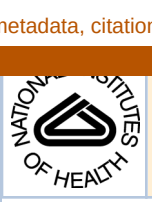

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Dietary Supplement Use Immediately Before and During Pregnancy in Norwegian Women with Eating Disorders

Jocilyn E. Dellava[1], **Ann Von Holle**[1], **Leila Torgersen**[2], **Ted Reichborn-Kjennerud**[2,3,4], **Margaretha Haugen**[5], **Helle M. Meltzer**[5], and **Cynthia M. Bulik**[1,6,*]

[1]Department of Psychiatry, University of North Carolina at Chapel Hill, CB #7160, 101 Manning Drive, Chapel Hill, NC, USA 27599-7160

[2]Division of Mental Health, Norwegian Institute of Public Health ,PO Box 4404 Nydalen, N-0403 Oslo, Norway

[3]Department of Psychiatry, University of Oslo, PO Box 1130 Blindern, N-0318 Oslo, Norway

[4]Department of Epidemiology, Columbia University, New York, NY, USA

[5]Division of Environmental Medicine, Norwegian Institute of Public Health, PO Box 4404, Nydalen, 0403 Oslo, Norway

[6]Department of Nutrition, University of North Carolina at Chapel Hill, NC, USA

Abstract

Objective—Many pregnant women use dietary supplements. Little is known about dietary supplement use during pregnancy in women with eating disorders.

Method—We examined dietary supplement use in 37,307 pregnant women, from the Norwegian Mother and Child Cohort Study.

Results—Dietary supplement use during pregnancy was as follows: 91.2% of women with anorexia nervosa, 92.2% of women with bulimia nervosa, 93.2% of women with eating disorder not otherwise specified-purging (EDNOS-P), 90.6% of women with binge eating disorder, and 93.5% of the women without eating disorder. Among group differences were not statistically significant. After adjusting for covariates, women with EDNOS-P were more likely to take iron containing supplements ($p \leq 0.04$).

Conclusion—Overall dietary supplement use, in this sample is similar in women with and without eating disorders.

Keywords

Binge eating disorder; Eating disorder; Dietary supplements; Pregnancy; eating disorder not otherwise specified

Introduction

Inadequate amounts of micronutrients during pregnancy might have substantial negative implications on birth outcomes.[1-4] Many pregnant women use dietary supplements to make

[*]**Correspondence to:** Dr Bulik, Department of Psychiatry, University of North Carolina at Chapel Hill, CB #7160, 101 Manning Drive, Chapel Hill, NC 27599-7160, Voice: (919) 843 1689 Fax: (919) 966-5628, cbulik@med.unc.edu.

certain that adequate amounts of micronutrients are available for mother and fetus.[5, 6] Little is know about use of dietary supplements in pregnant women with eating disorders.

Women with eating disorders, including those with anorexia nervosa (AN) are able to have children; [7-11] however, birth outcomes may be adversely influenced by the presence of maternal eating disorders.[7-10, 12] Although little is know about micronutrient status of pregnant women with eating disorders, pregnant women with binge eating disorder (BED) consume less of certain micronutrients through diet than women without eating disorders.[13] Dietary supplement use in individuals with AN and subthreshold eating disorders may mitigate the impact of inadequate food intake on micronutrient intake, [14, 15] but how this translates to pregnancy is unknown. Dietary supplements may be important in maintaining adequate micronutrient status in some women with eating disorders during pregnancy.

No studies have reported on the use of dietary supplements in pregnant women with eating disorders despite the potential impact of poor nutrition and dysregulated eating on birth outcomes and the potential for supplement use to partially mitigate these adverse effects. We explored the use of dietary supplements across eating disorder subtypes compared with a referent group of women without eating disorders in the Norwegian Mother and Child Cohort Study (MoBa).

Method

Participants

MoBa, described in detail previously,[12, 13, 16] is a longitudinal pregnancy cohort study directed by the Norwegian Institute of Public Health which started in 1999 and ended in 2008. Pregnant women from all parts of Norway were invited to participate through a postal invitation in connection with a routine ultrasound examination offered to all pregnant women in Norway at 17-18 weeks of gestation (www.fhi.no/morogbarn). The participation rate was 43.5 %.[17] All procedures involving human subjects were approved by the appropriate Norwegian Medical Ethics Committee, the Norwegian National Data Inspectorate, and the University of North Carolina at Chapel Hill Biomedical Institutional Review Board. Written informed consent was obtained from all participants. Data for the current study were from the quality assured data release version 3, 2007. The 37,307 women included in the current analyses: (a) completed questionnaires 1 and 3; (b) had demographic information available; (c) had information about use of dietary supplements in the 8 weeks prior to pregnancy and throughout pregnancy available; (d) did not complete the pilot version of the questionnaires (n=2,599); (e) returned questionnaire 1 before the birth of their child; (f) had a singleton birth; and (g) provided information that could be used to determine the presence of eating disorder subtypes prior to and during pregnancy.

