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Proposal of two facial scales using emojis as tools to understand emotions in research with Brazilian consumers

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ABSTRACT. Emojis are used in digital communication to express feelings and emotions and are commonly used on social media platforms. Research aiming to interpret the meaning of facial emojis is needed and should consider differences among several characteristics as the cultural aspects across different countries. This study aimed to assess the meaning of emojis by Brazilians and create two facial scales that can be used in later research with applications of emojis in consumer studies and sensory analysis of food and beverages. The associations between emotions and emojis were evaluated by 132 participants from Brazil using 39 descriptive terms and 33 facial emojis through a modified Check-All-That-Apply (CATA) questionnaire. The overall average of emoji associations for each CATA term varied from 1.1 to 4.3, demonstrating that the associations varied a lot, depending on the emotion. In this way, it was possible to obtain a group of emotions with a strong association with one emoji (*n*=15); a second group with a strong association with more than one emoji (*n*=8), and; a third group with weak associations (*n*=16). The emojis from the first and second groups were used to make a chart with 14 emojis to be used in consumer research with Brazilian consumers and also a 5-point facial scale of intensity to be used in sensory analysis with food and beverages.

Keywords: Non-verbal communication; check-all-that-apply (CATA); social media; sensory analysis; emotion measurement; emoticons

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Introduction

Information and communication technologies have advanced a lot in the last years, and as technology advances, new terminologies have been inserted into the market. Therefore, almost every person has a smartphone in hand and uses several applications to communicate, manage money, purchase products, express emotions, feelings, and other activities. In this context, emojis have grown in popularity as a method for digital communication. Emojis are small icons used in digital communication to express feelings and emotions (Kaye, Malone, & Wall, 2017) that are commonly used on social media platforms and smartphones worldwide (Lu et al., 2016; Sick, Spinelli, Dinnella, & Monteleone, 2020).

Researchers have been investigating the use of emojis as a method for assessing affective and emotional responses about food and eating occasions (Vidal, Ares, & Jaeger, 2016; Jaeger, Lee, Kim, Chheang, Jin, & Ares, 2017a; Swaney-Stueve, Jepsen, & Deubler, 2018; Lima, Alcantara, Martins, Ares, & Deliza, 2019). These studies claimed that emoji scales could be a source for collecting responses about food products and validated the idea that consumers use emojis to express their food-related emotions (Vidal et al., 2016). Jaeger, Vidal, Kam, and Ares (2017) found that emojis terms can be used to discriminate stimuli and groups of consumers during CATA tests, expressing perceptions about food products. Swaney-Stueve et al. (2018) related the emoji scale's suitability for measuring emotional response using verbal stimuli names with North American children aged between 8–11 and indicate it is a reasonable alternative to the Peryam and Kroll scale for this demographic. However, according to Jaeger and Ares (2017), it is essential to study the most common meaning associated with emojis to understand the dominant meanings.

Sick et al. (2020) noted that the number of selected emojis varied across evoked eating contexts eliciting different foods. Moreover, age and gender significantly affected emoji selection across and within foods obtained by varied eating contexts. Jones, Wurm, Norville, and Mullins (2020) demonstrated that women reported greater overall use of emojis and had higher familiarity ratings than man; also, women rated the negative emojis as more negative than did the men, demonstrating that familiarity, and valence are an

important consideration in the selection of emojis for scientific studies. Therefore, research aiming to interpret the meaning of facial emojis is needed and should consider differences among several personal characteristics as the cultural aspects across different countries.

Thus, this study aimed to assess the meaning of emojis by Brazilians, creating a database that can be used in later research with applications of emojis in studies with consumers and sensory research with food and beverages.

Material and methods

Participants demographics

A total of 132 participants from Brazil (72% women and 28% men) took part in the study from February to April 2020. Most consumers (62%) were aged between 20 and 30 y; 16,7% between 31 and 40 y; 6,8% between 41 and 50 y; 7,6% between 18 and 20 y and 3,8% older than 51 y. Participants were recruited online, using social media, and the questionnaire was elaborated using the interface Google Forms®. Most of them (87,1%) used smartphones to answer the survey, and 12,9% used a computer. All interventions with consumers were carried out online and were previously approved by the Research Ethics Committee of the Federal University of São João del-Rei (CAAE: 26716819.7.0000.5151).

