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Title:
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Date:
2017-06-01

Citation:
Pila, E., Mond, J. M., Griffiths, S., Mitchison, D. & Murray, S. B. (2017). A thematic content analysis of #cheatmeal images on social media: Characterizing an emerging dietary trend. International Journal of Eating Disorders, 50 (6), pp.698-706. https://doi.org/10.1002/eat.22671.

A thematic content analysis of #cheatmeal images on social media: Characterizing an emerging dietary trend

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Abstract: 176 words

Manuscript: 4,358 words

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This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version record. Please cite this article as doi:10.1002/eat.22671.

Abstract

Objective: Despite the pervasive social endorsement of "cheat meals" within pro-muscularity online communities, there is an absence of empirical work examining this dietary phenomenon. The present study aimed to characterize cheat meals, and explore the meaning ascribed to engagement in this practice. **Method:** Thematic content analysis was employed to code the photographic and textual elements of a sample (n = 600) that was extracted from over 1.6 million images marked with the #cheatmeal tag on the social networking site, Instagram. **Results:** Analysis of the volume and type of food revealed the presence of very large quantities (54.5%) of calorie-dense foods (71.3%) that was rated to qualify as an objective binge episode. Photographic content of people commonly portrayed highly-muscular bodies (60.7%) in the act of intentional body exposure (40.0%). Meanwhile, textual content exemplified the idealization of overconsumption, a strict commitment to fitness, and a reward-based framework around diet and fitness. **Discussion:** Collectively, these findings position cheat meals as goal-oriented dietary practices in the pursuit of physique-ideals, thus underscoring the potential clinical repercussions of this socially-endorsed dietary phenomenon.

Keywords: cheat meal; binge eating; eating disorders; content analysis; social media; muscle dysmorphia

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The utilization and influence of online social networking in the last decade has given rise to the capacity for individuals to discover and share content with like-minded communities around the globe (1). Of the emerging trends on social media, health-related content on diet and fitness has garnered widespread popularity (2,3). Recognition of this rising trend has prompted a new wave of empirical research to explore both the content of health-related social media commentary, and the correlates of exposure and engagement in this content. For example, researchers have identified that social media use is associated with body and weight dissatisfaction, internalization of body ideals (4), depressive symptoms (5), and disordered eating (6). Notably, pro-eating disorder (7,8), and more recently pro-muscularity social communities (9) have emerged through social media platforms. These social communities, and their rapid proliferation, create an easily-accessible and potentially disturbing platform that endorses and supports disordered health behaviors.

With respect to pro-eating disorder platforms, a growing body of evidence has begun to depict the nature of these sites (10–12). Qualitative studies of pro-eating disorder online content have identified recurring themes, particularly in reference to anorexia nervosa, which is positioned as a lifestyle choice in the pursuit of control and bodily perfection (13). These pro-anorexia online platforms typically serve to promote a community of support and solidarity, and recommend highly dangerous “tips and tricks” to conceal disordered behaviors and evade clinician detection (13,14). Not surprisingly, the consequences of viewing this content are significant. In a meta-analysis of outcomes associated with exposure to pro-eating disorder content in community samples predominantly consisting of women, Rodgers and colleagues (15)

reported that even brief exposure was linked with increased body image concerns, negative affect, lower self-esteem, and compensatory behaviors (i.e., desires to exercise for weight loss (16); and reduced caloric intake (17)).

Perhaps alarmingly, these pro-eating disorder trends have extended beyond small communities sharing advice (14), to a pervasive and widespread proliferation of 'healthy living' content that perpetuates dysfunctional eating attitudes and behaviors (18), in addition to popular 'thinspiration' and 'fitspiration' trends targeted toward women (19,20). 'Thinspiration' content is characterized by portrayals of ultra-thin bodies and explicit encouragement of restrictive eating (7,8), while 'fitspiration' content portrays messages of healthful eating and exercise through a framework of empowerment and strength (3). Yet despite being positioned as a body-positive alternative to 'thinspiration' content, 'fitspiration' content similarly promotes the endorsement of very narrow body ideals, and places a central focus on appearance and physique-objectification (21). Alongside these thin-centric online trends, recent evidence also points towards the emergence of a pro-muscularity online community, predominantly targeted to and comprised of men, which idealizes a highly muscular body type and espouses an array of exercise and dietary practices in the pursuit of this end (9). In keeping with the pro-thinness and -fitness trend, pro-muscularity content is characterized by rigid dietary and exercise practices in pursuit of the purported ideal body (9), which cumulatively render exposed individuals to higher risk of disordered eating (3). However, despite substantial conceptual overlap with pro-thinness and -fitness content, the nature of this muscularity-oriented web content is markedly distinct and warrants further examination.

