



Overweight and obese midlife women in Israel: cultural differences in perceived weight status

Roni Elran-Barak · Tzvia Blumstein · Valentina Boyko ·
Dana Hadar · Adel Farhi · Liat Lerner-Geva · Yael Benyamini

Received: 2 January 2015 / Revised: 31 August 2015 / Accepted: 5 October 2015 / Published online: 26 October 2015
© Swiss School of Public Health (SSPH+) 2015

Abstract

Objectives To examine cultural differences in Weight status misperception (WSMP) and identify associations between weight perception and weight control efforts among overweight/obese midlife women in Israel.

Methods Data from the nationally representative Women's-Health-in-Midlife-National-Study were used. Participants included overweight ($25 \leq \text{BMI} < 30$) and obese ($\text{BMI} \geq 30$) midlife women (45–64 years) from three cultural groups: Long-Term Jewish Residents (LTJR), Immigrants from the former USSR, and Arabs. Interviews included measures of BMI, weight perception, lifestyle, and socio-demographics.

Results Most overweight/obese women (88 %) perceived their weight status correctly. No significant differences were found in overall WSMP rates across cultural groups. Overweight women of Arab origin were significantly more likely ($p < 0.001$) to perceive their weight as “about right” relative to LTJR and Immigrants. WSMP was associated with several unhealthy eating patterns [eating red meat (OR = 2.1, 95 % CI = 1.13–3.97), white bread (OR = 2.4, 95 % CI = 1.26–4.58)] and with more perceived barriers to exercising (OR = 1.8, 95 % CI = 1.00–3.42).

Conclusions Health care providers are encouraged to pay attention to overweight/obese women who misperceive

their weight status. These women are more likely to consume unhealthy foods and to be at higher risks of suffering from medical complications associated with obesity.

Keywords Weight misperception · Obesity · Midlife · Ethnicity · Culture · Weight loss

Introduction

Obesity is a major public health problem, which has been found to be associated with several serious medical morbidities (e.g., type 2 diabetes, cardiovascular disease, dyslipidemia, osteoarthritis, hypertension, stroke, and some cancers) (Ogden et al. 2014; Ng et al. 2014) and with premature death (Danaei et al. 2009). Studies on ethnic/racial differences in the prevalence of obesity have shown that rates of this medical condition vary across groups (Racette et al. 2003; Ogden et al. 2007). For example, non-Hispanic black women in the United States of America (USA) have twice the prevalence of obesity compared to non-Hispanic white women (Ogden et al. 2006), and Mexican-American women have a significantly higher prevalence of obesity compared to non-Hispanic whites (Racette et al. 2003). Similarly, Keinan-Boker et al. (2005) have shown that obesity rates in Israel are significantly higher among Arab women in comparison to women of Jewish Israeli origin.

Weight status misperception (WSMP) among overweight and obese people is defined as an underestimate of one's actual weight status and a belief among overweight/obese people that they are at a healthy weight. Previous epidemiologic reports have documented WSMP among overweight/obese individuals from different socio-demographic backgrounds (Chang and Christakis 2001; Gregory

R. Elran-Barak (✉) · Y. Benyamini
Bob Shapell School of Social Work,
Tel Aviv University, Tel Aviv, Israel
e-mail: roniebarak@gmail.com

T. Blumstein · V. Boyko · D. Hadar · A. Farhi · L. Lerner-Geva
Women and Children's Health Research Unit, The Gertner
Institute for Epidemiology and Health Policy Research, Chaim
Sheba Medical Center, Tel Hashomer, Israel

et al. 2008; Johnson-Taylor et al. 2008; Kuchler and Variyam 2003; Miller et al. 2008; Paeratakul et al. 2002; Ver Ploeg et al. 2008). These reports, which have mainly been conducted in the USA, show that WSMP is prevalent in as many as 38 % of overweight and 8 % of obese adults (Dorsey et al. 2009). Furthermore, WSMP was found to be more frequent in racial/ethnic minorities such as blacks and Hispanics, and in persons with lower educational levels (Kuchler and Variyam 2003). For example, a study using nationally representative data from the USA (Bennett and Wolin 2006) examined racial differences in WSMP and reported that black overweight/obese women were two to three times more likely to misperceive their weight status compared to their white counterparts. In addition, a study using the National Health and Nutrition Examination Survey (Dorsey et al. 2009) found that overweight/obese women with less than high school education had significantly higher odds of misperceiving their weight compared to women with some college education. Despite these findings about WSMP among minority groups in the USA, empirical data describing WSMP among both native-born and immigrant minorities around the world are relatively scarce (Blokstra et al. 1999; Odone et al. 2014).

The correlates of WSMP are no less interesting than its sources; in particular, possible connections between such misperceptions and adoptions of healthy attitudes and behaviors. Such associations have been examined in only a few studies (Duncan et al. 2011; Edwards et al. 2010; Skinner et al. 2008). These studies were mainly conducted to test the hypothesis that overweight/obese individuals who underestimate their weight status are less likely to engage in efforts to reduce their weight and suffer from lack of motivation to implement healthy eating patterns and/or physical activity, compared with individuals with a more realistic perception of their weight. For example, Duncan et al. (2011) found that WSMP among overweight/obese adults was associated with fewer weight loss attempts and less physical activity. Furthermore, research conducted among obese individuals has shown that WSMP is linked with less distress regarding overeating and unhealthy dietary intake (Skinner et al. 2008). However, contradictory evidence has also been reported (Edwards et al. 2010), showing that WSMP may also be linked with positive outcomes such as less eating disorder psychopathology (Jones et al. 2009). Despite these reports, little is known about associations between WSMP and healthy weight control behaviors among different minority groups.

