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Abstract:

***Background*:** The relationship between body-mass-index (BMI) during pregnancy and the risk of disease has been widely explored. The following study examined the relationship between self-esteem, disordered eating and body image to BMI during pregnancy.

***Methods*:** 110 women from Israel and the UK completed the following questionnaires: Sociodemographic details (self-reported age, education levels); the Rosenberg Self-Esteem questionnaire; the Dutch Eating Behaviour Questionnaire (DEBQ); and scales to assess body image and body image disturbance. BMI was calculated from antenatal records and classified as healthy weight (BMI <25 kg/m^2) or overweight (≥25 kg/m^2) using standard BMI cut offs. Spearman correlation, Mann-Whitney tests and linear regression modelling were applied to determine the relationship between variables and differences between countries and BMI categories.

***Results*:** Self -esteem did not differ from non-pregnant population levels. Frequency of high restraint (>3.5 DEBQ) was lower for UK healthy weight women. For both countries a high correlation was found between body image and BMI, with significantly higher body dissatisfaction for Israeli than UK women.

***Conclusions*:** In pregnancy, UK and Israeli women's levels of self-esteem did not differ from reported ranges for non-pregnant women, whilst poor body image and more restrained eating in healthy-weight women was found only in Israel.

Key words: pregnancy, eating behaviours, body image, self-esteem BMI

Introduction:

Overweight and obesity are increasing worldwide (Yu et al., 2006). The World Health Organization (WHO) suggests that obesity is the most serious health problem of the 21st century (Sirimi and Goulis, 2010) and various studies have focused on the best time to start treating obesity. Before and during pregnancy, obesity is a major health risk factor for the mother and the foetus (Koubaa et al, 2008; Ludwig et al, 2010; Sirimi and Goulis, 2010; Micali and Treasure., 2007). The offspring of obese women have a higher likelihood of becoming obese during childhood, developing metabolic syndrome in adulthood (Shrestha et al, 2010; Sirimi and Goulis, 2010; Stein et al, 2006; Kendall et al., 2001) and are twice as likely to become obese by 2 years of age (Catalano and Ehrenberg, 2006; Shields et al., 2010; Smith and Hulsey, 2008).

Much research has focused on the physical health risks associated with maternal overweight and obesity, while there is less attention paid to the emotional well-being of women during pregnancy and any potential effects on their child's body weight and emotional development (Harris et al, 1999; Herring et al., 2008; Meaghan et al., 2008). These factors are important as they may well have an impact on the mother's ability to parent effectively and the way in which feeding is carried out (Franko et al, 1993; Hampson et al, 2010; Ozmen et al., 2007; Patel et al., 2002; Reba-Harreleson et al., 2009).

Evidence demonstrates that pregnancy is a period of body dissatisfaction for some women as they face significant changes in body size as pregnancy progresses (Skouteris et al, 2005; Duncombe et al 2008). These changes provide a powerful counterpoint within Western cultures where pressure to achieve and maintain slimness is prevalent and pervasive (Davies and Wardle 1994; Fox and Yamaguchi, 1997). On the other hand Wardle suggests pregnancy might result in an improvement of body image (Davis and Wardle., 1994) since the weight gain is both expected and accepted. Pregnancy can also affect eating behaviours as it presents women with an opportunity to "eat for two", to abandon diet plans and then enjoy body weight and shape changes since this bodes well for the health of their baby (Conner et al, 2004; Clark et al, 2009).

Pre-pregnancy body image issues appear to moderate dissatisfaction with body size and shape in pregnancy and these seem to remain relatively stable with greatest dissatisfaction experienced postpartum (Morin et al, 2002; Skouteris et al, 2009). Body mass index (BMI) predicts dissatisfaction with heaviest women reporting greatest dissatisfaction (Clark et al, 2009; Furnham et al, 2002; Huang et al, 2010; Yakura et al, 1997).

The surrounding culture can also impact on the expression of body dissatisfaction depending on how weight change is perceived. Cultural roles may impact on the way women relate to themselves (Loth et al., 2011) thus in Poland for example, where pregnancy is venerated and weight change during pregnancy a matter of some pride, body image is generally positive and mediated by self-esteem (Kazmeirczak and Goodwin, 2012). Thus body dissatisfaction during pregnancy may be influenced by a range of factors including the extent to which thinness is an ideal promoted within a culture as well as how much this is internalised by individual women.

