The effect of exposure to food in social networks on food cravings and external eating

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Abstract

Background: Food practices are socially, culturally and historically embedded in everyday life. It is a common notion that people eat due to internal state of physiologic hunger but in fact the drive behind eating behaviors is more complex. People eat, inter alia, because they respond to external cues such as the sight and smell of food, or external eating. Another related concept is food cravings: intense irresistible desires to consume a particular food. Both external eating and food cravings have been associated with impulsivity, eating disorders and obesity. During recent decades the role of the media, and recently of the social media sites (SNS) in our lives has grown significantly, and their influence on culture and society is now extensive. Common activities on SNS are viewing and posting pictures of tempting food, known as 'food porn'. Food porn has been found to correlate with eating patterns and food-related variables. The aim of this study is to conduct a controlled manipulation in order to test for causality. We hypothesized that (1) Viewing appetizing food pictures will result in higher rates of external eating and food cravings than viewing food-neutral pictures; (2) viewing appetizing food pictures will lead participants to order greater amounts and different types of food; (3) The effect of viewing food pictures on external eating, food cravings and food orders will be greater for participants with disordered eating than for other participants.

Method: 165 participants aged 18-35 (141 females and 24 men) responded to online questionnaires. Initially, demographic attributes, SNS food preoccupation and disordered eating (EAT-26) were assessed. Participants were then randomly assigned to view a video clip showing pictures of appetizing foods (experimental group) or neutral pictures of tourist destinations (control group). After viewing the video, participants responded to scales assessing external eating (DEBQ), food cravings (FCQ-S) and were also asked to order food they would like to eat immediately from a hypothetical menu.

Results: Contrary to expectations, appetizing food pictures didn't affect external eating, food cravings, or the type or amount of food ordered from a menu after controlling for disordered eating levels. Additionally, viewing food pictures didn't affect individuals with disordered eating

more than individuals without disordered eating for either of the dependent variables. Despite findings of insignificant causality, results indicated that SNS food preoccupation was significantly associated with disordered eating, food craving and the size of portions ordered from a menu, but not with external eating and type of foods chosen. Also SNS food preoccupation marginally moderated the relationship between the manipulation group and type of food chosen from a menu.

Discussion: Results support previous findings documenting an association between SNS use and SNS food preoccupation and eating patterns (disordered eating, food cravings and food portion size and food portion type selected from the menu). Such results are important because this is one of the first studies to investigate direct causality between these variables. Result of this study suggests that while SNS use is correlated with eating patterns, it does not influence them directly.

Keywords: food porn, food craving, external eating, disordered eating, social networks

Introduction

Food is an integral part of daily life and has profound consequences on our wellbeing. Beyond nutrients consumed, eating attitudes and behaviors contribute to the course and prevention of chronic disease and mental health (Belloc & Breslow, 1972; Nishida, Uauy, Kumanyika, & Shetty, 2004). Because eating attitudes have such profound consequences, it is important to understand which factors influence them and how. A factor that possibly affects eating attitudes is social media use or Social Network Sites (SNS) use. Mass media use and SNS use have been found to be associated in different ways with eating patterns, EDs and related variables (Elfhag & Morey, 2008; Pater, Haimson, Andalibi, & Mynatt, 2016; Santarossa, 2015; Vaterlaus, Patten, Roche, & Young, 2015). The aim of this study is to expand understanding of the relationship between SNS and eating attitudes and to explore whether social media use affects eating patterns.

Eating patterns

Food practices are socially, culturally and historically embedded in daily life and involve far more than mere nutrient intake (Neely, Walton, & Stephens, 2014). It is a common myth that people eat due to an internal state of physiologic hunger alone; what drives our eating behaviors is in fact much more complex and diverse (van Strien, Frijters, Bergers, & Defares, 1986). For example, we sometimes eat because we smell something delicious or see food that is appetizing. This is an example of "external eating", defined as "eating in response to food-related stimuli (such as smell sight or taste), regardless of the internal state of hunger or satiety". The eating behavior of external eaters is guided by external rather than inner cues, arguably because they have lost the ability to recognize and act upon internal hunger cues (van Strien et al., 1986, p. 296).

Researchers have linked external eating to overeating and obesity via various mechanisms. First, researchers suggest that individuals who engage in external eating overeat due to a poor recognition of physical hunger and heightened sensitivity to external food cues (O'Reilly, Cook, Spruijt-Metz, & Black, 2014). Second, external eating was found to be associated

with emotional eating, which involve disregarding internal hunger cues and eating despite their absence (Ouwens, van Strien, & van Leeuwe, 2009; van Strien et al., 1986). This inability to distinguish between emotional arousal and physical hunger leads to overeating in response to emotions (O'Reilly et al., 2014). Third, external eating has been found to be associated with the personality trait of impulsivity and with lack of self-discipline (Elfhag & Morey, 2008; Ouwens et al., 2009). Forth, it has been linked with dysregulated eating behaviors such as binge eating in people of average and above-average weight, with and without eating disorders (EDs) (Elfhag & Morey, 2008; Vervaet, Van Heeringen, & Audenaert, 2004).

Another food-related experience found to be intertwined with impulsive eating behaviors and external eating is cravings (Neely et al., 2014). Food cravings can be defined as "intense and irresistible desires to consume a particular type of food that differs from hunger by their specificity and intensity" (Kahathuduwa, Binks, Martin, & Dawson, 2017, p. 1). The concept of food cravings is distinct from hunger, which is not necessarily a precondition for food craving. Indeed, food cravings can emerge even when hunger is reduced (Chen, Dong, Jackson, Zhuang, & Chen, 2017). Intuitively, food cravings lead to an increase in food consumption. Overweight and obese people experience higher levels of craving for energy-dense foods (Kahathuduwa et al., 2017). Furthermore, food cravings has been found to mediate the association between body mass index (BMI) and addiction-like eating behavior in obese and in people with EDs (Kahathuduwa et al., 2017). Cravings often precipitate and trigger binge-eating episodes in both non-obese and obese individuals (Crowley et al., 2014) and are more frequent in obese women with EDs (binge-eating disorder and night-eating syndrome) than women without EDs. The binge-purge eating patterns characteristics of bulimia have been explained by food cravings, with over 70% of people with this disorder attributing their binge eating to cravings for specific foods, especially sweet foods. However, food craving can occur in individuals of any weight, with and without EDs and the mechanisms underlying their association are yet to be fully understood.

Tough the notion of food cravings may be intuitive, its definition, measurement and underlying mechanisms are complex (Chen et al., 2017; Kahathuduwa et al., 2017). Food craving

may be situational and state-like, or characteristic of a person and therefore trait-like. In addition, food craving is a hypothetical, internal construct and therefore cannot be directly measured (Weingarten & Elston, 1990). Hence, it is usually measured in research via self-report. The amount of food consumed is sometimes used to avoid self-report biases, but consumption measures are based on a circular definition: the level of cravings is measured by the amount of food eaten and that specific amount of food was eaten because it as craved at that level. Weingarten & Elston (1990) suggest that in order to solve food cravings measurement problems it can be operationalized in two ways (self-report and consumption). Combination of both measurement approaches could encompass subjective, internal experience and objective quantification.

Social Media

The role of media in our everyday lives has changed dramatically over recent decades and its influence on cultural and social practices, such as eating habits, is now extensive (McHale, Dotterer, & Kim, 2009). Emerging adults spend more time using the media, in particular social media, than doing any other activity (Coyne, Padilla-Walker, & Howard, 2013). Sixty five percent of all American adults and 90% of young American adults now use social networking sites (SNS) (Perrin, 2015). One of the most common and popular reasons for SNS use is viewing and sharing pictures (Bicen, 2015), including pictures of food. More than 10% of the pictures on SNS are of food (Hu, 2002), pictures of appetizing, tempting foods have been coined "food porn" (or hashtag #Foodporn). Food porn includes photos and videos of tempting food in the media, for example in cookbooks, magazines, television, blogs, websites, and social media platforms like Twitter, Facebook, Instagram, and Pinterest (Rousseau, 2014).