Measures and Interviews

Determination of maternal eating disorder status and subtype has been described in detail[12] and the questions had been previously widely used in Norway.[18, 19] Briefly, based on questionnaire 1 at approximately 19 weeks of gestation, algorithms were used to determine if AN, bulimia nervosa (BN), eating disorder not otherwise specified-purging subtype (EDNOS-P), or BED was present before or during pregnancy. To be given a diagnosis of AN, lowest reported adult body mass index had to be below 19.0 kg/m^2 and all other DSM-IV criteria had to be met except amenorrhea. BN was defined according to DSM-IV criteria (excluding duration and lowering the frequency requirement to 1 binge/purge episode per week). EDNOS-P was defined as at least one purging episode per week in the absence of binge eating. BED was defined as at least one binge eating episode per week in the absence of compensatory behaviors. If women fit into more than one eating disorder subtype before

or during pregnancy, she was placed into one subtype according to the following hierarchy: AN, BN, EDNOS-P and BED, as previously described.[12]

Questionnaire 1 [gestational week (GW) 19; questions 45 and 46] and Questionnaire 3 (GW 30; questions 57 and 58) included information about supplement use. The respondent was asked whether she currently used any supplements. If yes, she was asked to complete a checklist including 22 specific nutrients, at three time points prior to pregnancy (>=9 weeks, 8-5 and 4-1 week before conception) and eight time periods during pregnancy (GW 1-4, 5-8, 9-12 13-16, 17-20, 21-24, 25-28, and 29_{+}). Non-responses to all questions about dietary supplement use were considered missing at random and therefore missing values and not included in analyses.

Covariates included in this study were maternal age, parity, smoking (yes/no), household income and education level. Each of these items was self-reported on questionnaire 1.

Statistical Analyses

Means, standard errors, frequency percents, and counts were calculated for the descriptive statistics of the population sample. To test differences in supplement use by eating disorder subtype, two different sets of Poisson regression analyses were conducted. The first set of analyses estimated percent of supplement use at any time across eating disorder subtypes. The second set of analyses estimated percent of women who endorsed supplement use across time at 8 time points during pregnancy by eating disorder subtype. There was no significant interaction effect between eating disorder subtype and time, thus relative risk estimates in Table 2 imply a similar change at all 8 time points for each eating disorder subtype.

The Benjamini-Hochberg [20] method for control of the false discovery rate (FDR) was used to account for multiple testing. Each set of analyses contained an unadjusted model and an adjusted model controlling for maternal age, parity, smoking, household income and education level. Robust estimates of the variance with quasi-likelihood estimates and GEE were used. [11, 21, 22] All analyses were done in SAS/STAT® software for Windows and AIX (v9.1)[23] and significance tests were two-tailed.

Results

Descriptive statistics are in Table 1.

Use of any supplements

In the two months preceding pregnancy, 38.2% (95% confidence interval (CI), 24.9-58.6%) of women with AN, 43.9% (95% CI, 38.8-49.7%) of women with BN, 30.2% (95% CI, 19.2-47.6%) of women with EDNOS-P, 38.8% (95% CI, 36.7-41.0%) of women with BED and 44.3% (95% CI, 43.7-44.8%) of women without an eating disorder consumed dietary supplements (data not shown). At some point during pregnancy, 93% of all the women in this sample consumed some form of dietary supplement (Table 2). Dietary supplement use increased at the beginning of pregnancy and did not drop below 60% at any point during pregnancy.

Table 3 presents dietary supplement use at any time during pregnancy. In the unadjusted model, women with BED were significantly less likely to use any dietary supplements than the referent group ($p< 0.01$), but this was no longer significant in the adjusted model. No significant differences existed between women with AN, BN, or EDNOS-P and the referent group for use of any dietary supplement during pregnancy (Table 3).

Table 4 presents the relative risk of using supplements across 8 time points during pregnancy in women with AN, BN, EDNOS-P and BED compared with women without an eating disorder. Use of any dietary supplement across time was significantly lower in women with BED compared with the referent group, but only in the unadjusted ($p<0.001$) model.