Our study was located in Israel and the UK, both developed western countries, which vary in culture as well as in their recommendations for medical care during pregnancy. Thus, while most western countries, have four routine health check-ups during pregnancy (measuring blood pressure, levels of haemoglobin, Hepatitis B etc.) (Haertsch et al., 1999) Israeli women have 12 procedures (State of Israel, ministry of health, 2012) including more than 8 genetic tests required for Jewish Ashkenazi women including fragile-X and Tay-Sachs (Sher et al., 2003). Moreover, as Israel is a country which suffers from continuous conflict (Meljer, A. 1985) we hypothesized that the differences in everyday life and potentially higher levels of stress for Israeli women might affect levels of self-esteem, body image and eating behaviours during pregnancy.

Our study is the first to explore the relationship between self-esteem, disordered eating and body image during pregnancy in two contrasting cultures (Israel and the UK). The aims of the study were (1) to explore and characterise the relationship between BMI, self-esteem, body image and eating behaviours amongst pregnant women in Israel and the UK, (2) to compare these variables between countries and (3)

to identify the prevalence of poor body image, low self-esteem and restrained eating during pregnancy in Israel and in the UK

Methods:

Recruitment

From April 2011 until June 2011, 110 pregnant women from Israel and the UK were recruited through distribution of posters and flyers in community centres and the University of Leeds, and emails were sent through the University circulation lists. Most of the women (N>93) were in their first trimester aiming to minimise response bias as pregnancy progressed. A power calculation showed that 86 participants were sufficient to detect clinically meaningful differences in the questionnaire scores between normal weight and overweight subjects. All women were assessed once during their pregnancy and were provided with questionnaires by post or email from the same individual.

Procedures

The women were asked to complete a 5 part questionnaire which took less than 20 minutes to complete. The questionnaires were in English in both countries although one Israeli woman requested help from the lead researcher (NS) in reading the questionnaire while filling it in. Completed questionnaires were returned to the lead researcher via email or post.

Questionnaires

Sociodemographic data

Self-reported details concerning family circumstances (marital status), pregnancy and level of education (less than a degree, a degree, higher than undergraduate degree) were collected. Participants were asked to check their antenatal record and provide the researcher with the recorded weight and height at the time of booking (week 8 in Israel vs. week 12 for UK women).

Rosenberg self-esteem questionnaire (RSEQ)

To assess self-esteem the RSEQ was used which consists of ten questions, five are positive and five are negative, these are rated on a four point Likert scale (Rosenberg,

1965). The scoring scale ranges from 0-30 and a higher score indicates higher levels of self-esteem.

Dutch Eating Behaviour Questionnaire (DEBQ)

This is a thirty-three item scale measuring restraint (10 items which relate to restriction in amount of food consumed in attempts to lose/maintain weight), emotional eating (13 items relating to eating in response to emotional difficulties/inconvenience rather than physical hunger,) and external eating (10 items, relating to eating in response to external food cues.) .The first question was amended to reflect eating behaviour before pregnancy (rather than current behaviour). Respondents were required to rate each item on a 5 point Likert scale ranging from 1 (seldom) to 5 (very often). A higher score indicated a higher prevalence of disordered eating and restrained eating is typically considered ≥3.5 (Jansen et al, 2011; Van-Strein et al., 1986).

Stunkard figure rating scale (BIS)

To assess body image the BIS tests the accuracy of participant's self-perception and satisfaction towards their body. This scale contains nine body shapes from the slimmest to the largest (Stunkard et al., 1983; Thompson and Altabe., 1991). In this study we measured the difference in scores between their recalled body image prior to pregnancy (BIPP) and the desired body image (BID) after pregnancy. A positive score indicated a desire to be slimmer and a negative score a desire to be plumper.

Body Image Disturbance Questionnaire (BIDQ)

This questionnaire measures levels of disturbance in body image. It contains seven statements with a Likert scale (Cash et al., 2004) and a range of scores from 1-5. The statements were amended so that they related to general appearance rather than disfigurement. Scoring is taken as the mean of the seven items, with a higher score indicating higher levels of body image disturbance.

Ethics approval

The study was ethically approved by the Joint School of Medicine Research Ethics Committee; reference number HSLTLM/10/021. All participants provided written informed consent.

Data analysis

BMI (kg/m^2) was calculated as weight (kg) divided by height (m^2) from measurements at booking in the participants' antenatal records. Women were classified as healthy weight vs. overweight/obese using standard BMI cut offs (<25 kg/m^2; ≥25 kg/m^2 respectively). Due to the relatively small sample size obesity and overweight categories were combined for analysis.