Furthermore, it may be interesting to examine WSMP outside of the USA, as overweight/obesity rates in the USA are relatively high in comparison to most other western countries (about 62 % of women in the USA are overweight/obese relative to 53 % of Israeli women) (Ng et al.

2014). Understanding WSMP among midlife women may be particularly important as studies using community samples have shown that both women and men tend to gain a significant amount of weight until the end of midlife (Sheehan et al. 2003), which may influence their WSMP in different ways. The current study focuses on Israeli women from three cultural groups: long-term Jewish residents, Jewish immigrants from the former Soviet Union, and Arab women. Each cultural group represents Israeli women who identify each other based on common ancestral, social, ethnic or national experience (Barth 1998).

This study seeks to explore the following research questions among overweight/obese midlife women in Israel: (1) What are the differences in WSMP across cultural groups? (2) What are the relationships of socio-demographic characteristics and WSMP? (3) Is WSMP associated with healthy eating patterns and physical activity? Findings from this study may contribute to our understanding of the link between WSMP and obesity.

Methods

Participants

Data for this study come from the Women's Health in Midlife National Study (WHiMNS) that was designed to sample three main sub-population groups in Israel that represented over 95 % of women aged 45–64 years living in Israel in the early 2000s (Central Bureau of Statistics 2002). The first group consists of native-born/long-term Jewish residents (LTJR), a heterogeneous group of women who have lived in Israel since birth or childhood/early adulthood. Although women in this group are culturally diverse, living in Israel for a long period of time has led to some homogeneity in their beliefs, attitudes, and practices. The second group is composed of Jewish women from the former Soviet Union who immigrated to Israel after the fall of the Communist regime, in 1990 or later (Immigrants). The third group consists of Arab–Israeli women, mostly Muslim, who have been living in Israel for their entire lives (Arabs). While both Immigrants and Arabs are not fully integrated into the majority group, Immigrants may be more acculturated relative to Arabs who mostly reside in Arab towns or segregated neighborhoods and conduct a more traditional lifestyle.

The sample of the WHiMNS consisted of women living in Israel as of January 2004, randomly selected from the National Population Registry, stratified by age and population sub-group. To arrive at a maximal number of interviewees, replacement of those who refused or were not located was allowed. The final WHiMNS sample included 540 LTJR, 151 Immigrants, and 123 Arab women.

Response rate was calculated on the basis of 1494 approaches to women in the original sample: 814 were interviewed (54.5 %), 389 refused (26.0 %), 256 were not located (17.1 %), and 35 were not interviewed due to health or language barriers (2.3 %). Response rate was highest among Arab women (79 %, with 7.1 % refusals and 27.6 % not located), followed by LTJRs (53.5 %, with 26.0 % refusals and 14.7 % not located), and lowest among Immigrants (45.5 %, with 36.6 % refusals and 17.9 % not located). Additional information about the WHiMNS can be found elsewhere (Benyamini et al. 2008; Blumstein et al. 2012; Lerner-Geva et al. 2010). The population of the current study was limited to overweight/obese participants from the WHiMNS (BMI \geq 25) yielding a final sample of 523 women (299 LTJR, 120 Immigrants, and 104 Arab women).

Procedure

The study protocol was approved by the Institutional Review Board at the Sheba Medical Center and all participants signed an informed consent form. The sampled women were contacted by telephone and interviews were conducted at participants' homes by trained interviewers from the same cultural groups as the participants. The interviews were conducted between 2004 and 2006. The structured questionnaire was professionally translated to Russian and Arabic with backward translation to Hebrew and reconciliation of discrepancies in translation.

Measures

The measures used are part of the WHiMNS extensive questionnaire, designed to collect data on women's physical and mental health at midlife (Benyamini et al. 2014).

Socio-demographic characteristics included age (continuous), years of education (0–8, 9–12, 13+), work status (currently employed or unemployed), household income (Israeli Shekels), and study group (LTJR/Immigrants/Arabs).

Weight status and weight status misperception Weight status (overweight/obese) was calculated using self-reported weight (kilograms) and height (centimeters). In addition, Respondents were asked if they considered themselves now to be “underweight, about the right weight, slightly overweight, or overweight”. None of the overweight/obese participants reported their weight to be underweight.

Lifestyle characteristics These included selected items that reflect the women's adoption of healthy weight control behaviors: (1) engaging in any physical activity in the past

year (yes/no); (2) attempts to lose weight (current or during the last 5 years), defined as engaging in dietary behaviors to lose weight/maintain weight or because of medical reasons (yes/no); (3) healthy dietary habits, defined as adhering to at least three healthy habits from a checklist of six items (low frequency of eating: cheese with high percentage of fat, red meat, fried food, chicken skin, white [not whole wheat] bread, fast food) (yes/no); (4) perceived barriers to exercise, based on the scale developed by Champion (1995) to measure the constructs of the Health Belief Model (Champion 1984). Four statements were used to assess perceived barriers to exercise in terms of time, cost, effort, and interference with normal activities (Brown 1999), rated on 5-point Likert scales. Cronbach's alpha for internal reliability was 0.67.

