Organivore or organorexic? Examining the relationship between alternative food network engagement, disordered eating, and special diets

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ABSTRACT

The alternative food network (AFN) refers to connections between consumers, producers, and sellers of organic, local/regional, "sustainably grown," and other artisanal and niche food not produced by the conventional system (Goodman & Goodman, 2007). Alternative foods are often viewed as the "right" consumption choice while conventional counterparts are positioned as ethically "wrong." A moral positioning of food, avoidance of certain food groups, and anxiety elicited by food consumption choices bears similarities to disordered eating behaviors (Hesse-Biber, Leavy, Quinn, & Zoino, 2006), including a newly proposed eating syndrome, orthorexia nervosa (ON; Vandereycken, 2011; Zamora, Bonaechea, Sánchez, & Rial, 2005). This study examines the relationship among engagement in the AFN, disordered eating behaviors, and special diets. We hypothesized that individuals with higher AFN engagement would be more likely report disordered eating behaviors as well as to follow a special diet. Adult men and women (N = 284) completed a series of measures assessing engagement in the AFN and eating behaviors. We found that individuals with higher AFN engagement were more likely to report ON tendencies but not significantly likely to engage in other disordered eating behaviors. Individuals following a special diet were significantly more engaged in the AFN, more likely to report ON tendencies, and more likely to self-report an eating disorder. Our findings suggest that the most engaged consumers participate in the AFN for the purported benefits reaped by society and the environment and not to moderate their consumption or mask disordered eating behaviors. Future research should prospectively explore associations between AFN engagement, ON and disordered eating behaviors, and special diets as well as consider the utility of incorporating AFN engagement into existing disordered eating prevention programs.

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1. Introduction

The alternative food network (AFN) refers to connections between consumers, producers, and sellers of organic, local/regional, "sustainably grown," and other artisanal and niche food not produced by the conventional system (Goodman & Goodman, 2007). Increasing awareness of the ecological, social, and ethical problems associated with the conventional agro-food system has caused certain subsets of consumers to participate more actively in the developing AFN by consuming food that emerges from the AFN; some even identify as "locavores" (consumers of local food; Stanton, Wiley, & Wirth, 2012) or "organivores" (a neologism used to describe consumers of organic food). The AFN assures consumers of sustainable and/or ethical food based on certification schemes, shortened supply chains, and process-based farming techniques (Maye, Holloway, & Kneafsey, 2007). Differences between agricultural methods at sites of production, whether real or perceived (see Goodman, DuPuis, & Goodman, 2012; Guthman, 1998, 2004), create a dualistic, complex global foodscape that mandates a higher level of reflexivity (i.e., constant reflection and assessment of impact of food choice on self and environment) for ethical consumption (Sassatelli, 2004).

The new food paradigm constructs "conventional" food as poor quality, ethically "wrong," and ecologically irresponsible while

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positioning the consumption of "alternative" food as the high quality, healthy, ethically "right" choice (Goodman et al., 2012; Guthman, 2007; Honkanen, Verplanken, & Ottar Olsen, 2006). By engaging in the AFN, consumers construct an identity as ethical individuals and trust that they are opting out of the conventional, industrial agro-food complex (Barnett, Cloke, Clark, & Malpass, 2005; Goodman & Goodman, 2007; Goodman & Sage, 2013; Maxey, 2007). For some consumers, the complexity of the current foodscape and the ensuing moralization of food choices requires onerous attentiveness and can produce fear and anxiety (Beardsworth & Keil, 1997; Goodman & Sage, 2013; Guthman, 2003; Honkanen et al., 2006; Lang, Barling, & Caraher, 2009).

A moral positioning of food, avoidance of certain food groups, and anxiety elicited by food consumption choices bear disquieting similarities to subclinical disordered eating behaviors (e.g., skipping meals, fasting, dieting, etc.) and clinically significant eating disorders (e.g., anorexia nervosa, bulimia nervosa, and binge eating disorder; Lang et al., 2009). Eating disorders involve a preoccupation with food and often the refusal to eat certain foods based on individually constructed moralities (e.g., "fat is bad") with the aim of controlling weight and shape (Fallon, Katzman, & Wooley, 1994). The various "food rules" for good consumption promoted by the AFN could prompt the development of disordered eating symptoms, such as restrictive eating or preoccupation with food, that mirror those of eating disorders. Conversely, disordered eating behaviors could lead individuals to participate in the AFN, as it already classifies food into convenient categories. Foods positioned as sustainable, organic, local, or alternative might provide another way for individuals with eating disorders to restrict and control their food intake in a socially acceptable way.