Descriptive statistics were calculated to determine levels and prevalence of self-esteem, satisfaction with body image and eating behaviours in each country (main outcome measures) and divided into BMI categories. Combined results are also presented. Spearman correlation and the two-sample Mann-Whitney test were applied to determine whether there was any evidence of a significant relationship between the outcomes measured from the questionnaires and BMI. Medians were calculated for all variables separately for country and the BMI category. A P- value of less than 0.05 was considered significant.

The dependant variables were the questionnaire scores. Linear regression was used to model the responses from each questionnaire with the following independent variables: age (years), education level (degree vs. no degree), number of children (≥1 vs. 0) and BMI (≥25 vs. <25). We examined whether the relationship between the questionnaires scores (outcome) and BMI differed according to country of origin by including a binary variable (UK/Israel) in the linear regression modelling. Initially each variable was added separately into a univariable model aiming to determine the effect of each independent variable separately on the dependent variables. The second phase was to regress all variables simultaneously together in a multivariable model to determine whether adjustment for important covariates influenced the association between outcome and BMI. Stata version 11.1 was used to analyse the data.

Results:

Sample

Sixty-two Israeli and forty-eight UK pregnant women (N=110) were recruited. Most were married (N=101, 91.8%), healthy (no medical complications before and during pregnancy) with 85% holding a higher education degree. On average the women were 32.8 years old (SD 4.4 years), which is older than average for pregnancy in both countries (26.9 years) (The Central Bureau of Statistics, Israel, 2010; Office of National Statistics UK, 2011).

76.3% of Israeli women were healthy weight, vs. 66.6% of UK women (N=45 and 28 respectively). Higher prevalence of overweight was seen in UK women (23.8%, N=10) vs. 15.2% (N=9) in Israel. Levels of obesity did not vary between countries; however, one Israeli participant had a markedly higher BMI (39 kg/m^2) than other participants from either country. Her measurements were identified as an outlier and the analysis repeated after excluding this subject. As her exclusion did not affect the results, the findings from the full cohort (N=110) are presented.

Measurements:

Most women in the present sample were classified within the normal weight category with a mean BMI (SD) for both countries of 22.9 (4.2) kg/m^2. 12.5% of BMI data were missing for women in the UK compared to 4.8% in Israel. Both groups were representative of their respective population denominator statistics. Table 1 summarizes these measurements [table 1 near here].

Table 2 presents the summary of scores for all questionnaires. Cronbach's alpha showed valid responses and high consistency (>0.86) for all questionnaires other than body image which had a relatively low consistency [table 2 near here].

Figure 1 presents the results of the body image figure scale, representing the difference in scores between pre pregnancy body image to the desired post pregnancy body image [figure 1 near here].

Multivariate regression modelling (table 3 near here) showed that, after adjusting for all covariates simultaneously there were no significant differences in responses between countries indicating that country was not a significant predictor in terms of

explaining differences in women's levels of self-esteem and eating behaviours (appendix 1). Responses were consistently lower for the UK indicating greater body disturbance for the Israeli participants, although no significant association was found. BMI only exerted a significant effect on response for the DEBQ-emotional and BIS questionnaires, with overweight and obese women more likely to exhibit higher scores which represented a relationship between high BMI, emotional eating and body image. For the RSEQ and BIDQ questionnaires, there was very little change seen in the effect sizes and level of significance between the univariable and multivariable modelling results.

[Table 3 near here].

RSEQ: self-esteem.

The median score for RSEQ for both countries was 25.

DEBQ: Dutch Eating Behaviour Questionnaire.

The median score for restrained eating for all participants was 2.6. In Israel, more than 15% of healthy weight women had scores of 3.5 and above, indicative of relatively high restrained eating, compared to 3.7% from the UK. There was no significant difference in DEBQ-restraint scores by BMI category (Appendix 1a and 1b).

The median score for emotional eating for both groups was 2.2 and did not vary significantly between the two BMI categories in either country (Appendix 1a and 1b).

For external eating the overall median was 2.8, and did not differ significantly by BMI category (Appendix 1a and 1b).

BIS: body image scale.

The difference between perceived BIPP and BID was measured (Stunkard et al., 1983; Thompson and Altabe., 1990). Scores ranged from one to nine. The median for the whole population was 3.0 prior to pregnancy.

