title/Abstract]))))	352



	Pattern"[Title/Abstract] OR "Pattern, Feeding"[Title/Abstract] OR "Patterns, Feeding"[Title/Abstract] OR "Food Habits"[Title/Abstract] OR "Food Habit"[Title/Abstract] OR "Habit, Food"[Title/Abstract] OR "Habits, Food"[Title/Abstract] OR "Eating Habits"[Title/Abstract] OR "Eating Habit"[Title/Abstract] OR "Habit, Eating"[Title/Abstract] OR "Habits, Eating"[Title/Abstract] OR "Dietary Habits"[Title/Abstract] OR "Dietary Habit"[Title/Abstract] OR "Habit, Dietary"[Title/Abstract] OR "Habits, Dietary"[Title/Abstract] OR "Diet Habits"[Title/Abstract] OR "Diet Habit"[Title/Abstract] OR "Habit, Diet"[Title/Abstract] OR "Habits, Diet"[Title/Abstract])) OR ((Beverages[MeSH Terms]) OR (Beverages[Title/Abstract] OR Beverage[Title/Abstract]))	
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PsycInfo		
	Strategy	Results
1	((Any Field: (Ambivalence) OR Any Field: (Ambivalent) OR Any Field: ("Attitudinal ambivalence") OR Any Field: ("Felt ambivalence") OR Any Field: ("Motivational ambivalence") OR Any Field: ("Mixed feelings")))	12,443
2	((Any Field: (Eating) OR Any Field: ("Food Intake") OR Any Field: ("Intake, Food") OR Any Field: (Ingestion)) OR (Any Field: (Food) OR Any Field: (Foods)) OR (Any Field: (Diet) OR Any Field: (Diets)) OR (Any Field: ("Feeding Behavior") OR Any Field: ("Behavior, Feeding") OR Any Field: ("Behaviors, Feeding") OR Any Field: ("Feeding Behaviors") OR Any Field: ("Eating Behavior") OR Any Field: ("Behavior, Eating") OR Any Field: ("Behaviors, Eating") OR Any Field: ("Eating Behaviors") OR Any Field: ("Feeding Patterns") OR Any Field: ("Feeding Pattern") OR Any Field: ("Pattern, Feeding") OR Any Field: ("Patterns, Feeding") OR Any Field: ("Food Habits") OR Any Field: ("Food Habit") OR Any Field: ("Habit, Food") OR Any Field: ("Habits, Food") OR Any Field: ("Eating Habits") OR Any Field: ("Eating Habit") OR Any Field: ("Habit, Eating") OR Any Field: ("Habits, Eating") OR Any Field: ("Dietary Habits") OR Any Field: ("Dietary Habit") OR Any Field: ("Habit, Dietary") OR Any Field: ("Habits, Dietary") OR Any Field: ("Diet Habits") OR Any Field: ("Diet Habit") OR Any Field: ("Habit, Diet") OR Any Field: ("Habits, Diet")) OR (Any Field: (Beverages) OR Any Field: (Beverage)))	177,522

1 AND 2	((Any Field: (Eating) OR Any Field: ("Food Intake") OR Any Field: ("Intake, Food") OR Any Field: (Ingestion)) OR (Any Field: (Food) OR Any Field: (Foods)) OR (Any Field: (Diet) OR Any Field: (Diets)) OR (Any Field: ("Feeding Behavior") OR Any Field: ("Behavior, Feeding") OR Any Field: ("Behaviors, Feeding") OR Any Field: ("Feeding Behaviors") OR Any Field: ("Eating Behavior") OR Any Field: ("Behavior, Eating") OR Any Field: ("Behaviors, Eating") OR Any Field: ("Eating Behaviors") OR Any Field: ("Feeding Patterns") OR Any Field: ("Feeding Pattern") OR Any Field: ("Pattern, Feeding") OR Any Field: ("Patterns, Feeding") OR Any Field: ("Food Habits") OR Any Field: ("Food Habit") OR Any Field: ("Habit, Food") OR Any Field: ("Habits, Food") OR Any Field: ("Eating Habits") OR Any Field: ("Eating Habit") OR Any Field: ("Habit, Eating") OR Any Field: ("Habits, Eating") OR Any Field: ("Dietary Habits") OR Any Field: ("Dietary Habit") OR Any Field: ("Habit, Dietary") OR Any Field: ("Habits, Dietary") OR Any Field: ("Diet Habits") OR Any Field: ("Diet Habit") OR Any Field: ("Habit, Diet") OR Any Field: ("Habits, Diet")) OR (Any Field: (Beverages) OR Any Field: (Beverage))) AND ((Any Field: (Ambivalence) OR Any Field: (Ambivalent) OR Any Field: ("Attitudinal ambivalence") OR Any Field: ("Felt ambivalence") OR Any Field: ("Motivational ambivalence") OR Any Field: ("Mixed feelings"))))	487
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Web of Science		
	Strategy	Results
1	Todos os campos: (Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings") Índices=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Tempo estipulado=Todos os anos	21,354
2	TÓPICO: (Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR TÓPICO: (Food OR Foods) OR TÓPICO: (Diet OR Diets) OR TÓPICO: ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR TÓPICO: (Beverages OR Beverage) Índices=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Tempo estipulado=Todos os anos	1,415,611