To date, there is no known research that has directly examined the connection between AFN engagement and disordered eating behaviors. However, a few studies have explored orthorexia nervosa (ON), a new eating syndrome that involves the exclusion of foods considered "impure" that may be contaminated with pesticides or artificial substances (Donini, Marsili, Graziani, Imbriale, & Cannella, 2005; Korinth, Schiess, & Westenhoefer, 2009; Vandereycken, 2011; Zamora, Bonaechea, Sánchez, & Rial, 2005). Although ON has not been well-defined or researched, it is gaining currency in the public realm with articles citing ON as an eating syndrome driven by the "clean eating" trend (Kaplan, 2015; Williams, 2015). ON is characterized by an extreme preoccupation with food production methods in regards to health and purity (Bosi, Çamur, & Güler, 2007; Korinth et al., 2009; Zamora et al., 2005), and Rangel, Dukeshire, and MacDonald (2012) postulate that awareness of the problems associated with industrial agriculture can escalate risk perception and produce the dietary anxiety associated with ON. Consumers engaged in the AFN are more likely to be aware of these problems and be more attentive to the type and quality of food they consume (Maye et al., 2007). For example, a scale that seeks to diagnose ON (ORTO-15; Donini et al., 2005, p. 30) asks questions that appear associated with engagement in the AFN (e.g., willingness to spend more money on healthier food and valuing the quality of food over taste). Although there is no known research linking AFN engagement and ON or other disordered eating behaviors, research has suggested connections between AFN engagement and following a vegetarian diet (Fox & Ward, 2008; Hughner, McDonagh, Prothero, Shultz, & Stanton, 2007), as well as connections between vegetarianism and disordered eating behaviors (Bardone-Cone et al., 2012; Hughner et al., 2007; Sullivan & Sadhana, 2000).

Vegetarians are more likely to purchase and consume organic food (Hughner et al., 2007), a component of AFN engagement. Studies have suggested that following a vegetarian diet is sometimes used to disguise restrictive eating patterns employed to control weight and shape (Kadambari, Gowers, & Crisp, 1986; Martins, Pliner, & O'Connor, 1999). One study found that nearly half of their participants with a history of disordered eating reported following a vegetarian diet at some point and cited weight control as a primary reason for this choice (Bardone-Cone et al., 2012), while another found that semi-vegetarians, as opposed to "true" vegetarians, were more likely to report a disordered relationship with food (Timko, Hormes, & Chubski, 2012). The higher incidence of eating disorders in connection with vegetarianism suggests that other special diets may also be connected to disordered eating behaviors and engagement in the AFN. Other special diets, including pescatarian, vegan, paleo, gluten-free, and raw foods, may serve as socially acceptable means to mask disordered eating behaviors while also being associated with higher AFN engagement. To date, however, there is no known research exploring these relationships.

The current study seeks to address gaps in the literature by exploring connections among engagement in the AFN, disordered eating behaviors, and adherence to special diets. We hypothesized that greater engagement in the AFN would be associated with more disordered eating behaviors. We also hypothesized that following a special diet compared to no special diet would be associated with greater AFN engagement as well as higher incidence of disordered eating behaviors.

2. Methods

2.1. Participants

Men and women, 18+ years of age, were recruited through advertisements at a small Southern liberal arts college and through local alternative food network (AFN) hubs (e.g., local organic groceries and food co-ops) and environmental organizations to participate in a study about "eating habits and participation in local, organic, sustainable, and ethical food networks" via posters, listserv emails, social media, and word-of-mouth. Participants younger than 18 years of age were excluded from participation.

2.2. Procedure

The Furman University Human Research Internal Review Board approved the study. All participants provided informed voluntary written consent prior to initiating the survey via an online consent form asking for their electronic signature. Participants completed a series of measures (described below) via the online survey tool, SurveyMonkey. Following completion of the survey, participants were fully debriefed, provided with the option of withdrawing their survey responses, and entered to win one of six $25 cash gift cards. No other compensation was offered.

2.3. Measures

The *Alternative Food Network Engagement Scale (AFNE)* was developed for the current study to measure engagement in the AFN because no known scale exists to assess this construct. We created this scale based on food choice research (Baker, Thompson, Engelken, & Huntley, 2004; Hjelmar, 2011; Honkanen et al., 2006; Lindeman & Stark, 1999) and existing scales, including the Measurement of Ethical Food Choice Motives (Lindeman & Väänänen, 2000) and the Food Choice Questionnaire (Steptoe & Pollard, 1995). This scale assesses the degree to which consumers prefer organic, local, sustainable, and other niche foods over products emerging from the conventional, industrialized food system. The scale consists of 11 items assessed on a 5-point Likert-type scale ranging from 1 ("not at all important" or "strongly disagree") to 5

("very important" or "strongly agree"). The mean of all 11 items was computed to determine an overall AFNE scale score, with higher scores indicating greater AFN engagement. The scale demonstrated strong internal consistency; Cronbach's alpha was $\alpha = 0.89$. Factor loadings on a single AFNE factor ranged from 0.56 to 0.80. Item-total correlations ranged from $r = 0.48$ to $r = 0.73$. See Table 1 for AFNE scale items and psychometric properties.

