

The validity of the Dutch Eating Behavior Questionnaire: some critical remarks

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Abstract Recent debate has considered the validity of self-reports and laboratory-based behavioral measures of emotional eating. This paper reviews the literature on self-reported emotional eating and actual eating behavior (i.e., examines the concurrent validity). As detailed in the review, the literature suggests mixed findings on the correspondence between these self-reports and actual eating behavior. Based on this, we cite characteristics of studies that support the concurrent validity of the DEBQ and address possible reasons for the lack of concurrent validity in other studies, as well as concerns about the measurement of emotional eating in the laboratory. Two reasons for the lack of concurrent validity of self-report emotional eating scales identified in this review include (1) methodological/experimental design flaws and (2) the variability of emotional eating based on participant characteristics. We argue that further research on emotional eating needs to address factors related to self-reports of emotional eating and objective emotional eating behavior (e.g., negative affect, inaccurate recall of eating behaviors, sample differences, and laboratory design). We conclude with recommendations for future research on emotional eating.

Keywords Emotional eating · Dutch Eating Behavior Questionnaire · DEBQ · Validity · Measurement

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Introduction

The relationships between emotions and eating behavior are complex and, in some cases, unclear. In fact, a recent model theorizing about these relationships [1] identified five classes of emotion-induced changes in eating, indicating that there are several ways that emotions and eating relate to one another. One of these five classes, emotional eating, has received considerable examination over the past several decades. According to the five-way model [1] and its roots in psychosomatic theory [2, 3], emotional eating is defined as eating in response to negative emotion, as a coping mechanism (e.g., to alleviate negative affect, such as anger, sadness, stress, etc.). The construct of emotional eating has received significant research attention as it has been targeted as a possible contributor to overweight [4].

Emotional eating is typically measured using self-report scales requesting that individuals indicate how often they engage in emotional eating or eating while feeling a specified emotion. Perhaps the most commonly used self-report emotional eating scale is the Dutch Eating Behavior Questionnaire (DEBQ; [5]). The DEBQ consists of three subscales measuring emotional eating, restrained eating, and external eating (i.e., eating in response to external cues). Another self-report measure of emotional eating is Karlsson et al.'s [6] revision of Stunkard and Messick's [7] Three Factor Eating Questionnaire (TFEQ), which measures emotional eating, cognitive restraint, and uncontrolled eating (TFEQ-R18). Version 2 of the TFEQ-R18 (TFEQ-R18V2) [8] has demonstrated good reliability and factor structure in obese and non-obese samples. Finally, the Emotional Eating Scale (EES) [9] assesses eating in response to a variety of specific emotions that cluster around three major mood states (depression, anger/frustration, and anxiety). Although originally developed on an

obese treatment-seeking sample, the EES has been found to have adequate internal consistency and construct validity among non-obese individuals [10]. Because the study of emotion-induced eating is complex and the classification of emotional eaters is frequently based on self-report, it is imperative that self-report emotional eating scales are reliable and valid.

Early research, rooted in psychosomatic theory as an explanation of the development and maintenance of obesity, held that self-reports of emotional eating were valid (for an early review of emotional eating: [11]) because obese individuals reported higher levels of emotional eating than non-obese individuals. This conclusion, however, is at odds with findings that normal weight individuals also emotionally eat [1] and that there are other variables that could account for higher endorsement of emotional eating among obese individuals (see [12, 13]). Consistent with this, van Strien [14] discouraged comparisons of emotional eating in normal weight versus overweight individuals, as the “assessment of eating behavior regardless of body weight was also the impetus for the construction of the DEBQ” (p. 303).

As such, more recent studies (i.e., those described in this review) have tested the validity of emotional eating scales in the general population using actual food intake in both laboratory and naturalistic settings. Results of such studies have been mixed, raising doubt about the meaning of previous research findings, which have relied on such self-report instruments (see [4, 15]).