1 AND 2	<p>Todos os campos: (Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings")</p> <p>Índices=SCI-EXPANDED, SSCI, A&amp;HCI, CPCI-S, CPCI-SSH, ESCI Tempo</p> <p>estipulado=Todos os anos AND TÓPICO: (Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR TÓPICO: (Food OR Foods) OR TÓPICO: (Diet OR Diets) OR TÓPICO: ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR TÓPICO: (Beverages OR Beverage)</p> <p>Índices=SCI-EXPANDED, SSCI, A&amp;HCI, CPCI-S, CPCI-SSH, ESCI Tempo</p> <p>estipulado=Todos os anos</p>	595
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	EBSCOHOST - Cinahl	Results
1	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings")	3536
2	((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	327,893
1 AND 2	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings") AND ((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	173

	Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	
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	EBSCOHOST - FSTA	Results
1	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings")	132
2	((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	1,179,571
1 AND 2	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings") AND ((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	126

	EBSCOHOST - CAPES FSTA (additional collection as part of the FSTA database)	Results
1	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings")	494
2	((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR	869,37

	"Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	
1 AND 2	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings") AND ((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	123

	EBSCOHOST - Food Sciences Source	Results
1	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings")	490
2	((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	905,296
1 AND 2	(Ambivalence OR Ambivalent OR "Attitudinal ambivalence" OR "Felt ambivalence" OR "Motivational ambivalence" OR "Mixed feelings") AND ((Eating OR "Food Intake" OR "Intake, Food" OR Ingestion) OR (Food OR Foods) OR (Diet OR Diets) OR ("Feeding Behavior" OR "Behavior, Feeding" OR "Behaviors, Feeding" OR "Feeding Behaviors" OR "Eating Behavior" OR "Behavior, Eating" OR "Behaviors, Eating" OR "Eating Behaviors" OR "Feeding Patterns" OR "Feeding Pattern" OR "Pattern, Feeding" OR "Patterns, Feeding" OR "Food Habits" OR "Food Habit" OR "Habit, Food" OR "Habits, Food" OR "Eating Habits" OR "Eating Habit" OR "Habit, Eating" OR "Habits, Eating" OR "Dietary Habits" OR "Dietary Habit" OR "Habit, Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	124

	Dietary" OR "Habits, Dietary" OR "Diet Habits" OR "Diet Habit" OR "Habit, Diet" OR "Habits, Diet") OR (Beverages OR Beverage))	
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## Appendix II: Studies ineligible following full-text review

1. Ahlich E, Verzijl CL, Simon JA, Schlauch RC, Rancourt D. Support for a two-dimensional model of food craving using self-report questionnaire and cue-reactivity methodologies. *Int J Eat Disord*. 2020 Sep;53(9):1439–49.

*Reason for exclusion:* does not assess, measure, or classify ambivalence

2. Bachelin G. [Attitudes of man in relation to milk consumption [France; milk consumers, inquiry]]. [French]. *Revue Laitiere Francaise*. 1980

*Reason for exclusion:* does not assess, measure, or classify ambivalence

3. Bart A. Students' nutrition orientations: differences according to gender and subject of study. *Ernährungs Umschau Int*. 2015;62:120–7.

