



Binge eating behaviours and food cravings in women with Polycystic Ovary Syndrome



Y.M. Jeanes^{a,*}, S. Reeves^a, E.L. Gibson^b, C. Piggott^a, V.A. May^a, K.H. Hart^c

^a Health Sciences Research Centre, Department of Life Sciences, University of Roehampton, UK

^b Clinical and Health Psychology Research Centre, Department of Psychology, University of Roehampton, UK

^c Department of Nutritional Sciences, Faculty of Health and Medical Sciences, University of Surrey, Guildford, Surrey, UK

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ABSTRACT

Polycystic Ovary Syndrome (PCOS), the most common endocrine condition in women, is often anecdotally associated with binge eating behaviours and food cravings; however there is a paucity of research. This study aimed to report the prevalence of binge eating and food cravings and their relation to obesity risk in women with PCOS. Participants completed an online survey including the Bulimia Investigatory Test, Edinburgh, Food Cravings-Trait Questionnaire and the Three Factor Eating Questionnaire revised-18. The study included obese ($n = 340$), overweight ($n = 70$) and lean ($n = 45$) women with PCOS and lean healthy women ($n = 40$). Sixty percent of obese women with PCOS were categorised with binge-eating behaviour, with 39% presenting with clinically significant behaviour. Obese women with PCOS presented with high mean food cravings-trait scores (131.6 ± 28.9) that were significantly greater compared with lean (114.0 ± 34.9) and overweight women with PCOS (120.1 ± 29.5 ; $p < 0.001$). Multiple regression exploring relations between eating styles and adiposity explained 57% of the variance in binge eating symptom scores in women with PCOS ($F = 130.4$; $p < 0.001$, $n = 463$): significant predictors were food cravings total score ($\beta = 0.53$; $p < 0.001$), emotional eating score ($\beta = 0.18$; $p < 0.001$), body mass index ($\beta = 0.11$; $p < 0.001$) and uncontrolled eating score ($\beta = 0.009$; $p = 0.02$). Compared with lean healthy women, lean women with PCOS exhibited significantly higher binge eating symptom scores (10.9 ± 7.8 versus 7.4 ± 6.0 ; $p < 0.05$), though similar total food craving scores (114.0 ± 34.9 versus 105.6 ± 26.6 : NS). This study is the largest, to date, to robustly report that a high proportion of women with PCOS exhibit binge eating behaviours. We recommend screening women with PCOS for binge eating behaviours to help inform the choice of weight management approach for this clinical population.

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1. Introduction

Polycystic ovary syndrome (PCOS) is the most common endocrine condition in women, affecting up to 18% of women (March et al., 2010) and is characterised by a heterogeneous presentation of hyperandrogenism and ovulatory dysfunction. Women with PCOS have greater insulin resistance, risk of developing type 2 diabetes (Moran, Misso, Wild, & Norman, 2010), and a greater risk of being overweight and obese compared with healthy controls

(BMI >30 RR 2.77 (95% CI 1.88 to 4.10) (Lim, Davies, Norman, & Moran, 2012). Obesity significantly worsens all metabolic and reproductive outcomes for women with PCOS (Lim, Norman, Davies, & Moran, 2013), though importantly as little as 5% weight loss has been shown to improve reproductive, metabolic and clinical markers (Haqq, McFarlane, Dieberg, & Smart, 2014, 2015). Weight management through lifestyle modification is the first line treatment within international guidelines for the management of PCOS (Conway et al., 2014; Legro et al., 2013; National Institute of Clinical Excellence, 2013; PCOS Australian Alliance, 2011; Royal College of Obstetricians and Gynaecologists, 2014), although the effectiveness of such treatments is limited.

Binge eating has been shown to predict excess weight gain (Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007), obesity onset (Haines, Neumark-Sztainer, Wall, & Story, 2007), weight

Abbreviations: PCOS, Polycystic ovary syndrome.

* Corresponding author.

E-mail addresses: y.jeanes@roehampton.ac.uk (Y.M. Jeanes), s.reeves@roehampton.ac.uk (S. Reeves), l.gibson@roehampton.ac.uk (E.L. Gibson), k.hart@surrey.ac.uk (K.H. Hart).

regain after dieting (Elfhag & Rössner, 2005) and failed weight loss (Moroshko, Brennan, & O'Brien, 2011). Binge eating behaviour is characterized by: (i) eating, in a discrete period of time, an amount of food that is definitely larger than most people would eat in a similar period of time under similar circumstances; and (ii) a sense of lack of control over eating (American Psychiatric Association, 2013). There is a paucity of studies exploring disordered eating behaviours in women with PCOS; small studies have indicated a higher prevalence of PCOS in patients with eating disorders (Morgan, Scholtz, Lacey, & Conway, 2008; Naessén, Carlström, Garoff, Glant, & Hirschberg, 2006). There are also reports suggesting both that disordered eating and bulimia nervosa are more common among women with PCOS (Hollinrake, Abreu, Maifeld, Van Voorhis, & Dokras, 2007; Larsson et al., 2015; McCluskey, Evans, Lacey, Pearce, & Jacobs, 1991), though others have reported no difference (Michelmores, Balen, & Dunger, 2001). Furthermore, a meta-analysis showed an increased prevalence of depression and anxiety associated with PCOS compared with controls (Dokras, Clifton, Futterweit, & Wild, 2011, 2012), and it is known that negative emotions are a key predictor of binge eating (Goldfield, Adamo, Rutherford, & Legg, 2008; Mason, Heron, Braitman, & Lewis, 2016). Binge eating is positively associated with hyperandrogenism (Sundblad, Bergman, & Eriksson, 1994) and amenorrhea (Algars et al., 2014), with hyperandrogenism implicated within the pathogenesis of anovulation and menstrual irregularities (Haning et al., 1993; Van Anders & Watson, 2006). The role of circulating testosterone concentrations in the aetiology of eating disorders has yet to be fully elucidated (Baker, Girdler, & Bulik, 2012). Elevated testosterone concentrations may promote bulimic behaviours by influencing food cravings and impulse control (Baker et al., 2012; Cassin & von Ranson, 2005). A suggestion supported by the observation that anti androgenic treatment reduces bulimic behaviour (Naessen, Carlström, Byström, Pierre, & Hirschberg, 2007). An alternative hypothesis is that recurrent binge eating may increase insulin levels, which, via decreased concentrations of sex hormone binding globulin, increase free circulating testosterone (Nestler, 1997), ultimately negatively impacting upon follicular maturation and ovulation (Algars et al., 2014).