Elaboration of the modified CATA questionnaire and data collection

The associations between emotions and emojis were evaluated using 39 descriptive terms (Table 1) and 33 facial emojis based on the study of Jaeger and Ares (2017). Each CATA term was presented monadically for each participant, accompanied by a chart with the 33 facial emojis (Figure 1). Participants were then instructed to look at the CATA term and check in the boxes the numbers of each emoji that they considered appropriated to describe it. The presentation order of the emojis was randomized. The WhatsApp version (2.19.352) of emoji was used, obtained from www.emojipedia.com. CATA terms as well as the whole questionnaire was translated to Portuguese. As a cut-off point, only the emojis used by 25% or more of the participants are considered for the study. A limit of 3 emojis with the highest associations with each CATA term was shown in Table 1.

Participants were also asked to answer questions related to the use of emojis, such as the frequency of using them in conversations; the situations that they use emojis most (at work, with family, with friends, among others); the types of devices that they use emojis most; which operating system was used most and in which social networks they use emojis most to express emotions. The time to complete the survey was approximately 35 min.

Table 1. Frequency of use (%) of emojis used by Brazilian consumers to represent 39 CATA terms related to emotions.

CATA term	Emojis used by consumers and frequency[1]	Emoji name[2]	Emoji meaning according to Emojipedia
Angry	(92.4%)	Angry face	Anger, irritation
	(37.1%)	Confounded face	Irritation, frustration, disgust, sadness
Bad	(72.0%)	Angry face	Anger, irritation
Bored	(31.8%)	Expressionless face	Frustration, annoyance
Confused	(34.8%)	Unamused face	Irritation, displeasure, grumpiness
	(25.8%)	Weary face	Frustration, sadness
Cool	(37.1%)	Grinning face	Pleasure, cheer
	(34.8%)	Winking face with tongue	Fun, excitement, wackiness, joking
	(28.8%)	Beaming face with smiling eyes	Radiant, gratified happiness

Deceitful	 (47.0%)	Smirking face	Convey flirtation, sexual innuendo
Depressed	 (58.3%)	Pensive face	Sad emotions, disappointed, hurt, lonely
	 (56.1%)	Disappointed face	Disappointment, grief, stress, regret, remorse.
	 (42.4%)	Crying face	Sadness, pain
Disappointed	 (40.9%)	Pensive face	Sad emotions, disappointed, hurt, lonely
	 (34.1%)	Downcast face with sweat	Sadness, pain, frustration, disappointment
	 (32.6%)	Disappointed face	Disappointment, grief, stress, regret, remorse
Disbelief	Association fewer than 25%		
Disgust/Dislike	 (59.8%)	Confounded face	Irritation, frustration, disgust, sadness
	 (28.8%)	Persevering face	Frustration, sadness, helplessness
Embarrassed/Shy	 (57.6%)	Smiling face	Love, happiness, gratitude
	 (49.2%)	Smiling face with smiling eyes	Genuine happiness and warm, positive feelings
	 (47.0%)	Flushed face	Embarrassment, flattery, surprise, disbelief, admiration, affection
Excited	 (51.5%)	Grinning face with smiling eyes	Happiness, good-natured
	 (50.0%)	Beaming face with smiling eyes	Radiant, gratified happiness
	 (44.7%)	Grinning face	Pleasure, cheer
Flirty	 (56.8%)	Smirking face	Flirtation or sexual innuendo
	 (36.4%)	Smiling face with heart-eyes	Feelings of love, infatuation, adoration
	 (31.8%)	Face blowing a kiss	A kiss goodbye, good night, feelings of love and affection
Frustrated	 (28.8%)	Weary face	Frustration, sadness, amusement
	 (28.0%)	Tired face	Frustration, sadness
	 (25.0%)	Downcast face with sweat	Sadness, pain, frustration, disappointment
Fun	 (54.5%)	Winking face with tongue	Fun, excitement, wackiness, buffoonery
	 (36.4%)	Face with tears of joy	Funny, pleasing
	 (34.1%)	Squinting face with tongue	Fun, excitement, playfulness, hilarity, happiness
Good	 (48.5%)	Smiling face with smiling eyes	Happiness and warm, positive feelings
	 (31.8%)	Smiling face	Love, happiness, gratitude
Satisfied	 (73.5%)	Beaming face with smiling eyes	Radiant, gratified happiness
	 (64.4%)	Grinning face	Pleasure, cheer
	 (60.6%)	Smiling face with smiling eyes	Happiness and warm, positive feelings