Use of specific supplements

Specific nutrient use increased during pregnancy, with the exception of folic acid. Table 2 shows folic acid supplementation was the most common dietary supplement. In the two months prior to pregnancy, 29.4% of women with AN, 32.1% of women with BN, 18.6% of women with EDNOS-P, 28.8% of women with BN, and 33.5% of women without an eating disorder took supplements containing folic acid (data not shown). The women with BED were significantly less likely to take supplements with folic acid at any time during pregnancy ($p<0.01$) and across time ($p<0.01$) compared with the referent group; however, there were no between group differences in the adjusted model (Tables 3 and 4). Across time, women with BED were less likely to use supplements which contained folic acid compared with the referent group ($p<0.01$), but differences did not remain in the adjusted model (Table 4). Folic acid supplementation increased in all groups during the first trimester of pregnancy and then decreased following week 12 of pregnancy.

Women with EDNOS-P were more likely to take iron supplements at anytime ($p<0.04$) (Table 3), even after adjusting for covariates. Women with BED were less likely to report using supplements with cod-liver oil anytime during pregnancy and across time ($p<0.001$). Consumption of supplements with omega 3 fatty acid ($p<0.01$), iron ($p<0.02$), and vitamin D ($p<0.04$) were lower across time for women with BED than the referent group, but differences did not remain in the adjusted model (Table 4).

Discussion

In the current study approximately 93% of pregnant women reported consumption of a dietary supplement during pregnancy, higher than a previous report from this cohort.[5] However, the current study reported supplement use through week 29+ of pregnancy and the earlier study reported use through week 24 of pregnancy. In the current sample, dietary supplement use increased during pregnancy and could account for the differences between reports.

It has previously been reported that 11.8% women in the MoBa sample took folic acid supplements in the months immediately preceding pregnancy; this report included 22,500 women enrolled in the MoBa between 2000 and 2003.[24] The current study included 37,307 pregnant women enrolled in the MoBa sample though 2006; only 32.2% of pregnant women in the current sample took dietary supplements containing folic acid in the two months before pregnancy. Folic acid supplement use was higher during pregnancy than prior to pregnancy for all women; however, the point at which folic acid supplement use increased was likely too late to prevent many birth defects attributed to folate deficiency.[24]

In the unadjusted models, women with BED were significantly less likely to consume any dietary supplement across time during pregnancy and were also significantly less likely to consume dietary supplements which contained folic acid, vitamin D, iron, and cod-liver oil/ omega 3 fatty acids. When adjusted for maternal age, parity, household income, education level, and smoking, differences between women with BED and the referent women did not remain. Although our covariates may have been more strongly associated with likelihood of taking these supplements than having BED, these results and previous observations on this

sample of women with BED[12, 13] reveal an important and clinically identifiable group of women who may be appropriate for targeted nutritional intervention during pregnancy.

Women with EDNOS-P were more likely to take dietary supplements containing iron than the referent women. Norwegian recommendations indicate that some women may need iron supplements to ensure adequate iron status, especially if the prenatal iron stores are inadequate.[25] Iron supplementation may be an important source of iron for women with EDNOS-P and help protect against adverse maternal and child health outcomes. Given that supplements do not contribute significantly to overall energy intake, this may be a less threatening means to achieve proper nutrition during pregnancy than actual food consumption and is in accordance with dietary supplement use in non-pregnant women with eating disorders.[14, 15]

In the MoBa sample, many women failed to meet recommended intakes for some micronutrients through diet and supplementation[5] and it should be noted that multi-vitamin consumption in the MoBa samples is higher than pregnant women in Norway who did not participate in MoBa.[17] However, there is evidence that association measures including vitamins are non-biased in the MoBa sample, and this may extend to relative risks calculated in these analyses.[17] Although increasing micronutrient intake through diet would be most consistent with Norwegian recommendation, this may be more difficult to achieve in women with eating disorders. Encouraging supplementation may be an important means of at least partially protecting against the potential adverse effects of inadequate or irregular nutrition during pregnancy in women with eating disorders and may be more readily accepted by these women than increasing micronutrient intake via dietary intake.