Of particular interest, in an examination of pro-muscularity web content, Murray and colleagues reported that regular and planned engagement in 'cheat meals' was frequently

encouraged in the service of attaining a muscular ideal, predominantly among males (9). Cheat meals were characterized by "the consumption of an objectively large amount of food in a short amount of time, the loss or "letting go" of control, and subsequent attempts to compensate via restrictive dietary practices" (pg. 19). In addition, cheat meals were often framed as a goal-oriented strategy to attain a metabolic advantage of ensuring that dietary fat is utilized as a primary energy source, thereby limiting body adiposity (9). Due to the purposeful and goal-directed dietary patterns to achieve a specific physique, it is likely that the cheat meal phenomenon may overlap with eating disorder pathology. In particular, cheat meals are similar in nature to objective binge episodes, a behavior central to the psychopathology of binge eating disorder and bulimia nervosa (22). But unlike binge episodes, cheat meals may be fundamentally unique in their nature as strategically pursued and egosyntonic behaviors in the pursuit of muscularity. The current dearth of scientific research on cheat meals precludes an understanding of the characteristics of this dietary phenomenon, and the intersections with eating pathology. And notwithstanding the identification of cheat meals in pro-muscularity platforms (9), and the high endorsement of this phenomenon within the fitness community (i.e., *Lean Body Program,* www.bodybuilding.com), there has been very minimal reference to cheat meals in current research (e.g., 21,22). Additionally, no data to date has examined the gender distribution of those engaging in cheat meals, which may be an important gap in the literature when considering the potential overlap between fitspiration-related online content and engagement in muscularity-oriented endeavors, and the increasingly prevalent muscularity-oriented concerns reported by women (25). Further, with a recent meta-analysis noting that the effects of social networking, and photo-based social networking in particular, are equally profound in impacting body image concerns in both men and women (26), gender-related data related to cheat meals is important to

consider.

The aim of the present study was to characterize the cheat meal phenomenon, ascertain what constitutes a cheat meal, and explore the connotations ascribed to engagement in cheat meals. Given the potential disconnect between the absence of empirical evidence relating to cheat meals, and the pervasive reference to cheat meals throughout social media and pro-muscularity-related online postings, direct content analysis of social media content may be instructive. Historically, online content analyses of disordered eating trends have offered much clinical utility in alerting clinicians to the nature of emerging disordered eating behaviors, and the social landscape that may serve to normalize them (14). And with recent evidence suggesting that the photo-sharing component of social networking is most relevant for predicting psychopathology (6), it is imperative that content analyses of potentially disordered eating trends include both visual/photographic and textual content. As a photo-sharing social networking site, Instagram has been identified as an important platform for exploring health and fitness-related content (e.g., 19,23). As such, this exploratory study will advance existing research on physique-focused trends to characterize the visual and textual content associated with Instagram images categorized with the #cheatmeal tag. Specific a priori objectives included documenting the type and amount of food present, assessing the presence of diet- and exercise-related attitudes and behaviours, and exploring potential gender differences around cheat meal practices.

Methodology

Content selection. Content was selected from the user-generated photographic submissions on Instagram. Users can categorize uploaded images with identifying tags or labels (i.e., hashtags), for the purpose of sharing content with like-minded communities. First, a freely available social media analytics service (www.talkwalker.com) was used to determine the

number of publically-shared images marked with the #cheatmeal tag, and general metrics for user engagement. Second, a search was conducted on www.instagram.com on two non-consecutive days in October, 2016, to capture both weekday and weekend content marked with the #cheatmeal tag. Images were extracted and systematically examined. Consistent with past methodologies (e.g., 3,19) and predictions for thematic saturation, 600 images were selected for analysis (i.e., the first 300 images that appeared on the selected weekday, and the first 300 images on the selected weekend day). All photographic content and associated textual content by the original poster (i.e., photo captions/descriptions) were included in the analysis. Textual comments by others in response to the photo were excluded, and all additional hashtags were excluded. Content was excluded if the main purpose was product advertisement (n = 34), or if content was a photo meme (n = 12), or a duplicate image (or "repost") within the selected sample (n = 2). For images that met inclusion criteria, but included textual content in a non-English language, the visual content of the image was included for coding.

Coding procedures. Due to the absence of empirical literature relating to this dieting phenomenon, no a priori coding themes were developed and a general inductive approach was employed to identify frequently occurring themes and categories (28). Consistent with past social media content analyses relating to eating disorder content, an emergent coding structure was utilized (9,14). Utilizing this methodology, a preliminary set of frequently occurring categories is identified and then applied to the full raw data, and reworked as necessary. In the first step, the coding team (EP; female doctoral candidate; SBM; male clinical psychologist) collectively reviewed 120 images (i.e., 20% of the total sample). In a collaborative and iterative process, the two coders identified frequently occurring features and themes and created a consolidated coding strategy. The coding strategy delineated specific coding parameters and examples to ensure

consistency between raters (see Figure 1 for overview; Table 1 for defined parameters). In the second step, the researchers used the pre-determined coding strategy to independently code the preliminary sample of 120 images, revealing excellent inter-rater agreement (kappa = .978 to .984 across themes). In instances of disagreement, consensus was reached through discussion. Once reliability was established, the third step consisted of one member of the coding team (EP) independently applying the coding strategy to the remaining 80% of the data, according to the coding framework established in the first step. The fourth and final step consisted of the second member of the coding team (SBM) independently reviewing a random sample of the coded data (*N*=300 images, 50% of the dataset) in indexing adequate inter-rater reliability for the remaining coded content (kappa = .981). Finally, in additional steps to explore the content, food volume was estimated using mainstream services for caloric estimation (i.e., myfitnesspal.com), and chi-square analyses were undertaken to explore differences in prevalence for (i) food type and volume, (ii) body type and action, (iii) gender and action, and (iv) gender and body type.