Statistical analyses

Analyses were carried out with procedures of SAS 9.2 statistical software that take into account the sampling design and the sampling weights. In all analyses strata weights were assigned to the specific age group and population sub-group of participants. Weights were calculated by dividing the number of women in the population in each cell by the number of women interviewed in this cell. Because cultural group was highly related to socio-demographic characteristics, and because income and work status were highly related to education, in the multivariate analyses only age and a combined indicator of cultural group and educational level were used to represent socio-demographic status.

Logistic regression models (SAS procedure SURVEY-LOGISTIC) were fitted to assess the contribution of each covariate to each of the dependent variables (WSMP and healthy weight control behaviors), adjusted for socio-demographics and BMI. Odds ratios (OR) and 95 % confidence intervals (CI) were calculated. We used the receiver operating characteristic (ROC) technique to find an optimal cutoff for the score of barriers to physical activity that best differentiates between groups of misperception. This cutoff point was chosen to have highest sensitivity and specificity rates.

Results

The original WHiMNS sample included 811 women from all weight statuses. Our sample of 523 overweight/obese midlife women (BMI \geq 25) comprises 65 % of the entire WHiMNS sample (i.e., 53 % of LTJR, 79 % of Immigrants, 84 % of Arabs).

Population characteristics ($n = 523$) projected from the sampled data appear in Table 1. Arab women had significantly higher rates of obesity (55 %) relative to LTJR

Table 1 Descriptive characteristics of long-term residents, Immigrants, and Arab Israelis (Israel, 2004–2006)

	Long-term residents <i>N</i> = 299	Immigrants <i>N</i> = 120	Arab Israelis <i>N</i> = 104	Total sample <i>N</i> = 523	<i>p</i> value
Socio-demographics					
Age, years [mean (SE)]	55.08 (0.09)	56.34 (0.13)	55.12 (0.19)	55.33 (0.07)	<0.001
BMI (mean)	29.83 (0.25)	30.65 (0.46)	30.97 (0.41)	30.16 (0.19)	0.040
Weight status, <i>n</i> (%)					0.016
Overweight, 25 ≤ BMI < 30	182 (60.87)	67 (55.83)	47 (45.19)	296 (56.60)	
Obese, BMI ≥ 30	117 (39.13)	53 (44.16)	57 (54.81)	227 (43.40)	
Family status, <i>n</i> (%)					<0.001
Married	242 (81.2)	73 (61.2)	73 (76.3)	388 (76.6)	
Education (years), <i>n</i> (%)					<0.001
0–8	63 (19.6)	0	85 (78.1)	148 (24.4)	
9–12	119 (39.8)	28 (23.9)	11 (12.6)	158 (32.7)	
13+	117 (40.6)	92 (76.1)	8 (9.4)	217 (42.9)	
Household income, <i>n</i> (%)					<0.001
High	148 (56.5)	30 (29.1)	5 (5.7)	183 (43.4)	
Average	87 (30.1)	33 (30.2)	22 (26.2)	142 (29.6)	
Low	37 (13.4)	48 (40.7)	71 (68.1)	156 (27.0)	
Work status, <i>n</i> (%)					<0.001
Currently employed	169 (61.4)	64 (57.4)	6 (6.5)	239 (52.5)	
Weight perception and weight status, <i>n</i> (%)					0.006 ^a
About right, 25 ≤ BMI < 30	18 (6.3)	6 (5.1)	14 (14.4)	38 (7.6)	
About right, BMI ≥ 30	2 (0.7)	0 (0.0)	7 (7.2)	9 (1.8)	
Slightly overweight, 25 ≤ BMI < 30	75 (26.0)	39 (33.1)	4 (4.1)	118 (23.5)	
Slightly overweight, BMI ≥ 30	14 (4.9)	4 (3.4)	0 (0.0)	18 (3.6)	
Overweight, 25 ≤ BMI < 30	78 (27.1)	20 (16.9)	23 (23.7)	121 (24.1)	
Overweight, BMI ≥ 30	101 (35.1)	49 (41.5)	49 (50.0)	199 (39.6)	
Lifestyle characteristics, <i>n</i> (%)					
Any attempts to lose weight ^b	206 (69.5)	78 (66.4)	44 (42.3)	328 (62.7)	<0.001
Healthy dietary habits	201 (66.7)	89 (73.6)	33 (30.7)	323 (62.7)	<0.001
Physical activity in the past year	176 (58.4)	31 (24.9)	23 (27.8)	230 (47.3)	<0.001
Barriers to exercise	112 (39.2)	68 (58.3)	74 (71.2)	254 (47.7)	<0.001

Percents are population estimates projected from sample data. Wald χ^2 tests were used for comparison of categorical variables, taking into account the survey design. Continuous variables were tested by analysis of variance

SE standard error, BMI body mass index

^a Differences between the “about right” category and the other two categories together

