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Food image validation for assessing diurnal patterns of appetite and food reward in individuals ranging in BMI with and without type 2 diabetes

K. Beaulieu¹, H. Pedersen², C. S. Søndergaard², C. van Elst², K. Færch², G. Finlayson¹ and J. S. Quist^{2,3}

¹*School of Psychology, University of Leeds, Leeds, UK*

²*Clinical Research, Copenhagen University Hospital—Steno Diabetes Center Copenhagen, Herlev, Denmark*

³*Department of Biomedical Sciences, University of Copenhagen, Copenhagen, Denmark*

Increasing scientific interest in diurnal patterns of appetite and food reward means it is important to employ valid methodologies that are time-of-day appropriate. Moreover, it is unknown whether people with type 2 diabetes (T2D) experience similar diurnal patterns to healthy individuals. The Steno Biometric Food Preference Task (SBFPT)⁽¹⁾ utilises an array of food images to assess food reward and biometric responses to food cues varying in fat content and sweet taste. We aimed to adapt and validate the SBFPT to assess diurnal appetite and food reward in Danish adults with a range of BMI with/without T2D.

An anonymous online survey was used to validate 28 food images (7 high-fat sweet (HFSW), 7 lowfat sweet (LFSW), 7 high-fat savoury (HFSA) and 7 low-fat savoury (LFSA)) in Danish residents in order to select 16 images for the diurnal-SBFPT (4 from each category). For each food image, participants had to name the food, report the frequency of consumption, and rate its tastiness, sweetness, fat content, appropriateness to consume in the morning (between 8:00-12:00), afternoon (between 12:00-16:00), and evening (between 16:00-20:00) on a 100-mm visual analogue scale⁽²⁾.

We obtained 207 complete responses (with >80% completion). Participants included 61 men, 144 women and 2 not specified. Of these, 124 did not have T2D and 83 had T2D with a median [Q1, Q3] diagnosis duration of 12 [8, 18] years. Median [Q1, Q3] age was 61 [50, 67] years and BMI was 26.4 [23.4, 31.8] kg/m². After data were cleaned, the mean of the individual ratings for each food was calculated and adequacy was judged according to pre-specified criteria⁽²⁾. As there were overall differences in ratings of appropriate consumption time between those with/without T2D regardless of time of day (linear mixed model $\beta = -5.3$ mm; $p = .01$), a difference score between morning (AM) and afternoon/evening (PM) ratings was computed (AM-PM difference). Adequacy for this criterion was based on foods with the smallest absolute mean across those with/without T2D and smallest absolute difference between groups.

Overall, the majority of the final 4 images from each food category met the criteria for recognition, frequency of consumption, liking, taste and perceived fat content. LFSW foods had the smallest absolute AM-PM differences (i.e., more similar appropriateness scores in AM vs PM; range 110mm), followed by LFSA (5-21mm), HFSA (8-21mm) and HFSW (8-38mm).

This image validation study will allow us to examine appetite and food reward across the day using a validated tool among Danish adults ranging in BMI with/without T2D. Future studies should consider the perceived appropriateness of the foods selected for appetite-related assessments in T2D, especially high-fat sweet foods.

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References

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