Results

On the first day of data extraction, there were 1,627,379 images with the #cheatmeal tag on Instagram. Web analytic tools revealed over 4.5 thousand images posted predominantly by men (59.7%), 312.4 thousand users engaged (assessed by sum of 'likes' and 'comments'), and 26.1 million users reached (assessed by number of author followers) within the days of data extraction. Of the sample selected for coding, the most frequently occurring theme related to graphic images of food (82.0%), followed by images containing people (15.5%), and images comprising of quotes or textual content (3.8%). Results are summarized in Tables 1. Notably, just over half of the images (54.5%) displayed volumes of food that were independently deemed, by both members of the coding team, to represent a volume of food consistent with an objective

binge episode. Caloric estimations ranged from 214 (e.g., slice of camembert cheese and tablespoon of jam) to 9120 (e.g., two dozen donuts). The remaining images contained either a normative volume of food that qualified as an appropriate meal to be consumed in one sitting by a single individual (14.3%) or a restricted volume of food (13.2%) that would not serve either nutritional or caloric requirements for a meal serving. In terms of food type, the considerable majority of food images (71.3%) portrayed foods that were calorically dense, high in fat, and low in nutritional quality. Common examples included hamburgers, fries, pizza, and ice cream. The subsequently most common type of food images consisted of food varied in their range of macronutrient and nutritional content (17.1%), followed by the remaining minority (11.6%) which consisted of high-protein meals, single type macronutrients, and alcoholic beverages.

Notably, there was a significant association between volume and type of food, whereby large volumes of food were more likely to be calorie-dense, χ^2 (1, N = 493) = 94.48, p < .001, and not classified as high in protein, χ^2 (1, N = 493) = 9.04, p = .003, varied, χ^2 (1, N = 493) = 60.62, p < .001, or single items, χ^2 (1, N = 493) = 7.64, p = .009. Meanwhile, restrained volumes were less likely to be coded as calorie-dense, χ^2 (1, N = 493) = 62.87, p < .001, high in protein, χ^2 (1, N = 493) = 5.36, p = .025, varied, χ^2 (1, N = 493) = 19.55, p < .001, single type, χ^2 (1, N = 493) = 62.87, p < .001, or alcohol-only, χ^2 (1, N = 493) = 7.26, p = .03. Normative volumes are less likely to be coded as varied, χ^2 (1, N = 493) = 26.63, p < .001.

Images of individuals had a relatively evenly distributed presentation of men (53.8%) and women (46.2%), which roughly coincides with the submission rates of all posts (i.e., 59.7% men; 40.3% women). The highest proportion of images featuring an individual consisted of "body selfies" or intentional exposure of the body and/or its parts (40.0%), followed by individuals in the act of eating (30.5%), and individuals in the act of exercising (15.8%). Body exposure and

exercising images were highly physique-salient, whereby individuals depicted in the images had flexed muscles and wore revealing attire. Exercise type almost exclusively consisted of weight lifting. Meanwhile, 13.9% of images of individuals displayed the act of taking a "selfie", with images being captured as headshots and thereby omitting the physique-salient element observed in the preceding theme. In terms of the body type of those portrayed in images, the majority of individuals in the images displayed a highly muscular physique with well-defined and developed musculature (60.7%), followed by individuals with normative body types (23.8%), and individuals with noticeably slender bodies (15.5%).

An examination of frequencies revealed a significant association between body type and action, whereby content of individuals with normative bodies were more likely to be pictured in the act of eating, χ^2 (1, N = 98) = 30.64, p < .001, rather than exercising, χ^2 (1, N = 98) = 4.54, p = .02, or engaging in body selfies or exposure, χ^2 (1, N = 98) = 12.08, p < .001. However, content depicting muscular bodies was more likely to feature engagement in body selfies or body exposure, χ^2 (1, N = 98) = 25.74, p < .001, rather than exercising, χ^2 (1, N = 98) = 5.55, p = .02, or eating, χ^2 (1, N = 98) = 5.09, p = .02. Although slender bodies were likely to be presented in an objectifying manner (i.e., cropped photo of legs), the association was not significant (p = .32). Content depicting selfies was most likely to feature women, χ^2 (1, N = 98) = 6.65, p = .02, but no other significant associations between gender and action emerged (p = .06 to .53). Content depicting normative bodies was more likely to feature both genders, but this association was only significant for females, χ^2 (1, N = 98) = 4.55, p = .03, and not males (p = .13). Meanwhile, content depicting muscular bodies was more likely to feature males, χ^2 (1, N = 98) = 19.72, p < .001, and less likely to feature females, although the association for females was not significant

(p = .12). Content with slender bodies was less likely to include males, χ^2 (1, N = 98) = 11.26, p < .001, and more likely to include females, χ^2 (1, N = 98) = 10.10, p = .002.

The small proportion of images that included written or textual content (n = 23) was related to normalizing the large quantity of food and supporting overindulgence (43.5%), or endorsing a strong commitment to exercise and fitness (34.8%). Additional content was characterized by an inspirational and explicit emphasis towards endorsing a 'no pain no gain' mentality, and the glorification of restraint and willpower to commit to rigid dietary and fitness practices (21.7%).

Across all typologies of image, the vast majority (n = 496; 82.6%) included textual commentary that fit into one or more of the coding categories (see Table 2 for textual content). Similar to emerging themes in the photographic content, textual content endorsed dietary restriction (11.1%) and staunch commitment to an exercise regimen (8.1%). Specifically, within these two aforementioned themes, the process of planning cheat meals was often presented as a goal-directed behaviour designed to impact metabolic adaptation. An example statement included: "*cheat meals on days I'm working on muscles been great for spiking the metabolism and growing the muscles*." Cheat meals were also defended as integral strategy to maintain psychological health within a typically restricted lifestyle: "*sometimes you just have to have a refeed meal and enjoy it, all about the balance. I miss bread during cutting so it's nice to work it in every now and then and keep things sustainable*".