Use of the mass media and SNS, including picture viewing, have been found to be associated in different ways with eating patterns, EDs and related variables (Elfhag & Morey, 2008; Pater et al., 2016; Santarossa, 2015; Vaterlaus et al., 2015). For instance, television viewing time is positively associated with BMI (Spence, Okajima, Cheok, Petit, & Michel, 2016a). It has also been consistently found that exposure to mass media is associated with negative body image and the idealization of thinness (Elfhag & Morey, 2008), which are associated with eating

behaviors aimed at reducing body weight, and with EDs. However, these findings are based on correlational designs that preclude causality (Elfhag & Morey, 2008). Reviews of quantitative laboratory studies (Hausenblas et al., 2013) and of correlational, experimental and longitudinal studies (Ferguson, 2013) found that mass media exposure to cultural beauty ideals had a minimal to small influence on ED symptoms, with most of the effect limited to participants already at high risk for developing an ED. Similar to findings of mass media, finding of SNS indicate that time spent on SNS and problematic SNS use (such as Mood Alteration, Compulsivity and Excessive SNS Use) were found to be associated with higher levels of dieting and frequency of ED patterns such as binge eating and purging and self-esteem among young adults (Santarossa, 2015). Moreover, viewing pictures on SNS was found to be associated with the use of laxatives/diet pills/diuretics to lose/control weight (Santarossa, 2015). It should be noted that the few studies examining direct influence of social media use on body image and disordered eating found no direct influence (Ferguson, Muñoz, Garza, & Galindo, 2014; Perloff, 2014). Yet, the use of SNS seems to influence eating patterns in complex ways (Perloff, 2014), as suggested by the massive presence of pro-ED communities on SNS. In these communities pictures of emaciated people and guidelines on how to develop and maintain ED behaviors are shared to promote EDs (Pater et al., 2016). Posts and YouTube videos with pro-ED content receive more 'likes' and views than health promoting content (Syed-Abdul et al., 2013). Mechanisms underlying the association between SNS use, eating and body image problems are poorly understood and there is a lack of research on a possible direct causal effect (Perloff, 2014).

Underlying mechanisms of the relations between eating patterns and food porn

Several mechanisms have been postulated to account for the correlation between eating patterns and viewing food pictures in the media. Four well-established cognitive theories best describe such mechanisms: Social learning theory, Priming theory, Attention theories and Reward theories (Valkenburg, Peter, & Walther, 2016). The first cognitive theory that strives to explain this association is social learning theory (or social-cognitive theory) (Valkenburg et al., 2016). According to social learning theory, individuals learn from observing others' behavior

about incentives (outcome of an action or reinforcement) and expectancies (expected likelihood that a certain behavior will be reinforced) (Bandura, 1969; Rosenstock, Strecher, & Becker, 1988). Theorists who use social learning theory to explain the relationship between eating patterns and viewing food pictures on the media suggest that what and how much we eat is influenced by culturally and socially expected reinforcements learned via the media (Nestle et al., 2009). For instance, viewing a picture of appetizing food posted on the social media with many likes facilitate the expectation that we will be popular (reinforcement) if we eat this food (potential behavior). The behavior of other people is another important external behavioral cue, and people automatically mimic others' eating behaviors, including food choice and amount, without realizing they are doing so (Harris, Bargh, & Brownell, 2009).

The second well-established cognitive theory that strives to account for the association between food pictures and eating patterns is Priming theory (Valkenburg et al., 2016). Priming theorists suggest that the effect of food content presented via media on eating patterns can occur outside of participants' intention or awareness but has far-reaching potential (Harris et al., 2009). "Priming" refers to the effect of an external stimulus on the way people react to subsequent stimuli. When a concept and its associations are activated, their activation becomes easier (Roskos-Ewoldsen, Roskos-Ewoldsen, & Carpentier, 2002). Media priming research has demonstrated the effect of primes on complex social and physical behaviors; for example, children and adults who viewed food advertisement as a prime consumed afterwards a greater amount of healthy and unhealthy foods (Harris et al., 2009).

Third, cognitive theories of attention describe how attention functions might mediate the way food porn pictures viewing affect eating patterns. These theories suggest that different people might be affected differently by food stimuli due to differences in attention mechanisms functions. Because one of the brain's most important functions is to seek nutritious foods, a largely visual activity (Spence et al., 2015), it is only reasonable that visual food stimuli are allocated more attention and that cognitive mechanisms are heavily affected by the sight of food. Indeed, the visual search for food is mediated by the attentional and reward systems, as well as by

complex cycles of hunger. Attentional function is the behavioral and cognitive process of selectively concentrating on a discrete aspect of information, while ignoring other perceptive information (Spelke, Hirst, & Neisser, 1976). An experimental paradigm widely used in research to measure attention allocation is perceptional bias, a faster response to stimulus receiving more attention. Individuals with an ED (bulimia and anorexia nervosa) showed greater perception bias toward food pictures than restrained eaters (RE), a group at risk for ED but without a clinical diagnosis (Spence, Okajima, Cheok, Petit, & Michel, 2016b). Food words caused greater attention in REs than non REs (during the Stroop task), and this was not altered by a food preload or an appetizer. This suggests that attention allocation in susceptible individuals is unrelated to satiety, and might indicate that dysfunctional cognitions occur before disordered eating behavior begins (Brooks, Prince, Stahl, Campbell, & Treasure, 2011; Spence et al., 2016a).

Reward system is the fourth theoretical concept that might explains possible underlying mechanism of the relationship between food stimuli and eating patterns. The incentive theory proposes that people are pulled toward behaviors that lead to rewards and pushed away from actions that might lead to negative consequences (Bandura, 1977). Reward system activity determines the degree of pleasure a certain individual experience or expect from a specific stimuli (Stoeckel et al., 2008). Individual differences in activity levels of the reward system shape behaviour and cognitive processes and thus might explain why certain individuals are more vonerable to stimuli such as food porn. Individuals with binge eating disorder and bulimia nervosa experience greater reward sensitivity, brain activation, and arousal than controls, after viewing images of pleasant food (Spence et al., 2016a). In addition, neuroimaging studies show that individuals who are overweight may anticipate more reward from food intake, but experience less sensory pleasure from eating (Spence et al., 2016a). Other neuroimaging studies demonstrated that high-fat food images were processed differently, and more rapidly than low-fat food images (Spence et al., 2016a). Also, REs consumed significantly more food than non REs and reported more food-related thoughts in response to food cues. All these findings show that even though

clinical and non-clinical people of all BMIs react to food stimuli, differences between those groups have yet to be fully mapped (Spence et al., 2016a).

The present study

The focus of the present study is the potential consequences of the growing social media. Peoples' vast preoccupation with pictures posted on the social media may influence their food-related pattern, such as external eating and food cravings and subsequently ED symptoms. A possible causal relationship should therefore be examined. The aim of this study is to examine such a causal link by conducting a controlled manipulation. This study aimed to expand our understanding of the consequences of social media use on two specific eating patterns, external eating and food cravings. We hypothesized that (1) Viewing appetizing food pictures will result in higher rates of external eating and food than viewing other, food-neutral pictures; (2) watching appetizing food pictures will lead participants to order greater amounts of different kinds of food cravings; (3) The effect of viewing food pictures on external eating, food cravings and food orders will be greater for participants with disordered eating patterns than for other participants.

