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Abstract

Background: Maternal eating behaviours such as cognitive restraint, uncontrolled, and emotional eating styles can have important implications for both maternal own weight, and the weight and eating behaviour of her children. Maternal eating style can affect her feeding interactions with her child, which in turn can influence their weight and eating behaviour. However, despite a body of research examining these relationships, research examining differences in maternal eating behaviour between ethnic groups is sparse with much of the research, particularly in the UK, conducted with White British samples. The aim of the current research was therefore to explore how maternal eating behaviour may differ between ethnic groups in the UK.

Methods: 659 UK mothers with a child aged 5 – 11 years old completed a self-report questionnaire. Items included ethnicity, demographic data and the three-factor eating questionnaire to measure maternal cognitive restraint, uncontrolled and emotional eating.

Results: Mothers from Chinese backgrounds were significantly higher in cognitive restraint and lower in emotional and uncontrolled eating compared to all groups. Conversely mothers from South Asian backgrounds were the highest in emotional and uncontrolled eating and lower in cognitive restraint than all other groups. Black mothers were also higher in uncontrolled eating compared to White British and Chinese mothers.

Conclusions: Variations in maternal eating behaviours vary between ethnic groups. Understanding how cultural factors may influence these variations is important, as maternal eating behaviours can influence her own and her child’s weight. Maternal eating behaviour may therefore be a contributor to higher levels of overweight amongst South Asian and Black children living in the UK.

Key words: Maternal eating behaviour; Cognitive restraint; Emotional eating; Uncontrolled eating; Ethnicity; South Asian; Chinese
Key messages

Maternal eating behaviour differs between ethnic groups in the UK and therefore eating behaviour research should routinely collect ethnicity data and ensure diversity in samples.

 Mothers from South Asian backgrounds have significantly higher levels of emotional eating and lower levels of restrained eating than Chinese, White British, and Black Afro Caribbean groups. The opposite pattern is seen for Chinese mothers.

Public health interventions aiming to improve weight and eating behaviour should ensure that they are culturally relevant for different ethnic groups.

Background

The variability and influence of maternal eating behaviour is a growing field of research. Maternal eating behaviour, and the perceptions that go with it, can influence both her and her children’s weight (Ventura & Birch, 2008). Understanding influences on how and why mothers eat, especially in the absence of hunger, is therefore important for supporting and protecting wider family health. However, in the UK there is a dearth of maternal eating behaviour research that is diverse in its sampling, or compares outcomes, between ethnic groups. This is a gap for both research and practice, which needs to be explored to ensure that research is accurate, generalizable and culturally sensitive for all.

Humans eat for many reasons, many of which are not related to simple hunger (Ogden, 2011). Eating behaviour is typically measured along three broad aspects: how restrained an individual is e.g. dieting, restricting intake of food, how uncontrolled they are e.g. eating in response to smelling or seeing food, and finally whether they eat for emotional reasons e.g. eating in response to sadness, boredom, or happiness (Stunkard & Messick, 1986). Eating for reasons not associated with
hunger or trying to restrict intake of food can affect weight and therefore physical 
and emotional health (Wyert, Winters & Dubbert, 2006), but understanding the link 
between eating and weight is not always straightforward.

In terms of restrained eating, individuals who are overweight are more likely to 
report they are high in constraint (Johnson & Wardle, 2005). However, they often 
become stuck in a cycle where too much restraint leads to uncontrolled eating, and 
thus more weight gain (Woods, Racine & Klump, 2010). Emotional eating is also 
associated with an increased risk of overweight due to an excess intake of calories 
(Snoek, Van Strien, Janssens & Engels, 2007). Eating in response to emotional 
reactions, can lead to eating in the absence of hunger, and thus overweight (Macht, 
2008).

Maternal eating behaviour is also associated with her feeding attitudes and 
interactions with her child. Mothers who are high in restraint are more likely to 
restrict their child’s intake of food (Rodgers et al, 2013), often out of a belief that 
they will protect their child from becoming overweight like themselves (Benton, 
2004). Unfortunately, this can often have the opposite effect. Although not all 
research is conclusive, mothers who use high levels of controlling feeding practices 
with their child are more likely to have a child who is overweight, because restricting 
a food increases desire (Webber, Hill, Cooke, Carnell & Wardle, 2010; Clark, Goyder, 
Bissell, Blank & Peters, 2007; Shloim, Edleson, Martin & Hetherington, 2015).
Children whose mother is high in restriction are therefore more likely to eat in the 
absence of hunger when given free access to restricted foods (Kral & Rauh, 2010), 
thus being at greater risk of overweight (Faith & Kerns, 2005).