Notably, textual content consistently exemplified the idealization of excessive food and endorsement of overconsumption (30.4%), with common phrases used to describe the food: "*feast*", "*heaven*", "*obsessed may be an understatement*", and "*I don't want to look back one day and think 'I could have eaten that"*". Of particular interest, within this theme, there was a

reoccurring representation of loss of control when consuming cheat meals. For example, in an image displaying 10 jars of nut butters, the poster noted "*I can't control myself around these bad boys on prep, I need to hide them*", while another image displaying remaining slices of a pizza noted "*oops I did it again*". Similarly, in a photo displaying an assortment of restaurant dishes, the poster noted "*I was going to be good with the main meal, then it was to be good with the main meal and have dessert, then it was go all out*".

Other textual themes consisted of instructional content (10.9%) aimed to provide strategies for dietary and fitness success, and motivational content (5.8%) meant to inspire others to conform to the collective social framework that supports cheat meal practices. Content ranged from cheat meal recipes to inspirational messages, for example, "*we all have the power to be knowledgeable and the ability to make better and wiser choices when it comes to your health*." Reward-based cognitions and behaviors (4.4%) were also observed in a reciprocal association with diet and exercise, whereby cheat meals were used as a reward for strict dietary and fitness practices, and to replenish energy depleted during exercise, as described by the following poster in description of an image depicting 8 McDonalds burgers and poutine: "*cheatmeal for me and sister. F***ing hard chest and arm day*". Other less common themes encompassed a minimization of health risk and normalizing problematic behaviours (3.6%), and presenting the dual and contrasting hedonic needs to indulge in palatable calorie-dense foods and also mitigate impacts on body shape and size (1.8%). The remaining descriptors (53.0%) consisted of neutral or descriptive, or non-English content.

Discussion

Despite pervasive and widespread dissemination through online social networking platform, and brief indications in research studies (i.e., 20–22,25), there has been an absence of

empirical work to examine the concept of cheat meals. The present study is the first to illustrate the prevalence of this emerging dietary phenomenon and advance an understanding of both the characteristics of cheat meals, alongside the goal-directed connotations attached to engagement in this dietary practice. Primarily, the present study provides novel insights into the high endorsement of this dietary trend, and secondarily, attests that cheat meals comprise of large volumes and high calories. Further, these findings point towards a broader social context in which cheat meals are embedded, related to the pursuit of the muscular ideal, which may both normalize and ascribe goal-oriented attributes to cheat meals.

In analyzing the caloric volume of images linked to the #cheatmeal tag, a significant majority were deemed to be of a volume which would constitute an objective binge episode, based on standards outlined in the Diagnostic and Statistical Manual of Mental Disorders (22) and past empirical conceptualizations of a single binge episode consisting of at least 1,000 calories (30). In fact, the uppermost caloric volume was estimated to be as high as 9,000 calories. Perhaps more notably, the resemblance between cheat meals and binge episodes was illustrated by textual content that displayed a pattern of loss of control during cheat meal consumption. This is consistent with empirical studies suggesting that objective binge episodes are characterised not only by the amount of food consumed, but chiefly by the perceptions of loss of control (31–33).

Further, the vast majority of images that were deemed to be of objective binge episode volume were comprised of highly calorie-dense foods, which is consistent with existing literature relating to binge episodes in eating disorders (34). Importantly, many images of foods constituting large amounts of calorie dense foods were accompanied by commentary relating to (i) the normalization of overindulging during cheat meals, (ii) strict adherence to exercise regimens outside of cheat meals, and (iii) immediate compensation via adherence to dietary

restraint beyond cheat meals. The notion of engaging in calorically dense binge episodes, which must be followed by either strict compensatory exercise or dietary restraint, bears semblance to the symptomatic behaviors displayed in presentations of bulimia nervosa, where binge episodes are immediately met with compensation designed to offset the impact of the binge episode (22). Alternatively, for some individuals, the consumption of cheat meals might act as an acute compensatory response to exercise, and perhaps associated with exercise-induced changes in the hedonic response to food (35). Crucially, with robust empirical evidence suggesting that dietary restraint may also promote engagement in binge episodes in bulimia nervosa (31), little evidence has explored how muscularity-oriented dietary restraint may precipitate potential engagement in cheat meals. Considering the potential underlying pathology of cheat meal engagement, the normalization and explicit endorsement of cheat meals in the fitness industry presents an overlooked clinical dilemma. Engagement in cheat meals in this study may also be interpreted within the compensatory health beliefs model (36), whereby an individual believes that the effects of an unhealthy behaviour (e.g., a highly caloric cheat meal) can be neutralised by engaging in subsequent healthy behaviour (e.g., weight training).

In addition to presentations of food, common images with the #cheatmeal tag consisted of objectified muscular bodies, often in the act of weight lifting – suggesting that these dietary behaviors may be associated with a broader pursuit of muscularity. Findings from a recent content analysis of pro-muscularity websites (9) revealed that sporadic engagement in large and calorically-dense cheat meals was thought to be effective in ensuring that one's metabolism continues to burn adipose tissue throughout prolonged periods of dietary restraint, augmenting the definition and visibility of one's muscularity. The body-related content depicted in the #cheatmeal tag is also highly pertinent to recent discussions around muscularity-oriented

disorder eating– in that it provides evidence for the direct association between the pursuit of muscularity and specific rule-driven and goal-oriented dietary practices (9,37). Despite the finding that depictions of male bodies were more likely to be muscular, the notable proportion of cheat meal content posted by women, at 40.3%, may reflect an increasing propensity for women to engage in health practices for muscularity-oriented reasons, and not necessarily for the pursuit of thinness per se (25).

