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Discrimination of chocolate texture varies with individual differences in oral somatosensation

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Texture plays a major role in the acceptance or rejection of many foods. In chocolate, grittiness/sandiness is driven by sugar crystal size. Industrial lore suggests chocolate is gritty or sandy if particle sizes at the 90th percentile (D90) exceed ~25-35 microns, although data behind this dogma is unclear. In experiment 1, we measured just noticeable differences (jnds) for experimental chocolate in the range of 19 to 32 microns, and analyzed 9 commercially available dark chocolates on the market in the US and Europe to determine particle sizes. In 60 adults, jnds were ~4.7 microns. Most (8/9) commercial chocolates had D90 particle sizes of 19.2-25.2 microns. While mechanisms of oral texture perception remain poorly understood, Linne and Simons recently reported differences in roughness discrimination are related to the astringency of epigallocatechin gallate. Thus, we explored whether individual differences were related to particle size perception in chocolate. In experiment 2, we assessed two oral touch measures, oral point pressure sensitivity and surface roughness discrimination, testing whether either one would predict differences in chocolate texture. In 51 adults, pressure point sensitivity thresholds were measured with Von Frey Hair (VFH) monofilaments (8mg-10g) and surface roughness thresholds were measured with stainless steel blanks ground to different roughness (0.54-0.72 microns), both using staircase procedures. Two commercial dark chocolates differing in particle size (19 v. 26 micron) were evaluated for grittiness via a 2AFC task. Point pressure sensitivity and roughness discrimination were variable, so we separated participants into groups for roughness (RLow v. RHigh) and point pressure sensitivity (PPLow v. PPHigh). Overall, participants successfully discriminated between the two chocolates, but this was driven almost entirely by those more sensitive to VFH pressure: 85% of the PPLow group correctly identified the grittier chocolate, versus chance performance (50%) for PPHigh. No effect was seen for the two roughness groups.