Limitations

The results of this study should be considered within the context of its limitations. First, all variables used to establish broad eating disorders were based on self-reported answers to questions consistent with diagnostic criteria; however, the eating disorder algorithms resulting from these reports have been used previously.[11-13] Second, women were retrospectively asked to report dietary supplement use over the 8 weeks prior to pregnancy and throughout pregnancy. It is possible that women either did not accurately recall dietary supplement consumption at each time point. Third, women were not asked about the amount of each item contained in the dietary supplement making it impossible to determine if women with eating disorders consumed more or less micronutrients from dietary supplements than referent women. Fourth, the aim of this study was not to evaluate overall micronutrient status of pregnant women with eating disorders. Although we have information on dietary intake during pregnancy, [13] those data only covered the first 24 weeks of pregnancy and the current study covered the duration of pregnancy restricting our ability to estimate total micronutrient status across time during pregnancy. Fifth, we do not know if more women with eating disorders were instructed to take dietary supplements by medical personnel than women without eating disorders. We also do not know about use of prescription supplements in women with or without eating disorders. Sixth, some differences exist between the MoBa sample and the general population, including differences in education and multi-vitamin consumption which may limit generalizability.[16, 17]

In conclusion, in the adjusted models, women with EDNOS-P reported higher consumption of iron supplements during pregnancy compared with the referent group. Women in all eating disorder groups as well as the referent women failed to meet Norwegian recommendations for consumption of supplements containing folic acid in the two months prior to pregnancy. Health care practitioners should provide information about the

importance of adequate micronutrient intake during pregnancy, especially to women with eating disorders.

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Table 1

Demographic information

	Anorexia nervosa		**Bulimia nervosa**		**EDNOS-P[1]**		**Binge eating disorder**		**Referent Group**		**Overall Sample**	
Variable	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N
Age	26.4 (4.67)	34	29.5 (4.86)	326	28.0 (4.95)	44	30.0 (4.57)	1,944	29.9 (4.53)	34,959	29.9 (4.54)	37,307
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Education												
<3 year high school	6.7	2	13.9	43	16.3	7	11.1	204	8.0	2,635	8.2	2,891
Vocational high school	33.3	10	16.8	52	11.6	5	18.0	331	14.1	4,659	14.3	5,057
3-year high school general studies, junior college	23.3	7	19.1	59	18.6	8	18.9	348	15.5	5,149	15.8	5,571
Regional technical college/4-year university degree	16.7	5	35.9	111	39.5	17	39.3	722	42.1	13,943	41.9	14,798
University, Technical college, more than 4 years	20.0	6	14.2	44	14.0	6	12.7	233	20.4	6,751	19.9	7,040
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Income (NOK)												
< 200,000	24.2	8	15.9	48	31.4	11	10.0	177	8.1	2,635	8.3	2,879
200,000-499,999	51.5	17	49.8	150	45.7	16	60.3	1,070	55.4	17,951	55.6	19,204
500,00-699,999	18.2	6	21.6	65	20.0	7	21.1	375	23.7	7,667	23.5	8,120
700,000+	6.1	2	12.6	38	2.9	1	8.6	152	12.7	4,121	12.5	4,314
Smoked during Pregnancy												
No	67.6	23	84.0	273	81.4	35	87.1	1,688	91.0	31,723	90.7	33,742

	Anorexia nervosa		Bulimia nervosa		EDNOS-P[1]		Binge eating disorder		Referent Group		Overall Sample	
Yes	32.4	11	16.0	52	18.6	8	12.9	251	9.0	3,143	9.3	3,465
Live Births												
0	70.6	24	49.4	161	65.9	29	45.6	886	51.8	18,102	51.5	19,202
1	20.6	7	33.1	108	18.2	8	34.8	676	31.5	11,026	31.7	11,825
2+	8.8	3	17.5	57	15.9	7	19.7	382	16.7	5,831	16.8	6,280