Mothers who are emotional eaters are more likely to use emotional feeding styles 
with their children, giving food in response to their child’s emotions (Wardle, 
Sanderson, Guthrie, Rapoport & Plomin, 2002). Mothers apply the same logic that 
they use to eat to their children e.g. trying to deal with sadness through eating 
palatable foods (Tan & Holub, 2015). Children of mothers who are high in emotional 
eaters are more likely to emotionally eat themselves (Lauzon-Guillain, Romon,
Musher-Eizenman, Heude, Basdevant, & Charles, 2009) and also are more likely to be overweight, due to an excess intake of energy (Hajna, Leblanc & Faught, 2014).

Understanding factors that are associated with eating behaviour is important in supporting individuals to adopt healthier eating patterns. Factors such as body image (Tiggemann & Lynch, 2001) and cultural pressure (Braun, Park & Gorin, 2016) are well documented in affecting maternal restraint (and often uncontrolled eating). Stress is also associated with both uncontrolled eating (particularly in those high in restraint) and emotional eating (Zellner et al, 2006).

Variations have been associated with demographic background. For example, individuals on a lower income are more likely to be high in emotional eating (Reagan & Hersch, 2005). However, although research has examined how differences in body image differ broadly between ethnic groups, with South Asian (Cachelin, Rebeck, Chung & Pelayo, 2002) and African American (Wardle & Marsland, 1990) women typically having more positive body images than White American women, evidence is sparse in considering how ethnicity may affect eating behaviour. The aim of the current study was therefore to explore how maternal eating behaviour may differ between the largest ethnic groups in the UK: White British, South Asian, Black and Chinese.

**Method**

**Participants**

Ethical approval was granted by a University research ethics committee and all participants gave informed consent before involving in the study research. All aspects of the Declaration of Helsinki were followed. Participants included mothers living in the UK with at least one child aged 5 – 11, which encompassed primary school age children. Exclusion criteria included identification in an ethnic group outside of the four large groups chosen for the study (White British, South Asian, Chinese and Black), and also maternal inability to
consent, maternal age younger than eighteen years, and significant child health issues that would impact on feeding interactions.

**Measures**

Participants completed a questionnaire which collected demographic background (maternal age, education, occupation, household income), Ethnicity data, and the Three Factor Eating Questionnaire [TFEQ-R18] (Karlsson, Persson, Sjöström & Sullivan, 2000).

Ethnicity data was collected via tick box using the ethnic classifications specified in the UK census 2011 (White British, Gypsy/traveller/Irish traveller/ Asian or Asian British [Indian, Pakistani, Bangladeshi, Chinese, other], Black or Black British, and other) (ONS, 2011). A number of further questions identified degree of acculturation. Mothers identified whether they were born in the UK [yes/no], the number of years they had lived in the UK, and the language they spoke at home [English/mixed/home language e.g. Urdu]. In order to examine diversity of home neighbourhood, participants also gave postcode which was used to extract neighbourhood level data regarding the percentage of the local population who were White British (NSLP, 2011). Neighbourhood deprivation data was also extracted using this database.

To measure eating behaviour mothers completed all three scales of the TFEQ-R18 were completed. The TFEQ-R18 is a revised, shorter version of the original longer TFEQ (Stunkard & Messick, 1985) and was designed to enhance validity of the scales (De Lauzon, Romon, Deschamps, Lafay & Borys, 2004). It consists of 18 items which are scored to give three factors of Cognitive restraint (6 items), uncontrolled eating (9 items) and emotional eating (3 items) (Stunkard & Messick, 1985).

The TFEQ is a widely used measure of eating behaviour that shows good internal consistency and prediction of weight for both normal and obese individuals. It has been translated and used within diverse samples, although typically to assess college student or general population behaviour (e.g. Quick & Byrd-Bredbenner, 2014; Dodd,
A primary aim of the research was to ensure as diverse a sample as possible. Therefore data collection was concentrated on increasing participation of Non-white mothers. Study information highlighted this need, emphasizing the importance of conducting research with diverse groups that would have greater generalisability.