Notably, to examine the concurrent validity of emotional eating self-reports, Evers et al. [4] conducted four laboratory-based studies, inducing various emotional states and measuring food consumption. As evidence of possible problems with the validity of self-reports of emotional eating, self-reported emotional eaters in these studies did not consume significantly more calories in the laboratory than non-emotional eaters. One limitation in these studies cited by the authors [4] was the use of only one emotional eating scales, the DEBQ [5], suggesting the possibility that the lack of concurrent validity of self-reports of emotional eating may be limited to the DEBQ. However, in a similar study by this review’s authors (Musher-Eizenman 2010, unpublished), self-reported emotional eating was measured via the DEBQ and the EES. Consistent with Evers et al. [4], results indicated no relation between either the DEBQ or the EES and actual calories consumed following a negative mood induction. Therefore, it appears the question of the validity of self-reports of emotional eating is not limited to the DEBQ and may generalize to other self-report measures of emotional eating.

Although it has been reported that, “negative emotions have been thoroughly studied and it is well established that they increase food consumption” ([16], p.162), behavioral measurement of emotional eating in the laboratory yields

mixed results [4]. Thus, in addition to the concerns about self-reports of emotional eating, laboratory-based measurement of emotional eating may also be problematic.

The goal of this paper is to review the literature on the relationship between self-reported emotional eating and actual eating behavior (i.e., the concurrent validity). After describing the method used to review the literature, as well as the exclusion and inclusion criteria, we describe the evidence for the concurrent validity of self-reported emotional eating and offer possible reasons for the lack of concurrent validity between self-report emotional eating scales and actual eating behaviors. We also examine issues related to laboratory-based tests of emotional eating. Finally, we offer directions for future research that could clarify the nature of emotional eating.

Method

Literature searches were conducted using PsycINFO with the terms (with number of articles that were displayed under these search terms): “emotional eating (n = 249)”, “Dutch eating behavior questionnaire (n = 214)”, “Dutch eating *behaviour* questionnaire (n = 121)”, “emotional eating scale (n = 51)”, “three factor eating questionnaire (n = 302)”, “DEBQ (n = 77)”, “EES (n = 107)”, and “TFEQ (n = 92)”. Searches were also limited to peer-reviewed journal articles, published between January 1986 and December 2012. We restricted articles to this date range because the DEBQ was developed in 1986, the first of the self-reported emotional eating scales reviewed in this paper [5].

Because this review is specific to examining the *concurrent validity* of self-reported emotional eating scales, we only included studies that met the following criteria: [1] measured self-reported emotional eating in adults (18 years and older) with either the DEBQ (emotional eating subscale), the TFEQ-R18 (versions 1 or 2; emotional eating subscale), or the EES, [2] defined emotional eating as eating in response to negative emotions (e.g., sadness, anger, frustration, or stress), and [3] either measured actual eating behavior (calories or types of food consumed) in the laboratory after a negative mood induction or assessed food consumed outside of the laboratory over a given time frame (in addition to mood ratings during this time frame). These parameters greatly narrowed down the eligible studies to 12, with 8 measuring self-reported emotional eating and calories consumed in the laboratory and 4 using naturalistic measurement of food intake in response to negative affect or stress as it naturally occurs to study the concurrent validity of emotional eating measures. In addition to the other issues raised in this review, it is noteworthy that so few published studies have included both self-reports and behavioral indicators of emotional eating, limiting the definitive

conclusions that can be drawn in this area. Also, it should be noted that, with one exception (EES: [17]), the only self-report emotional eating scales used in the studies that met inclusion criteria was the DEBQ. Thus, although some authors argue that emotional eating self-report measures are quite similar (e.g., the EES and the DEBQ; [4]), the findings presented here are primarily limited to the DEBQ.

Literature review

Several laboratory and naturalistic studies have been conducted using food intake (instead of BMI) to test the validity of emotional eating self-report scales. An examination of the literature since the development of the DEBQ [5] revealed eight published studies involving laboratory-based mood inductions and four published studies involving naturalistic measurement of food intake in response to stress as it naturally occurs to study the concurrent validity of emotional eating measures.