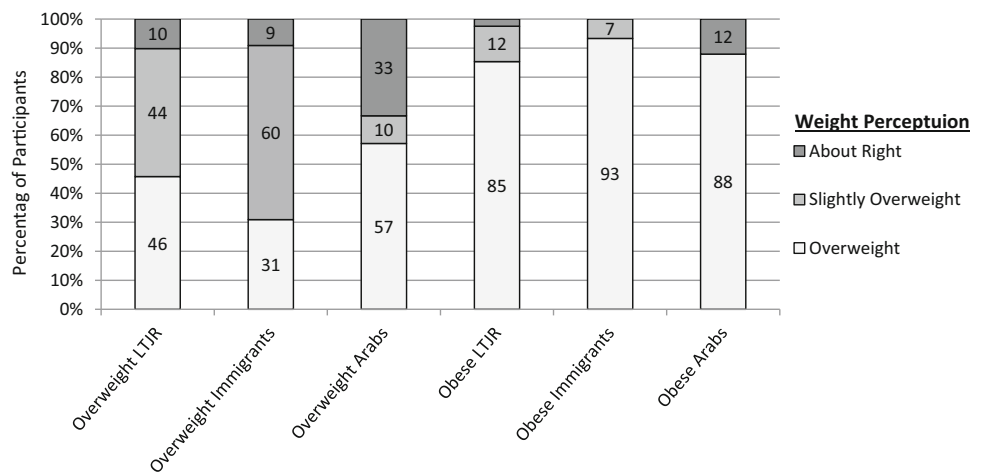
^b Current attempts or during the last 5 years

(39 %) and Immigrants (44 %). Education was strongly associated with group. As many as 76 % of Immigrants attained high education relative to 41 % of LTJR and only 9 % of Arabs, with corresponding differences in levels of income and employment. Regarding lifestyle characteristics, women from the three groups significantly differed in these measures: Arab women were less likely be engaged in an effort to lose weight (currently or during the last

5 years) and to adhere to healthy dietary habits; LTJR were more likely to engage in physical activity and to report less barriers to such activity relative to the other two groups. Immigrants resembled the LTJR in weight loss attempts and dietary habits and were more similar to the Arab women in physical activity and barriers to it.

Figure 1 shows that overweight Arabs are significantly more likely (Chi square = 17.033, $p < 0.001$) than

Fig. 1 Weight perception among overweight and obese midlife women [long-term Jewish Residents (LTJR), Immigrants, and Arab Israelis] in Israel (2004–2006)



overweight LTJR and Immigrants to estimate their weight as “about right”. Ten percent of overweight LTJR ($n = 18$) and 9 % of overweight Immigrants ($n = 6$) misperceived their weight status as “about right” relative to 33 % of overweight Arabs ($n = 14$). In contrast, no significant differences (Chi square = 1.324, $p = 0.512$) in WSMP were found among obese midlife women of different cultural backgrounds. Fifteen percent of obese LTJR ($n = 16$), 7 % of obese Immigrants ($n = 4$), and 12 % of obese Arabs ($n = 7$) misperceived their weight status as “about right” or “slightly overweight”.

Next, we compared between overweight/obese women with and without WSMP (Table 2). For this comparison, the WSMP category included overweight women who reported to be at “about the right weight” and obese women who reported to be at “about the right weight” or “slightly overweight” (i.e., misperception was defined as weight underestimation, given the restriction of the sample to overweight/obese women). No significant differences by cultural group, age, weight status, and marital status were found among overweight/obese women who misperceived or perceived their weight status.

Multivariate logistic regression of WSMP is presented in Table 3. In this analysis, overweight/obese participants with a realistic perception of their weight served as the reference group. We used the combined education and group variable because of the extent of correspondence between these two characteristics. The model presented in Table 3 showed that LTJR with high school education or lower and Arab women with some or complete primary education were 8.5–13 times more likely to underestimate their weight status as compared to LTJR with high education. We also repeated the same multivariate logistic regression of WSMP while separating the variables of education and cultural group (data not shown in a table). This second model indicated that cultural group did not have an independent association with WSMP (OR = 1.26,

CI = 0.55–2.85, $p = 0.583$ for Immigrants relative to LTJR; OR = 1.12, CI = 0.51–2.45, $p = 0.783$ for Arabs relative to LTJR). However, women with lower education were significantly more likely to misperceive their weight status relative to women with higher education (OR = 6.08, CI = 2.35–15.75, $p < 0.001$ for women with 0–8 relative to more than 12 years of education, OR = 3.82, CI = 1.79–8.15, $p < 0.001$ for women with 9–12 relative to more than 12 years of education).

Several multivariate logistic regression models were tested to determine the associations of WSMP with the outcome variables (Table 4). WSMP did not have an independent association with any attempts to lose weight, healthy dietary patterns, and physical activity. However, women with WSMP were 1.8 times more likely to report barriers to physical activity in comparison to women without WSMP. In addition, separate examination of the six healthy eating patterns [i.e., low frequency of eating: cheese with high percentage of fat, red meat, fried food, chicken skin, white (not whole wheat) bread, fast food] revealed that women with WSMP were 2.1 times more likely to eating red meat (CI = 1.13–3.97) and 2.4 times more likely to eat white bread (95 % CI = 1.26–4.58) relative to women without WSMP (data not shown).