Notes: EDNOS-P, eating disorder not otherwise specified-purging

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Table 2

Percent of women Using Dietary Supplement at Anytime during Pregnancy*

	Anorexia Nervosa (n=34)	Bulimia Nervosa (n=326)	EDNOS-P [1] (n=44)	Binge eating disorder (n=1,944)	Referent Group (n=34,959)
Supplement	**Percents**	**Percents**	**Percents**	**Percents**	**Percents**
Vitamin					
Folic Acid	73.5 (60.1, 90.0)	83.9 (79.9, 88.0)	77.3 (65.8, 90.7)	79.6 (77.8, 81.4)	83.6 (83.2, 84.0)
Thiamine	44.1 (30.2, 64.4)	45.3 (40.1, 51.1)	39.5 (27.3, 57.2)	40.7 (38.6, 43.0)	41.4 (40.9, 41.9)
Riboflavin	44.1 (30.2, 64.4)	45.3 (40.1, 51.1)	37.2 (25.2, 54.9)	40.8 (38.7, 43.1)	41.4 (40.9, 41.9)
Vitamin B6	44.1 (30.2, 64.4)	47.8 (42.6, 53.6)	39.5 (27.3, 57.2)	42.4 (40.3, 44.7)	42.9 (42.3, 43.4)
Vitamin B12	47.1 (32.9, 67.2)	46.2 (41.1, 52.0)	37.2 (25.2, 54.9)	39.5 (37.3, 41.7)	39.7 (39.2, 40.2)
Niacin	29.4 (17.5, 49.5)	30.5 (25.8, 36.0)	16.3 (8.3, 32.1)	25.2 (23.3, 27.2)	25.0 (24.6, 25.5)
Pantothenic Acid	32.4 (19.9, 52.6)	37.1 (32.2, 42.8)	25.6 (15.4, 42.6)	31.6 (29.6, 33.7)	32.2 (31.7, 32.7)
Biotin	11.8 (4.7, 29.5)	18.6 (14.8, 23.4)	23.3 (13.5, 40.0)	17.7 (16.1, 19.5)	16.3 (15.9, 16.7)
Vitamin C	58.8 (44.4, 77.9)	51.7 (46.5, 57.5)	52.3 (39.4, 69.3)	47.7 (45.5, 50.0)	47.9 (47.4, 48.4)
Vitamin A	47.1 (32.9, 67.2)	47.5 (42.3, 53.3)	41.9 (29.4, 59.5)	41.5 (39.4, 43.8)	42.7 (42.1, 43.2)
Vitamin D	50.0 (35.7, 70.0)	50.3 (45.1, 56.1)	46.5 (33.8, 64.1)	44.6 (42.4, 46.9)	46.2 (45.7, 46.7)
Vitamin E	47.1 (32.9, 67.2)	50.6 (45.4, 56.4)	46.5 (33.8, 64.1)	46.0 (43.8, 48.3)	47.7 (47.2, 48.3)
Minerals					
Iron	67.6 (53.6, 85.3)	62.9 (57.8, 68.4)	74.4 (62.5, 88.7)	59.7 (57.5, 61.9)	61.7 (61.2, 62.2)
Calcium	23.5 (12.8, 43.1)	27.1 (22.7, 32.5)	34.9 (23.2, 52.5)	23.7 (21.9, 25.7)	22.8 (22.4, 23.2)
Iodine	32.4 (19.9, 52.6)	35.2 (30.3, 40.9)	34.9 (23.2, 52.5)	27.1 (25.2, 29.2)	28.2 (27.7, 28.6)
Zinc	38.2 (24.9, 58.6)	39.9 (34.9, 45.7)	32.6 (21.2, 50.1)	34.3 (32.2, 36.5)	34.1 (33.6, 34.6)
Selenium	35.3 (22.4, 55.6)	37.7 (32.8, 43.5)	25.6 (15.4, 42.6)	32.7 (30.7, 34.9)	32.7 (32.2, 33.2)
Copper	35.3 (22.4, 55.6)	34.1 (29.2, 39.7)	32.6 (21.2, 50.1)	28.9 (27.0, 31.0)	28.8 (28.3, 29.3)
Chromium	35.3 (22.4, 55.6)	35.5 (30.6, 41.2)	30.2 (19.2, 47.6)	31.2 (29.2, 33.4)	30.6 (30.1, 31.1)
Magnesium	23.5 (12.8, 43.1)	36.8 (31.9, 42.5)	27.9 (17.3, 45.1)	30.2 (28.2, 32.3)	29.9 (29.5, 30.4)
Other					
Cod-Liver Oil	23.5 (12.8, 43.1)	32.7 (27.9, 38.3)	30.2 (19.2, 47.6)	35.0 (32.9, 37.2)	40.3 (39.8, 40.8)
Omega 3	47.1 (32.9, 67.2)	54.9 (49.7, 60.6)	45.5 (32.9, 62.8)	46.2 (44.0, 48.4)	49.0 (48.4, 49.5)

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	Anorexia Nervosa (n=34)	Bulimia Nervosa (n=326)	EDNOS-P [1] (n=44)	Binge eating disorder (n=1,944)	Referent Group (n=34,959)
Supplement	**Percents**	**Percents**	**Percents**	**Percents**	**Percents**
Any Supplement	91.2 (82.1, 101.2)	92.2 (89.4, 95.2)	93.2 (86.0, 100.9)	90.6 (89.4, 91.9)	93.5 (93.2, 93.7)