Validation of the DEBQ using food intake in the laboratory

Results of stress or mood inductions in the laboratory indicate mixed findings on the concurrent validity of self-reported emotional eating for actual food intake. As described in the introduction, Evers et al. [4] induced negative emotion in four laboratory studies (sadness induced in three of the studies and an ego-threatening task in the fourth study) and measured food intake of a variety of foods. There was no significant relationship between self-reported emotional eating and food intake in an analysis of the merged studies. In these studies, high emotional eaters and low emotional eaters were categorized by use of the median split (as posited by [18, 19]). In another study, Wallis and Hetherington [20] found self-reported emotional eating predicted *perceived* food intake. However, in their experimental manipulation, emotional eating (with low and high emotional eaters categorized based on the median-split) did not predict *actual* food intake. Similarly, Royal and Kurtz [21] found that after presenting participants with unsolvable anagrams, self-reported emotional eating did not predict actual food intake, but *did* predict perception of food consumed. Thus, in both of these studies, emotional eaters perceived higher consumption in response to stress than non-emotional eaters, even though this perception was not supported by actual food intake.

In contrast, five studies have been conducted that found that self-report of emotional eating *does* predict food intake. Oliver et al. [22] used a stress-induction task where participants were informed that they would be giving a speech. For their food stimuli, multiple types of foods were

used with varying fat content presented in a buffet. Although emotional eating did not predict food intake for bland or salty foods, it did predict intake of high-fat sweet foods. Wallis and Hetherington [23] also found that self-report of emotional eating was correlated with the actual intake of sweet, high-fat foods (chocolate) following an ego-threatening Stroop task. Greater consumption following the ego-threatening Stroop task was found compared to caloric intake in the control condition for individuals categorized as high in emotional eating and restraint. Fay and Finlayson [24] induced negative affect in participants using autobiographical recall for a negative or sad memory and measured participants' caloric intake of popcorn. They found a significant correlation ($r = .61, p < .01$) between self-reported emotional eating and food intake during the negative affect condition, and greater calorie intake for participants who were higher on restraint and disinhibition (a variable combining emotional and external eating subscale means) compared to those lower on both variables.

Finally, in two studies conducted by van Strien et al. [19], a moderator effect of self-reported emotional eating was found which supported the concurrent validity of the DEBQ. By using the 20th and 80th percentiles of emotional eating to classify participants into “no” emotional eating (less than the 20th percentile) and “high” emotional eating (greater than the 80th percentile), high emotional eaters consumed more calories (crisps and M&Ms) during a sad movie (Study 1) or during a social stress task (Trier Social Stress Test; Study 2) compared to the participants who did not emotionally eat.

In summary, the extant literature is approximately split between the number of laboratory studies that demonstrates concurrent validity of the DEBQ compared to those that do not. When support for validity was found, it was often found when the offered food was sweet and high in fat. In addition, when concurrent validity was *not* supported, the studies employed the use of a median split whereas three of the five studies demonstrating that concurrent validity did not use this technique (as suggested by van Strien [18]).

Validation of the DEBQ using naturalistic methods

In addition to measuring emotional eating in the laboratory, some studies have used naturalistic methods to examine whether self-reported emotional eaters consume more food in response to negative emotions (e.g., stress).

When daily hassles or stressors are recorded in addition to food intake outside of the laboratory, some findings do suggest concurrent validity of self-reported emotional eating. For example, Newman et al. [25] measured daily hassles and snack intake diaries for 2 weeks and participants' self-reported eating behaviors. They found that participants who were highly reactive to stress showed a stronger

relationship between self-reports of emotional eating and snack intake when daily hassles were reported. This suggests that individual differences in tolerance to “daily hassles” could impact stress-related emotional eating.

Other similar research has yielded mixed results. Adriaanse et al. [26] did not find support for a correlation between self-reported emotional eating and calories of unhealthy snack consumption preceded by negative affect, as measured by a 7-day snacking diary. Likewise, Conner et al. [27] did not find that self-reported emotional eating was related to snacking in response to daily hassles, whereas O'Connor et al. [28] found that the hassles–snack eating relationship was present in self-reported emotional eaters. One major difference in these studies which might account for the discrepancies in the findings is the use of different outcome measures. For Conner et al. [27], participants reported the number of snacks consumed each day, over a 7-day period. On the other hand, O'Connor et al. [28] used a variety of outcome measures: in addition to measured 7-day diary of snack consumption, they also coded types of snacks (e.g., high in fat or sugar); if participants perceived they ate more or less; and the number of fruits and vegetables consumed daily. In their findings, O'Connor et al. [28] reported that daily hassles were related to an increase in high-fat and high-sugar snacks between meals, less food consumed during meals, and a reduction in vegetable and fruit consumption. This is consistent with laboratory-based findings that the self-report/emotional eating link is more often found for high-fat, high-sugar foods. Another possible explanation for the difference in results among the naturalistic studies is the sample studied. Newman et al.'s [25] and O'Connor et al.'s [28] samples were older (average age approximately 34- and 40-year old, respectively). On the other hand, Adriaanse et al. [26] and Conner et al. [27] sampled college students.