The questionnaire was hosted online with SurveyMonkey, although paper copies were available upon request (although no participant requested a paper copy). Adverts for the data were circulated firstly via online parenting forums (specifically those who have dedicated research request boards), via paper posters in local community and religious centres in South Wales (particularly those with diverse membership) and via schools based in regions in the UK with high levels of diversity (including for example Birmingham, Leicester, Leeds, Bradford and London). Social media was also used to share the advert. In all cases the relevant gatekeeper was approached for permission e.g. the forum or social media group moderator, community centre staff, and for schools the head teacher who then circulated information via school newsletter. The aim was to over sample those in ethnic minority groups as a proportion of the sample compared to population statistics in order to enable statistical comparison.

In all cases study information directed the potential participant to online information about the study. Participants could read full study background information and only if they agreed with consent questions would the full questionnaire load. Researcher details were available to request further information or a paper copy of the questionnaire. At the end of the questionnaire a debrief was loaded with information about the study and repeated details of how to contact the researcher if required.

Data analysis
Data were analysed using IBM SPSS statistics (version 22.0). Ethnic groups were classified according to UK census (Office of National Statistics, 2011). Four major groups were identified: White British, South Asian, Black and Chinese. Those identifying as mixed or other (n = 11) were excluded from the analysis to allow comparison of the four larger groups.

The TFEQ was scored according to instructions to give the factors of cognitive restraint, uncontrolled eating and emotional eating. The three eating behaviour factors were tested for normality using the Kolmogorov-Smirnov Test and found to be normally distributed.

The association between maternal demographic factors and ethnicity was examined using chi square, Pearson’s correlations and MANOVA, and significant associations used as covariates in further analyses. MANCOVA were then used to explore differences in the TFEQ between ethnic groups, using covariates identified in the results. Post hoc bonferonni tests were used to explore significant differences between groups.

Finally, the association between acculturation factors and eating behaviour were examined. T tests were used to explore differences in the TFEQ scores between mothers born in the UK or not. MANOVA were used to examine differences in TFEQ scores between home language group. For those not born in the UK, Pearson’s correlations were used to explore the association between the length of time lived in the UK and maternal eating style. For the sample as a whole, Pearson’s correlations used to explore associations neighborhood diversity, neighbourhood deprivation, and eating behaviour.

Results

Six hundred and fifty-nine responses were included in the sample. The mean age of respondents was 35.74 (SD: 6.17), with a range from 23 to 54 years old. Three hundred
and ninety (59.2%) were White British, 145 (22.0%) South Asian, 84 (12.7%) Chinese and 40 (8.1%) Black or Black British. Further details of the sample are shown in table one.

**Ethnicity and demographic background**

A number of demographic factors were related to ethnicity (See table one for breakdown between groups). A significant difference in family size was found between ethnic groups \(F(3, 655) = 15.353, p = .001\), whilst significant associations were found between ethnic group and household income group \(\chi^2 = 64.09, p = .001\), education \(\chi^2 = 60.55, p = .001\), maternal employment \(\chi^2 = 84.05, p = .001\) and occupation \(\chi^2 = 62.822, p = .001\). Mothers from South Asian and Black backgrounds had more children and lower education than White British and Chinese mothers. Mothers from White and Black backgrounds were more likely to be employed and mothers from White background were more likely to have a professional or managerial occupation. Mothers from White and Chinese backgrounds had higher incomes than those in Black and South Asian. No significant association was found for area diversity or deprivation between ethnic groups. Further analyses therefore controlled for household income, occupation, employment, family size and education.

However, no significant relationships were found between maternal demographic background and maternal eating behaviour, apart from a significant positive correlation between degree of neighbourhood deprivation and uncontrolled eating (Pearson’s = -.112, \(p = .005\)).

**Differences in maternal eating behaviour between ethnic groups**

Differences in each of the three eating behaviour factors between ethnic groups were then examined (Table 2). Significant differences between ethnic groups were found for all three eating behaviour factors. Post hoc Bonferroni tests showed that for cognitive restraint, Chinese mothers were significantly higher in restraint than both South Asian \((p = .010)\) and Black \((p = .022)\) mothers. White British mothers were
significantly higher than south Asian (p = .007) and Black (p = .045) mothers. No further significant differences were found.