To assess adherence to a *special diet*, participants were asked: "Do you follow any of the following diets: vegetarian, pescatarian, vegan, raw foods, paleo, gluten-free, or none of the above?" These "special diets" were not explicitly defined for participants; however, a vegetarian diet typically excludes meat and may or may not also exclude eggs, dairy, and other animal products. A pescatarian diet typically includes fish but no other type of meat (e.g., no beef, pork, chicken). A vegan diet typically refers to a vegetarian diet that excludes all animal products, including eggs and dairy. A raw foods diet is the consumption of uncooked and unprocessed foods and typically refers to a raw version of a vegan or vegetarian diet, although some raw food eaters consume raw meat. A paleo or Paleolithic diet typically follows the eating habits of early hunter-gatherers and excludes dairy and grains while emphasizing meat, vegetable, and nut/seed consumption. A gluten-free diet excludes the consumption of gluten (a grain protein) that is found in barley, rye, and wheat. "No special diet" refers to no selection of any special diet, and, therefore, is assumed to be analogous to an omnivorous diet.

The *Eating Disorder Examination Questionnaire* (*EDE-Q*; Fairburn & Beglin, 1994) is a 28-item measure that assesses disordered eating psychopathology over the previous four weeks. It comprises one global score and four subscales: restraint, eating concern, shape concern, and weight concern. A sample restraint item asks about "deliberately trying to limit the amount of food … to influence your shape or weight." A sample eating concern item asks whether preoccupation with "food, eating, or calories made it very difficult to concentrate." A sample shape concern item asks about having "a definite desire to have a totally flat stomach." A sample weight concern item asks about the influence of weight in "how you think about (judge) yourself." Items are scored on a 7-point Likert-type scale ranging from 0 to 6, with higher scores indicating greater eating psychopathology (clinical significance indicated with a score of 4 or higher; Mond, Hay, Rodgers, & Owen, 2006). In addition to the subscale scores, we also explored participants' responses to items assessing the number of objective bulimic episodes (OBEs or "binges") in the past 28 days, which is a disordered eating behavior not captured in the EDE-Q subscales. OBEs were assessed by asking participants to report the number of times they have "eaten an unusually large amount of food" with "a sense of loss of control." The EDE-Q has demonstrated good validity and reliability for both women (Luce, Crowther, & Pole, 2008) and men (Lavender, De Young, & Anderson, 2010). In our sample, the Cronbach's alphas were $\alpha = 0.90$ for Global EDE-Q, $\alpha = 0.80$ for Restraint, $\alpha = 0.85$ for Eating Concern, $\alpha = 0.89$ for Shape Concern, and $\alpha = 0.82$ for Weight Concern.

The *ORTO-15* was developed and validated by Donini et al. (2005) to diagnose the presence of orthorexia nervosa (ON), which refers to the pathological fixation on healthy food consumption (Bratman & Knight, 2000). This 15-item scale asks participants to respond on a 4-point Likert-type from "always" to "never." Total scale scores can range from 15 to 60 with *lower* scores indicating *more* ON symptoms. According to Donini et al. (2005), in a sample of 404 community participants, a score *less than or equal* to 40 suggests a diagnosis of ON with high specificity and moderate

Table 1
Psychometric properties of the Alternative Food Network Engagement (AFNE) scale (N = 284).

AFNE scale items	Mean ± SD	Single factor loading	Item-total correlation
It is important to me that the food I eat on a typical day …			
1. Has been produced in a way that animals have not experienced pain. (1-not at all important to 5-very important)	3.63 ± 1.13	0.70	0.62
2. Has been produced in a way that animals' rights have been respected. (1-strongly disagree to 5-strongly agree)	3.76 ± 1.11	0.74	0.66
3. Has been prepared in an environmentally friendly way. (1-not at all important to 5-very important)	4.20 ± 0.87	0.88	0.72
4. Has been produced in a way which has not shaken the balance of nature. (1-strongly disagree to 5-strongly agree)	4.00 ± 1.02	0.80	0.73
5. Is packaged in an environmentally friendly way. (1-not at all important to 5-very important)	4.00 ± 0.93	0.71	0.62
6. When shopping for food, I look for ecological certifications. (1-strongly disagree to 5-strongly agree)	3.34 ± 1.16	0.73	0.66
7. I prefer buying local food to other types of food. (1-strongly disagree to 5-strongly agree)	4.45 ± 0.78	0.56	0.48
8. I am willing to spend more money to have sustainably produced food. (1-strongly disagree to 5-strongly agree)	4.13 ± 1.02	0.70	0.63
9. Because of my worldview there are some foods that are inappropriate for me. (1-strongly disagree to 5-strongly agree)	3.40 ± 1.41	0.65	0.58
10. It is important to me that I know how my food is produced. (1-strongly disagree to 5-strongly agree)	4.15 ± 0.93	0.75	0.68
11. When going out to eat, I seek out establishments that serve local, organic, or sustainable food. (1-strongly disagree to 5-strongly agree)	3.89 ± 0.97	0.59	0.51
AFNE Scale Score ($\alpha = 0.89$)	**3.90 ± 0.73**		

sensitivity. More recent research suggests that a score less than or equal to 35 provides a lower and more accurate estimate of the prevalence of ON than the cut-off of 40 (Ramacciotti et al., 2011). In our sample, Cronbach's alpha was $\alpha = 0.47$.