Cumulatively, the potential disconnect between planned engagement in cheat meals in the service of pursuing greater muscularity, and a potential loss of control during cheat meals, requires further elucidation. For instance, little is known as to whether cheat meals are planned or spontaneous, or both, and whether this distinction drives a different array of disordered eating psychopathology. Our findings suggest that users frequently portrayed cheat meals as operative "rewards" that served to reinforce long periods of dietary restraint and willful commitment to rigid fitness practices. As such, these permissive thoughts in regards to how cheat meals can serve in the pursuit of the muscular ideal may serve to mitigate the affective distress experienced during excessive and uncontrolled meal consumption, which would delineate these episodes from the binge/compensatory behaviors seen in typical conceptualizations of disordered eating (31). Indeed, empirical evidence has illustrated a dietary restraint model of binge episodes (38,39). However, future research ought to index the affective, cognitive, behavioural, and psychopathological correlates of engaging in cheat meals, as related to both spontaneous and planned occurrences, in addition to investigating how cheat meals are implicated in the broader pursuit of muscularity.

Due to the potentially pathological nature of cheat meals, the prevailing endorsement of this goal-directed dietary practice on online social networks has important clinical implications.

Our findings that engagement in cheat meals is encouraged, provided that they are "earned" and compensated for, and may even be considered goal-oriented in the pursuit of muscularity reflect underlying pathology in this practice, thus raising significant concerns. These findings also serve to alert clinicians to online engagement as a maintenance behavior (14), primarily clinicians working with muscularity-oriented presentations of eating disorders, due to the relative uncertainty and debate around these phenotypes (40). Further, clinicians should also specifically assess for cheat meal engagement in clients presenting with muscularity concerns, which given the egosyntonic nature of this behavior, may be minimized or denied. Due to the current scant empirical work on cheat meals, researchers are urged to further examine the experiences and associated psychological predictors and outcomes of cheat meal engagement, and potential markers of pathological versus non-pathological engagement in cheat meals.

The present findings should be interpreted in light of the following limitations. First, due to the fluid and rapidly changing nature of online social media content, the sample of selected images represents a single snapshot, which poses inherent challenges to replication efforts. Further, the content presented on Instagram is not necessarily representative of all social networking or web platforms, thereby urging future research to examine the characteristics and frequency of cheat meal content present on other popular web platforms. In addition, the present study design was intended to characterize the content with the #cheatmeal tag, without real world context or inferences, and therefore has no way of verifying that the food depicted in the image was consumed by a single individual, in a single siting. Further, content on cheat meals without the use of the #cheatmeal tag clearly exists, and was not examined in this study. Lastly, the current study design delimits an understanding of sociodemographic and psychological characteristics of individuals who post cheat meal-related content. Future research, in addition to

improving upon these limitations, may explore potential gender differences in the types of cheat meals individuals consume, and whether this relates to the nature of cravings. For instance, past research has found that men crave savory (e.g., sausage rolls) whilst women crave sweet (e.g., chocolate) foods (41), although this has not been consistently replicated (42).

Nevertheless, as the first study to identify the problematic nature of cheat meals, the present findings set the groundwork for further scientific inquiry to delineate the psychological correlates associated with this dietary practice. And due to the rising trend of online social networking, these findings highlight the need to identify factors that may be associated with exposure to cheat meal content, and engagement in cheat meal practices. Further examination of this dietary phenomenon is integral to a comprehensive clinical understanding of potentially problematic health behavior trends that are driven by physique-ideals.

References

1. Kietzmann JH, Hermkens K, McCarthy IP, Silvestre BS. Social media? Get serious! Understanding the functional building blocks of social media. Bus Horiz. 2011;54(3):241–51.
2. Fox S, Duggan M. Health online 2013. Health (Irvine Calif). 2013;1–55.
3. Boepple L, Thompson JK. A content analytic comparison of fitspiration and thinspiration websites. Int J Eat Disord. 2016;49(1):98–101.
4. Tiggemann M, Miller J. The internet and adolescent girls' weight satisfaction and drive for thinness. Sex Roles. 2010;63(1):79–90.
5. Lup K, Trub L, Rosenthal L. Instagram #Instasad?: Exploring Associations Among Instagram Use, Depressive Symptoms, Negative Social Comparison, and Strangers Followed. Cyberpsychology, Behav Soc Netw. 2015;18(5):247–52.
6. Mabe AG, Forney KJ, Keel PK. Do you "like" my photo? Facebook use maintains eating disorder risk. Int J Eat Disord. 2014;47(5):516–23.
7. Borzekowski DLG, Schenk S, Wilson JL, Peebles R. E-Ana and e-Mia: A content analysis of pro-eating disorder web sites. Am J Public Health. 2010;100(8):1526–34.
8. Rimal RN, Lapinski MK. Why health communication is important in public health. Bulletin of the World Health Organization. 2009;87(4):247.
9. Murray SB, Griffiths S, Hazery L, Shen T, Wooldridge T, Mond JM. Go big or go home: A thematic content analysis of pro-muscularity websites. Body Image. 2016;16:17–20.
10. Brotsky SR, Giles D. Inside the "pro-ana" community: a covert online participant observation. Eat Disord. 2007;15(April):93–109.
11. Fox N, Ward K, O'Rourke A. Pro-anorexia, weight-loss drugs and the internet: An "anti-recovery" explanatory model of anorexia. Sociol Heal Illn. 2005;27(7):944–71.