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### **Appendix III: Data extraction tool**

<b>Scoping review details</b>
Scoping review title:
Review objectives:
Review question/s:
<b>Inclusion/Exclusion Criteria</b>

Population:
Concept:
Context:
Types of evidence source:
<b>Evidence source Details and Characteristics</b>
Citation details (e.g., author/s, date, title, journal, volume, issue, pages):
Country:
Context:
Participants (details e.g., age/sex and number):
<b>Details/Results extracted from source of evidence</b> (in relation to the concept of the scoping review)
Study aims associated with ambivalence:
Definition of ambivalence used by the authors:
Object of attitude:
Description of methods used to assess ambivalence:
Whether the authors assessed validity and reliability of the method:
Main findings related to the review question:

## DISCUSSÃO GERAL

O presente trabalho evidencia o crescimento durante as últimas duas décadas no estudo da ambivalência em relação à comida e à alimentação, conforme demonstrado pelo aumento no número de publicações sobre o tema após 2011. O interesse nesse tema é possivelmente um reflexo do acúmulo de evidências e recomendações que apontam para a importância de levar a ambivalência em conta como parte do processo de mudança comportamental <sup>32,33</sup>, em especial visto que a mudança de comportamentos alimentares é essencial para a prevenção e manejo de doenças crônicas não transmissíveis, cada vez mais comuns em nossa sociedade <sup>34</sup>.

Outro ponto importante trazido por esta revisão de escopo é a variedade de definições de ambivalência existentes na literatura - a ambivalência potencial (também chamada de ambivalência objetiva ou ambivalência estrutural), a ambivalência sentida (também chamada de ambivalência subjetiva ou vivenciada) e a ambivalência cognitiva-afetiva (ou afetiva-cognitiva) <sup>35,36</sup>. É interessante observar que tais tipos de ambivalência não somente são discriminados entre si por autores com base em sua natureza, como também dispõem de metodologias diferentes para serem avaliados e correspondem a construtos diferentes. Isso é evidenciado pelo estudo de Armitage e Arden <sup>37</sup>, que demonstraram que há apenas uma correlação moderada entre a ambivalência potencial e a ambivalência sentida nos diferentes estágios de mudança propostos pelo modelo transteórico de mudança comportamental <sup>38</sup>. Armitage e Arden, sob uma ótica da entrevista motivacional, propõem que o aconselhamento para mudança comportamental pode ajudar pacientes a refletir sobre sua ambivalência potencial (presença de atitudes positivas e negativas em relação ao objeto de atitude em questão) em relação a um comportamento (como, no caso, consumir uma dieta baixa em gordura), de modo a tornar-se consciente do conflito existente entre tais atitudes, aumentando sua ambivalência sentida, que poderá ser trabalhada e manejada, e resolvida, permitindo que o paciente aumente suas intenções de aderir ao comportamento desejado e avance nos estágios de mudança.

A variedade de métodos identificados nesta revisão para a avaliação da ambivalência em relação à comida e à dieta, capazes de diferenciar entre a ambivalência

potencial, a ambivalência sentida e a ambivalência cognitiva-afetiva, oferecem, portanto, uma riqueza de oportunidades para pesquisas futuras. Por exemplo, pesquisas para avaliar suas propriedades psicométricas ou para compreender como as diferentes formas de ambivalência estão associadas às dificuldades em mudar comportamentos alimentares e como resolver essa ambivalência por meio de intervenções para a promoção da alimentação saudável.

## **CONCLUSÃO**

Os resultados apresentados pelo presente estudo oferecem um mapeamento das ferramentas disponíveis na literatura científica para a avaliação, mensuração e classificação da ambivalência de indivíduos perante a objetos de atitudes relacionados à comida e a dieta. Os métodos mais frequentemente empregados nos estudos incluídos nesta revisão foram o Índice de Griffin, o Subjective Ambivalence Questionnaire e o Orientation Towards Chocolate Questionnaire. Apesar de não haver um consenso quanto a forma de avaliar a ambivalência, as ferramentas oferecidas por esta revisão de escopo e suas características poderão auxiliar pesquisadores a tomar decisões acerca de quais métodos adotar ao avaliar a ambivalência.

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