Discussion

The purpose of the current study was to investigate WSMP among three cultural groups of overweight/obese midlife women in Israel (45–64 years). The findings pertain to our three research questions: first, regarding WSMP differences among the three examined cultural groups (LTJR, Arabs, Immigrants), results showed that the vast majority (88 %) of overweight/obese midlife women in Israel perceived their weight status correctly, with significant differences between the groups in rates of WSMP among overweight

Table 2 Socio-demographic and lifestyle characteristics among women with and without weight status misperception (Israel, 2004–2006)

	Misperception <i>N</i> = 65	No misperception <i>N</i> = 458	<i>p</i> values
Socio-demographics			
Ethnic/culture, <i>n</i> (%)			0.081
Long-term residents	34 (64.2)	265 (65.9)	
Immigrants	10 (13.1)	110 (20.4)	
Arab Israelis	21 (22.7)	83 (13.8)	
Age, years [mean (SE)]	56.22 (0.71)	55.22 (0.11)	0.204
BMI [mean (SE)]	29.13 (0.41)	30.30 (0.22)	0.012
Weight status, <i>n</i> (%)			
Overweight, 25 ≤ BMI < 30	38 (58.12)	258 (57.90)	0.978
Obese, BMI ≥ 30	27 (41.88)	200 (42.10)	
Family status, <i>n</i> (%)			
Married	51 (80.4)	337 (75.9)	0.369
Education (years), <i>n</i> (%)			
0–8	31 (41.2)	117 (22.2)	<0.001
9–12	22 (41.7)	136 (31.5)	
13+	12 (17.1)	205 (46.3)	
Household income, <i>n</i> (%)			
High	13 (25.8)	170 (45.7)	0.011
Average	18 (32.8)	124 (29.1)	
Low	29 (41.4)	127 (25.1)	
Work status, <i>n</i> (%)			
Currently employed	21 (39.7)	218 (54.2)	0.039
Lifestyle characteristics, <i>n</i> (%)			
Any attempts to lose weight ^a	29 (47.4)	299 (67.1)	0.007
Healthy dietary habits	31 (46.4)	292 (64.8)	0.011
Physical activity in the past year	22 (41.6)	208 (48.0)	0.350
Barriers to physical activity	43 (64.3)	211 (45.5)	0.008

Percents are population estimates projected from sample data. Wald χ^2 tests were used for comparison of categorical variables, taking into account the survey design. Continuous variables were tested by analysis of variance
SE standard error, *BMI* body mass index
^a Currently or during the 5 years before the interview

Table 3 Multivariate logistic regression analysis of weight status misperception by culture, education, age, and Body Mass Index (BMI) (Israel, 2004–2006)

	OR ^a	95 % CI	<i>p</i> value
Socio-demographics			
Cultural group and year of education			
Long-term residents, >13	1		
Long-term residents, 9–12	8.51	2.28–31.7	0.002
Long-term Residents, 0–8	10.73	2.63–43.7	0.001
Immigrants, >13	3.46	0.86–14.0	0.081
Immigrants, 9–12	4.09	0.59–28.1	0.151
Arab Israelis, >9	3.35	0.31–36.5	0.321
Arab Israelis, 0–8	13.21	3.53–49.4	<0.001
Age, years (continuous) ^b	1.02	0.97–1.08	0.410
BMI, Kg/m ² (continuous) ^b	0.91	0.84–0.98	0.017

CI confidence interval, *BMI* body mass index

^a Odds ratio, adjusted for all other variables; *N* = 503

^b Per increase in 1 unit

women but not among obese women. Second, regarding the relationship of WSMP with other characteristics, we found that women who misperceived their weight status had less education, lower income, and higher unemployment rates. Third, we studied the role that WSMP may play in the implementation of healthy weight control behaviors and found WSMP to be associated with several unhealthy eating patterns (e.g., consuming red meat and white bread) and with more perceived barriers to physical activity.

Although there were no significant differences in overall WSMP rates across cultural groups, one of the main findings of this study was that WSMP acts differently among overweight and obese women. Firstly, WSMP was significantly more common among overweight women relative to obese women. It is probably easier for overweight women (from all three cultural groups) to ignore their weight status relative to obese women as they have less excess weight. Nevertheless, WSMP among overweight women should not be ignored by public health professionals, as overweight people tend to gain weight over time

Table 4 Multivariate logistic regression analysis of lifestyle characteristics by weight misperception, culture, education, age, and Body Mass Index (BMI) (Israel, 2004–2006)