Method

Participants

Data was collected from 165 young adults aged 18-35 years (M=25.7, SD=3.91) who completed all questionnaire items including the manipulation check. Females (N=141) accounted for 85% of the sample and males (N=24) accounted for 14.5%. The vast majority of participants (N=153; 92.7%) were recruited via Hebrew-speaking social media sites, mostly via normative Facebook groups focused on regional interests, and giving and swapping second hand possessions. Twelve (7.3%) participants were Behavioral Sciences students at the Ruppin Academic Center who received credit points in exchange for participation. Most participants defined themselves as secular (N=106; 64%), 24 as traditional (14.5%) and 33 as religious (20%). Participants were randomly

assigned to view a video clip showing pictures of appetizing foods (experimental group) or neutral pictures of tourist destinations (control group). Full demographics are provided in table 1.

Design

The experimental design consisted of a video manipulation including two groups. Participants in the experimental group viewed a video presenting a travel story that included many pictures of food and the control participants viewed the same video without the food pictures. Additional independent variables were SNS use, SNS food preoccupation and disordered eating. The dependent variables were eating-related: external eating, food craving and food selection (type and amount).

Measures

Manipulation stimuli.

In order to investigate the effect of food-porn on SNS platform, participants were assigned to either an experimental or control manipulation group. In order to manipulate exposure to food-porn on SNS experimental group was manipulated by watching a video that contained pictures of appetizing foods as well as pictures of neutral content. Participants of the control group watched a similar video that contained only pictures of neutral content. All pictures (of food and neutral content) were obtained from SNS, particularly Facebook, Instagram or Pinterest. All food pictures were obtained from pages or hash-tags dedicated to food porn. Pictures of appetizing foods consisted of three types of foods that were found to be mostly posted and viewed on food porn sites: healthy foods (such as colorful salads), high calorie foods dense with fats and carbohydrates (such as hamburger with french-fries) and sugar dense desserts (such as chocolate cakes) (Chen et al., 2017). The characteristics of the videos were as identical as possible in order to ensure that any differences between the groups are due to viewing the food pictures: both of the videos had the same duration (3:34 minuets) and number of pictures (28); all neutral pictures presented in the experimental video (13) were presented in the control video as well. In order to mimic the environment of social media and to conceal the purpose of the manipulation, the videos

were presented as a 'Vlog' '(A term derived from the combination of the words 'video' and 'blog' and is a form of web television popular on the social platform of YouTube) and were accompanied by an appropriate audio track. Both Vlogs described a girl's trip to London and corresponding neutral content pictures of tourist sites.

Use of social Network Sites.

A measure of social networking site use was used by Santarossa (2015) and translated into Hebrew by Neter (2018). Specifically, it tapped SNS use by asking about the number of SNS membership accounts, frequency of daily use and SNS food-related activities.

SNS membership was assessed by asking participants whether they have an account in Facebook, Instagram WhatsApp and Pinterest. Positive responses were summed so that the scale ranged from 0 to 4. Participants were then asked about ***SNS use***. Specifically, how long they spent daily on each of listed SNS, the number of followers they have on Instagram, the number of users they followed on Instagram and the number of WhattsApp groups they belonged to. Responses to questions asking about the amount of time spent daily on SNS were on a 5-point Likert scale ranging from 0 to 3-5 hours. Other responses required participants a specific number. A total score was calculated by summing Z scores of all items (α = .47, M=0, SD=3.21). ***Social Network Sites food preoccupation*** was tapped by asking about the following eight SNS activities: frequency of posting food pictures on SNS, frequency of encountering food pictures, Instagram or Pinterest, frequency of sending food pictures on WhatsApp, frequency of receiving food pictures, frequency of following chefs, restaurants or brands, frequency of posting pictures of food one prepared, frequency of posting pictures of food one is about to eat, frequency of taking pictures of dishes ordered in a restaurant. An additional item asked about the number of memberships in food-related groups on SNS. Responses to the first eight questions were on a 5-point scale, ranging from 1 ('never') to 5 ('very often') and responses on the last question was on an 8-point scale, ranging from 1 ('0') to 8 ('7 or more'). A total mean score of nine SNS activities was computed (α = .84, M=19.41, SD=5.79).

Eating patterns.

The construct was assessed by disorders eating external eating and food cravings. ***Disordered eating*** was assessed using a Hebrew version of the Eating Attitudes Test 26 (EAT-26) (Koslowsky et al., 1992). The EAT-26 is a measure of symptoms and characteristics of EDs that is widely used as a screen for EDs. It contains three subscales that assess dieting (e.g "I am aware of the calorie content of foods that I eat"), bulimia and food preoccupation (e.g "I find myself preoccupied with food") and oral control (e.g "I avoid eating when I am hungry"). The EAT-26 consists of 26 items scaled on a six point Likert scale ranging from 1 ('never') to 6 ('always'). Each answer was scored so that the three least frequent categories ("never," "rarely," and "sometimes") were given a score of 0, "often" was scored as 1, "usually" was scored as 2, and "always" was given a score of 3. After 25th item was reversed, a mean score was computed (α = .86, M=12.62, SD=9.3).

Food cravings were assessed using the state subscale of the Food Craving Questionnaire (FCQ-S) (Cepeda-Benito, Gleaves, Willams, & Erath, 2000). The FCQ-S consists of 15 self-report items scored on a five point Likert scale that measure five factors: intense desire to eat (e.g. "I have an intense desire to eat [one or more specific foods]"), anticipation for positive reinforcement (e.g. "eating [one or more specific foods] would feel wonderful"), anticipation of relief from negative states (e.g. "If I ate something, I wouldn't feel so sluggish and lethargic"), lack of control over eating (e.g. "If I had [one or more specific foods], I could not stop eating it.") and cravings as physiological sate (e.g. "I am hungry"). The questionnaire was translated into Hebrew for the purpose of this study using a back translation procedure (Su & Parham, 2002). A total mean score of cravings was computed (α = .90, M=40.96, SD=11.06).

External eating was assessed using the Hebrew version of the external eating subscale in the Dutch Eating Behavior Questionnaire (DEBQ) (Samuel & Cohen, 2018). The external eating subscale is a self-report questionnaire that contains 10 statements scored on a five point Likert scale (e.g " If you see others eating, do you also have the desire to eat?"). A total mean score of external eating was computed (α = .82, M=33.41, SD=5.62).

Food selection.

A menu was designed in order to measure a behavioral aspect of the effect of the manipulation on eating patterns, in addition to self-reports. As Weingarten & Elston (1990) have suggested, combining measurements of both self-report and behavior might solve possible measurement problems. Participants were asked to choose from a menu foods they would like to eat immediately. The menu included three sections: starter, main course and dessert. Participants were instructed to order one food from each section. It was found that three types of foods were mostly posted and viewed on food porn sites: healthy foods (such as colorful salads), high calorie foods dense with fats and carbohydrates (such as hamburger with french-fries) and sugar dense desserts. Thus, each section of the menu (starters, main dishes and dessert) contained foods that matched at list two of these categories. Participants' responses were coded in two different variables: the first describing the size of portions they ordered (menu food size) and the second counted the number of healthy food types they chose (menu food type). To compute the menu food size each response was given a score ranging from 1 (small portion) to 3 (big portion) and all scores were summed (M=5.75, SD= 1.44). To compute menu food type each response was given a score ranging from 1 (unhealthy food choice) to 3 (healthy food choice) and all scores were summed (M=5.25, SD= 1.85). Figure 1 displays the menu.

Procedure

After receiving an explanation about the study and providing informed consent online, participants were directed to a link where they responded to online questionnaires. Initially, demographic attributes, SNS food preoccupation and disturbed eating were assessed. Participants were then randomly assigned to view a video clip showing pictures of appetizing foods (experimental group) or neutral pictures of tourist destinations (control group). After viewing the video, participants responded to scales assessing external eating and food cravings, and were also asked to order food they would like to eat immediately from a hypothetical menu. Participants

were given a chance to submit theie name to a 200 shekel price lottery. The study was approved by the Ruppin Academic center IRB.

