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Exploring the underpinning mechanisms of the proximity effect within a competitive food environment

Daniel Knowles, Kyle Brown, Silvio Aldrovandi

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**Additional File 1**

1) Breakdown of Ethnicity across conditions

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Characteristic |  |  |  |  |  |  | Condition |  |  |  |  |  |  |
|  |  |  |  |  | |  | |  | |  | |  | |  | |
|  |  |  |  | Both Proximal | | Fruit Proximal | | Chocolate Proximal | | Both Distal | | Overall (Non- | | Overall (Including | |
|  |  |  |  |  |  |  |  |  |  |  |  | bowl Movers) | | Bowl Movers) | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Education (N (%)) | 5+ GCSE's | 0 | | (0%) | 2 | (16.7%) | 0 | (0%) | 1 | (8.3%) | 3 | (6.3%) | 4 | (7.1%) |
|  |  | 2+ A-Levels | 1 | | (9.1%) | 3 | (25%) | 5 | (38.5%) | 7 | (58.3%) | 16 (33.3%) | | 18 (32.1%) | |
|  |  | Bachelors | 9 | | (81.9%) | 7 | (58.3%) | 7 | (53.8%) | 2 | (16.7%) | 25 (52.1%) | | 30 (53.6%) | |
|  |  | Post-Graduate | 1 | | (9.1%) | 0 | (0%) | 1 | (7.7%) | 2 | (16.7%) | 4 | (8.3%) | 4 | (7.1%) |
|  | Ethnicity (N (%)) | White British | 7 | | (63.6%) | 5 | (41.7%) | 7 | (53.8%) | 6 | (50.0%) | 25 (52.1%) | | 28 (50%) | |
|  |  | Indian British | 0 | | (0%) | 0 | (0%) | 1 | (7.7%) | 0 | (0%) | 1 | (2.1%) | 2 | (3.6%) |
|  |  | Black African | 1 | | (9.1%) | 1 | (8.3%) | 1 | (7.7%) | 1 | (8.3%) | 4 | (8.3%) | 4 | (7.1%) |
|  |  | Bangladeshi British | 0 | | (0%) | 1 | (8.3%) | 2 | (15.4%) | 0 | (0%) | 3 | (6.3%) | 3 | (5.4%) |
|  |  | Pakistani British | 1 | | (9.1%) | 2 | (16.7%) | 1 | (7.7%) | 2 | (16.7%) | 6 | (12.5%) | 9 | (16.1%) |
|  |  | Indian | 0 | | (0%) | 1 | (8.3%) | 0 | (0%) | 0 | (0%) | 1 | (2.1%) | 1 | (1.8%) |
|  |  | White European | 1 | | (9.1%) | 0 | (0%) | 1 | (7.7%) | 2 | (16.7%) | 4 | (8.3%) | 5 | (8.9%) |
|  |  | Mixed White & Asian | 0 | | (0%) | 1 | (8.3%) | 0 | (0%) | 1 | (8.3%) | 2 | (4.2%) | 2 | (3.6%) |
|  |  | Mixed Black & Caribbean | 1 | | (9.1%) | 0 | (0%) | 0 | (0%) | 0 | (0%) | 1 | (2.1%) | 1 | (1.8%) |
|  |  | Other | 0 | | (0%) | 1 | (8.3%) | 0 | (0%) | 0 | (0%) | 2 | (2.1%) | 1 | (1.8%) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Additional File 2**

1) Questionnaire used in study

Section One

1. Age:

Please state your age (in years)

1. Gender:

Please state your gender

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Male |  | Female |  | Rather not say/Other |
|  |  |  |  |  |

1. Education Level (Dropdown boxes used)

What is the highest qualification you have achieved or are currently working towards?

* + No qualifications
  + Up to 4 GCSE's (Including 1-4 O Levels/CSE/GCSEs (any grades), Foundation Diploma, NVQ level 1, Foundation GNVQ or equivalents) (or foreign equivalent)
  + 5 or more GCSE's or 1 A-level (Including 5+ GCSEs (Grades A\*-C),1 A Level/ 2-3 AS Levels, NVQ level 2, Intermediate GNVQ, City and Guilds Craft, BTEC First/General Diploma, RSA Diploma, Apprenticeship or equivalents) (or foreign equivalent)
  + 2 or more A-levels (Including 2+ A Levels, 4+ AS Levels, NVQ Level 3, Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, BTEC National, RSA Advanced Diploma or equivalents) (or foreign equivalent)
  + Bachelor's degree (Including BA, BSc, NVQ Level 4-5, HNC, HND, RSA Higher Diploma, BTEC Higher level or equivalents) (or foreign equivalent)
  + Post-Graduate degree or qualification (Including Higher Degrees e.g. MA, PhD, PGCE, Professional qualifications e.g. teaching, nursing, accountancy or equivalents) (or foreign equivalent)

1. Location

What is your postcode (If you are a student, what is the postcode of your non term-time/university address)?