Possible explanations for poor validity of self-report emotional eating measures

Methodological or laboratory design

Based on the literature reviewed above, several factors common to these studies may account for the mixed support for concurrent validity of self-reported emotional eating. First, both laboratory and naturalistic studies highlight the consumption of sweet, high-fat foods in response to certain types of negative emotions. Thus, the food options available in laboratory settings could impact the extent of participants' emotional eating. The typical laboratory is not equipped to provide food options as diverse as those found in natural environments. In fact, one of the two laboratory studies that found that high emotional eaters ate more sweet fatty foods

than low emotional eaters in the stress condition used a “buffet” presentation of a variety of foods [22]. Similarly, there are individual preferences in comfort foods and types of sweet, high-fat foods that are most appealing to participants. Thus, depending on individual preference in comfort foods and the types of foods offered, emotional eating may or may not occur in laboratory settings [11].

Another aspect of these studies which appears to be important is the type of negative emotion or stressor induced. For example, O'Connor et al. [28] found that certain types of stressors were related to greater consumption of snacks than others. Specifically, emotional eating was a significant moderator of the relation between hassles and snack consumption when the hassles were physical (exhaustion, illness, injury); ego-threatening (job-interview, performance review); or work-related. This was not true for interpersonal hassles (fighting with spouse, argument with friend), where disinhibited eating stood out as the significant moderator in the combined model.

Thus, in addition to the type of food available, a relationship between self-reported emotional eating and food intake may depend on the type of negative emotion induced or measured. In the lab, stress-induction tasks, rather than mood-induction tasks, may better simulate environments where emotional eating occurs, with three of the five studies supporting the concurrent validity of the DEBQ using stress induction tasks. Furthermore, for the naturalistic studies, daily hassles or stressors appear to capture situations when emotional eating occurs. In contrast, studies that manipulate sadness ([4, 19, 24]; Musher-Eizenman 2010, unpublished) in the laboratory have more mixed findings about the relation between self-report of emotional eating and food consumption. Furthermore, Ganley [11] suggested that emotional eating may be more episodic and occur during times when there is “sufficient overall stress and not necessarily during brief or transitory bouts of emotion” (p. 353), conditions that may be hard to replicate in the laboratory. Thus, the validity of self-reported emotional eating may depend on the nature and strength of the induction. This was also a concern identified by Macht [1], who suggested that the ideal level of emotion for inducing emotional eating is one that is medium in strength, with very strong emotions expected to predict under-eating.

In sum, the findings that self-reported emotional eating may not correlate with actual food consumption in the lab could be driven by laboratory methodologies that do not accurately reflect typical emotional eating environments.

Sample characteristics in validation studies of the DEBQ

In addition to methodological concerns with inducing emotional eating in the laboratory, a second issue in the

study of the validity of emotional eating self-reports is sample characteristics. As previously described, emotional eating scales were developed using samples of treatment seeking adults or participants who were obese. However, studies that have failed to find a correlation between self-report of emotional eating and actual eating behavior ([4, 20, 21]; Musher-Eizenman 2010, unpublished) have been conducted with convenience samples of healthy (average BMI) college students. Similarly, of the naturalistic studies that supported concurrent validity of self-reported emotional eating, the participants were older than the participants in the laboratory studies that found null effects. Emotional eating in treatment seeking adults and adults who are obese may be qualitatively and quantitatively different than emotional eating in college student samples. Specifically, individuals may be more accurate self-reporters of emotional eating depending on the frequency and severity of the emotional eating behavior. Thus, it is possible that it is hard to demonstrate validity of self-reports of emotional eating in college students because this group answers emotional eating questions less accurately than individuals who are more aware of their eating behaviors (e.g., treatment-seeking adults).