Statistical analyses

Descriptive statistics were computed to describe the demographic characteristics of participants, as well of the key variables of SNS use, disturbed eating, food cravings, external eating and menu choices (type and amount). The main analysis examined the effect of the video manipulation on external eating, food cravings and type and amount of food ordered, using MANCOVA, and disordered eating was entered as a covariate. All statistical analyses were performed using SPSS 23 (IBM SPSS Statistics, New York, USA).

Results

Descriptive for demographic and key variables were computed and examined in order to characterize the study sample. BMI distribution was compatible to BMI distribution in the general Israeli population (Greenberg, Cwikel, & Mirsky, 2007). Disordered eating rates of the sample were as expected of Israeli population of young adults ranging from 5 to 22 percent (Katz, 2014) since 18.2% (N=30) of the sample had EAT-26 scored exceeding the cut-off point of 19 (Garner, Olmstead, Bohr, & Garfinkel, 1982). Membership on social media sites was high (M=2.82, SD=0.75 on a scale ranging from 0 to 4). The experimental group included 94 participants and the control group 71. No differences were observed between groups in age, gender or levels of disordered eating.

Main effect of the manipulation and disturbed eating on eating patterns and bivariate associations with demographic attributes

A one-way MANCOVA was conducted in order to test the main hypotheses and determine whether or not the type of video participants watched (food \ neutral pictures) affected their external eating, food cravings, size and type of food portions they chose from the menu, while controlling for disordered eating levels. As evident in table 2, there was no significant effect

(F(1,162)=.47, p=.76) of the video type on external eating (F(1,162)=.48, p=.49), food cravings (F(1,162)=.77., p=.38) or type (F(1,162)=.02., p=.89) / size of food portions chosen (F(1,162)=.45., p=.50), after controlling for disordered eating. The covariate, disturbed eating, had significant main effect on external eating (F(162)=11.46, p<.001), food cravings (F(162)=7, p<.01) and type of food selected from a menu (F(162)=6.89, p<.01). Participants with disordered eating had higher level of external eating, food cravings and selected less healthy food types. Disordered eating also had a marginal effect on the size of food portions selected from the menu (F(1,162)=3.02, p<.08), so that participants with high disordered eating levels chose bigger food portions.

Aassociations between SNS use and eating patterns (disordered eating external eating and food cravings) and menu choices (food type and size) were computed. The means, SD and inter-correlations are displayed in Table 3. As evident in table 3, SNS indicators had week to moderate significant positive associations with one another (r=0.24 to r=0.50). Eating patterns (external eating, food cravings and disordered eating) also showed weak to moderate significant positive associations with one another (r=0.20 to r=0.55). There was no significant association between the size and type of food participants ordered from the menu, but menu selections variables generally correlated with eating patterns: the size of the portions ordered positively correlated with external eating and cravings but not with disordered eating. Also the type of food seleected correlated weakly and negatively with disordered eating and correlated weakly and positively with external eating and cravings. SNS food preoccupation was weakly and positively associated with disordered eating, food craving and size of portions ordered from the menu, but SNS preoccupation was not significantly associated with external eating and type of foods selected.

Interaction between the manipulation and disordered eating

To test the hypothesis that the effect of manipulation was greater for individuals with high levels of disordered eating, a moderation analysis was conducted separately for each of the dependent variables. In order to check whether disordered eating moderated the relationship between the manipulation and each of the dependent variables (external eating, food cravings, size of portions ordered and type of food ordered from the menu) a hierarchical multiple regression

analysis was conducted separately for each of the dependent variables. After centring disordered eating group, the group–by-disordered eating interaction term was computed and the hierarchical regression was conducted in two steps. In the first step, the effects of group and disturbed eating were entered and in the second step the interaction was added to the regression model. Full results are displayed in table 4 indicating that these variables accounted for a significant amount of variance in external eating (R^2=.068, F(3,161)=3.89, p=.01) and food cravings (R^2=.046, F(3,161)=2.60, p=.05), for a marginal amount of variance in type of food ordered (R^2=.043, F(3,161)=2.43, p=.07) and for insignificant variance of portion size of food ordered (R^2=.035, F(3,161)=1.95, p=.12). The interaction step was insignificant for external eating, food cravings, portion size and type of food ordered. Thus, the hypothesis that disordered eating moderates the relationship between the manipulation and external eating, food cravings menu size or menu type was rejected.

Post-hoc analysis

In order to better understand the association and relationship between the key variables, several moderation models were examined. To test the possibility that SNS food preoccupation moderated the relationship between the manipulation and each of the dependent variables (external eating, food cravings, portion size and type of food ordered from a menu), a hierarchical multiple regression analysis was conducted separately for each of the dependent variables. After centring SNS food preoccupation and manipulation group and computing the group–by-SNS food preoccupation interaction term the hierarchical regression was conducted in two steps. In the first step, group and SNS food preoccupation were included and in the second step the interaction was added to the regression model. Full results are displayed in table 4. Result indicated that these variables accounted for a significant amount of variance in food cravings (R^2=.092, F(3,161)=5.43, p=.001) and for insignificant amount of variance in external eating (R^2=.028, F(3,161)=1.57, p=.2), portion size (R^2=.033, F(3,161)=1.83, p=.14) and type of food ordered from the menu (R^2=.028, F(3,161)=1.55, p=.2). The interaction step was insignificant for external eating, food cravings or portion size ordered from the menu. Therefore, SNS food preoccupation didn't moderate the

relationship between manipulation group and external eating, food cravings or portion size. Still, a marginally significance interaction for type of food ordered was found. Thus, the hypothesis that SNS food preoccupation moderated the relationship between the manipulation group and type of food chosen from a menu was supported. Johnson-Neyman output is displayed in table 6 and interaction is displayed in figure 2. Examination of Johnson-Neyman output and interaction plot indicates that the marginal moderation effect derives solely from high levels of SNS preoccupation (Z scores higher than 1). Specifically, that viewing food pictures didn't affect participants with low to moderate levels of SNS food preoccupation to select different food types, but marginally affected participants with high levels of SNS food preoccupation to select less healthy food types compared to participants who viewed neutral pictures.

Discussion

The aim of this study was to investigate whether food porn influences eating patterns. More specifically, it was hypothesized that exposure to appetizing food pictures on SNS would increase levels of food cravings and external eating and affect the type and amount of food ordered from a menu. It was also assumed that these effects would be greater for individuals with disordered eating than for individuals without disordered eating. Contrary to expectations, appetizing food pictures did not affect external eating, food cravings, or the type or amount of food ordered from a menu. Additionally, viewing food pictures did not affect individuals with disordered eating more than other individuals for either of the dependent variables. In other words, disordered eating did not moderate the relationship between viewing pictures of appetizing food and external eating, food craving or the amount or type of foods individuals chose from a menu.

Nevertheless, results indicated that SNS food preoccupation was significantly associated with disordered eating, food craving and the size of portions ordered from a menu, but not with external eating and type of foods chosen. Disordered eating had a significant bivariate association with external eating, food cravings and type of food chosen from the menu so that participants with high disordered eating levels had high level of external eating, food cravings and chose less

healthy food types. Disordered eating also had marginal effect on size of food selected from the menu so that participants with high disordered eating levels chose bigger food portions. There was no association between the size and the type of food participants ordered from the menu, but menu choices correlated with most of eating patterns: the size of food ordered correlated with external eating and cravings but not with disordered eating. Also the type of food correlated weakly with all eating patterns at.

Further investigation of the relationship between key variables showed that SNS food preoccupation marginally moderated the relationship between viewing food pictures and the type of foods chosen from a menu. More specifically, that watching food pictures didn't affect participants with low to moderate levels of SNS food preoccupation to choose different food types, but marginally affected participants with high levels of SNS food preoccupation to choose less healthy food types.