2. Tierney S. The dangers and draw of online communication: pro-anorexia websites and their implications for users, practitioners, and researchers. Eat Disord. 2007;14(3):181–90.
3. Norris ML, Boydell KM, Pinhas L, Katzman DK. Ana and the Internet: A review of pro-anorexia websites. Vol. 39, International Journal of Eating Disorders. 2006. p. 443–7.
4. Harshbarger JL, Ahlers-Schmidt CR, Mayans L, Mayans D, Hawkins JH. Pro-anorexia websites: What a clinician should know. Int J Eat Disord. 2009;42(4):367–70.
5. Rodgers RF, Lowy AS, Halperin DM, Franko DL. A Meta-Analysis Examining the Influence of Pro-Eating Disorder Websites on Body Image and Eating Pathology. Vol. 24, European Eating Disorders Review. 2016. p. 3–8.
6. Bardone-Cone AM, Cass KM. What does viewing a pro-anorexia website do? An experimental examination of website exposure and moderating effects. Int J Eat Disord. 2007;40(6):537–48.
7. Jett S, La Porte DJ, Wanchisn J. Impact of exposure to pro-eating disorder websites on eating behaviour in college women. Eur Eat Disord Rev. 2010;18(5):410–6.
8. Boepple L, Thompson JK. A content analysis of healthy living blogs: Evidence of content thematically consistent with dysfunctional eating attitudes and behaviors. Int J Eat Disord. 2014;47(4):362–7.
9. Ghaznavi J, Taylor LD. Bones, body parts, and sex appeal: An analysis of #thinspiration images on popular social media. Body Image. 2015;14:54–61.
0. Lewis SP, Arbuthnott AE. Searching for thinspiration: the nature of internet searches for pro-eating disorder websites. Cyberpsychology, Behav Soc Netw. 2012;15(4):200–4.
1. Tiggemann M, Zaccardo M. “Exercise to be fit, not skinny”: The effect of fitspiration imagery on women’s body image. Body Image. 2015;15:61–7.

2. Diagnostic and Statistical Manual of Mental Disorders (DSM-5®) - American Psychiatric Association - Google Books. 2013.
3. McCartney M. Margaret McCartney: Clean eating and the cult of healthism. BMJ. 2016;354:i4095.
4. Theiss JA, Carpenter AM, Leustek J. Partner Facilitation and Partner Interference in Individuals' Weight Loss Goals. Qual Health Res. 2015;
5. McCreary DR, Saucier DM. Drive for muscularity, body comparison, and social physique anxiety in men and women. Body Image. 2009;6(1):24–30.
6. Holland G, Tiggemann M. A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. Body Image. 2016;17:100–10.
7. Lewallen J, Behm-Morawitz E. Pinterest or Thinterest?: Social comparison and body image on social media. Soc Media + Soc. 2016;2(1):Social media have become increasingly popular mech.
8. Thomas DR. A General Inductive Approach for Analyzing Qualitative Evaluation Data. Am J Eval. 2006;27(2):237–46.
9. Robinson SL, Lambeth-Mansell A, Gillibrand G, Smith-Ryan A, Bannock L. A nutrition and conditioning intervention for natural bodybuilding contest preparation: case study. J Int Soc Sports Nutr. 2015;12:20.
0. Raymond NC, Neumeyer B, Warren CS, Lee SS, Peterson CB. Energy intake patterns in obese women with binge eating disorder. Obes Res. 2003;11(7):869–79.
1. Cooper PJ, Fairburn CG. Binge-eating and self-induced vomiting in the community. A preliminary study. Br J Psychiatry. 1983;142(2):139–44.

2. Latner JD, Clyne C. The diagnostic validity of the criteria for binge eating disorder. Int J Eat Disord. 2008;41(1):1–14.
3. Wolfe BE, Baker CW, Smith AT, Kelly-Weeder S. Validity and utility of the current definition of binge eating. Walsh BT, editor. Int J Eat Disord. 2009 Dec;42(8):674–86.
4. Allison S, Timmerman GM. Anatomy of a binge: Food environment and characteristics of nonpurge binge episodes. Eat Behav. 2007;8(1):31–8.
5. Finlayson G, Bryant E, Blundell JE, King NA. Acute compensatory eating following exercise is associated with implicit hedonic wanting for food. Physiol Behav. 97:62–7.
6. Rabiau M, Knäuper B, Miquelon P. The eternal quest for optimal balance between maximizing pleasure and minimizing harm: The compensatory health beliefs model.
7. Murray SB, Rieger E, Hildebrandt T, Karlov L, Russell J, Boon E, et al. A comparison of eating, exercise, shape, and weight related symptomatology in males with muscle dysmorphia and anorexia nervosa. Body Image. 2012;9(2):193–200.
8. Freeman LMY, Gil KM. Daily stress, coping, and dietary restraint in binge eating. Int J Eat Disord. 2004 Sep;36(2):204–12.
9. Haedt-Matt AA, Keel PK. Revisiting the affect regulation model of binge eating: A meta-analysis of studies using ecological momentary assessment. Psychol Bull. 2011;137(4):660–81.
0. Murray SB, Touyz SW. Muscle dysmorphia: towards a diagnostic consensus. Aust N Z J Psychiatry. 2013 Mar;47(3):206–7.
1. Wansink B, Cheney MM, Chan N. Exploring comfort food preferences across age and gender. Physiol Behav. 2003;79(4):739–47.
2. Hallam J, Boswell RG, DeVito EE, Kober H. Gender-related Differences in Food Craving

and Obesity. Yale J Biol Med. 2016 Jun;89(2):161–73.