	Any attempts to lose weight ^a N = 503		Healthy dietary habits N = 503		Physical activity N = 503		Barriers to physical activity N = 501	
	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI
Misperception	0.53	0.28–1.01	0.56	0.29–1.05	1.04	0.55–1.06	1.84*	1.00–3.422
Cultural group and year of education								
Long-term residents, ≥13	1		1		1		1	
Long-term residents, 9–12	0.78	0.43–1.42	0.53*	0.28–0.98	1.36	0.76–2.42	1.47	0.79–2.71
Long-term residents, 0–8	0.43	0.21–0.88	0.31**	0.15–0.64	5.06***	2.49–10.29	3.86***	1.96–7.58
Immigrants, ≥13	0.71	0.38–1.33	0.89	0.44–1.83	5.78***	3.08–10.87	3.93***	2.09–7.58
Immigrants, 9–12	0.47	0.21–1.08	0.55	0.20–1.51	11.55***	3.99–33.47	3.67*	1.49–9.03
Arab Israelis, ≥9	0.20***	0.10–0.39	0.09***	0.03–0.34	1.75	0.61–5.02	3.56*	1.17–10.78
Arab Israelis, 0–8	0.29***	0.09–0.89	0.15***	0.07–0.32	8.28***	3.93–17.44	7.85***	3.75–16.41
Age, years (continuous) ^b	0.98	0.95–1.02	1.05**	1.01–1.09	0.99	0.95–1.02	0.94***	0.91–0.98
BMI, Kg/m ² (continuous) ^b	1.80	1.20–2.69	0.99	0.95–1.05	1.22	0.81–1.84	0.99	0.95–1.04

Significant values presented in bold. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

CI confidence interval, OR odds ratio adjusted for all other variables, BMI body mass index

^a Currently or during the 5 years before the interview

^b Per increase in 1 unit

while increasing their risks of developing chronic diseases (Field et al. 2001). Secondly, WSMP was significantly more prevalent among overweight Arabs relative to overweight LTJR and Immigrants. Although these results should be interpreted with caution due to the absolute small numbers, it may be that these differences are caused by comparisons to cultural norms that are prevalent in the women's surrounding. These cultural norms may potentially describe overweight/obesity using less strict criteria (Yates et al. 2004) that do not take into account recent medical findings about health consequences associated with overweight/obesity.

Several studies have supported our understanding of the various perceptions of overweight/obesity that are prevalent among individuals from different ethnic groups. For example, studies conducted in the USA suggest that Blacks appear to have a greater social acceptance of overweight compared to Whites (e.g., Bennett and Wolin 2006), and that overweight/obese women from minority groups (i.e., Blacks; Hispanic) are more satisfied with their body size relative to the dominant groups (e.g., European American) (Kuchler and Variyam 2003; Cachelin et al. 2002). Furthermore, a study conducted in Saudi Arabia suggested that a large number of individuals still perceive overweight or obesity as being healthy (Al-Nozha et al. 2005). For these reasons, it may be important to develop culturally and ethnically sensitive psycho-educational programs that teach about the medical risks associated with overweight/obesity.

Unlike the cited findings, our data showed only borderline significant differences in overall rates of WSMP among our three cultural groups. However, combining cultural group and education yielded interesting findings in the multivariate analysis. LTJR with high school education (or lower) and Arabs with primary education were 9–11 times more likely to misperceive their weight relative to LTJR with high education. These findings imply that overweight/obese women with very low education, and especially from Arab origin, are particularly likely to misperceive their weight. It should be noted that in Israel, as in many other Western countries, it is difficult to separate the effects of origin and education because of the great overlap between cultural group and education. Our Arab group was characterized by lower education levels relative to our other two groups, while Immigrants from the former USSR were mostly highly educated. Education may mediate between cultural group and weight status misperception. Alternatively, both lower education and higher weight norms may be characteristic of women in a mostly traditional society. Future studies may be designed to further explore the link between cultural background, education, and WSMP by investigating the undersized populations of Arab women with high education and Immigrants with primary education (e.g., by over-sampling women from these sub-groups).

The findings showed that WSMP among overweight/obese midlife Israeli women is associated with a few healthy eating patterns (refrain from consuming red meat

and white bread) in models adjusted for background variables (culture, education, BMI, age). This suggested association between WSMP and unhealthy eating patterns may be explained by the Health Behavior Model (Champion 1984, 1995). This model implies that perceived susceptibility to a given health-related condition is necessary to promote behavioral change. Although our study does not provide specific data about susceptibility, it is plausible that overweight/obese women without WSMP are more likely to be aware of their susceptibility to chronic diseases (such as diabetes or heart disease) and consequently may be more motivated to consume health foods. Such awareness may also be related to higher education.

Of additional note is our finding suggesting that overweight/obese midlife women with WSMP are likely to report high barriers to physical activity. Previous reports about the construct of barriers to physical activity (Allison et al. 1999) have shown that this construct is correlated with participation in physical activity. Our data do not provide support for these correlations as WSMP was associated with barriers to exercising, but not with the actual implementation of exercising. The Health Belief Model argues that an actual implementation of any health-related behavior (e.g., exercising) is a result of the combination of several variables (i.e., perceived severity of the related condition, perceived personal susceptibility, benefits, confidence, barriers) (Champion 1984, 1995). Measurements of all of these contributing variables may be needed to predict physical activity and assess the role that WSMP plays in predicting barriers to physical activity and physical activity among overweight/obese midlife women.