The results replicate and extend previous findings documenting the association between SNS use and eating patterns. Previous studies found that watching pictures on SNS was associated with use of laxatives/diet pills/diuretics to lose/control weight (Santarossa, 2015). Also, Neter (2018) found that SNS food preoccupation was associated with external eating and food cravings (trait). The association found in this study between situational food cravings and SNS food preoccupation corroborates these findings and adds knowledge about situational cravings. Conversely, the present findings of no significant association between external eating and SNS food preoccupation are inconsistent with Neter's (2018). This discrepancy may indicate that the association with external eating is not stable across samples and needs further corroboration.

Previous findings on the association between eating patterns and other aspects of SNS use, such as SNS membership have yielded contradicting conclusions (Harris, Starcevic, Ma, Zhang, & Aboujaoude, 2017; Santarossa, 2015). Some previous findings suggest that frequency of online use is not associated with pathology (Harris et al., 2017). Other incongruent findings suggest an association between time spent on SNS and high levels of dieting and frequency of ED behaviors such as binge eating purging and use of laxatives (Santarossa, 2015). Results of the present work of

a significant association between SNS use, disordered eating and food cravings, are consistent with previous findings suggesting that online use is indeed associated with disorder-like eating patterns.

Finding of this study implicate that while SNS preoccupation is correlated with eating patterns, it does not influence them directly; it is consistent with and expand previous finding regarding mass media exposure. Previous research on the mass media has repeatedly documented an association between mass media exposure and eating patterns and related variables, but little to no causal effect of mass media exposure on eating patterns and related variables (Ferguson, 2013; Hausenblas et al., 2013). In other words, in the case of mass media correlation does not imply causation because findings suggest that mass media exposure does not directly influence eating patterns even though eating patterns level fluctuate according to exposure to mass media. Similar to findings of mass media, finding of SNS indicate that time spent on SNS, viewing pictures on SNS and problematic SNS use (such as Mood Alteration, Compulsivity and Excessive SNS Use) were found to be associated with higher levels of dieting and frequency of ED patterns (Santarossa, 2015). But the few studies examining causal influence of social media use on body image and disordered eating found no direct influence (Ferguson et al., 2014; Perloff, 2014). Result of this study support previous research on SNS suggesting that while SNS use is correlated with eating patterns, it does not influence them directly, as in the case of traditional media. In other words, findings of the present work suggest that the relationship between eating patterns and mass media resemble the relationship between eating patterns and SNS.

There could be several explanations to why SNS use correlates with eating patterns, even though it does not influence them directly (Ferguson et al., 2014; Perloff, 2014; Santarossa, 2015). First explanation might be that the associated between SNS use or food preoccupation on SNS and eating patterns isn't meaningful. In other words, just because the two variables (SNS use and eating patterns) seem to fluctuate in tandem, that doesn't prove they are meaningfully related to one another, as suggested by finding of this study ruling causality. The association might be caused, for example, by a third variable that has meaningful relationship with eating patterns and

also has separate meaningful relationship with SNS use. A second explanation might be that contrary to the explanation that SNS food preoccupation influence eating patterns, that prior eating patterns influence SNS food preoccupation. For example, perhaps individuals with higher levels of disordered eating patterns are influenced by their patterns to be more preoccupied with food on SNS. This explanation is consistent with the massive presence of pro-ED communities on SNS. These communities inter-alia promote EDs and food porn (Lavis, 2017; Pater et al., 2016). Results of the present study document an association between disordered eating and SNS use as well as association between food preoccupation and disordered eating, as measured prior to any manipulation. That means that disordered eating levels were associated with SNS use and SNS food occupation even before food porn was manipulated. These findings support both of the suggested explanations, but can't determine one explanation as superior to the other.

Finding of this study suggest that SNS food preoccupation marginally moderated the effect of viewing food pictures on the type of food selected from a menu. More specifically, that watching food pictures didn't affect participants with low to moderate levels of SNS food preoccupation to select different food types, but marginally affected participants with high levels of SNS food preoccupation to select less healthy food types from the menu. Most research has suggested that viewing food porn has a negative effect in health, BMI and eating patterns (Santarossa, 2015). This finding of the present work suggest that this might be true for some individuals but not for others. Individual attributes, such as food occupation on SNS, might alter the effect of viewing food porn. Previous research indicate several constructs believed to influence the effects of food porn such as psychological characteristics, an ED diagnosis and the ability to imagine the multisensory experience of eating the food viewed (Brooks et al., 2011; Petit, D Cheok, & Oullier, 2016). Our findings add SNS food preoccupation to these constructs and suggest it plays a key role.

This study has several strengths. First and foremost, this in one of the first studies that conducted an experimental design in order to check for causality on top of association between SNS use and eating patterns. Second, results of this study add important information to previous

studies describing the characteristics of the continually growing SNS use. Most important addition comes from results that suggest eating patterns have similar relationship with SNS to the relationship with mass media. Third, the experimental design of this study mimics real-world exposure to food porn by introducing the food porn manipulation to participants as a 'Vlog', a common SNS phenomenon.

This study also has several limitations. First, participants were recruited by convenience sampling using social networks, which may have resulted in sample bias of higher SNS use rates compared to rates of the general population. Indeed, SNS membership rates were high in the study sample (with average of 2.82 on a scale ranging from 0 to 4). Second, the sample size was small which may have resulted in overlooking effect existing in the general population. Third, the translation of the food craving questionnaire has not yet been validated. Forth, food porn manipulation was designed to emulate food porn on SNS but was presented in an experimental environment obvious as separate from SNS to participants. Even though it's highly likely that the manipulation inflicted effects similar to actual food porn on SNS, the manipulation differed from real-world SNS use in several ways. Participants were exposed to food pictures during the manipulation video for only three minutes, short exposure time compared to real-life SNS use. Also, participants were exposed to the manipulation video only a single time, whereas real-life SNS use is more likely to expose people to food porn repeatedly and maybe even daily. These differences may have resulted in a small effect of food porn on eating patterns that misrepresented real-world effect. Another possibility is that watching the manipulation video was passive while SNS use consists of both passive (e.g. watching posts other users post) and active (e.g. writing comment, posting pictures, actively searching) interactions (Alloway & Alloway, 2012). There is a possibility that passive exposure to food porn influence eating patterns differently than active exposure. Fifth, self report tools were used to measure mental constructs such as external eating and food cravings, which may have misrepresented unconscious cognitive effects or were subjects to self-report bias.

Future studies should address and remedy these limitations and further investigate characteristics associated with food porn in several ways. As this study is one of the first studies to investigate the complex relationship of eating patterns and SNS use, future studies should further test for causality in order to determine whether this relationship resembles the relationship between eating patterns and mass media. These studies could manipulate food porn by prolonged exposure to food pictures, perhaps trough several days. These studies could also manipulate food porn in both active and passive aspects of SNS use, in order to better mimic real-world SNS use. Hopefully such manipulations could create a more substantial effect of food porn on eating patterns if such one exists. Alternatively, as suggested by Branley & Covey (2017), a longitudinal study could be used to track actual social media use and behavior over long time periods (Cox & Cox, 1998).

Other studies could explore the possibilities that food porn does not affect eating patterns, but that prior individual eating patterns effects preoccupation with food on SNS and cause people to look for more food porn. These studies could employ a manipulated design testing for the effect of individual eating patterns level on SNS food preoccupation. For example by manipulating participants' situational food cravings and checking how much they are occupied with food on SNS or how much food porn they choose to consume. In addition, future studies could investigate postulated underlying mechanisms such as social learning and reward system activities. This could be achieved by neuroimaging (Spence et al., 2016b) and by assessing variables such as interpersonal qualities associated with social learning and EDs (Nestle et al., 2009). Another possible mechanism might be imaginative tendencies (the process of imagining the multidimensional experience of eating) previously found as a mediator of food porn affects (Lavis, 2017; Petit et al., 2016).