Notes: EDNOS-P, eating disorder not otherwise specified-purging

Table 3

Dietary Supplement Use at Any Point during Pregnancy*

	Anorexia Nervosa (n=34)		Bulimia Nervosa (n=326)		EDNOS-P [1] (n=44)		Binge eating disorder (n=1,944)	
	Relative Risk		Relative Risk		Relative Risk		Relative Risk	
Supplement	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
Vitamin								
Folic Acid	0.88 (0.72, 1.08)	0.92 (0.74, 1.14)	1.00 (0.96, 1.05)	1.02 (0.97, 1.08)	0.92 (0.79, 1.09)	0.98 (0.84, 1.14)	0.95 (0.93, 0.97)**	0.98 (0.96, 1.01)
Thiamine	1.07 (0.73, 1.56)	1.07 (0.72, 1.60)	1.09 (0.97, 1.23)	1.08 (0.95, 1.23)	0.95 (0.66, 1.38)	1.06 (0.74, 1.53)	0.98 (0.93, 1.04)	1.02 (0.96, 1.08)
Riboflavin	1.07 (0.73, 1.56)	1.07 (0.72, 1.60)	1.09 (0.97, 1.23)	1.08 (0.95, 1.23)	0.90 (0.61, 1.32)	1.06 (0.74, 1.53)	0.99 (0.93, 1.04)	1.02 (0.96, 1.08)
Vitamin B6	1.03 (0.70, 1.50)	1.04 (0.69, 1.54)	1.12 (0.99, 1.25)	1.10 (0.97, 1.24)	0.92 (0.64, 1.34)	1.09 (0.78, 1.53)	0.99 (0.94, 1.04)	1.02 (0.97, 1.08)
Vitamin B12	1.18 (0.83, 1.69)	1.19 (0.82, 1.72)	1.16 (1.03, 1.31)	1.13 (0.99, 1.29)	0.94 (0.64, 1.38)	1.10 (0.77, 1.58)	0.99 (0.94, 1.05)	1.03 (0.97, 1.10)
Niacin	1.18 (0.70, 1.98)	1.23 (0.72, 2.10)	1.22 (1.03, 1.44)	1.24 (1.04, 1.48)	0.65 (0.33, 1.28)	0.81 (0.42, 1.56)	1.01 (0.93, 1.09)	1.06 (0.97, 1.15)
Pantothenic Acid	1.00 (0.62, 1.63)	1.08 (0.66, 1.77)	1.15 (1.00, 1.33)	1.16 (1.00, 1.35)	0.79 (0.48, 1.32)	1.01 (0.63, 1.63)	0.98 (0.92, 1.05)	1.01 (0.94, 1.09)
Biotin	0.72 (0.29, 1.81)	0.81 (0.33, 2.01)	1.14 (0.91, 1.44)	1.08 (0.84, 1.40)	1.43 (0.83, 2.46)	1.60 (0.92, 2.79)	1.09 (0.99, 1.20)	1.14 (1.03, 1.27)
Vitamin C	1.23 (0.93, 1.63)	1.27 (0.94, 1.70)	1.08 (0.97, 1.20)	1.06 (0.95, 1.19)	1.09 (0.82, 1.45)	1.18 (0.90, 1.54)	1.00 (0.95, 1.05)	1.03 (0.98, 1.08)
Vitamin A	1.10 (0.77, 1.58)	1.10 (0.75, 1.63)	1.11 (0.99, 1.25)	1.12 (0.99, 1.27)	0.98 (0.69, 1.40)	1.08 (0.76, 1.54)	0.97 (0.92, 1.03)	1.04 (0.98, 1.10)
Vitamin D	1.08 (0.77, 1.52)	1.09 (0.76, 1.57)	1.09 (0.98, 1.22)	1.10 (0.97, 1.23)	1.01 (0.73, 1.39)	1.13 (0.83, 1.55)	0.97 (0.92, 1.02)	1.02 (0.97, 1.08)
Vitamin E	0.99 (0.69, 1.41)	0.98 (0.67, 1.44)	1.06 (0.95, 1.18)	1.07 (0.95, 1.20)	0.97 (0.71, 1.34)	1.16 (0.86, 1.56)	0.96 (0.92, 1.01)	1.02 (0.97, 1.07)
Minerals								
Iron	1.10 (0.87, 1.38)	1.10 (0.86, 1.42)	1.02 (0.94, 1.11)	1.00 (0.91, 1.09)	1.21 (1.01, 1.44)	1.32 (1.13, 1.55)***	0.97 (0.93, 1.00)	0.99 (0.95, 1.03)
Calcium	1.03 (0.56, 1.89)	1.04 (0.55, 1.98)	1.19 (0.99, 1.43)	1.10 (0.90, 1.35)	1.53 (1.02, 2.30)	1.69 (1.11, 2.56)	1.04 (0.96, 1.13)	1.07 (0.98, 1.17)
Iodine	1.15 (0.71, 1.87)	1.09 (0.64, 1.87)	1.25 (1.08, 1.45)	1.25 (1.06, 1.47)	1.24 (0.82, 1.86)	1.36 (0.89, 2.06)	0.96 (0.89, 1.04)	1.02 (0.95, 1.11)
Zinc	1.12 (0.73, 1.72)	1.11 (0.70, 1.76)	1.17 (1.02, 1.34)	1.16 (1.00, 1.35)	0.96 (0.62, 1.47)	1.13 (0.74, 1.72)	1.01 (0.94, 1.07)	1.06 (0.99, 1.13)
Selenium	1.08 (0.68, 1.70)	1.05 (0.64, 1.72)	1.15 (1.00, 1.33)	1.16 (0.99, 1.35)	0.78 (0.47, 1.30)	0.91 (0.54, 1.51)	1.00 (0.94, 1.07)	1.06 (0.99, 1.13)
Copper	1.23 (0.78, 1.93)	1.20 (0.73, 1.97)	1.18 (1.01, 1.38)	1.16 (0.98, 1.37)	1.13 (0.74, 1.74)	1.35 (0.89, 2.05)	1.00 (0.93, 1.08)	1.04 (0.97, 1.13)
Chromium	1.15 (0.73, 1.82)	1.12 (0.69, 1.84)	1.16 (1.00, 1.35)	1.15 (0.97, 1.35)	0.99 (0.63, 1.56)	1.17 (0.75, 1.82)	1.02 (0.95, 1.09)	1.07 (0.99, 1.15)
Magnesium	0.79 (0.43, 1.44)	0.81 (0.43, 1.53)	1.23 (1.06, 1.42)	1.19 (1.01, 1.39)	0.93 (0.58, 1.51)	0.99 (0.59, 1.67)	1.01 (0.94, 1.08)	1.06 (0.99, 1.14)
Other								
Cod-Liver Oil	0.58 (0.32, 1.07)	0.73 (0.43, 1.25)	0.81 (0.69, 0.95)	0.84 (0.71, 0.99)	0.75 (0.48, 1.18)	0.83 (0.51, 1.35)	0.87 (0.82, 0.92)*+	0.92 (0.86, 0.98)