The median for the difference for the whole population was 1.0. Overall, there did not appear to be any significant difference in the distribution of BIS scores among Israeli and UK women.

50% of healthy weight women in the UK chose figure 3 (third image from the slimmest body image figure) to represent themselves prior to pregnancy, as compared to 23% of Israeli women.

The regression modelling showed that the BIPP, BID and the difference in scores were highly correlated with weight status. Thus the higher the body weight, the higher the body image dissatisfaction in both countries (Appendix 1a and 1b).

BIDQ: body image disturbance.

The median scores for both countries were 1.4 and highest for Israeli overweight and obese women (1.7). Higher median scores were found for Israeli women compared to UK women (≥1.7 vs. ≥1.4) respectively indicating higher prevalence of body image disturbance for Israeli women despite no significant differences among the BMI groups. Body image was significantly more disturbed for Israeli than UK women. In particular, scores for the last statement of the questionnaire, concerning avoidance to do things as a result of appearance, was significantly higher for Israeli women (0.04).

Discussion:

The aims of the study were to explore and characterize the relationship between body mass index (BMI) self-esteem, body image and eating behaviours amongst pregnant women in Israel and the UK; and then to compare these measurements between the countries and to identify low levels of self-esteem, poor body image and restrained eating during pregnancy. To our knowledge, this was the first time the questionnaires have been used with pregnant women in this way.

The relationship between BMI, self-esteem, body image and eating behaviours.

The majority of scores were within the healthy range for self-esteem, body image and restrained eating. An indicator of good mental health was evident for both cohorts, with self-esteem in pregnancy comparing favourably with that reported for the general population. Self-esteem tended to be relatively high in this sample of women during pregnancy and supports previous findings of stability of self-esteem during pregnancy (although this was not measured directly in this sample of women) (Kazmeirczak and Goodwin 2012). BMI proved to be a significant predictor of body image satisfaction

supporting previous evidence (Clark et al, 2009), and is in line with findings in the non-pregnant population (Cash et al., 2004).

Previous studies suggest that body weight, shape and dieting concerns are suspended for many women in pregnancy (Clark et al, 2009) However, one cannot exclude the possibility of recall bias, with women changing their perception of how they felt towards their bodies prior to pregnancy (Loth et al., 2011). For a minority of pregnant women, body image disturbance and restrained eating were apparent despite being classified as healthy weight. This supports the idea that even during pregnancy some women are dissatisfied with weight and shape and despite "eating for two" exert restrained eating. Restrained eating is associated with higher than recommended gestational weight gains in healthy, overweight and obese women and lower than recommended gestational weight gain in underweight women (Mumford et al, 2008). Thus restrained eating appears to produce differential effects during pregnancy dependent on weight status.

Our study suggests that for most women pregnancy is a time of unrestrained eating, although there was an indication of some relatively high restrained eating among healthy weight Israeli women. This is of concern as eating restraint could have implications for the growth of the foetus and unhealthy maternal nutrition during lactation. Studies have reported that the estimated prevalence of an actual eating disorder during pregnancy is in the range of 1% compared to 3.5% in the non-pregnant population (Lewis et al, 2009; Soares et al., 2009), with a decrease in symptoms tending to occur between the first and third trimester in women with an active eating disorder. The accuracy of these studies may however be constrained by both their small sample size (Micali et al, 2007), and the possibility that shame, secrecy and denial might preclude patients from informing their doctor when an eating disorder is present during pregnancy.

Differences in body satisfaction, self-esteem and eating behaviors between countries

Both nations are Western countries and comparability of scores may be expected. Our findings showed a tendency towards lower self-esteem and a higher prevalence of restrained eating and body image dissatisfaction for Israeli women. The explanation is not clear, although it might relate to the stresses of everyday life in Israel, a country which is continuously under threat of conflict (Glasser et al., 1998; Lindquist et al.,

1997). Stress during pregnancy is associated with developmental outcome in infancy and also has implications on mothers' wellbeing (Schetter and Tanner, 2012; Huizink et al., 2003). For example Rofe and Goldberg (1983) showed that pregnant Israeli women who lived in a military zone had higher blood pressure than those living in less stressed areas (Rofe and Gold, 1983); and is has been shown that children born during war were more likely to have developmental problems than those born during peace (Meljer, 2007).