The *Eating Disorder Diagnostic Scale* (*EDDS*; Stice, Telch, & Rizvi, 2000) is a 22-item self-report measure used to diagnose full threshold and sub-threshold eating disorders—anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED)—over the past three months based on the Diagnostic and Statistical Manual of Mental Disorders-IV (APA, 2000). Sample items ask participants to report on behaviors including having "a definite fear that you might gain weight or become fat," eating "an unusually large amount of food and experienced a loss of control," and making "yourself vomit to prevent weight gain" (Stice et al., 2000, p. 131). The scale has good internal consistency and predictive validity for the diagnosis of eating disorders (Stice, Fisher, & Martinez, 2004). In our sample, Cronbach's alpha was $\alpha = 0.88$.

To assess *eating disorder history*, participants were also asked to self-report if they currently have and/or have ever had an eating disorder with the following question: "Do you currently or have you ever suffered from an eating disorder?" categorized as current eating disorder, past eating disorder, or no eating disorder history.

To assess sample *demographics*, participants were asked to report their age, gender, height, weight, education, and any medical conditions affecting their eating choices.

2.4. Statistical analyses

To examine differences in sample demographics across special diets, we conducted analyses of variance (ANOVA) for continuous variables (age, BMI) and chi-square analyses for categorical variables (gender, education). To explore our first hypothesis that greater engagement in the AFN would be associated with greater eating psychopathology, we conducted bivariate Pearson correlations between the AFNE scale, EDE-Q subscales (global, restraint, eating concern, shape concern, weight concern), objective bulimic episodes (OBEs), and the ORTO-15, separately by gender, noting that women typically report greater disordered eating behaviors than men (Lewinsohn, Seelely, Moerk, & Striegel-Moore, 2002). To explore our second hypothesis that following a special diet would be associated with greater AFN engagement and greater eating psychopathology, we conducted *t*-tests to examine differences between those with any special diet group versus no special diet with continuous variables (AFNE, EDE-Q, ORTO-15) and chi-square analyses with categorical variables (EDDS, self-reported eating disorder history). Similarly, for our exploratory analyses to examine differences between special diets on disordered eating variables, we conducted a series of ANOVAs with continuous variables and chi-square analyses with categorical variables.

3. Results

3.1. Sample demographics

The final sample comprised 284 adult men and women who were on average 38.2 years old and had a mean Body Mass Index (BMI) of 24.9 kg/m^2. Participants were predominantly female, had completed at least some college, and did not follow a special diet (see Table 2). Overall, participants reported high alternative food network (AFN) engagement and orthorexia nervosa (ON) tendencies, and low rates of current and past eating disorders. There were no significant differences between special diet groups on age, BMI, gender, or education (all *p*'s > 0.05). We found the same pattern when we compared any special diet versus those who followed no special diet: no differences on age, BMI, gender or

Table 2
Overall sample means, standard deviations, and frequencies for demographic and eating variables (N = 284).

Demographic variables	N	M ± SD
Age	284	38.15 ± 17.89
BMI	260	24.87 ± 4.74
	N	**n (%)**
Gender (% female)	259	216 (83.4)
Education	259	
≤ High school		14 (5.4)
Some college or bachelors		176 (68.0)
Graduate degree		69 (26.6)
Special diet groups	284	
Vegetarian		22 (7.7)
Pescatarian		12 (4.2)
Vegan/raw foods		11 (3.9)
Paleo		11 (3.9)
Gluten-free		15 (5.3)
No special diet		213 (75.0)
Eating variables	**N**	**M ± SD**
AFNE	284	3.90 ± 0.73
EDE-Q		
Global	275	1.40 ± 1.15
Restraint	275	1.38 ± 1.32
Eating concern	276	0.65 ± 1.00
Shape concern	276	1.85 ± 1.51
Weight concern	276	1.72 ± 1.40
OBEs	268	1.49 ± 3.63
ORTO-15	283	36.34 ± 3.95
	N	**n (%)**
EDDS	260	
No diagnoses		236 (90.8)
Sub BN		12 (4.6)
Full BN		9 (3.5)
Full BED		3 (1.2)
ED history	240	
None		206 (85.8)
Current		17 (7.1)
Past		17 (7.1)

BMI: Body Mass Index with scores between 18.5 and 24.9 kg/m^2 considered normal weight. AFNE: Alternative Food Network Engagement scale with higher scores indicating greater engagement. EDE-Q: Eating Disorder Examination-Questionnaire with higher scores indicated greater eating psychopathology. OBEs: Total number of objective bulimic episodes over the past 28 days. ORTO-15: Orthorexia scale with lower scores indicating more orthorexic tendencies. EDDS: Eating Disorder Diagnostic Scale with scores indicating full threshold, sub-threshold, or no eating disorder diagnosis. ED history: self-reported current or past eating disorder history.

education (all *p*'s > 0.05). Ten participants did not complete the AFNE scale and were not included in the final sample of 284. Twelve participants cited medical reasons for following their specific special diet but did not significantly differ from those who did not cite a medical reason for their diet on disordered eating variables so were kept in our sample. Six participants chose to withhold their survey responses and were not included in the final sample. We included all other participants, including those who provided incomplete data on other measures in order to retain statistical power.