	Anorexia Nervosa (n=34)		Bulimia Nervosa (n=326)		EDNOS-P [1] (n=44)		Binge eating disorder (n=1,944)	
	Relative Risk		Relative Risk		Relative Risk		Relative Risk	
Supplement	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
Omega 3	0.96 (0.67, 1.37)	1.03 (0.71, 1.50)	1.12 (1.01, 1.24)	1.15 (1.03, 1.27)	0.93 (0.67, 1.28)	0.92 (0.65, 1.32)	0.94 (0.90, 0.99)	0.99 (0.94, 1.05)
Any Supplement	0.98 (0.88, 1.08)	0.99 (0.88, 1.11)	0.99 (0.96, 1.02)	1.00 (0.96, 1.03)	1.00 (0.92, 1.08)	0.99 (0.89, 1.09)	0.97 (0.96, 0.98)**	0.98 (0.97, 1.00)

Notes: EDNOS-P, eating disorder not otherwise specified-purging

* Results from Poisson regression models estimating dietary supplement use by eating disorder subtype at any time during pregnancy. Generalized estimating equations were applied to all models and the adjusted models had maternal age, parity, income, education, and smoking status as covariates. Relative Risk and 95% Confidence Intervals are presented. Each eating disorder subtype was compared with the referent group.

** $p<0.01$

*** $p<0.04$

*+ $p<0.001$ (corrected using false discovery rate)