Consistent with this idea, Evers et al. [4] proposed that self-reported emotional eating is threatened by recall biases. That is, individuals must recall eating, the emotions experienced, and the association between them. The authors posit that this is a “triple recall bias”, due to findings that individuals do not always accurately recall and report their behavior (e.g., social desirability bias), individuals often over- or under-estimate the emotions, and individuals have difficulty in assessing the influence of hot (emotional) states on their behavior. Supporting the idea that individuals do not accurately report their eating behaviors, Adriaanse et al. [26] found that emotional eating is a significant predictor of eating concerns, such as worrying about one’s eating behavior, lower perceived control over one’s eating, and higher level of monitoring of one’s eating behavior. These correlates of emotional eating may complicate assessment of true emotional eating and may explain the lack of concurrent validity in the aforementioned studies.

A further possibility is that emotional eating in the context of a binge eating episode may form a more salient memory in treatment-seeking individuals. Thus, recalling emotional antecedents and the frequency of emotional eating behavior may be easier for an emotional eater that binge eats, perhaps because of the more intense nature of the eating behavior (i.e., increased volume of food eaten, feeling as though one is out of control with eating or dissociating while bingeing, and having trouble controlling impulsivity).

It is also possible that, as suggested by van Strien [18] and van Strien et al. [19], different criteria for cut-off

scores separating high emotional eaters versus low or no emotional eaters be used. Indeed, in their study, evidence of increased caloric intake after a negative mood induction was not found when the authors used the median split to categorize emotional eaters. As such, sample characteristics may require using alternative cut-off scores to best capture true emotional eaters [19].

Furthermore, also suggested by van Strien et al. [19], other sample characteristics in the studies not finding support for the increased consumption of food in those high in emotional eating could suggest (1) that there were not extreme enough scores of emotional eating to detect this effect, or (2) that the sample sizes were not large enough. In other words, van Strien et al. [19] explained that it is essential to have a proportion of participants in emotional eating studies with extreme scores (e.g., [29], as cited by [19]) to be able to detect significant interactions [30], as well as a large enough sample size [31]. This argument seems likely given evidence that emotional eating may be better conceptualized as a categorical construct, rather than a continuous variable [19].

Directions for future inquiry

As this review of the literature illustrates, emotional eating is a complex behavior that can be difficult for individuals to report on and tricky to induce in the laboratory. Given this, we argue that future research should be undertaken to address the potential explanations of inconsistent concurrent validity of self-reported emotional eating provided in the current review. Specifically, further research on emotional eating needs to address (1) the factors related to self-reports of emotional eating and actual emotional eating behavior, and (2) the conditions needed to experimentally induce emotional eating.

Factors related to self-report of emotional eating

There are a variety of factors, other than actual eating behavior, that are related to self-reports of emotional eating that may account for some of the problems in the validation studies of emotional eating measures (see [26]). Perceptions of emotional eating could differ based on characteristics of individuals in the sample studied as well. For example, Bekker et al. [32] found that negative mood alters one’s self-reported emotional eating, suggesting that it is important to assess emotional eating before a mood induction or while controlling for negative affect.

Second, the societal message that overweight or obesity is caused by eating to deal with negative emotions could also bias self-report. It is not uncommon that weight-loss advertisements and the media convey the message that

people remain or become overweight because they eat to make themselves feel better. Therefore, if individuals are asked whether they eat more when they are depressed, higher exposure to this message could bias their answer, regardless of whether they engage in the behavior or not. This argument was originally posited by Allison and Heshka [12] as it relates to the messages that obese individuals receive about eating behaviors. A possible future study could test differences in self-reported emotional eating when weight-loss commercials (with and without the message that obesity stems from emotional eating) are shown or other food cues are made salient.

Another direction to take is to examine how accurately treatment- and non-treatment-seeking adults recall emotional eating episodes. Glynn and Ruderman [33] acknowledged how complicated reporting on eating behaviors can be. They created the Eating Self-Efficacy Scale and cautioned researchers that “discerning the ‘reasons’ or conditions that result in eating is a deceptively difficult task. Eating typically co-occurs with a simultaneous variety of internal states (e.g., hunger, anxiety, pleasure) and external circumstances (e.g., availability of appealing food, time of day; 33, p. 418)”.