1. Tiredness

Please rate on a scale of 1 to 5, with 1 being ‘not tired at all’ and 7 being ‘very tired’ how

tired you currently feel?

Not tired at all 1 2 3 4 5 6 7 Very Tired

1. Hunger

Please rate on a scale of 1 to 5, with 1 being ‘Not hungry at all’ and 7 being ‘Very hungry’, how hungry do you currently feel?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Not Hungry at all | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Very |
| Hungry |  |  |  |  |  |  |  |  |

1. Daily Stressors: 4-item short version of Perceived Stress Scale (Cohen et al, 1983) Please answer the following questions in relation to your experiences over the last month, with 1 being ‘Never, and 5 being ‘Very Often’.

How often have you felt that you were unable to control important things in your life?

1 2 3 4 5

How often have you felt confident about your ability to handle your personal problems?

1 2 3 4 5

1 2 3 4 5

How often have you felt difficulties were piling up so high that you could not overcome

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| them? |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 |

1. Impulse Control: Adapted from Hunter et al (2016) questionnaire

Please answer the following questions in relation to your experiences over the last month, with 1 being ‘Not like me at all’, and 5 being ‘Very much like me’.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Do you find it difficult to keep your attention on a particular task? | | | | | |  |
| Not like me at all | 1 | 2 | 3 | 4 | 5 | Very much like me |
| Do you find yourself having problems concentrating on a task? | | | | | |  |
| Not like me at all | 1 | 2 | 3 | 4 | 5 | Very much like me |
| Do you have difficulty carrying out more than one task at a time? | | | | | |  |
| Not like me at all | 1 | 2 | 3 | 4 | 5 | Very much like me |
| Do you tend to "lose" your train of thoughts? | | |  |  |  |  |
| Not like me at all | 1 | 2 | 3 | 4 | 5 | Very much like me |
| Do you have difficulty seeing through something that you have started? | | | | | | |
| Not like me at all | 1 | 2 | 3 | 4 | 5 | Very much like me |
| Do you find yourself acting on “impulse” frequently? | | | |  |  |  |
| Not like me at all | 1 | 2 | 3 | 4 | 5 | Very much like me |

1. Delay Discounting: Adapted from Hunter et al (2016), but using different values

If you could be entered into a raffle to win one of the following, which would you choose?

Raffle to win £20 in 2 days’ time

Raffle to win £70 in three months’ time

1. Handedness (Adapted from Hunter et al, 2016)

Please answer the following questions on a scale of 1 to 5, with 1 being always left, and 5 being always right.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Which hand do you commonly use to write? | | |  |  |  |  |
| Left | 1 | 2 | 3 | 4 | 5 | Right |
| Which hand do you commonly use to throw an object? | | | | |  |  |
| Left | 1 | 2 | 3 | 4 | 5 | Right |
| Which hand do you commonly use to brush your teeth? | | | | |  |  |
| Left | 1 | 2 | 3 | 4 | 5 | Right |
| Which hand do you commonly use to eat with a spoon? | | | | |  |  |
| Left | 1 | 2 | 3 | 4 | 5 | Right |

(Remaining questions to be given after break due to if questions were asked before, the participant may guess the intent of the study)

Section two

11. Tiredness

Please rate on a scale of 1 to 5, with 1 being ‘not tired at all’ and 5 being ‘very tired’ how tired you currently feel?

Not tired at all 1 2 3 4 5 Very Tired

1. Hunger

Please rate on a scale of 1 to 5, with 1 being ‘Not hungry at all’ and 5 being ‘Very hungry’,

how hungry do you currently feel?

Not hungry at all 1 2 3 4 5 Very Hungry

1. Food Liking

Please draw a cross (X) on the lines below to indicate how pleasing a mouthful of the following foods would be, with the left being ‘Not pleasant at all’, and the right being ‘Very, very pleasant’.