A strength of the current study is the use of a representative sample of women from three different cultural groups, which may enhance the generalizability of these findings. In addition, the accuracy of our findings may have increased due to our measurement of WSMP using a 4-point rating scale (underweight, about the right weight, slightly overweight, overweight) relative to many studies that used a 3-point rating scale (e.g., Bennett and Wolin 2006). However, several limitations should be noted. First, weight and height were determined by self-report. Nevertheless, some previous studies suggested that people generally provide accurate self-reported data regarding their weight and height (Ali et al. 2013). This is especially likely in our case because the interviewer was in the room with the respondent and verbally asked her to provide this information. Second, BMI as a measure for obesity has been criticized (e.g., Rothman 2008), as the same BMI might correspond to completely different body shapes and body fatness. Future studies may use other anthropometric measures (e.g., skin-fold thickness; body circumference at waist, hip, chest), which may be better predictors of obesity than BMI. Third, we employed the

widely used World Health Organization BMI cutoffs (WHO 2000) of overweight (BMI = 25) and obesity (BMI = 30), while some studies suggest that these cutoffs differ across ages (Dixon et al. 2015; Flegal et al. 2012) and ethnic groups (Yates et al. 2004). Fourth, the use of cross-sectional data precluded any conclusions regarding the temporal order of the measured variables (e.g., BMI, perceived weight status, barriers to physical activity, and actual attempts at weight loss). It is unknown how long these women have been overweight/obese, while they have been asked about current attempts to lose weight or during the last 5 years. Nevertheless, previous reports examining associations between WSMP and health-related behaviors have also used a cross-sectional design (Miller et al. 2008; Duncan et al. 2011).

Lastly, the sample sizes of Immigrants and Arabs were relatively small and did not include Immigrants with primary education or Arabs with high education. Yet, it is the first national survey of WSMP that compares midlife women across major population groups, and these groups (Immigrants, Arabs) are of interest to health promotion professionals in many Western countries. Future work should examine additional variables, such as perceived susceptibility, barriers, benefits, and confidence in actual attempts at weight loss/control. In addition, future research should be longitudinal in nature to better understand the effect of age and weight gain/loss on WSMP across cultural groups. Finally, future research may be designed to explore reasons for differences in WSMP among different cultural groups.

In sum, our data suggest WSMP to be prevalent among about 12 % of overweight/obese midlife women in Israel. In addition, these data suggest that WSMP may play a role in predicting few healthy eating patterns. Our study can inform future development of interventions aimed at weight loss by highlighting the importance of considering WSMP in their design. Furthermore, this study emphasizes the need to strengthen the sensitivity of healthcare providers (e.g., medical doctors, dietitians) to overweight/obese women who may not correctly perceive their weight because of cultural norms or other barriers. These women may be less likely to engage in weight loss efforts and, therefore, may potentially be at a higher risk of suffering from the medical complications associated with obesity. Special attention could be paid to overweight Arab women who underestimate their weight and may not be fully aware of the medical complications associated with their BMI. These women may benefit from educational programs that explain that overweight (and not only obesity) is associated with elevated risks for chronic diseases.

Acknowledgments This study was funded by the Israel National Institute for Health Policy and Health Services Research, Grant Number 63/02.