A further factor may be differences in health care in pregnancy with women in Israel having more prenatal visits (NHS pregnancy guidelines. 2012; Israeli health care guidelines. 2012). This could arguably lead to a difference in levels of concern regarding weight gain and also stress. In both countries, healthy weight or overweight and obese women receive guidelines regarding nutrition in pregnancy (www.health.gov.il; www.nhs.uk) and are strongly advised to follow the WHO recommendations regarding weight gain. (www.health.gov.il; www.nhs.uk). It is possible that restrained eating might relate to guidance by health professionals.

Relatively higher levels of body image disturbance were found for Israeli women. This is concordant with studies in the non-pregnant Israeli population which showed higher levels of underweight in 17 years old compared with other Western countries (Bar Dayan et al., 2005) and higher levels of disordered eating in native Israeli students compared to new immigrants from the USSR (Greenberg et al., 2007).

While body image dissatisfaction has previously been found to relate to disordered eating (Scagliusi et al., 2006; Loth et al., 2011), in the present cohort this was expressed mainly in restrained eating rather than eating disorders *per se*. Desire to be slim may be suspended in pregnancy (Clark et al, 2009) and there was evidence in the present study that preferred body image for overweight and obese women matched closely to their actual body size rather than an unrealistic ideal.

The results of the study need to be considered within the context of its limitations. Firstly we used recorded heights and weights at booking for pregnancy care. Although these were likely to be more accurate than reported pre-pregnancy measurements, and were not likely to have increased markedly in the first trimester, nevertheless they may not be an accurate reflection of BMI prior to pregnancy. Categorizing our sample size into healthy weight, overweight and obese groups yielded a relatively low

number of participants for overweight and obese categories. A larger sample size would allow discrimination between these two categories and lead to better understanding of the variation and the prevalence of poor body image, levels of self-esteem and eating behaviours in the overweight and obese pregnant population. Selection bias is also likely to have been an issue, as due to the recruiting process (emails through a University) the population was highly educated and of relatively high socioeconomic status. Lastly, it would have been interesting to measure levels of stress and anxiety during pregnancy as these might well impact on self-esteem and eating behaviours.

Our study has demonstrated the feasibility of recruiting women to study the potentially sensitive issue of body image and self-esteem during pregnancy, and the scales validated in the nonpregnant population were found to be suitable for use in pregnancy, so should allow for comparison between non- pregnant and pregnant populations. Our findings suggest the need for larger cohort studies, with adequate numbers of overweight and obese women to ascertain the extent that weight status influences how women feel and eat during this crucial phase of life. As obesity reaches epidemic proportions, pregnancy could be an ideal time to discuss issues of weight, body image and eating could be critical periods to intervene both for the mother and for the future health of her child.

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Table 1: Comparison of participants' characteristics by country of origin.

Variable	Number of observations			Mean(SD)			Median			Range		P value*
	Israel	UK	Israel + UK	Israel	UK	Israel+ UK	Israel	UK	Israel + UK	Israel	UK	
Age (years)	60	48	108	32.8 (3.53)	32.6 (5.29)	32.7 (4.38)	33.2	33	33	25 -39	22 -42	0.97
Weight at booking (kg)	61	41	102	61.82(12.8)	62.04(11.11)	61.95(12.09)	59	60	60	44- 109	44.5 -90	0.60
Height at booking (cm)	59	45	104	165(0.04)	163(0.07)	164(0.06)	165	167	165	155- 175	150 -167	0.85
BMI (kg/m^2)	59	42	101	22.6 (4.45)	23.3 (3.84)	22.9 (4.20)	21.8	22.2	22	15.6- 39	16.1-33	0.23
Number of children per family	62	48	110	___	____	___	1	0	1	**0-8**	**0 -13**	0.03*
Level of education	62	48	110	4.9(0.27)	4.4(1.0)	4.7(0.75)	5	5	5	**4-5**	**1-5**	0.01*
Marital status	62	48	110	1.06(0.35)	1.27(0.67)	1.15(0.52)	1	1	1	**1-3**	**1-3**	0.03*

* Two- sample Mann-Whitney test comparison of medians between Israel and the UK. SD (Standard deviation), BMI (body max index). Level of education:1 indicates none, ;4 indicates at least 3A levels and 5 indicates a degree, Marital status: 1 ;married, 2;long-time partner and 3; single.

Table 2: Summary scores for all questionnaires.