Sorrow/Distress	 (65.2%)	Loudly crying face	Inconsolable grief, uncontrollable laughter, overwhelming joy
	 (54.5%)	Crying face	Sadness, pain
	 (50.8%)	Pensive face	Sad emotions, disappointed, hurt, lonely
Happy	 (78.8%)	Grinning face with Smiling eyes	Happiness, good-natured
	 (65.2%)	Beaming face with smiling eyes	Radiant, gratified happiness
	 (43.2%)	Grinning face	Pleasure, cheer
Ironic/Sarcastic	 (36.4%)	Smirking face	Flirtation, sexual innuendo
Joking	 (66.7%)	Winking face with tongue	Fun, excitement, wackiness, buffoonery, joking
	 (50.8%)	Squinting face with tongue	Fun, excitement, playfulness, hilarity, and happiness
	 (40.2%)	Face with tongue	Fun, excitement, silliness, cuteness, happiness, jesting
Just ok	Association fewer than 25%		
Not happy, Not sad	 (62.1%)	Neutral face	Neutral sentiment, irritation, concern , a deadpan sense of humor
	 (30.3%)	Expressionless face	Frustration, annoyance
Love	 (97.7%)	Smiling face with heart-eyes	Love, infatuation, adoration
	 (49.2%)	Face blowing a kiss	A kiss goodbye, good night, feelings of love and affection
Mad/Crazy	 (55.3%)	Winking face with tongue	Fun, excitement, wackiness, buffoonery, joking
	 (37.9%)	Squinting face with tongue	Fun, excitement, playfulness, hilarity, happiness
Naughty	 (34.1%)	Winking face with tongue	Fun, excitement, wackiness, buffoonery, joking
	 (26.5%)	Squinting face with tongue	Fun, excitement, playfulness, hilarity, happiness
Nervous	 (32.6%)	Confounded face	Irritation, frustration, disgust, sadness
	 (29.5%)	Angry face	Anger, irritation
	 (28.0%)	Weary face	Frustration, sadness, amusement, affection
Neutral	 (63.6%)	Neutral face	Neutral sentiment, irritation, concern, a deadpan sense of humor
	 (41.7%)	Expressionless face	Frustration, annoyance
No comments	 (38.6%)	Expressionless face	Frustration, annoyance
	 (37.9%)	Neutral face	Neutral sentiment, irritation, concern, a deadpan sense of humor
	 (25.8%)	Unamused face	Irritation, displeasure, grumpiness
Pleasure	 (28.8%)	Smirking face	Flirtation, sexual innuendo
	 (25.0%)	Smiling face with smiling eyes	Genuine happiness and warm, positive feelings
Relaxed/Calm	 (62.1%)	Relieved face	Contentment, calm, peace and relief, happiness, good-natured humor

Sad	(62.9%)	Pensive face	Sad emotions, disappointed, hurt, lonely
	(55.3%)	Disappointed face	Disappointment, grief, stress, regret, remorse
	(50.0%)	Crying face	Sadness, pain
Scared/Afraid	(64.4%)	Face screaming in fear	Shock, awe, disbelief, intense excitement
	(50.0%)	Flushed face	Embarrassment, flattery, surprise, disbelief, admiration, affection, excitement
Sleepy	(95.5%)	Sleeping face	Sleep, sleepiness
Stressed	(57.6%)	Angry face	Anger, irritation
	(33.3%)	Confounded face	Irritation, frustration, disgust, sadness
Surprised	(87.9%)	Face screaming in fear	Shock, awe, disbelief, intense excitement
	(44.7%)	Flushed face	Embarrassment, flattery, surprise, disbelief, admiration, affection, excitement
Tired/Exhausted	(51.5%)	Weary face	Frustration, sadness, amusement
	(31.3%)	Tired face	Frustration, sadness
	(26.5%)	Downcast face with sweat	Sadness, pain, frustration, disappointment
	(25.0%)	Persevering face	Frustration, sadness, helplessness, struggle
Unsure	(33.3%)	Grimacing face	Nervousness, embarrassment, awkwardness
Worried	(25.0%)	Flushed face	Embarrassment, flattery, surprise, disbelief, admiration, affection, excitement
	(25.0%)	Grimacing face	Nervousness, embarrassment, awkwardness

[1]WhatsApp version (2.19.352) [2]Description of each emoji was obtained from www.emojipedia.com.