References

- Ali MM, Minor T, Amialchuk A (2013) Estimating the biases associated with self-perceived, self-reported, and measured BMI on mental health. *PLoS One* 8:e81021
- Allison KR, Dwyer JJ, Makin S (1999) Perceived barriers to physical activity among high school students. *Prev Med* 28:608–615
- Al-Nozha MM, Al-Mazrou YY, Al-Maatouq MA, Arafah MR et al (2005) Obesity in Saudi Arabia. *Saudi Med J* 26(5):824–829
- Barth F (1998) Ethnic groups and boundaries: the social organization of culture difference. Waveland Press, Long Grove
- Bennett GG, Wolin KY (2006) Satisfied or unaware? Racial differences in perceived weight status. *Int J Behav Nutr Phys Act* 12:40
- Benyamini Y, Blumstein T, Boyko V, Lerner-Geva L (2008) Cultural and educational disparities in the use of primary and preventive health care services among midlife women in Israel. *Womens Health Issues* 18:257–266
- Benyamini Y, Boyko V, Blumstein T, Lerner-Geva L (2014) Health, cultural and socioeconomic factors related to self-rated health of long-term Jewish residents, immigrants, and Arab women in midlife in Israel. *Women Health* 54:402–424
- Blokstra A, Burns CM, Seidell JC (1999) Perception of weight status and dieting behavior in Dutch men and women. *Int J Obes Relat Metab Disord* 23:7–17
- Blumstein T, Benyamini Y, Hourvitz A, Boyko V, Lerner-Geva L (2012) Cultural/ethnic differences in the prevalence of depressive symptoms among middle-aged women in Israel: the Women's Health at Midlife Study. *Menopause* 19:1309–1321
- Brown J (1999) Barriers to physical activity in people at risk of coronary heart disease. *Br J Nurs* 8:517
- Cachelin FM, Rebeck RM, Chung GH, Pelayo E (2002) Does ethnicity influence body-size preference? A comparison of body image and body size. *Obes Res* 10:158–166
- Central Bureau of Statistics (2002) Statistical abstract of Israel. Central Bureau of Statistics, Jerusalem, p 53
- Champion VL (1984) Instrument development for Health Belief Model constructs. *ANS Adv Nurs Sci* 6:73–85
- Champion VL (1995) Development of a benefits and barriers scale for mammography utilization. *Cancer Nurs* 18:53–59
- Chang VW, Christakis NA (2001) Extent and determinants of discrepancy between self-evaluations of weight status and clinical standards. *J Gen Intern Med* 16:538–543
- Danaei G, Ding EL, Mozaffarian D, Taylor B, Rehm J, Murray CJ, Ezzati M (2009) The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Med* 6:e1000058
- Dixon JB, Egger GJ, Finkelstein EA, Kral JG, Lambert GW (2015) 'Obesity paradox' misunderstands the biology of optimal weight throughout the life cycle. *Int J Obes* 39(1):82–84
- Dorsey RR, Eberhardt MS, Ogden CL (2009) Racial/ethnic differences in weight perception. *Obesity (Silver Spring)* 17:790–795
- Duncan DT, Wolin KY, Scharoun-Lee M, Ding EL, Warner ET, Bennett GG (2011) Does perception equal reality? Weight misperception in relation to weight-related attitudes and behaviors among overweight/obese US adults. *Int J Behav Nutr Phys Act* 8:20
- Edwards NM, Pettingell S, Borowsky IW (2010) Where perception meets reality: self-perception of weight in overweight adolescents. *Pediatrics* 125:e452–e458
- Field AE, Coakley EH, Must A, Spadano JL, Laird N, Dietz WH, Rimm E, Colditz GA (2001) Impact of overweight on the risk of developing common chronic diseases during a 10-year period. *Arch Intern Med* 161(13):1581–1586
- Flegal KM, Carroll MD, Kit BK, Ogden CL (2012) Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999–2010. *JAMA* 307(5):491–497
- Gregory CO, Blanck HM, Gillespie C, Maynard LM, Serdula MK (2008) Health perceptions and demographic characteristics associated with underassessment of body weight. *Obesity (Silver Spring)* 16:979–986
- Johnson-Taylor WL, Fisher RA, Hubbard VS, Starke-Reed P, Eggers PS (2008) The change in weight perception of weight status among the overweight: comparison of NHANES III (1988–1994) and 1999–2004 NHANES. *Int J Behav Nutr Phys Act* 5:9
- Jones M, Grilo CM, Masheb RM, White MA (2009) Psychological and behavioral correlates of excess weight: misperception of obese status among persons with Class II obesity. *Int J Eat Disord* 43:628–632
- Keinan-Boker L, Noyman N, Chinich A, Green MS, Nitzan-Kaluski D (2005) Overweight and obesity prevalence in Israel: findings of the first national health and nutrition survey (MABAT). *Israel Med Assoc J* 7:219–223
- Kuchler F, Variyam JN (2003) Mistakes were made: misperception as a barrier to reducing overweight. *Int J Obes Relat Metab Disord* 27:856–861
- Lerner-Geva L, Boyko V, Blumstein T, Benyamini Y (2010) The impact of education, cultural background, and lifestyle on symptoms of the menopausal transition: the Women's Health at Midlife Study. *J Womens Health* 19:975–985
- Miller EC, Schulz MR, Bibeau DL, Galka AM, Spann LI, Martin LB, Aronson RE, Chase CM (2008) Factors associated with misperception of weight in the stroke belt. *J Gen Intern Med* 23:323–328
- Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C et al (2014) Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 384(9945):766–781
- Odone A, Gallus S, Lugo A, Zuccaro P, Colombo P, Bosetti C et al (2014) Weight perception among Italian adults, 2006–2010. *Eur J Cancer Prev* 23:141–146
- Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM (2006) Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA* 295:1549–1555
- Ogden CL, Yanovski SZ, Carroll MD, Flegal KM (2007) The epidemiology of obesity. *Gastroenterology* 2007(132):2087–2102
- Ogden CL, Carroll MD, Kit BK, Flegal KM (2014) Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA* 311(8):806–814
- Paeratakul S, White MA, Williamson DA, Ryan DH, Bray GA (2002) Sex, race/ethnicity, socioeconomic status, and BMI in relation to self-perception of overweight. *Obes Res* 10:345–350
- Racette SB, Deusinger SS, Deusinger RH (2003) Obesity: overview of prevalence, etiology, and treatment. *PhysTher* 83:276–288
- Rothman KJ (2008) BMI-related errors in the measurement of obesity. *Int J Obes* 32:S56–S59
- Sheehan TJ, DuBrava S, DeChello LM, Fang Z (2003) Rates of weight change for black and white Americans over a twenty year period. *Int J Obes Relat Metab Disord* 27:498–504
- Skinner AC, Weinberger M, Mulvaney S, Schlundt D, Rothman RL (2008) Accuracy of perceptions of overweight and relation to self-care behaviors among adolescents with type 2 diabetes and their parents. *Diabetes Care* 31:227–229
- Ver Ploeg ML, Chang HH, Lin BH (2008) Over, under, or about right: misperceptions of body weight among food stamp participants. *Obesity (Silver Spring)* 16:2120–2125
- World Health Organization. Obesity: preventing and managing the global epidemic. No. 894. World Health Organization, 2000
- Yates A, Edman J, Aruguete M (2004) Ethnic differences in BMI and body/self-dissatisfaction among Whites, Asian subgroups, Pacific Islanders, and African-Americans. *J Adolesc Health*, 34(4), 300–307