In regard to reporting on antecedents of eating behavior, Glynn and Ruderman [33] suggested that participants may need “extensive training”. Although this may not work in a laboratory induction of emotional eating, qualitative research on how participants similar to the sample being studied understand emotional eating may be informative. Self-report measures that are specific to types of emotions that trigger a person to eat might also help in guiding accurate responses. Accordingly, the EES may be especially useful in assessing emotional eating because it lists several types of specific emotions that precede overeating in addition to an overall emotional eating score in the DEBQ. Because external eating and restrained eating are associated with emotional eating, the DEBQ is well suited to capture these eating behaviors.

Conditions needed to experimentally induce emotional eating

More research on the best ways to successfully induce emotional eating in the laboratory is also needed. Food choice, type of stressor, and the current stressors that participants are experiencing outside the laboratory can affect whether a person emotionally eats. Of the studies that quantified food consumed as an indicator of concurrent validity, those that induced stress, as opposed to sadness (with two exceptions: [19, 24]), reported an association between emotional eating and food consumed. Also, these studies found increased consumption of sweet and fatty foods. In addition, naturalistic studies, in which emotional

eating was found to be a moderator, used “daily hassles” or daily stressors and its relation to snacking.

Another direction that could be taken is to consider how control conditions are experienced by participants. Although the laboratory studies did assess for positive and negative affect (or stress) in the control and experimental groups, one emotion was not measured: boredom. This feeling could be aversive to participants in the control condition and, recent research suggests that college students highly endorse eating when bored [34]. For example, if the stimulus used in the control condition is particularly boring, participants may engage in emotional eating in that condition as well, masking the impact of the experimental manipulation. Also, the intensity of the mood induced could account for either over- or under-eating. Understanding what influences people to self-identify as emotional eaters and determining the factors that influence actual emotional eating behavior will inform the creation of experiments that best reflect what individuals are experiencing.

Finally, as previously described, it may be important for future studies to use extreme cut-off scores (versus the median split), and ensure that there are enough participants falling beyond these cut-offs [19]. This will allow for the detection of significant interaction effects in the study of emotional eating. With evidence that emotional eating may be better understood as a categorical (rather than a continuous) variable [19], a line of future research could also further explore this possibility.

Replicating the real-life experience of emotional eating and controlling for conditions where individuals may misperceive their own eating behaviors will allow for a greater understanding of emotional eating and efforts that are successful in its reduction. Despite mixed findings in previous self-report, laboratory-based, and naturalistic research on emotional eating, these recommendations should encourage researchers to continue to investigate this important eating behavior.

Conclusion

Despite the implications of this review, some limitations should be considered. First, the criteria used to select articles in this review excluded newer emotional eating self-report measures (e.g., Emotional Overeating Questionnaire, [35]; Emotional Appetite Questionnaire, [36]). Similarly, eating in response to *positive* emotions was not considered in this review. Because emotional eating in this study was conceptualized as eating in response to a negative emotion, other studies (e.g., [37]) were not included. Indeed, as demonstrated by van Strien et al. [38] and Nolan et al. [36], emotional eating in response to negative

emotions is conceptually different from positive emotional eating. Nolan et al. [36] found that, in the validation study of the Emotional Appetite Questionnaire, those who eat more in response to positive emotions are different from those who eat in response to negative emotions. Specifically, Nolan et al. [36] found a low correlation between DEBQ emotional eating scores and the EMAQ positive emotion scores, suggesting that eating in response to positive emotions may be a separate type of eating behavior. Although these differences support the exclusion of studies on eating in response to positive emotions in this literature review, future research on eating in response to positive emotions should not be overlooked.

Further, although we sought to include the TFEQ and the EES in this review, only one laboratory or naturalistic study was found that used one of these measures to assess emotional eating and also met the other inclusion criteria. Thus, the implications from this review are limited to the DEBQ. Notwithstanding these limitations, this review contributes to the study of emotional eating in two main ways. First, we highlight the paucity of studies that measure both food intake after a mood induction and self-reported emotional eating (via the DEBQ; $n = 8$) and identify a need for further evaluation of self-reported emotional eating scales. Second, we review the characteristics of the studies that may be related to successful induction of emotional eating, as well as possible participant characteristics that should be considered in future research. Given the subjective experience of emotional eating reported by individuals in many research and clinical settings, it is critical that researchers do not take the mixed evidence of validity presented here and elsewhere as a call to abandon this line of research, but rather as a motivation to increase efforts to untangle this complicated issue.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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