Figure 1. Chart of WhatsApp emoji used in the survey. Participants were instructed to check the corresponding numbers of each emoji that they considered appropriated to describe each CATA term in the boxes.

Data analysis

The descriptive statistic was used to obtain the frequency (%) of the association between 39 CATA terms and emojis. For this, the number of people that selected each emoji was divided by the number of participants (*n*=132). Data were evaluated by Cochran's Q test, multiple pairwise comparisons using the Chi-square test with a significance level of 0.05, and correspondence analysis using XLSTAT, Version 2017.4 (Addinsoft, New York, USA).

Proposal of emoji scales

Two facial charts were proposed for consumer surveys, based on Swaney-Stueve et al. (2018). A chart with 14 emojis with strong associations (> 50% of the participants) with emotion and the second chart is a 5-point facial scale of intensity, to be used in sensory analysis of food and beverages.

Results

Participants information related to the use of emojis

The operating systems most used by the participants are Android (74.2%) and IOS (26.5%), while Microsoft Windows (15.9%) and Windows Phone (1.5%) were less used. The most used social networks are WhatsApp (99.2%), Instagram (91.7%), Facebook (82.6%), Facebook Messenger (60.6%), Youtube (59.1%), Linkedin (47.0%), Skype (33.3%), Pinterest (31.1%), Twitter (28.8%) and Snapchat (22.7%). Other networks were mentioned less frequently (<20%), such as ResearchGate, Discord, Tik Tok, Telegram, and others.

All the participants (100%) stated that they use emojis on Whatsapp, while 68.2% use them on Instagram, 44.7% on Facebook, 43.2% on Facebook Messenger. The other networks were mentioned less frequently (fewer than 20%). In professional social networks, such as Linkedin and ReserchGate, fewer than 2% of the participants use emojis, demonstrating a more formal posture.

Associations between each emotion and emojis

The overall average of emoji associations for each CATA term was 2.1, demonstrating that the participants were limited to scoring about two emojis for each emotion. However, this average varied a lot, depending on the CATA term. For example, the emotion "sleepy" had an average of 1.1 association, being strongly associated (95.5%) only with the sleeping face emoji (😴). In contrast, the term "happy" was associated with 4.3 emojis on average and related to the emojis grinning face with smiling eyes 😄 (78.8%), beaming face with smiling eyes 😁 (65.2%), and grinning face 😁 (43.2%). Table 1 shows the main associations made by Brazilian participants for CATA terms and emojis. A cut-off value of 25% of the association was used, and a limit of 3 emojis with the highest associations to each CATA term was shown in Table 1.

CATA data and proposal of two facial scales

From the 39 CATA terms, it was possible to obtain three groups of associations between emotions and emojis: i) emotions with a strong association (> 50%) to one emoji (*n*=15); ii) emotions with a strong association (>50%) to more than one emoji (*n*= 8) and; iii) emotions with weak associations (< 50%) with emojis (*n*=16). Figure 2 shows the correspondence analysis with the associations between each CATA term (emotions) with the emojis.

The emojis from the first and second groups were selected to develop the facial chart presented in Figure 3. The proposed chart has only 14 emojis because some emotions were strongly associated with the same emoji, such as the terms "angry," "bad," and "stressed" that were associated with the angry face emoji (😠). The terms "fun," "joking," and "mad/crazy" were associated with the winking face with tongue emoji (😜). Also, the terms "not happy/not sad" and "neutral" had the same association with the emoji neutral face (😐). It can be noted that, although the same emoji was associated with more than one emotion, the meanings were very similar.

Regarding the second group, it was composed of the following emotions: "depressed", "excited", "sorrow/distress", "happy", "joking", "sad", "satisfied", and "scared/afraid". These emotions were strongly

related to more than one emoji, as can be seen in Table 1, and only the emoji with higher frequency checked by consumers were included in the proposed chart (Figure 3). Table 2 shows all emojis from the first and second groups with their respective associations by Brazilian consumers.