For uncontrolled eating, Chinese mothers were significantly lower in uncontrolled eating than the White British (p = <.001), South Asian (p = .003) and Black (p = .020) mothers. No further significant differences were found.

For emotional eating, the Chinese group were significantly lower in emotional eating than the White British (p = .013), South Asian (p = <.001) and Black (p = .004) mothers. White mothers were significantly lower than both South Asian (p = .043) and Black mothers (p = .041).

Does acculturation affect eating behaviour?
The longer an individual lived in the UK, the significantly lower their uncontrolled (Pearson’s = .296, p = <.001) and emotional eating (Pearson’s = .242, p = .015). No further significant associations were found.

A multivariate ANOVA was used to explore the difference in maternal eating style between those who spoke English alone at home, a mixture of English and another language at home and those who spoke a non-English language only at home. No significant differences were found.

No significant associations were found between maternal eating behaviour and the percentage of neighbourhood population that was white.

Discussion
The aim of this study was to explore how maternal eating behaviour might differ between ethnic groups in the UK. Although research has explored maternal eating behaviour and its influence upon child eating behaviour and weight, research in the UK is often conducted predominantly with White British samples with sparse research examining how behaviours might differ between ethnic groups. The results showed
that eating behaviour did vary between ethnic groups, and as the first study of its type to examine this concept in the UK, further research is needed to understand the associations that have emerged and how they might be relevant to those supporting families in practice.

Overall, Chinese mothers were considerably higher in cognitive restraint than other groups whilst South Asian and Black mothers had the highest scores for both emotional eating. Conversely, levels of emotional and uncontrolled eating were lowest amongst Chinese mothers, whilst South Asian and Black mothers had the lowest levels of cognitive restraint. Maternal eating behaviour was also associated with degree of acculturation; the longer a mother had lived in the UK, the higher their uncontrolled and emotional eating behaviour. Potentially South Asian and Black mothers – who were the highest in emotional eating (with a non-significant trend in the means also showing higher uncontrolled eating) - start to adapt to the higher levels of restraint present in the UK, associated with higher levels of body image dissatisfaction amongst White British women. In turn that may cause an increase in uncontrolled eating. In Australia, the longer female immigrants lived in Australia, the more their eating behaviour matched typical Western values of dieting and dissatisfaction (Yang, 2006). Potentially however, something about their experience is increasing their risk of emotional eating.

South Asian and Black mothers had higher levels of Emotional eating. Although emotional eating is tied to body weight due to an excess intake of calories (Snoek et al, 2007), it is not a direct attempt to gain weight, instead caused by a reaction to external events (Macht, 2008). Understanding why mothers from South Asian and Black backgrounds are at an increased risk of emotional eating is therefore important. Emotional and binge eating are associated with financial difficulties, most likely as a coping mechanism (Koupil et al, 2016; Reagan & Hersch, 2005) and mothers from South Asian and Black backgrounds in the UK are more likely to have a lower income. Emotional eating is also a response to stress (Zellner et al, 2006) and depression (van Strien, Konttinen, Homberg, Engels & Winkens, 2016). South Asian and Black mothers
are at a higher risk of depression compared to White British mothers, particularly if they are immigrants to the UK (Nilaweera, Doran & Fisher, 2014).

As noted in the introduction, maternal eating behaviour is an important concept to understand as it can affect not only her own weight and body image but her feeding interactions with her child, increasing their risk of overweight or own eating behaviour (Wardle et al. 2002; Lauzon-Guillain et al. 2009; Morrison et al. 2013; Rodgers et al, 2013). It is possible that maternal eating behaviour therefore has an impact upon child weight and may contribute to increased levels of overweight found in South Asian and Black children in the UK (NHS, 2017). Although of course ethnicity and weight is complex, and affected by factors such as genetics (Cecil, Dalton, Finlayson, Blundell, Hetherington & Palmer, 2012), diet (Gatineau & Mathrani, 2011) and activity (Owen, Nightingale, Rudnicka, Cook, Ekelund, & Whincup, 2009), this relationship is an important element to consider.