Questionnaire	N			Median			IQR			
ISRAEL	BMI <25	BMI ≥25	**Total**	BMI <25	BMI ≥25	**Median Overall**	BMI <25	BMI ≥25	**IQR Overall**	**Percentage of missing data**
RSEQ	43	13	**57**	25	22	**25**	(24- 26)	(16 -17)	**(22- 28)**	8.0
DEBQ:										
Restraint	42	9	**58**	2.5	2.8	**2.7**	(2.1- 3.1)	(2.7- 3.1)	**(2.1- 3.1)**	8.0
Emotional	40	7	**54**	2.1	2.4	**2.2**	(1.6- 2.5)	(2 - 3.5)	**(1.7- 2.7)**	13.0
External	43	13	**59**	3	3	**3**	(2.7- 3.3)	(2.7 -3.4)	**(2.7- 3.4)**	4.8
BIS:										
Before pregnancy	44	14	**61**	3	5	**4**	(2- 4)	(4 -6)	**(2- 4)**	1.6
Desired	44	14	**61**	3	3	**3**	(2- 3)	(3- 4)	**(2- 3)**	1.6
Difference score	44	14	**61**	0.5	1	**1**	(0- 1)	(1 -3)	**(0- 1)**	1.6
BIDQ	43	14	**58**	1.4	1.71	**1.4**	(1.1- 1.8)	(1.3- 2.4)	**(1.3- 1.8)**	6.4
UK										
RSEQ	28	14	**48**	25	25	**25**	(23.5- 25)	(24- 27)	**(24- 26)**	0
DEBQ:										
Restraint	27	13	**46**	2.4	2.9	**2.5**	(1.8- 3.1)	(2.2- 3.2)	**(2- 3.1)**	4.1
Emotional	28	13	**47**	2.2	2.3	**2.3**	(1.69- 2.69)	(1.6- 2.9)	**(1.7- 2.8)**	2.0
External	28	13	**47**	2.8	2.7	**2.8**	(2.55- 3.2)	(2.7- 2.9)	**(2.7- 3.1)**	2.0
BIS:										
Before pregnancy	28	13	**47**	3	4	**3**	(2.5- 3.5)	(3- 5)	**(3- 4)**	2.0
Desired	28	13	**47**	3	3	**3**	(2- 3)	(3- 4)	**(2- 3)**	2.0
Difference score	28	13	**47**	0	1	**1**	(0- 1)	(1- 1)	**(0- 1)**	2.0
BIDQ	25	12	**41**	1.3	1.2	**1.3**	(1.14 -1.42)	(1.1- 1.7)	**(1.1- 1.4)**	14.6

TOTAL Israel and UK	**IS**	**UK**	**Total**	**IS**	**UK**	**Median Overall**	**IS**	**UK**	**IQR Overall**	**Percentage of missing data**
RSEQ	57	48	**105**	25	25	**25**	(23 -27)	(24 25.5)	**(24- 26)**	8.0
DEBQ:										
Restraint	58	48	**104**	2.7	2.5	**2.6**	(2.1- 3.1)	(2.1- 3.1)	**(2.1- 3.1)**	12.2
Emotional	54	46	**101**	2.2	2.3	**2.2**	(1.61- 2.69)	(1.7- 2.8)	**(1.7- 2.8)**	14.9
External	59	47	**106**	3	2.8	**2.8**	(2.6- 3.4)	(2.6 -3.1)	**(2.6- 3.3)**	7.0
BIS:										
Before pregnancy	61	47	**108**	4	3	**3**	(2- 4)	(3- 4)	**(2- 4)**	3.7
Desired	61	47	**108**	3	3	**3**	(2- 3)	(2- 3)	**(2- 3)**	3.7
Difference score	61	47	**108**	1	1	**1**	(0- 1)	(0- 1)	**(0- 1)**	3.7
BIDQ	58	41	**99**	1.4	1.3	**1.4**	(1.28- 1.85)	(1.1- 1.4)	**(1.1- 1.7)**	21.0