This study highlights the importance of conducting such future studies by pointing out the discrepancies between the association and causality between SNS use and eating patterns. The study is one of the first studies to addresses the need of understanding the continually growing use of SNS in the context of eating patterns.

References

Alloway, T. P., & Alloway, R. G. (2012). The impact of engagement with social networking sites (SNSs) on cognitive skills. *Computers in Human Behavior*. https://doi.org/10.1016/j.chb.2012.04.015

Bandura, A. (1969). Social-Learning Theory Of Identificatory Processes. *Handbook of Socialization Theory and Research*. https://doi.org/10.1080/19371918.2011.591629

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*. https://doi.org/10.1037/0033-295x.84.2.191

Belloc, N. B., & Breslow, L. (1972). Relationship of physical health status and health practices. *Preventive Medicine*, *1*(3), 409–421. https://doi.org/10.1016/0091-7435(72)90014-X

Bicen, H. (2015). Determination of University Students' Reasons Ofusing Social Networking Sites in their Daily Life. *Procedia - Social and Behavioral Sciences*, *190*(November 2014), 519–522. https://doi.org/10.1016/j.sbspro.2015.05.036

Brooks, S., Prince, A., Stahl, D., Campbell, I. C., & Treasure, J. (2011). A systematic review and meta-analysis of cognitive bias to food stimuli in people with disordered eating behaviour. *Clinical Psychology Review*. https://doi.org/10.1016/j.cpr.2010.09.006

Cepeda-Benito, Gleaves, D. H., Willams, T. L., & Erath, S. A. (2000). The Development and Validation of the State and Trait Food-Cravings Questionnaires. *Behavior Therapy*, *31*(November 1998), 151–173. https://doi.org/10.1016/S0005-7894(00)80009-X

Chen, S., Dong, D., Jackson, T., Zhuang, Q., & Chen, H. (2017). Trait-based food-cravings are encoded by regional homogeneity in the parahippocampal gyrus. *Appetite*, *114*, 155–160. https://doi.org/10.1016/j.appet.2017.03.033

Cox, A. D., & Cox, D. (1998). Beyond "peer pressure": A theoretical framework for understanding the varieties of social influence in adolescent risk behavior. *Social Marketing Quarterly*, *4*(4), 43–47. https://doi.org/10.1080/15245004.1998.9961017

Coyne, S. M., Padilla-Walker, L. M., & Howard, E. (2013). Emerging in a Digital World: A Decade Review of Media Use, Effects, and Gratifications in Emerging Adulthood. *Emerging Adulthood*, *1*(2), 125–137. https://doi.org/10.1177/2167696813479782

Crowley, N., Madan, A., Wedin, S., Correll, J. A., Delustro, L. M., Borckardt, J. J., & Karl Byrne, T. (2014). Food cravings among bariatric surgery candidates. *Eating and Weight Disorders*, *19*(3), 371–376. https://doi.org/10.1007/s40519-013-0095-y

Elfhag, K., & Morey, L. C. (2008). Personality traits and eating behavior in the obese: Poor self-control in emotional and external eating but personality assets in restrained eating. *Eating Behaviors*, *9*(3), 285–293. https://doi.org/10.1016/j.eatbeh.2007.10.003

Ferguson, C. J. (2013). In the eye of the beholder: Thin-ideal media affects some, but not most, viewers in a meta-analytic review of body dissatisfaction in women and men. *Psychology of Popular Media Culture*, *2*(1), 20–37. https://doi.org/10.1037/a0030766

Ferguson, C. J., Muñoz, M. E., Garza, A., & Galindo, M. (2014). Concurrent and Prospective Analyses of Peer, Television and Social Media Influences on Body Dissatisfaction, Eating

Disorder Symptoms and Life Satisfaction in Adolescent Girls. *Journal of Youth and Adolescence*, *43*(1), 1–14. https://doi.org/10.1007/s10964-012-9898-9

Garner, D. M., Olmstead, M. P., Bohr, Y., & Garfinkel, P. . (1982). The eating attitudes test: Psychometric features and clinical correlates. *Psychological Medicine*, *12*(1980), 871–878. https://doi.org/10.1017/S0033291700049163

Greenberg, L., Cwikel, J., & Mirsky, J. (2007). Cultural correlates of eating attitudes: A comparison between native-born and immigrant university students in Israel. *International Journal of Eating Disorders*. https://doi.org/10.1002/eat.20313

Harris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming effects of television food advertising on eating behavior. *Health Psychology : Official Journal of the Division of Health Psychology, AmericHarris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming Effects of Television Food Advertising on Eating Behavior. Health Psychology : Official Journal of the Division*, *28*(4), 404–413. https://doi.org/10.1037/a0014399

Harris, K. M., Starcevic, V., Ma, J., Zhang, W., & Aboujaoude, E. (2017). Suicidality, psychopathology, and the internet: Online time vs. online behaviors. *Psychiatry Research*, *255*(June), 341–346. https://doi.org/10.1016/j.psychres.2017.06.012

Hausenblas, H. A., Campbell, A., Menzel, J. E., Doughty, J., Levine, M., & Thompson, J. K. (2013). Media effects of experimental presentation of the ideal physique on eating disorder symptoms: A meta-analysis of laboratory studies. *Clinical Psychology Review*. https://doi.org/10.1016/j.cpr.2012.10.011

Hu, F. B. (2002). Dietary pattern analysis: a new direction in nutritional epidemiology. *Current Opinion in Lipidology*, *13*(1), 3–9. https://doi.org/10.1097/00041433-200202000-00002

Kahathuduwa, C. N., Binks, M., Martin, C. K., & Dawson, J. A. (2017). Extended calorie restriction suppresses overall and specific food cravings: A systematic review and a meta-analysis. *Obesity Reviews*. https://doi.org/10.1111/obr.12566

Katz, B. (2014). Gender and disordered eating of adolescents in Israel. *Israel Journal of Psychiatry and Related Sciences*.

Koslowsky, M., Scheinberg, Z., Bleich, A., Mark, M., Apter, A., Danon, Y., & Solomon, Z. (1992). The Factor Structure and Criterion Validity of the Short Form of the Eating Attitudes Test. *Journal of Personality Assessment*. https://doi.org/10.1207/s15327752jpa5801_3

Lavis, A. (2017). Food porn, pro-anorexia and the viscerality of virtual affect: Exploring eating in cyberspace. *Geoforum*. https://doi.org/10.1016/j.geoforum.2015.05.014

McHale, S. M., Dotterer, A., & Kim, J.-Y. (2009). An Ecological Perspective on the Media and Youth Development. *The American Behavioral Scientist*, *52*(8), 1186–1203. https://doi.org/10.1177/0002764209331541

Neely, E., Walton, M., & Stephens, C. (2014). Young people's food practices and social relationships. A thematic synthesis. *Appetite*, *82*, 50–60. https://doi.org/10.1016/j.appet.2014.07.005

Nestle, M., Wing, R., Birch, L., DiSogra, L., Drewnowski, A., Middleton, S., … Economos, C. (2009). Behavioral and Social Influences on Food Choice. *Nutrition Reviews*, *56*(5), 50–64. https://doi.org/10.1111/j.1753-4887.1998.tb01732.x

Nishida, C., Uauy, R., Kumanyika, S., & Shetty, P. (2004). The joint WHO/FAO expert consultation on diet, nutrition and the prevention of chronic diseases: process, product and policy implications. *Public Health Nutrition*, *7*(1A), 245–250. https://doi.org/10.1079/PHN2003592

O'Reilly, G. A., Cook, L., Spruijt-Metz, D., & Black, D. S. (2014). Mindfulness-based interventions for obesity-related eating behaviours: A literature review. *Obesity Reviews*. https://doi.org/10.1111/obr.12156