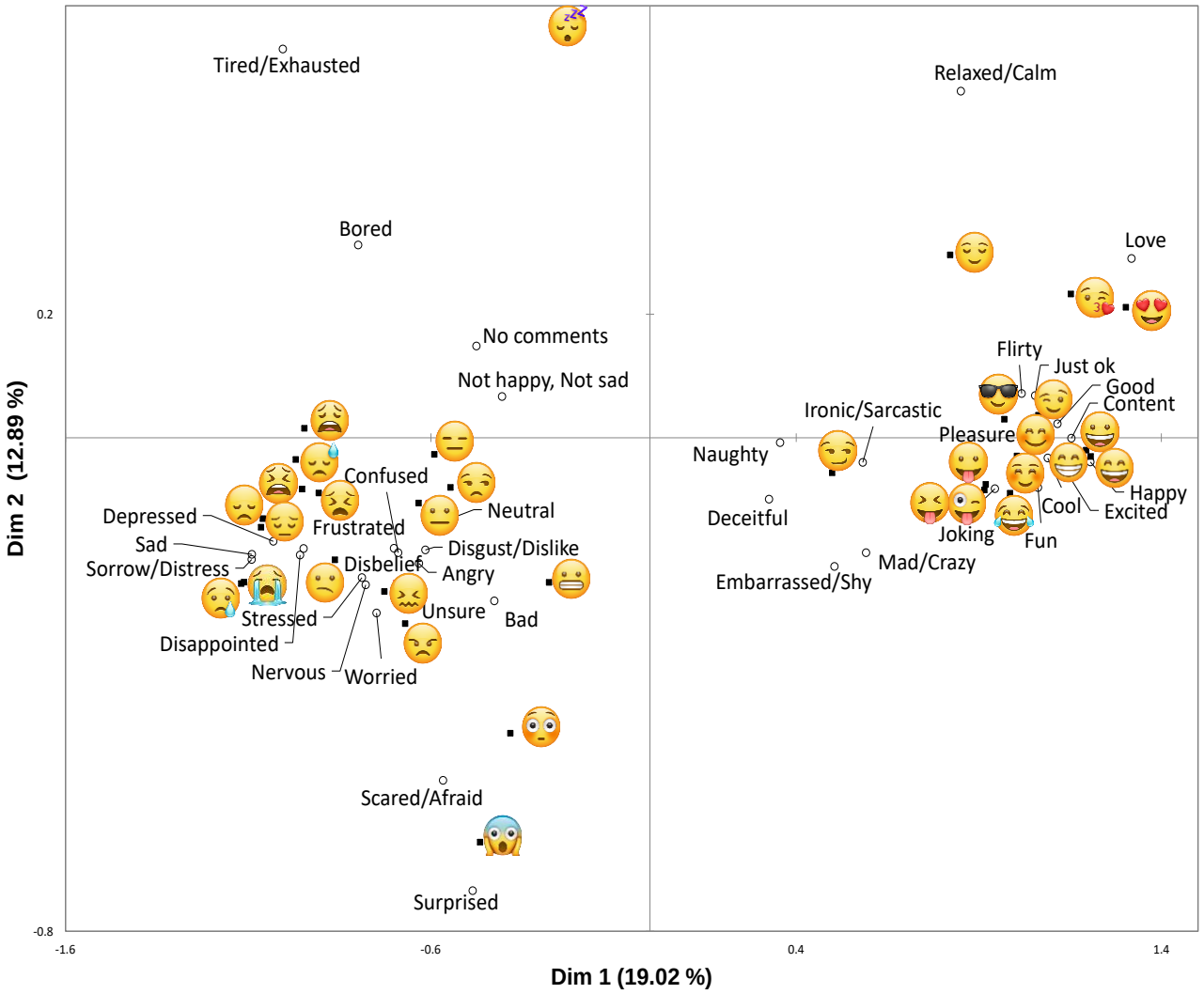

Figure 2. Emojis and meanings represented in the first and second dimensions of the correspondence analysis performed on consumer responses to 39 CATA questions and 33 facial emojis. Emoji positions are indicated by filled squares and term positions are indicated by open circles.

Figure 3. Proposal for the first facial chart. Example of a product evaluation using the emoji chart in research with Brazilian consumers.

Table 2. Emojis and associations[1] by Brazilian consumers.

Emoji	Emoji name[1]	Emoji meaning according to Brazilian consumers
😠	Angry face	Angry/Bad/Stressed
😁	Beaming face with smiling eyes	Satisfied
😔	Pensive face	Depressed/Sad
😖	Confounded face	Disgust/Dislike
☺️	Smiling face	Embarrassed/Shy/Good
😄	Grinning face with smiling eyes	Excited/ Happy
😏	Smirking face	Flirty
😜	Winking face with tongue	Fun/Joking/Mad/Crazy
😭	Loudly crying face	Sorrow/Distress
😐	Neutral face	Not happy, Not sad, Neutral
😍	Smiling face with heart-eyes	Love
😱	Face screaming in fear	Scared/Afraid/ Surprised
😴	Sleeping face	Sleepy
😩	Weary face	Tired/Exhausted

[1]This table describes the meanings of each emoji to be used in consumer research, according to the chart presented in Figure 3.