3.2. Hypothesis 1: Correlations between AFN engagement and disordered eating variables.

Table 3 presents the correlations among AFN engagement (AFNE scale score), disordered eating variables (EDE-Q subscales, OBEs, ORTO-15) to explore our first hypothesis. Inconsistent with our hypothesis, AFNE scale score was not significantly associated with any EDE-Q disordered eating behaviors. However, consistent with our hypothesis, greater AFN engagement (scale score) was significantly, negatively, and moderately correlated with the ORTO-15,

Table 3
Correlations between Alternative Food Network Engagement (AFNE) scale and disordered eating variables.

AFNE scale score	EDE-Q global	EDE-Q restraint	EDE-Q eating concern	EDE-Q shape concern	EDE-Q weight concern	EDE-Q OBEs	ORTO-15
Female (n = 216)	−0.07	−0.04	−0.06	−0.06	−0.08	−0.10	−0.38***
Male (n = 43)	−0.15	−0.26	0.01	−0.01	−0.19	−0.23	−0.26*
Total	−0.10	−0.08	−0.09	−0.06	−0.10	−0.11	−0.36**

$*p < 0.05$, $**p < 0.01$, $***p < 0.001$.
AFNE: Alternative Food Network Engagement scale with higher scores indicating greater engagement. EDE-Q: Eating Disorder Examination-Questionnaire with higher scores indicated greater eating psychopathology. OBEs: Total number of objective bulimic episodes over the past 28 days. ORTO-15: Orthorexia scale with lower scores indicating more orthorexic tendencies.

indicating that participants who reported greater AFN engagement were more likely to have ON tendencies. The pattern of correlations was similar for both women and men. Given the pattern of negative correlations between the AFNE scale score and the EDE-Q, we examined the correlations between the 11 AFNE items and the global EDE-Q and objective bulimic episodes (OBEs). Three AFNE items were significantly and negatively correlated with disordered eating behaviors. Specifically, AFNE item 8 (willingness to spend more money to have sustainably produced food) was significantly and negatively correlated with global EDE-Q (females: $r = −0.17$, $p < 0.05$; males: $r = −0.31$, $p < 0.05$), indicating that participants who reported more willingness to spend money on sustainably produced foods reported somewhat less disordered eating behavior. In addition, AFNE item 2 (importance of respecting animals' rights) for women ($r = −0.20$, $p < 0.01$) and AFNE item 3 (importance of food being prepared in an environmentally friendly way) for women and men (females: $r = −0.14$, $p < 0.05$; males: $r = −0.38$, $p < 0.05$) were significantly and negatively correlated with OBEs, indicating that participants who endorsed more concern for animal rights and the environment were somewhat less likely to report engaging in binge eating. It should be noted that the strength of the statistically significant correlations with EDE-Q variables was small (all r's −0.14 to −0.38) and that after correcting for multiple tests (0.05/43 = $p < 0.001$), these correlations were no longer significant. However, after correcting for multiple tests, the correlation between AFNE scale score and ORTO-15 for women remained significant.

3.3. Hypothesis 2: Special diet versus no special diet on AFN engagement and disordered eating variables.

To test our second hypothesis, we grouped together all participants who reported following any special diet (vegetarian, pescatarian, vegan/raw, paleo, and gluten-free) under the category of "special diet" and compared them to those who followed no special diet on AFN engagement (AFNE scale score) and disordered eating variables (EDE-Q, OBEs, ORTO-15, eating disorder history; see Table 4). Consistent with our hypothesis, those who followed a special diet were both significantly more engaged in the AFN and reported more ON tendencies than those who followed no special diet. In particular, those following a special diet met the ≤35 cut-off score indicating ON as proposed by Ramacciotti et al. (2011), whereas those not following a special diet did not meet this cut-off score. Also consistent with our hypothesis, those following special diets self-reported significantly more current and past eating disorders compared to those following no special diet. There were no other significant differences on other disordered eating variables. Effect sizes for the statistically significant differences were moderate for AFNE and ORTO-15. The moderate effect size for the AFNE is noteworthy given that the sample is overall relatively engaged in the AFN, suggesting that this is indeed a meaningful difference between diet groups.

Table 4
Comparisons between special diet and no special diet on alternative food network engagement and disordered eating variables.

	Special Diet (n = 71)	No Special Diet (n = 213)	t-test or chi-square			
	M ± SD	M ± SD	df	t	p	Cohen's d
AFNE	4.17 ± 0.66	3.81 ± 0.72	282	−3.69	0.00	0.52
EDE-Q						
Global	1.48 ± 1.29	1.37 ± 1.10	273	−0.72	0.47	0.10
Restraint	1.37 ± 1.44	1.38 ± 1.27	273	0.08	0.94	0.01
Eating concern	0.72 ± 1.18	0.63 ± 0.94	274	−0.65	0.52	0.08
Shape concern	2.05 ± 1.60	1.78 ± 1.48	274	−1.29	0.20	0.17
Weight concern	1.79 ± 1.51	1.70 ± 1.36	274	−0.45	0.66	0.06
OBEs	1.92 ± 4.90	1.34 ± 3.05	266	−0.94	0.25	0.14
ORTO-15	34.79 ± 4.06	36.85 ± 3.79	281	3.88	0.00	0.52
	n (%)	n (%)	df, N	X^2	p	ϕ
EDDS			3, 260	1.32	0.72	0.07
No diagnoses	64 (91.4)	172 (90.5)				
Sub BN	3 (4.3)	9 (4.7)				
Full BN	3 (4.3)	6 (3.2)				
Full BED	0 (0)	3 (1.6)				
ED history			2, 240	8.86	0.01	0.19
None	47 (74.6)	159 (89.8)				
Current	8 (12.7)	9 (5.1)				
Past	8 (12.7)	9 (5.1)				