Table 1

Description of coding strategy and summary of photographic content.

Content		Description	Example(s)	*n* (%)	κ
Food	Volume of food present	(i)Objective binge (i.e., collective volume of food present in photo would qualify as a binge if consumed in one sitting by a single individual)	1.42L tub of ice cream (3012 calories); large pizza (3082 calories); family sized dish of macaroni and cheese (4400 calories)	327 (54.50)	0.98
		(ii) Normative (i.e., collective volume of food present in photo would qualify as a reasonable meal to be consumed in one sitting by a single individual)	Medium-sized burger with fries (730 calories); steak with potatoes and vegetables (1230 calories); sweet crepe with chocolate and fruit (840 calories)	86 (14.33)	
		(iii) Restrained (i.e., collective volume of food present in photo would be considerably low to qualify for a meal by a single individual)	Single slice of cheese and fruit (214 calories); serving of yoghurt with fruit (200 calories); 2 rice cakes with peanut butter (300 calories)	79 (13.20)	

	Type of food present	(i) Calorie dense (i.e., high in calories/fat with low nutritional content)	Burgers; pizza; fries	351 (58.50)	0.97
		(ii)Varied (i.e., range of macronutrients and nutritional content)	Stir-fry vegetables with rice, sushi	84 (14.00)	
		(iii) High protein (i.e., high proportion of protein compared to other macronutrient)	Chicken breast; meat; raw fish; protein bar	33 (5.50)	
		(iv) Single type (i.e., any macronutrient that is presented as a sole type)	Blueberry blended drink; nut butter in jar	11 (1.83)	
		(v) Supplement (i.e., protein or vitamin supplement present)	Protein powder container; vitamin container	8 (1.33)	
		(vi) Alcohol only (i.e., any alcoholic beverage that is presented as the sole nutrient)	Bottle of wine; beer	5 (0.83)	
Person	Gender	Gender of the individual(s) in the photo (i.e., women, men, both)	Men	50 (8.33)	1.00
			Women	43 (7.17)	
	Action	(i) Individual(s) in photo are in the act of taking a "body selfie" or intentionally exposing a part or	Individuals posing and flexing muscle in bodybuilding competition attire;	38 (6.33)	1.00

		full body	individual lifting shirt to expose abdominal musculature		
		(ii) Individual(s) in photo are in the act of exercising	Individual in the act of weight lifting	29 (4.83)	
		(iii) Individual(s) in photo are in the act of eating	Individual sitting at table preparing to eat meal	15 (2.50)	
		(iv) Individual(s) in photo are in the act of taking a "selfie"	Individual taking face-only photo of self in exercise headband	13 (2.17)	
	Body type[a]	(i) Muscular (i.e., visible or high-level definition of muscularity)	Individual with physique-revealing attire and highly defined musculature	51 (8.50)	0.98
		(ii) Normative (i.e., medium frame with moderate level of visible fat)	Body selfie of individuals outside of a restaurant	20 (3.33)	
		(iii) Slender (i.e., slight frame with little to no visible fat stores)	Cropped photo of very slender women's legs	13 (2.17)	
Textual content	Quote in image	(i) Normalizing binge (i.e., implied or explicit text in the photo normalizes and supports	"*Snaccident: eating an entire pizza/box of chocolates/family size*	10 (1.67)	1.00

overindulgence)	*bag of chips by mistake*"	
(ii) Commitment to exercise (i.e., implied or explicit text in the photo endorses high commitment and obligation to exercise)	"*Sore? Tired? Out of breath? Sweaty? Good. It's working*"	8 (1.33)
(iii) Endorsing dietary restraint (i.e., implied or explicit text in photo recommends and supports consumption of restricted food quantities)	Screenshot of calorie tracking mobile application with remaining number of daily calories	5 (0.83)

[a] Preliminary creation of the coding strategy included 'excess weight' as a body type category, which was later removed since there was no content to fit within this category.

Table 2

Summary of textual content accompanying images.

Description	Example(s)	*n* (%)	κ
(i) Non-English (i.e., content in alternate language)	–	159 (26.50)	0.98
(ii)Idealizing food and/or binge (i.e., presenting food in grandiose manner and endorsing overconsumption of large quantities	"*Can't help thinking I want it all, can never decide on one meal.. Lets do business on stage and feast*"	151 (25.17)	
(iii) Neutral/Descriptive (i.e., content purely descriptive without valance or directional)	"*cheat meal on Friday*"	104 (17.33)	
(iv) Dietary restraint (i.e., endorsing consumption of restricted food quantities)	In reference to a package of chocolates: "*Just smelling and tasting the package.. so hard*"	55 (9.17)	
(v) Instructional (i.e., content that is descriptive and instructional, presented as exemplary for others to follow)	Meal recipes; exercise plan; "*order a 'to go' box as soon as you get your plate and set aside half to give to someone. This way I am satisfied and I don't feel horrible for*	54 (9.00)	