The emojis from the first and second groups (with association higher than 50%) were also used to elaborate an emoji scale of intensity for sensory evaluation of food and beverages with Brazilian consumers (Figure 4). This scale has two emojis with negative associations (angry face 😠 and confounded face 😖); one emoji with neutral meaning (neutral face 😐), and; 2 emojis with positive associations (smiling face ☺️ and smiling face with heart-eyes 😍). The meanings of these emojis are presented in Table 3.

Figure 4. Proposal for the second facial chart. Example of a product evaluation using the 5-point facial scale in sensory research of food or beverages with Brazilian consumers.

Table 3. Emojis and associations by Brazilian consumers. This table describes the meanings of the emojis to be used in sensory analysis of food and beverages, according to the chart shown in Figure 4.

Emoji	Emoji name[1]	Emoji meaning according to Brazilian consumers
😍	Smiling face with heart-eyes	Love
☺️	Smiling face	Good
😐	Neutral face	Neutral
😖	Confounded face	Dislike
😠	Angry face	Bad/Stressed

[1]WhatsApp version (2.19.352).

The third group is composed of the following emotions: "bored", "confused", "cool", "disappointed", "disbelief", "frustrated", "ironic/sarcastic", "just ok", "naughty", "nervous", "no comments", "pleasure", "unsure" and "worried". Due to the weak association (< 50%) between the emotions and emojis, these emotions were not included in the proposal of facial charts to be used in consumer's research with Brazilian people.

Discussion

Nowadays, emojis are essential for communication on social media and have been increasingly used in scientific research as a non-verbal tool to express emotions. Emojis can also affect how a question is applied, as demonstrated by Tang, Hew, Yuan, and Qiao (2020). When adding a friendly emoji (😀) to a request, it significantly increased the usefulness of the responses and the intimacy level with the participant. Gantiva, Sotaquirá, Araujo, and Cuervo (2020) suggest that the use of emoji faces in computer-mediated communication produces neural responses that are similar to those that are observed in face-to-face communication. In this way, emojis could be an important tool to influence and understand emotional insights and basic emotions elicited in a survey (Kaye et al., 2017).

Vidal et al. (2016) developed a study with consumers to identify spontaneous expressions of food-related emotional experiences. Emojis as "loudly crying face" (😭) was often used in Twitter at the lunch moment and related to negative associations, while the "face throwing a kiss" (😘) was often used in connection with dinner. The present study showed that Brazilian consumers related the first emoji with the emotion "sorrow/distress" and the second with "love." Considering the data obtained, the proposal for the first facial charts (Figure 3) is in concordance with the emojis used more frequently during the meals.

A similar study shows that emojis with smiling faces have expressed positive emotions for some fruits (oranges, pears, and kiwifruit). On the other hand, emojis with closed eyes, face screaming in fear, confused face, confounded face, tired face, weary face, persevering face, angry face, and crying face were associated with stewed prunes (Jaeger, Vidal, Kam, & Ares, 2017b). Thus, the facial chart presented in Figure 3 also represents the principal emojis described in research developed in other countries and related to food.

Some research has explored the meanings of emojis in the eating context Sick et al. (2020) studied emojis used by pre-adolescents to represent how they feel in response to food. In this study, they found that emojis related to the "smiling face with a halo" (😇) and "squinting face with tongue" (😝) was related to the most liked food situations. On the other hand, the most disliked food was described by "emoji with face vomiting" (🤮), while the "smiling face with heart-eyes" (😍) was associated with the most liked food. The emoji with heart-eyes was strongly related to the emotion "love" in the present, and for this, it was used in the second chart. In contrast, the emoji "angry face" was related to the opposite (angry), also included in the second chart.

Conclusion

This research demonstrated the dominant emotional meanings for facial emojis among Brazilian consumers. Strong associations to a single or more than one emotion were established for 23 emojis, enabling the development of two facial charts that can be used as relevant tools for studies with Brazilian consumers, especially related to food and beverage surveys. Thus, the authors suggest applying the facial charts developed in sensory studies with food and beverages as tools to understand the emotional associations by Brazilian consumers.

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