Understanding why these patterns emerge is therefore critical, and further research should be conducted in exploring the origins of eating behaviour between different ethnic groups. Food of course is heavily tied to culture, being part of how identity is formed and maintained (Kumanyika, 2008). Food and family are both highly valued and intertwined in South Asian culture (Maiter & George, 2003) and preparing, cooking and eating traditional foods with family and friends is central to South Asian culture (Pallan, Parry & Adab, 2012). Thus lower levels of restraint and higher levels of emotional eating may be embedded within culture and tradition. Traditional South Asian foods and cooking methods can however lead to a high fat content (Chowdhury et al., 2000) and if eaten to excess could exacerbate weight gain.

The opposite is also true, in that culture is tied to eating behaviour, and eating behaviour is not always a positive event. As noted above, emotional eating may also be a coping response to higher levels of stress and depression experienced by South Asian and Black women. The potential increased stress of immigration, loss of community, racism and poverty can affect both body image and eating behaviour as a coping mechanism (Sahi & Haslam, 2003; Reddy & Crowther, 2007).
Chinese mothers were more likely to report a feeding style high in restraint and low in uncontrolled eating. Although research amongst Chinese mothers in the UK and body image is sparse, research examining their feeding interactions with children highlights a tendency for restrictive practices, based on the concept of a ‘duty response’ to protect children from unhealthy Western eating habits. Potentially similar beliefs are influencing maternal own eating behaviour (Wehrly, Bonilla, Perez, & Liew, 2014).

Limitations to the study include the self-selected sample, with a trend towards older and more educated participants. Potentially this may be linked to English language completion of the questionnaire and further research may wish to include translated or interviews. However, this is a common pattern in much of public health and social science research due to a tendency to only more interested volunteers taking part. Further research may also wish to take clinical measures of weight and consider whether these relate to maternal eating behaviour.

Recruitment also relied on online data collection, which has been criticized in the past for attracting only more educated or affluence participants (Azar 2000). However with the rise of smart phones and internet accessibility, the approach is proving a common and popular approach in health and social science data collection due to the ability to recruit more diverse participants more effectively (e.g. Ferguson & Hansen, 2012; Plantin & Danebeck, 2009; Brown, 2016).

Finally, consideration must be given to the limitations of classifying individuals into strict ethnic groups. Although this standardized classification is useful for research purposes, and is a widely used approach, care must be taken not to over generalize or indeed stigmatise groups based such broad groupings (Bhopal, 2007). Further research may also wish to explore intra group differences e.g. whether differences arise between Bangladeshi and Pakistani groups for instance. It is also difficult to draw direct comparisons with research examining ethnic differences in other countries such as the USA as ethnic diversity follows a different pattern in the USA compared to the
UK, with a lower proportion of the USA from White backgrounds and differences in
the largest non-White groups [e.g. African American versus South Asian] (United
States Census Bureau, 2000; ONS, 2016).

In conclusion, this study adds an interesting element to existing maternal eating
behaviour research in the UK, highlighting the need for researchers to be mindful in
measuring ethnic background and collecting diverse samples. It also raises awareness
that dietary and weight interventions around families and healthy eating should be
mindful of ethnic differences and cultural influences when providing public health
advice.