* 1. Chocolate
  2. Chips
  3. Coffee
  4. Oranges
  5. Muffins
  6. Crisps
  7. Apple slices
  8. Cola
  9. Cereal Bars
  10. Carrot Sticks

1. Perceived Effort (Based on Maas et al, 2012)

Please rate on a scale of 1 to 5, with 1 being ‘Not at all’ and 5 being ‘Very much’, how much you agree with the statements below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| I had to work hard to get the \_\_\_\_\_\_\_\_\_: | | | | | |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |

The \_\_\_\_\_\_\_ was within easy reach:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |

Before reaching the \_\_\_\_\_\_\_\_, I had to do something else.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Reaching the \_\_\_\_\_\_\_\_ was effortless. | | | | | |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| To what extent did you have to use effort to attain the \_\_\_\_\_\_\_\_\_. | | | | | | |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |

1. Perceived Salience

Please rate on a scale of 1 to 5, with 1 being ‘Not at all’ and 5 being ‘Very much’, how much you agree with the statements below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | The \_\_\_\_\_\_\_ looked tempting | | | |  |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| I was able to resist the \_\_\_\_\_\_\_ effortlessly. | | | | | |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
|  | The \_\_\_\_\_\_\_ looked nice. | | | |  |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
|  | The \_\_\_\_\_\_\_ looked irresistible. | | | |  |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | I barely noticed the \_\_\_\_\_\_\_\_. | | | |  |  |
| Fruit - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |
| Chocolate - Not at all | 1 | 2 | 3 | 4 | 5 | Very Much |

1. Ethnicity and Background (Dropdown boxes used) Please state which race/ethnicity you identify with

☐White British / White Irish / Other White background

☐Mixed White and Black African / Mixed White and Asian / Mixed White and Black Caribbean / Other Mixed background

* Asian British (Chinese British/Indian British/Pakistani British/Bangladeshi British/Other Asian British)

☐Asian (Indian/Pakistani/Bangladeshi/Chinese/Other Asian background)

☐Black/Black British (African/Caribbean/Other Black/Black British background)

☐Other ethnic group (please state)

1. Awareness of Study

Do you think you know what the study was investigating?

|  |  |  |
| --- | --- | --- |
| Yes |  | No |
|  |  |  |

If yes, what do you think the research was? Please state below?

1. Acceptability of Nudges/Choice Architecture (roughly based on Petrescu et al, 2016, but mainly created originally).

Please read the following statements, and then answer the questions on a 5-point scale, with 1 being ‘Not in favour’, and 5 being ‘Very in favour’.

If a cafeteria altered the shape of drinks containers so they were taller and thinner, in order to reduce calorie consumption and tackle general over-eating, I would be…

Not in favour 1 2 3 4 5 Very in favour If a drinks manufacturer placed labels warning you of the risk of consuming too much sugar and educating you on the risks, I would be…

Not in favour 1 2 3 4 5 Very in favour

If a cafeteria placed healthy foods closer to you, and unhealthy foods further away, in order to

avoid over-eating and consuming too many calories, I would be… Not in favour 1 2 3 4 5

Very in favour

If a supermarket added extra prices or taxes on unhealthy foods to try and reduce

consumption of the unhealthy foods, I would be…

Not in favour 1 2 3 4 5 Very in favour

If a restaurant served food on larger plates to encourage you to eat more food, I would be…

Not in favour 1 2 3 4 5 Very in favour

If a supermarket placed healthy foods at eye-level, and unhealthy foods near the floor so you have to make more effort to see and pick them up, in order to help individuals, make healthier food choices, I would be…

Not in favour 1 2 3 4 5 Very in favour

If a shop displayed unhealthy food in easy to reach places, and healthy food in harder to reach

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| places, to make it easier to eat unhealthily, I would be… | | | | |  |  |
| Not in favour | 1 | 2 | 3 | 4 | 5 | Very in favour |

1. BMI

Please measure yourself with the assistance of the researcher and state your height

Please weight yourself on the scales and state your weight. This will be kept completely anonymous and confidential, and shall not be shared with any outside party

Thank you for answering these questions and for your participation. If you

have any questions, please feel free to ask.

**Additional File 3**

1) Inferential Statistics from Main Analysis

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Grams consumed | |  |  | Calories consumed | |  |
|  | Analysis | df | *F* | *p* | ȵ2 | df | *F* | *p* | ȵ2 |
|  |  |  |  |  |  |  |  |  |  |
|  | Snack Type | 1 | 0.04 | 0.839 | .001 | 1 | 0.05 | .833 | 0.001 |
|  | Snack Type x Handedness | 1 | 0.72 | 0.403 | .018 | 1 | 0.74 | .395 | 0.019 |
|  | Snack Type x Effort Fruit | 1 | 0.47 | 0.497 | .012 | 1 | 0.01 | .933 | <.001 |
|  | Snack Type x Chocolate | 1 | 1.73 | 0.196 | .042 | 1 | 0.26 | .611 | 0.007 |
|  | Snack Type x Salience Fruit | 1 | 16.62 | <.001 | .299 | 1 | 4.53 | .04 | 0.104 |
|  | Snack Type x Salience Chocolate | 1 | 4.65 | 0.037 | .107 | 1 | 4.63 | .038 | 0.106 |
|  | Snack Type x Fruit Position | 1 | 2.37 | 0.132 | .057 | 1 | 0.01 | .905 | <.001 |
|  | Snack Type x Chocolate Position | 1 | 7.35 | 0.01 | .159 | 1 | 3.65 | .063 | 0.086 |
|  | Snack Type x Fruit Position x Chocolate Position | 1 | 0.04 | 0.85 | .001 | 1 | 0.17 | .683 | 0.004 |
|  | Error | 39 |  |  |  | 39 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