Table 4

Dietary Supplement Use across Time by Eating Disorder Subtype *

	Anorexia Nervosa (n=34)		Bulimia Nervosa (n=326)		EDNOS-P [1] (n=44)		Binge eating disorder (n=1,944)	
	Relative Risk		Relative Risk		Relative Risk		Relative Risk	
Supplement	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
Vitamin								
Folic Acid	1.06 (0.81, 1.39)	1.11 (0.84, 1.47)	1.03 (0.96, 1.12)	1.06 (0.97, 1.15)	0.98 (0.78, 1.24)	1.04 (0.81, 1.32)	0.93 (0.90, 0.96)**	0.98 (0.94, 1.01)
Riboflavin	1.32 (0.86, 2.03)	1.35 (0.85, 2.14)	1.08 (0.93, 1.26)	1.09 (0.93, 1.28)	1.09 (0.69, 1.71)	1.21 (0.78, 1.88)	0.96 (0.89, 1.02)	1.00 (0.93, 1.07)
Vitamin B12	1.48 (0.99, 2.21)	1.51 (0.99, 2.31)	1.16 (1.00, 1.35)	1.16 (0.98, 1.36)	1.10 (0.70, 1.72)	1.21 (0.78, 1.87)	0.97 (0.90, 1.04)	1.02 (0.95, 1.09)
Vitamin A	1.51 (1.03, 2.20)	1.51 (0.99, 2.30)	1.15 (0.99, 1.32)	1.16 (0.99, 1.35)	0.87 (0.55, 1.37)	1.00 (0.63, 1.59)	0.94 (0.88, 1.00)	1.01 (0.94, 1.08)
Vitamin D	1.35 (0.93, 1.98)	1.39 (0.91, 2.12)	1.08 (0.94, 1.24)	1.11 (0.95, 1.29)	1.05 (0.71, 1.55)	1.14 (0.76, 1.71)	0.91 (0.86, 0.97)***	0.98 (0.91, 1.04)
Minerals								
Iron	1.45 (1.07, 1.96)	1.45 (1.05, 2.02)	1.05 (0.93, 1.18)	1.04 (0.92, 1.18)	1.19 (0.89, 1.58)	1.30 (0.99, 1.71)	0.92 (0.87, 0.97)****	0.96 (0.91, 1.01)
Iodine	1.66 (0.99, 2.77)	1.63 (0.91, 2.89)	1.23 (1.03, 1.48)	1.23 (1.01, 1.49)	1.35 (0.82, 2.23)	1.45 (0.89, 2.38)	0.91 (0.84, 1.00)	0.98 (0.89, 1.07)
Zinc	1.51 (0.95, 2.39)	1.54 (0.93, 2.54)	1.16 (0.98, 1.38)	1.16 (0.96, 1.39)	1.24 (0.78, 1.99)	1.38 (0.86, 2.20)	0.95 (0.88, 1.03)	1.01 (0.93, 1.10)
Selenium	1.55 (0.97, 2.49)	1.56 (0.92, 2.63)	1.12 (0.94, 1.34)	1.15 (0.95, 1.38)	1.05 (0.61, 1.82)	1.14 (0.66, 1.97)	0.96 (0.88, 1.04)	1.02 (0.94, 1.11)
Chromium	1.52 (0.94, 2.45)	1.56 (0.92, 2.66)	1.11 (0.93, 1.33)	1.10 (0.90, 1.34)	1.17 (0.69, 1.97)	1.28 (0.75, 2.17)	0.96 (0.88, 1.04)	1.01 (0.92, 1.10)
Magnesium	1.08 (0.56, 2.06)	1.09 (0.54, 2.17)	1.20 (1.00, 1.43)	1.18 (0.97, 1.43)	1.17 (0.66, 2.05)	1.24 (0.68, 2.26)	0.97 (0.89, 1.06)	1.03 (0.94, 1.12)
Other								
Cod-Liver Oil	0.71 (0.36, 1.38)	0.92 (0.51, 1.66)	0.77 (0.64, 0.94)	0.80 (0.65, 0.99)	0.70 (0.39, 1.27)	0.81 (0.44, 1.49)	0.82 (0.76, 0.88)+	0.88 (0.82, 0.96)
Omega 3	1.00 (0.65, 1.54)	1.06 (0.66, 1.70)	1.14 (1.00, 1.29)	1.18 (1.04, 1.35)	0.90 (0.61, 1.33)	0.82 (0.53, 1.28)	0.89 (0.84, 0.94)**	0.95 (0.89, 1.02)
Any Supplement	1.03 (0.87, 1.22)	1.11 (0.93, 1.33)	0.98 (0.93, 1.04)	1.00 (0.94, 1.06)	0.90 (0.76, 1.07)	0.97 (0.81, 1.16)	0.92 (0.89, 0.94) +	0.96 (0.93, 0.98)

Notes: EDNOS-P, eating disorder not otherwise specified-purging; RR, relative risk; CI, confidence interval

* Poisson regression models predicting dietary supplement use during pregnancy by time and eating disorder subtype. Generalized estimating equations were applied to all models and the adjusted models had maternal age, parity, income, education, and smoking status as covariates. Each eating disorder subtype was compared with the referent group.

** $p < 0.01$

*** $p<0.04$

**** P<0.03

[+] P<0.001(corrected using false discovery rate)