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| Demographic Group | Whole N | % | White N | % | South Asian N | % | Chinese N | % | Black N | % |
|-------------------|---------|---|---------|---|---------------|---|------------|---|---------|---|---|
| **Education**     |         |   |         |   |               |   |            |   |         |   |   |
| GCSE              | 72      | 10.9 | 35      | 9.0 | 21            | 14.5 | 7          | 8.3 | 9       | 10.9 |
| A level           | 131     | 19.9 | 66      | 16.9 | 25            | 17.2 | 22         | 26.2 | 18      | 45  |
| Degree            | 227     | 34.4 | 138     | 35.4 | 52            | 35.9 | 30         | 35.7 | 7       | 17.5 |
| Vocational        | 90      | 13.7 | 45      | 11.5 | 26            | 17.9 | 19         | 22.6 | 0       | 0   |
| Postgrad          | 138     | 20.9 | 106     | 27.2 | 21            | 14.5 | 6          | 7.1  | 6       | 15.0 |
| **Marital status**|         |   |         |   |               |   |            |   |         |   |   |
| Married           | 397     | 60.2 | 214     | 54.9 | 95            | 65.5 | 62         | 73.8 | 26      | 65.0 |
| Cohabiting        | 149     | 22.6 | 96      | 24.6 | 29            | 20.0 | 12         | 14.3 | 12      | 30.0 |
| Partner           | 39      | 5.9  | 25      | 6.4  | 11            | 7.6  | 3          | 3.6  | 0       | 0   |
| Single            | 65      | 10.6 | 49      | 12.6 | 8             | 5.5  | 7          | 8.3  | 1       | 2.5 |
| Divorced          | 9       | 0.5  | 6       | 1.5  | 2             | 1.4  | 0          | 0    | 1       | 2.5 |
| **Employment**    |         |   |         |   |               |   |            |   |         |   |   |
| Full time         | 321     | 48.8 | 66      | 45.5 | 26            | 31.0 | 28         | 70.0 | 66      | 45.5 |
| Part time         | 229     | 34.7 | 57      | 39.3 | 22            | 26.2 | 9          | 22.5 | 57      | 39.3 |
| None              | 109     | 16.5 | 22      | 15.2 | 36            | 42.9 | 3          | 7.5  | 22      | 15.2 |
| **Occupation**    |         |   |         |   |               |   |            |   |         |   |   |
| Higher professional /managerial | 152 | 21.5 | 106 | 27.1 | 26 | 17.9 | 11 | 13.0 | 9 | 22.5 |
| Lower professional /managerial | 183 | 28.7 | 126 | 32.3 | 29 | 20.0 | 20 | 23.8 | 8 | 20.0 |
| Skilled           | 145     | 20.2 | 88      | 22.6 | 39            | 26.8 | 8          | 9.5  | 10      | 25.0 |
| Routine occupations | 90 | 11.2 | 42      | 10.8 | 29            | 20.0 | 9          | 10.7 | 10      | 25.0 |
| Unemployed/ Stay at home | 89 | 2.7  | 28      | 7.1  | 22            | 15.2 | 36         | 42.9 | 3       | 7.5 |
| **Household income group** |    |   |         |   |               |   |            |   |         |   |   |
| Less than £1000   | 27      | 4.1  | 16      | 4.5  | 8             | 5.7  | 1          | 1.2  | 2       | 5.1 |
| £1001-1700        | 76      | 11.5 | 31      | 8.7  | 24            | 17.0 | 15         | 18.5 | 17      | 43.6 |
| £1701-2700        | 156     | 23.7 | 82      | 23.1 | 46            | 32.6 | 10         | 12.3 | 2       | 5.1 |
| £2701-4200        | 202     | 30.7 | 128     | 36.1 | 32            | 22.7 | 31         | 38.3 | 15      | 38.5 |
| £4201             | 176     | 26.7 | 98      | 27.6 | 31            | 22.7 | 24         | 29.6 | 3       | 7.7 |
| Rather not say    | 22      | 3.3  | 13      | 0.59 | 5             | 0.22 | 2          | 0.09 | 2       | 0.09 |
Table 2: Differences in maternal eating behaviour between ethnic groups (showing means and standard deviations)

<table>
<thead>
<tr>
<th></th>
<th>White British</th>
<th>South Asian</th>
<th>Chinese</th>
<th>Black</th>
<th>Significance without covariates</th>
<th>Significance with covariates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive restraint</td>
<td>2.48 (.44)</td>
<td>2.31 (.65)</td>
<td>2.49 (.46)</td>
<td>2.24 (.45)</td>
<td>F (3, 655) = 6.381, p = &lt;.001</td>
<td>F (3, 595) = 5.068, p = .002</td>
</tr>
<tr>
<td>Uncontrolled eating</td>
<td>2.69 (.63)</td>
<td>2.67 (.66)</td>
<td>2.30 (.74)</td>
<td>2.72 (.69)</td>
<td>F (3, 655) = 6.322, p = &lt;.001</td>
<td>F (3, 595) = 4.578, p = .004</td>
</tr>
<tr>
<td>Emotional eating</td>
<td>2.46 (.76)</td>
<td>2.64 (.85)</td>
<td>2.16 (.81)</td>
<td>2.67 (.64)</td>
<td>F (3, 655) = 6.836, p = &lt;.001</td>
<td>F (3, 595) = 6.714, p = &lt;.001</td>
</tr>
</tbody>
</table>