AFNE: Alternative Food Network Engagement scale with higher scores indicating greater engagement. EDE-Q: Eating Disorder Examination-Questionnaire with higher scores indicated greater eating psychopathology. OBEs: Total number of objective bulimic episodes over the past 28 days. ORTO-15: Orthorexia scale with lower scores indicating more orthorexic tendencies. EDDS: Eating Disorder Diagnostic Scale with scores indicating full threshold, sub-threshold, or no eating disorder diagnosis. ED history: self-reported current or past eating disorder history.

Table 5
Comparisons among special diet groups on alternative food network engagement and disordered eating variables.

	Vegetarian (n = 22)	Pescatarian (n = 12)	Vegan/raw foods (n = 11)	Paleo (n = 11)	Gluten-free (n = 15)	ANOVA or chi-square			
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	df	F	p	η^2
AFNE	4.37 ± 0.43	4.31 ± 0.40	4.32 ± 0.56	4.06 ± 0.58	3.74 ± 1.01	4, 66	2.68	0.04	0.14
EDE-Q									
Global	1.28 ± 1.20	1.16 ± 1.02	2.16 ± 1.67	1.10 ± 0.82	1.82 ± 1.47	4, 66	1.64	0.18	0.09
Restraint	1.07 ± 1.27	0.88 ± 1.18	2.21 ± 1.93	1.30 ± 1.27	1.61 ± 1.47	4, 66	1.68	0.17	0.09
Eating concern	0.56 ± 0.25	0.50 ± 0.34	1.22 ± 0.35	0.31 ± 0.35	1.07 ± 0.30	4, 66	1.38	0.25	0.08
Shape concern	1.89 ± 1.64	1.66 ± 1.31	2.67 ± 1.87	1.66 ± 1.12	2.43 ± 1.82	4, 66	1.02	0.41	0.06
Weight concern	1.58 ± 1.48	1.58 ± 1.24	2.55 ± 1.90	1.14 ± 1.05	2.17 ± 1.55	4, 66	1.67	0.17	0.09
OBEs	0.86 ± 1.90	1.33 ± 3.47	3.09 ± 6.36	0.77 ± 1.51	3.87 ± 8.06	4, 65	1.20	0.32	0.07
ORTO-15	35.02 ± 4.12	35.82 ± 3.60	34.18 ± 3.66	33.08 ± 5.09	35.36 ± 3.86	4, 66	0.83	0.51	0.05
	n (%)	n (%)	n (%)	n (%)	n (%)	df, N	X^2	p	ϕ
EDDS						8, 70	9.42	0.31	0.37
No diagnoses	21 (95.5)	10 (83.3)	8 (80.0)	11(100.0)	14 (93.3)				
Sub BN	0 (0)	2 (16.7)	1 (10.0)	0 (0)	0 (0)				
Full BN	1 (4.5)	0 (0)	1 (10.0)	0 (0)	1 (6.7)				
ED history						8, 63	7.35	0.50	0.34
None	17 (85.0)	6 (54.5)	7 (70.0)	8 (88.9)	9 (69.2)				
Current	1 (5.0)	2 (18.2)	2 (20.0)	0 (0)	3 (23.1)				
Past	2 (10.0)	3 (27.3)	1 (10.0)	1 (11.1)	1 (7.7)				

AFNE: Alternative Food Network Engagement scale with higher scores indicating greater engagement. EDE-Q: Eating Disorder Examination-Questionnaire with higher scores indicated greater eating psychopathology. OBEs: total number of objective bulimic episodes over the past 28 days. ORTO-15: Orthorexia scale with lower scores indicating more orthorexic tendencies. EDDS: Eating Disorder Diagnostic Scale with scores indicating full threshold, sub-threshold, or no eating disorder diagnosis. ED history: self-reported current or past eating disorder history.