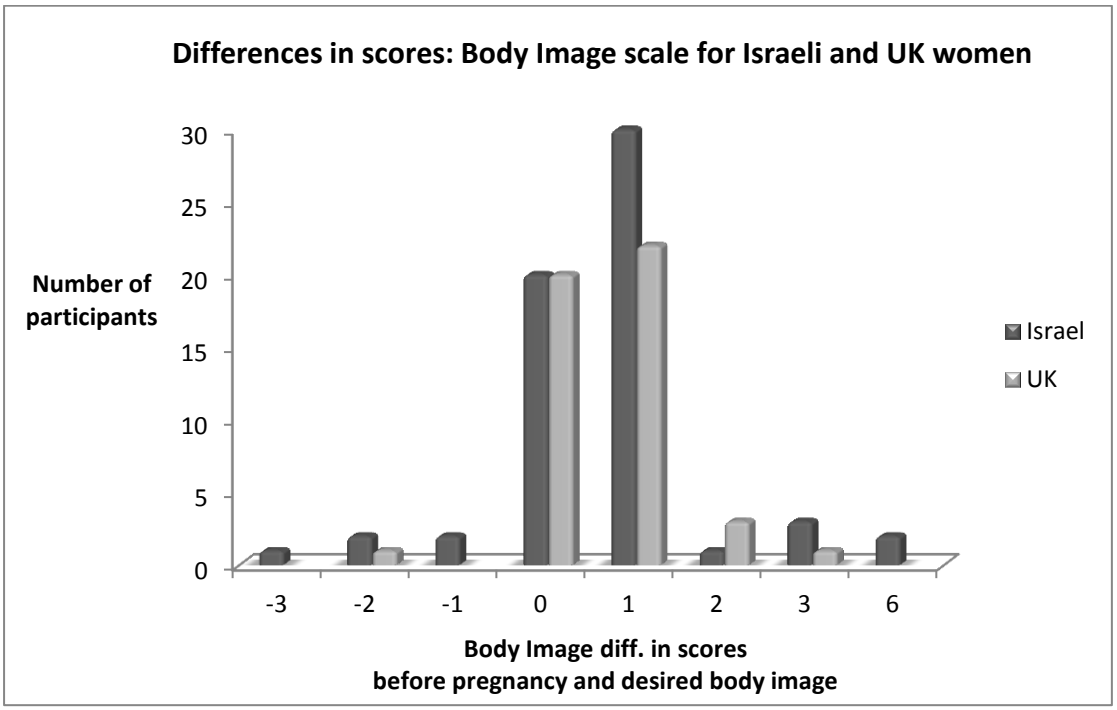
Two-sample Mann-Whitney test comparing questionnaire responses between BMI categories. **IQR** (Inter quartile range). **RSEQ** (Rosenberg self-esteem questionnaire), **DEBQ** (Dutch eating behaviour questionnaire), **BIS** (Body Image scale) and the **BIDQ** (Body Image Disturbance Questionnaire), ≤25 (healthy weight), >25 (Overweight+ Obese), **IS** (Israel).

Table 3: Linear regression (Multivariable modeling).

Outcome	Multivariable model Coefficient	95% CI	P value
RSEQ:			
Country (UK vs. Israel)	-0.46	-1.45,0.52	0.35
Age(years)	-0.01	-0.13,0.11	0.92
Number of Children (+1 vs. 0)	0.03	-0.25,0.43	0.85
Education level(Degree vs. no degree)	-1.05	-2.55,0.43	0.16
BMI Category (≥25 vs. <25)	0.35	-0.76,1.48	0.52
DEBQ: Restrained:			
Country (UK vs. Israel)	-0.16	-0.47,0.15	0.30
Age (years)	-0.009	-0.04,0.03	0.65
Number of Children (+1 vs. 0)	0.05	-0.05,0.15	0.34
Education level (Degree vs. no degree)	0.28	-0.19,0.76	0.23
BMI Category (≥25 vs. <25)	0.26	-0.09,0.62	0.14
DEBQ: Emotional			
Country (UK vs. Israel)	-0.07	-0.38,0.23	0.63
Age (years)	-0.04	-0.08,0.001	0.06
Number of Children (+1 vs. 0)	-0.02	-0.13,0.07	0.59
Education level (Degree vs. no degree)	-0.23	-0.70, 0.24	0.34
BMI Category (≥25 vs. <25)	0.44	0.07,0.80	*0.01
DEBQ: External:			
Country (UK vs. Israel)	-0.19	-0.42,0.02	0.07
Age (years)	-0.04	-0.06,-0.009	*0.009
Number of Children (+1 vs. 0)	-0.01	-0.09,0.05	0.63
Education level (Degree vs. no degree)	-0.03	-0.37,0.30	0.86
BMI Category (≥25 vs. <25)	0.13	-0.13,0.38	0.32
BIS: difference			
Country (UK vs. Israel)	-0.06	-0.50,0.36	0.75
Age (years)	0.004	-0.05,0.05	0.87
Number of Children (+1 vs. 0)	0.100	-0.04,0.24	0.16
Education level (Degree vs. no degree)	0.20	-0.45,0.87	0.53
BMI Category (≥25 vs. <25)	0.78	0.29,1.28	*0.002
BIDQ:			
Country (UK vs. Israel)	-0.30	-0.57,-0.03	*0.02
Age (years)	-0.01	-0.04,0.02	0.44
Number of Children (+1 vs. 0)	0.004	-0.08,0.09	0.92
Education level (Degree vs. no degree)	0.14	-0.25,0.54	0.47
BMI Category (≥25 vs. <25)	0.14	-0.16,0.43	0.36

*Significant.