2) Inferential Statistics when individuals who correctly identified the study aims were removed

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Grams consumed | |  |  | Calories consumed | |  |
|  | Analysis | df | *F* | *p* | ȵ2 | df | *F* | *p* | ȵ2 |
|  |  |  |  |  |  |  |  |  |  |
|  | Snack Type | 1 | .025 | .875 | .001 | 1 | .152 | .698 | .004 |
|  | Snack Type x Handedness | 1 | .52 | .476 | .014 | 1 | 1.15 | .291 | .030 |
|  | Snack Type x Effort Fruit | 1 | .42 | .522 | .011 | 1 | 0.18 | .894 | .000 |
|  | Snack Type x Effort Chocolate | 1 | 1.062 | .309 | .028 | 1 | .28 | .598 | .009 |
|  | Snack Type x Salience Fruit | 1 | 15.57 | < .001 | .296 | 1 | 4.97 | .032 | .118 |
|  | Snack Type x Salience Chocolate | 1 | 5.05 | .031 | .120 | 1 | 4.54 | .040 | .109 |
|  | Snack Type x Fruit Position | 1 | 2.08 | .157 | .053 | 1 | .07 | .789 | .002 |
|  | Snack Type x Chocolate Position | 1 | 6.94 | .012 | .158 | 1 | 3.67 | .067 | .088 |
|  | Snack Type x Fruit Position x Chocolate Position | 1 | 0.93 | .762 | .003 | 1 | .26 | .614 | .007 |
|  | Error | 37 |  |  |  | 37 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

1. Analysis regarding visual salience and perceived effort across conditions, and food liking ratings between conditions. Discussions of the results for each are also presented.

**Perceived Effort**

*Fruit Snack:* In line with previous findings, participants’ perceived effort to attain each snackwas measured and compared across conditions using ANOVAs (See Table 1). Perceived effort to attain the fruit was significantly different across conditions, *F*(1, 44) = 25.106, *p* < .001, ȵ2 = .363, with perceived effort being significantly lower to attain the fruit from 20cm (M = 1.51, SD = 0.67) than from 70cm (M = 2.70, SD = 0.95).

*Chocolate Snack:* Effort to attain the chocolate M&M’s was significantly different acrossconditions, *F*(1, 44) = 15.32, *p* < .001, ȵ2 = .258, with perceived effort being significantly lower when M&M’s were positioned at 20cm (M = 1.84, SD = .71) than at 70cm (M = 2.72, SD = .86). Overall, perceived effort to attain either fruit or chocolate snack was higher when the snack was further away (distal) compared to closer to the participant (proximal) across conditions.

**Visual Salience**

There were no significant differences between conditions for visual salience for either snack, *p*s > .108 (see Table 1). This finding suggests that not only did participants rate the visual salience ofthe fruit and chocolate snack similarly, but this occurred irrespective of proximity.

**Snack Preference**

Paired samples *t*-tests indicated that overall, participants rated chocolate as significantly higher (M = 69.94, SD = 28.05) than both oranges (M = 56.83, SD = 26.72), t(47) = 2.618, *p* = .012, *d*

* 0.48, and apple slices (M = 52.56, SD = 27.54), t(47) = 3.39, *p* = .001, *d =* 0.63, suggesting that overall participants significantly preferred chocolate to oranges and apple slices.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | df | *F* | *p* | ȵ2 |
|  | Perceived Effort | Fruit | 1 | 25.11 | < .001 | .363 |
|  |  | Chocolate | 1 | 15.32 | < .001 | .258 |
|  | Visual Salience | Fruit | 1 | 2.69 | .108 | .058 |
|  |  | Chocolate | 1 | .255 | .616 | .006 |
|  | Error |  | 44 |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  | df | *t* | *p* | d |
|  |  |  |  |  |  |  |
|  | Snack Preference | Chocolate - Orange | 47 | 2.62 | .012 | 0.48 |
|  |  | Chocolate - Apple | 47 | 3.39 | .001 | 0.63 |
|  |  |  |  |  |  |  |