3.4. Comparing special diet groups on AFN engagement and disordered eating variables

Given the dearth of research on AFN engagement, disordered eating behaviors, and special diets, we conducted a series of post-hoc analyses to further explore our findings. For these analyses, we aggregated participants who reported following a vegan (n = 5) or raw (n = 6) diet due to similar degrees of restrictiveness as well as the small number of participants who endorsed following these diets; the other special diet categories retained their original groupings. Table 5 presents the results from these exploratory analyses examining differences among special diets on AFN engagement and disordered eating behaviors. There were no significant differences among special diet groups on disordered eating behaviors (EDE-Q, OBEs, ORTO-15, eating disorder history). However, we found significant differences among special diet groups on AFN engagement. To examine these differences, we conducted a Tukey HSD post-hoc analysis, which revealed that those following a vegetarian, pescatarian, or vegan/raw foods diet were significantly more engaged in the AFN than those following a gluten-free diet ($p < 0.01$, $p = 0.02$, and $p = 0.02$, respectively). Furthermore, those who followed special diets that typically excluded meat (vegetarian, pescatarian, and vegan/raw, M = 4.34 ± 0.45) were significantly more engaged in the AFN than those who followed special diets that included meat (paleo and gluten-free, M = 3.88 ± 0.85, $t(69) = 3.01$, $p < 0.01$, $d = 0.68$), revealing a moderately large difference between those who do and do not typically consume meat.

4. Discussion

To our knowledge, this is the first study to explore the relationship between engagement in the emergent alternative food network (AFN), disordered eating behaviors, and special diets. Our results were mixed, as our findings suggest that engagement in the AFN was generally not associated with disordered eating as measured on the EDE-Q but was associated with more orthorexia nervosa (ON) tendencies as measured by the ORTO-15. We also found that those following a special diet (versus no special diet) were significantly more likely to engage in the AFN, particularly those following a vegetarian (versus gluten-free) diet, and to report ON tendencies and a self-reported eating disorder history. In sum, we found a more nuanced relationship between alternative consumption habits and disordered eating behaviors than we anticipated.

Our findings that AFN engagement was largely not associated with disordered eating behaviors (on the EDE-Q) as well as our findings that specific behaviors associated with AFN engagement were associated with *less* disordered eating (on the EDE-Q) contradict the idea that the "food rules" espoused by the AFN prompt the development of restrictive, disordered eating behaviors as well as the notion that individuals already suffering from disordered eating behaviors use the "food rules" put forth by the AFN as convenient categories to regulate and restrict consumption. It appears that both male and female consumers most engaged in the AFN may participate for the purported ecological and social benefits and not for another set of consumption rules with which they can moderate their behavior, weight, and waistlines. However, the strength of the correlations and the magnitude of the effect sizes were small and we cannot draw causal conclusions with our data, so we caution generalizing from these results. Future research should explore motivations behind AFN engagement as well as associations between AFN engagement and disordered eating in a larger sample with a wider range of AFN engagement to address the small and non-significant correlations found in the current dataset.

Despite AFN engagement not being associated with more disordered eating on the EDE-Q, our findings indicate that engagement in the AFN was moderately associated with more ON tendencies as measured by the ORTO-15. Given the poor psychometric properties of the ORTO-15, we tentatively offer the following thoughts about our results. Our findings of high AFN engagement being associated with ON but no other disordered eating behaviors suggest that the ORTO-15 scale may actually measure preoccupation with healthy foods, not disordered eating symptoms. Perhaps when a fixation on consuming healthy food is coupled with a concern for the environment, animal welfare, and the well-being of the humans who produced the food, concepts of "healthy" can encompass more than calorie, fat, and fiber content. Our study suggests that even if highly engaged AFN consumers are "obsessed"

with healthy and pure foods, this preoccupation may not manifest in disordered eating behaviors.

We propose that our findings of higher AFN engagement and more tendencies towards ON among our special diet group suggest that the higher reflexivity in engaged AFN consumers (Goodman & Sage, 2013; Goodman et al. 2012) could be driving special diet participation or that special diet participation could be prompting more focus on the quality of foods consumed. More specifically, those who have made a choice to restrict entire groups of food from their diet (e.g., meat) may reflect more on the quality of the food they do choose to consume. Quality could be assessed in how food has been produced (e.g., believing industrial meat production is bad for the environment). For example, those who followed special diets that excluded meat were significantly more engaged in the AFN compared to those who followed special diets that typically included meat, suggesting that meat-free special dieters may be more motivated to exclude meat for ethical, environmental, and sustainable reasons, while their meat-eating counterparts' restrictions may be driven by personal dietary needs. This finding is consistent with previous research on vegetarianism indicating that environmental and animal welfare concerns are prominent motivating factors for adopting a vegetarian diet (Bardone-Cone et al. 2012; Fox & Ward, 2008).

Consuming food is more complex than ever before: individual acts of consumption are fraught with society's idea of what is "good" and "bad" as foodstuffs are divided into categories derived from locale, ethical, and/or ecological production, constructions of health, and whether or not a certain foodstuff can help a body conform to societal ideals of thinness. Our findings suggest that, in navigating this complexity, consumers may not seek to palliate their anxiety in both AFN engagement *and* restrictive behaviors but seem to choose one or the other. The AFN is associated with an ecological and ethical consciousness that promotes *enjoying* food, not restricting it. We argue that those who are most engaged in the AFN may be more likely to exhibit a cultivated appreciation for the food they eat.