Figure 1: Body Image scale



Possitive score; desire to be slim.Negative score; desire to be larger.

Appendix:

Table 1: Linear regression (Univariable modeling).

Outcome	Univariable model Coefficient	95% CI	P value
RSEQ:			
Country (UK vs. Israel)	-0.32	-1.21,0.56	0.47
Age (years)	0.001	-0.10,0.09	0.97
Number of Children (+1 vs. 0)	0.10	-0.16,0.38	0.43
Education level (Degree vs. no degree)	-0.90	-2.12,0.32	0.14
BMI Category (≥25 vs. <25)	0.37	-0.67,1.43	0.47
DEBQ: Restrained:			
Country (UK vs. Israel)	-0.08	-0.38,0.22	0.59
Age(years)	0.01	-0.02,0.05	0.49
Number of Children (+1 vs. 0)	0.06	-0.03, 0.15	0.19
Education level (Degree vs. no degree)	0.24	-0.17,0.65	0.25
BMI Category (≥25 vs. <25)	0.27	-0.05, 0.60	0.10
DEBQ: Emotional			
Country (UK vs. Israel)	0.03	-0.26,0.32	0.83
Age (years)	-0.03	-0.06,0.00	0.05
Number of Children (+1 vs. 0)	-0.006	-0.09,0.08	0.88
Education level (Degree vs. no degree)	-0.24	-0.65,0.15	0.22
BMI Category (≥25 vs. <25)	0.30	-0.03,0.65	0.07
DEBQ: External:			
Country (UK vs. Israel)	-0.13	-0.34, 0.07	0.20
Age (years)	-0.03	-0.05,-0.009	*0.006
Number of Children (+1 vs. 0)	-0.03	-0.09, 0.03	0.37
Education level (Degree vs. no degree)	-0.11	-0.41,0.18	0.46
BMI Category (≥25 vs. <25)	0.008	-0.24, 0.25	0.94
BIS: difference			
Country (UK vs. Israel)	-0.10	-0.56,0.35	0.65
Age (years)	0.02	-0.02,0.08	0.38
Number of Children (+1 vs. 0)	0.16	0.02,0.30	*0.02
Education level (Degree vs. no degree)	0.01	-0.64,0.66	0.97
BMI Category (≥25 vs. <25)	0.88	0.42,1.34	*0.00
BIDQ:			
Country (UK vs. Israel)	-0.28	-0.52, -0.03	*0.02
Age (years)	-0.001	-0.03, 0.02	0.91
Number of Children (+1 vs. 0)	0.001	-0.07, 0.07	0.97
Education level (Degree vs. no degree)	0.12	-0.22,0.47	0.48
BMI Category (≥25 vs. <25)	0.08	-0.20, 0.37	0.56

*Significant.

Table 2: Pairwise correlation matrix for questionnaires scores.

	RSEQ	DEBQ: Restrained	DEBQ: Emotional	DEBQ: External:	BIS: Current	BIS: Desire	BIS: Difference in scores	BIDQ:
RSEQ	1.00							
DEBQ: Restrained	-0.09	1.00						
DEBQ: Emotional	-0.14	0.08	1.00					
DEBQ: External	-0.13	-0.05	0.51	1.00				
BIS: Current	0.02	0.14	0.17	0.05	1.00			
BIS: Desire	0.10	-0.11	0.07	-0.04	0.60	1.00		
BIS: Difference in scores	-0.08	0.29	0.13	0.10	0.54	-0.33	1.00	
BIDQ:	-0.09	0.32	0.25	0.14	0.11	-0.03	0.17	1.00

Pearson correlation test. Rosenberg Self-esteem questionnaire (RSEQ), Dutch Eating Behaviours Questionnaire (DEBQ), Body Image Scale (BIS), Body Image Disturbance Questionnaire (BIDQ).

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