Ouwens, M. A., van Strien, T., & van Leeuwe, J. F. J. (2009). Possible pathways between depression, emotional and external eating. A structural equation model. *Appetite*, *53*(2), 245–248. https://doi.org/10.1016/j.appet.2009.06.001

Pater, J., Haimson, O., Andalibi, N., & Mynatt, E. D. (2016). "Hunger Hurts but Starving Works:" Characterzing the Presentation of Eating Disorders Online. *Proceedings of the 2016 Computer Supported Cooperative Work Conference*, (Accepted/In process). https://doi.org/10.1145/2818048.2820030

Perloff, R. M. (2014). Social Media Effects on Young Women???s Body Image Concerns: Theoretical Perspectives and an Agenda for Research. *Sex Roles*, *71*(11–12), 363–377. https://doi.org/10.1007/s11199-014-0384-6

Perrin, A. (2015). 65% of Adults Now Use Social Networking Sites – a Nearly Tenfold Jump in the Past Decade. *Pew Research Center*, (October), 2005–2015. https://doi.org/202.419.4372

Petit, O., D Cheok, A., & Oullier, O. (2016). Can Food Porn Make Us Slim? How Brains of Consumers React to Food in Digital Environments. *Integrative Food, Nutrition and Metabolism*, *3*(1), 251–255. https://doi.org/10.15761/IFNM.1000138

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly*, *15*(2), 175–183. https://doi.org/10.1177/109019818801500203

Roskos-Ewoldsen, D., Roskos-Ewoldsen, B., & Carpentier, F. R. D. (2002). *Media Priming: A Synthesis*. *Lawrence Erlbaum Associates Publishers*.

Samuel, L., & Cohen, M. (2018). Expressive suppression and emotional eating in older and younger adults: An exploratory study. *Archives of Gerontology and Geriatrics*. https://doi.org/10.1016/j.archger.2018.06.012

Santarossa, S. (2015). # Socialmedia : Exploring the Associations of Social Networking Sites and Body Image , Self-Esteem , Disordered Eating and / or Eating Disorders and the Impact of a Media Literacy Intervention, 195.

Spelke, E., Hirst, W., & Neisser, U. (1976). Skills of divided attention. *Cognition*. https://doi.org/10.1016/0010-0277(76)90018-4

Spence, C., Okajima, K., Cheok, A. D., Petit, O., & Michel, C. (2016a). Eating with our eyes: From visual hunger to digital satiation. *Brain and Cognition*, *110*, 53–63. https://doi.org/10.1016/j.bandc.2015.08.006

Spence, C., Okajima, K., Cheok, A. D., Petit, O., & Michel, C. (2016b). Eating with our eyes: From visual hunger to digital satiation. *Brain and Cognition*, *110*, 53–63. https://doi.org/10.1016/j.bandc.2015.08.006

Stoeckel, L. E., Weller, R. E., Cook, E. W., Twieg, D. B., Knowlton, R. C., & Cox, J. E. (2008). Widespread reward-system activation in obese women in response to pictures of high-calorie foods. *NeuroImage*. https://doi.org/10.1016/j.neuroimage.2008.02.031

Su, C. T., & Parham, L. D. (2002). Generating a valid questionnaire translation for cross-cultural use. *American Journal of Occupational Therapy*, *56*(5), 581–585. https://doi.org/10.5014/ajot.56.5.581

Syed-Abdul, S., Fernandez-Luque, L., Jian, W. S., Li, Y. C., Crain, S., Hsu, M. H., … Liou, D. M. (2013). Misleading health-related information promoted through video-based social media: Anorexia on youtube. *Journal of Medical Internet Research*. https://doi.org/10.2196/jmir.2237

Valkenburg, P. M., Peter, J., & Walther, J. B. (2016). Media Effects: Theory and Research. In *ANNUAL REVIEW OF PSYCHOLOGY, VOL 67* (Vol. 67, pp. 315–338). https://doi.org/10.1146/annurev-psych-122414-033608

van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders*, *5*(2), 295–315. https://doi.org/10.1002/1098-108X(198602)5:2<295::AID-EAT2260050209>3.0.CO;2-T

Vaterlaus, J. M., Patten, E. V., Roche, C., & Young, J. A. (2015). Gettinghealthy: The perceived influence of social media on young adult health behaviors. *Computers in Human Behavior*, *45*, 151–157. https://doi.org/10.1016/j.chb.2014.12.013

Vervaet, M., Van Heeringen, C., & Audenaert, K. (2004). Personality-Related Characteristics in Restricting Versus Binging and Purging Eating Disordered Patients. *Comprehensive Psychiatry*, *45*(1), 37–43. https://doi.org/10.1016/j.comppsych.2003.09.008

Weingarten, H. P., & Elston, D. (1990). The phenomenology of food cravings. *Appetite*, *15*(3), 231–246. https://doi.org/10.1016/0195-6663(90)90023-2

Table 1

Descriptive information of sample characteristics (N=165)

Variable	N(%) / Mean (SD)
Age in years	
Range ; Interquartile range	18-35; 23-28
Mean (SD)	25.7 (3.91)
Median	25
Gender, N (%)	
Female	140 (84.8)
Male	24 (14.5)
Else	1 (.6%)
Religious identification, N (%)	
Religious	33 (20)
Traditional	24 (14.5)
Secular	106 (64.2)
BMI	
Variable	N(%) / Mean (SD)
Range ; Interquartile range	16.85-44.62 ; 20.32-24.61
Mean (SD)	23.11 (3.32)
Median	22.20

Table 2

Descriptive statistics and Multivariate Analysis of Covariance (MANCOVA) of the effect of the manipulation group (watching food / neutral pictures) on each dependent variable (external eating, food cravings, food portion size and food type selected form the menu)

Measure		Food group n=71	Control group n=94	F(1,162)	
External eating	M	33.62	33.24	.48	p=.49
	SD	6.20	5.16		
Food cravings	M	41.62	40.46	.77	p=.38
	SD	11.10	11.07		
Food size from menu	M	5.65	5.83	.45	p=.5
	SD	1.28	1.56		
Food type from menu	M	6.66	6.56	.02	p=.89
	SD	1.75	1.98		

Note: *p< .05; ** p< 0.01; *** p<0.001

Table 3

Descriptive and inter-correlations between SNSs use and eating patterns (N=179)

		1	2	3	4	5	6	7	8	9
1.	SNS membership	--								
2.	SNS use	.28***	--							
3.	SNS food preoccupation	.24**	.50***	--						
4.	Disordered eating	-.04	.25**	.25**	--					
5.	External eating	-.04	.11	.15	.25**	--				
6.	Food cravings	.00	.21**	.28***	.20*	.55***	--			
7.	Food size from menu	.06	.02	.17*	.14	.26**	.32***	--		
8.	Food type from menu	-.12	.04	-.08	-.20**	.17*	.16*	.08	--	
9.	BMI	-.10	.00	.10	.22**	-.05	.14	.27**	.03	--
	Mean	2.82	0	19.41	12.62	33.41	40.96	5.75	5.25	23.11
	SD	.75	3.2	5.79	9.3	5.62	11.06	1.44	1.85	22.20
	A	--	--	.84	.86	.9	.82	--	--	--

Note: *p< .05; ** p< 0.01; *** p<0.001

Table 4

Hierarchical multiple regression testing for moderation effect of disordered eating on the relationship between manipulation group (watching food / neutral pictures) and each dependent variables (external eating, food cravings, food portion size and food type selected form the menu)

Predictor		External eating		Food cravings		Menu size		Menu type	
		ΔR^2	B	ΔR^2	β	ΔR^2	B	ΔR^2	B
Step 1		.068**		.046*		.035		.043†	
	Group		-.994		-2.98		-.31		.188
	DE		.101		.041		-.042		-.010
Step 2		.001		.002		.013		.002	
	Group								
	DE								
	DE*Group		.032		.12		.04		-.018