Our study is novel in its preliminary examination of the AFN in relation to disordered eating. Although research on vegetarianism and veganism is becoming more prevalent, other special diets (pescatarian, paleo, raw, and gluten-free) are understudied, and no known research has explored their connections to the AFN and disordered eating. Our research can be useful for identifying potential risk factors for the development of clinically significant eating disorders and for identifying higher risk groups for prevention interventions. Our sample included both men and women, which expands on the majority of studies examining disordered eating and special diets, which typically have only included women (e.g., Bardone-Cone et al. 2012; Hesse-Biber, Leavy, Quinn, & Zoino, 2006). In addition, our sample size was small-to-moderate, which allowed us to draw useful comparisons between groups (special versus no special diet); however, our sample size may have limited our power to find other differences (such as significant correlations between AFNE scale score and EDE-Q variables) and may explain our statistically significant but small correlations. Further, our sample size did not include a large number of individuals reporting a special diet, which may have reduced our ability to find significant differences among special diet groups. Caution should also be taken in generalizing our findings given our small effect sizes.

Caution should also be taken when generalizing to the overall population because of our sample limitations. Specifically, our sample tended to be more highly educated (94.3% reported some college education) and may represent a population more engaged in the AFN (mean of 3.9 ± 0.7 on a 1–5 scale) than the overall U.S. population due to our recruitment methods (targeting undergraduate students and AFN hubs). Our survey did not ask participants to identify their race or ethnicity and, therefore, we were not able to examine differences in AFN engagement across racial and ethnic demographic groups, which also limit the generalizability of our findings.

BMI was self-reported, which can be inaccurate as women tend to under-report weight and men tend to inflate height (Rowland, 1990). However, we were examining correlations (more associated with range) and not specificity of BMI, and there were no significant differences between special diet groups. We also failed to define each special diet for participants, which did not limit our ability to test our second hypothesis because we grouped all special dieters together to compare to those who reported no special diet. However, not defining each diet may have limited our ability to find important differences between special diet groups on disordered eating variables because we cannot be sure of the homogeneity of consumption patterns within special diet groups. Further, we did not assess motivations or duration for following a special diet, future research needs to examine the role of AFN engagement and the pursuit of weight/shape concerns as motivating factors for initiating a special diet.

We employed validated, reliable, and widely used eating disorder scales (the EDE-Q and EDDS), which allowed us to accurately assess disordered eating behaviors in relation to both AFN engagement and special diets. The scale created to assess AFN engagement, the AFNE, was based on existing AFN-related measures and indicated good internal consistency ($\alpha = 0.89$), moderate-to-large item-total correlations (mean $r = 0.63$), and moderately high split-half reliability (Spearman-Brown coefficient $r = 0.79$). We did not administer the Measurement of Ethical Food Choice Motives (Lindeman & Väänänen, 2000) or the Food Choice Questionnaire (Steptoe & Pollard, 1995), so we were not able to determine convergent validity; however, the small-to-moderate sized correlation with the ORTO-15 suggests that the AFNE may be accurately assessing behaviors associated with healthy food consumption, consistent with the AFN. The AFNE demonstrated good discriminant validity with no significant correlations with the EDE-Q global score nor any EDE-Q subscale. Future research should further examine the scale's test-retest reliability, convergent validity, sensitivity and specificity, which was outside the scope of the current study.

Additionally, ON as both a construct and disorder requires further studies to assess its existence and clinical significance. In our study, we assessed ON with the ORTO-15, a scale that has not been validated or retested for use in English-speaking populations, lacks in-depth studies establishing psychometric properties, and had moderately poor internal consistency ($\alpha = 0.47$) in our sample. It is unclear what construct the ORTO-15 is capturing. There is not enough evidence yet on the existence of ON as a distinct eating syndrome to support inclusion in the DSM-5 as an eating disorder, though the original creator of the term more recently defined ON and provided research diagnostic criteria (Dunn & Bratman, 2016). Although our study provides unique insight into ON as it indicates correlation with AFN engagement, the methodological and conceptual problems associated with ON caution us from drawing more conclusions regarding these findings. Future research should continue exploring ON as a construct and eating syndrome, develop scales that more directly assess proposed diagnostic criteria, and continue to examine the relationship between ON, AFN engagement, and special diets.

Future studies would benefit from a larger, more gender-balanced sample size with a greater range of AFN engagement, as well as more individuals adhering to special diets to examine these relationships in more depth. Our study was cross-sectional, so causation and direction between AFN engagement, disordered eating behaviors, and special diets cannot be determined.

Prospective research is needed to elucidate whether AFN engagement dissuades the development of disordered eating behaviors or whether the opposite is true and for whom.

In sum, the current foodscape is complex and constantly changing, from the way food is produced to how it is packaged, marketed, and consumed. Our study provides a preliminary look into the relationship between AFN engagement, disordered eating behaviors, and special diets and suggests that the environmental and social consciousness espoused by the AFN may accompany healthier food relationships in individuals. Our preliminary findings suggest that by encouraging individuals to cultivate a more holistic, broader set of values regarding food and health, it may be possible to divert the development of unhealthy fixations on food. Future research might consider the utility of incorporating values that the AFN promotes, such as environmental awareness and food appreciation, into disordered eating prevention programs.

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