Food cravings and obesity are positively correlated (Chao, Grilo, White, & Sinha, 2014; Potenza & Grilo, 2015) with evidence that individuals who are obese have higher frequencies of food cravings than healthy weight individuals (Franken & Muris, 2005). Food cravings may also discriminate between successful and unsuccessful dieters (Batra et al., 2013; Meule, Lutz, Vögele, & Kübler, 2012). Recently, it has been reported that food craving was identified as a significant partial mediator in the relationships between elevated BMI and binge eating episodes (Joyner, Gearhardt, & White, 2015). A food craving has been defined as an intense desire directed at a specific food or drink that is hard to resist (White, Whisenhunt, Williamson, Greenway, & Netemeyer, 2002). Craved and binged foods usually have a high energy density and fat content (Gibson & Desmond, 1999; Gilhooly et al., 2007) and previous studies have reported strong associations between cravings and intake of high-fat foods, sweets, and fast-food (Forman, Hoffman, Juarascio, Butryn, & Herbert, 2013; Martin, O'Neil, & Pawlow, 2006). Food cravings are often anecdotally reported by women with PCOS (Herriot, Whitcroft, & Jeanes, 2008); and a pilot study indicated women with PCOS had significantly higher Food Cravings-Trait scores compared with healthy women (Hart et al., 2012).

Raised androgens and menstrual disturbances have been associated with greater food cravings in women without PCOS (Lim, Norman, Clifton, & Noakes, 2009). The underlying mechanism for the relationship is unclear; although circulating testosterone has been shown to stimulate appetite (Asarian & Geary, 2006) and is

associated with impaired impulse control, irritability and depression (Cassin & von Ranson, 2005; Eriksson, Sundblad, Landen, & Steiner, 2000, pp. 233–46). Accordingly, it has been proposed that elevated levels of androgens may promote food cravings (Hirschberg, 2012).

There is an inadequate understanding of eating behaviours in women with PCOS. If binge eating and food cravings are common in this group, this needs to be highlighted to help clinicians focus on appropriate interventions and strategies to promote weight loss. Weight loss has already been identified as a key treatment for reproductive and metabolic outcomes for women with PCOS, but one which women report difficulty achieving. This study aims to report the prevalence of binge eating and food cravings and their relation to obesity risk in women with PCOS. It is hypothesised that a high proportion of binge eating and food craving behaviours will be identified.

2. Methods

2.1. Participants

The study recruited 583 women with PCOS and 95 women without PCOS (Fig. 1). Healthy lean women were matched for weight, age and ethnicity to lean women with PCOS. Recruitment of study participants utilised social media sites and email advertisements at the University of Surrey. Participant eligibility was determined by a screening questionnaire. All women were at least 18 years of age. Participants were excluded if they were pregnant or breastfeeding. For women with PCOS, a diagnosis of PCOS by a healthcare professional was required. All overweight and obese women with PCOS were invited to participate in the 'Dieting experience' survey. Ethical approval was granted by the procedures of the University of Roehampton and University of Surrey. The studies were carried out in accordance with The Code of Ethics within the Declaration of Helsinki.

2.2. Assessments and measurements

The online survey was presented on the Bristol Online Survey and SurveyMonkey® platforms. Informed consent procedures were embedded into the survey. Participants were asked questions relating to PCOS diagnosis, other medical conditions, self-reported PCOS symptoms, weight, height and dieting history similar to a previous study (Barr, Hart, Reeves, Sharp, & Jeanes, 2011). Amenorrhoea was considered present if participants provided a negative response to "have you had a period in the previous 12 months?"

The following validated questionnaires were used:

- i The Bulimia Investigatory Test, Edinburgh, (BITE) (Henderson & Freeman, 1987); recognised for its validity and reliability (Burton, Abbott, Modini, & Touyz, 2015), is a 33-item self-report measure designed to identify individuals with symptoms of bulimia or binge eating. It consists of a symptom scale and a severity scale, which provides an index of the severity of bingeing and purging behaviour as defined by their frequency.
- ii The Food Cravings Questionnaire–Trait (FCQ–T), a 39-item self-report questionnaire whereby participants indicate how frequently each statement 'would be true for you in general' using a 6-point scale [range: 1 ('never or not applicable') to 6 ('always')]. Nine trait craving domains (Table 2) have been reported in healthy participants (Cepeda-Benito, Gleaves, Williams, & Erath, 2001), those with eating disorders (Moreno, Rodriguez, Fernandez, Tamez, & Cepeda-Benito, 2008) and obese populations (Vander Wal, Johnston, & Dhurandhar, 2007).

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