Note. DE=Disordered Eating, N=164, †p<0.1. *p<.05. **p<.01. ***p<.001

Table 5

Hierarchical multiple regression testing for moderation effect of SNS food preoccupation level on the relationship between the manipulation group (watching food / neutral pictures) and each dependent variable (external eating, food cravings, food portion size and food type selected form the menu)

	External eating		Food cravings		Menu size		Menu type	
Predictor	ΔR^2	B	ΔR^2	B	ΔR^2	β	ΔR^2	β
Step 1	.028		.092***		.033		.028	
Group		-2.458		-6.359		.129		1.739†
SNSFP		.362		1.114**		.037		1.20
Step 2	.005		.01		.000		.021†	
Group								
SNSFP								
SNSFP*Group		-1.43		-.377		.003		-.095†

Note. SNSFP=SNS food preoccupation, n=164, †p<0.1. *p<.05. **p<.01. ***p<.001

Table 6

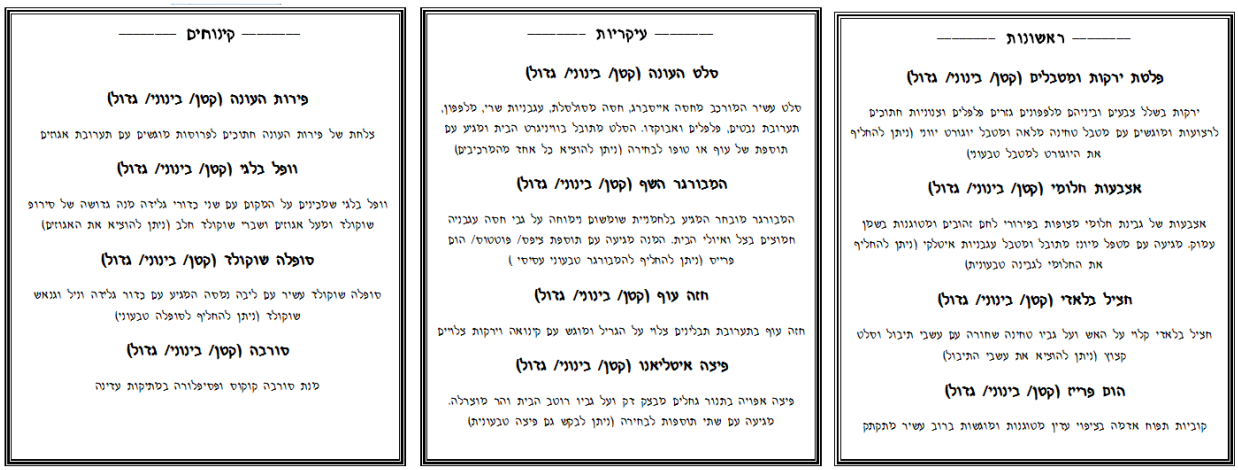
Johnson-Neyman output interpreting the how SNS food preoccupation moderated the relationship between manipulation group (watching food / neutral pictures) and healthiness of the type of food selected from the menu

SNSFP	Effect	se	T	P
9.6000	.8277	.5767	1.4353	.1531
11.2000	.6757	.5089	1.3278	.1861
12.8000	.5237	.4454	1.1758	.2414
14.4000	.3717	.3884	.9571	.3399
16.0000	.2198	.3411	.6443	.5203
17.6000	.0678	.3080	.2200	.8261
19.2000	-.0842	.2939	-.2866	.7748
20.8000	-.2362	.3016	-.7832	.4346
22.4000	-.3882	.3295	-1.1783	.2404
24.0000	-.5402	.3731	-1.4480	.1496
25.6000	-.6922	.4276	-1.6188	.1074
27.2000	-.8442	.4894	-1.7250	.0865 †
28.8000	-.9962	.5561	-1.7915	.0751 †
30.4000	-1.1482	.6261	-1.8340	.0685 †
32.0000	-1.3002	.6984	-1.8617	.0645 †
33.6000	-1.4522	.7723	-1.8802	.0619 †
35.2000	-1.6041	.8475	-1.8927	.0602 †
36.8000	-1.7561	.9237	-1.9013	.0591 †
38.4000	-1.9081	1.0005	-1.9072	.0583 †
40.0000	-2.0601	1.0779	-1.9112	.0578 †

Note. SNSFP= SNS food preoccupation, †p<0.1. *p<.05. **p<.01. ***p<.001

Figure 1

Menu presented to participants in order to measure food type and amount they would have liked to eat immediately



ראשונות

פלטת ירקות ומטבלים (קטן/ בינוני/ גדול)

ירקות בשלל צבעים וביניהם מלפפונים גזרים פלפלים וצנוניות חתוכים לרצועות ומוגשים עם מטבל טחינה מלאה ומטבל יוגורט יווני (ניתן להחליף את היוגורט למטבל טבעוני)

אצבעות חלומי (קטן/ בינוני/ גדול)

אצבעות של גבינת חלומי מצופות בפירורי לחם זהובים ומטוגנות בשמן עמוק. מגיעה עם מטפל מיוחד מתובל ומטבל עגבניות איטלקי (ניתן להחליף את החלומי לגבינה טבעונית)

חציל בלאדי (קטן/ בינוני/ גדול)

חציל בלאדי קלוי על האש ועל גביו טחינה שחורה עם עשבי תיבול ושלט קצוץ (ניתן להפיצא את עשבי התיבול)

הום פריז (קטן/ בינוני/ גדול)

קוביות תפוח אדמה בציפוי עדין מטוגנות ומוגשות ברוב עשיר מתקתק

עיקריות

סלט העונה (קטן/ בינוני/ גדול)

סלט עשיר המורכב מחסה אייסברג, חסה מסולסלת, עגבניות שרי, מלפפון, תערובת נבטים, פלפלים ואבוקדו. הסלט מתובל בוריניגרט הבית ומגיע עם תוספת של עוף או טופו לבחירה (ניתן להוציא כל אחד מהמרכיבים)

המבורגר השף (קטן/ בינוני/ גדול)

המבורגר מובחר המגיע בלחמניית שומשום מיוחה על גבי חסה עגבניה חמוצים בצל ואיולי הבית. המנה מגיעה עם תוספת צ'יפס/ פוטטוס/ הום פרייס (ניתן להחליף להמבורגר טבעוני עסיסי)

חזה עוף (קטן/ בינוני/ גדול)

חזה עוף בתערובת תבלינים צלוי על הגריל ומוגש עם קינואה וירקות צלויים

פיצה איטליאנו (קטן/ בינוני/ גדול)

פיצה אפויה בתנור גחלים מבצק דק ועל גביו רוטב הבית והר מוצרלה. מגיעה עם שתי תוספות לבחירה (ניתן לבקש גם פיצה טבעונית)

קינוחים

פירות העונה (קטן/ בינוני/ גדול)

צלחת של פירות העונה חתוכים לפרוסות מוגשים עם תערובת אגוזים

וופל בלגי (קטן/ בינוני/ גדול)

וופל בלגי שמכינים על המקום עם שני כדורי גלידה מנה גדושה של סירופ שוקולד ומעל אגוזים ושברי שוקולד חלב (ניתן להוציא את האגוזים)

סופלה שוקולד (קטן/ בינוני/ גדול)

סופלה שוקולד עשיר עם ליבה נמסה המגיע עם כדור גלידה וניל וגנאש שוקולד (ניתן להחליף לסופלה טבעוני)

סורבה (קטן/ בינוני/ גדול)

מנת סורבה קוקוס ופסיפלורה במתיקות עדינה

Figure 2

SNS food preoccupation level moderate the effect of manipulation group (watching food / neutral pictures) on the healthiness of food types chosen from menu