	overeating"	
(vi) Over commitment to fitness regime (i.e., exercise is prioritized above other life domains)	"*Where else would I be on a Friday night? Feel better today, not sure if its the drugs I'm on or whether I'm actually on the mend! Had a good shoulder workout and got to try the new Stairmaster*"	40 (6.67)
(vii) Inspirational (i.e., content with implied or explicit motivational connotation intended to inspire others to change health behaviors	"*Make every rep your best. There is no other way to success. Failing is not an option, at least not for me*"	29 (4.83)
(ix) Reward-based cognitions and behaviors (i.e., endorsing reward-based consumption in response to maintained fitness regime)	"*The countdown is on until I get to replenish these glycogen stores with some delicious naughty food! Work your ass off and earn it. Sit there at the end of the week and reward the dedication and consistency you've put in"*	22 (3.67)
(viii) Minimizing health risk (i.e., normalizing behaviors	"*When you just ate an entire pizza and you*	18 (3.00)

that may be problematic to physical and/or psychological health –	*can't decide if you're disgusted with yourself or you want to finish strong with a cake*"	
(ix) Dualism of diet and appearance (i.e., contrasting dietary indulgence and impact on body shape and size)	"*When you want abs but you also want junk*"	9 (1.50)

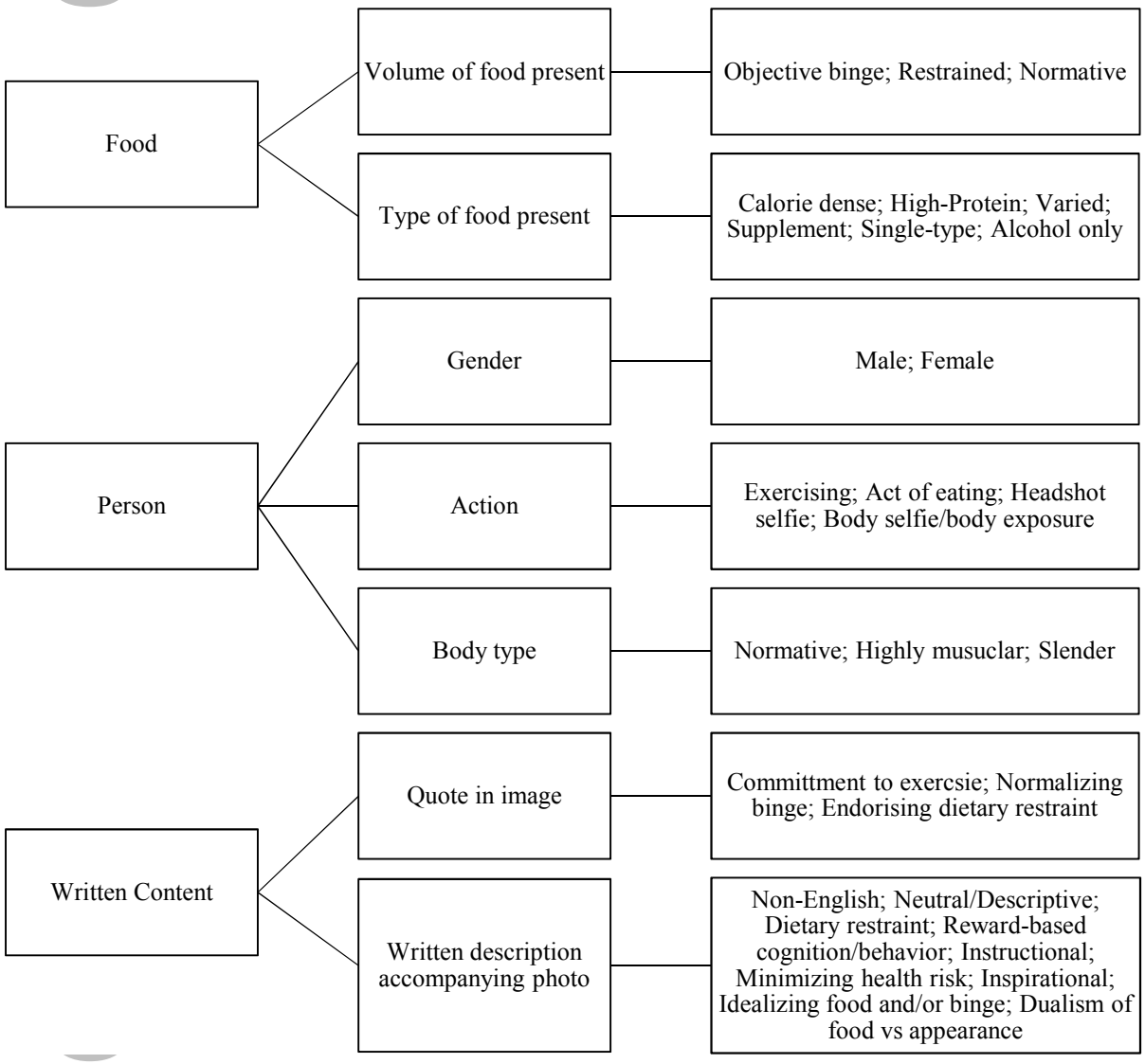

Figure 1. *Summary of coding strategy*

Acknowledgement & Disclosure of Conflicts

The authors have no conflicts of interest to declare. EP is supported by a Social Sciences and Humanities Research Council of Canada (SSHRC) Doctoral Fellowship. SG is supported by an Australian National Health and Medical Research Council (NHMRC) Early Career Fellowship.

Reviewer 1

The edits were very responsive to the reviewers' suggestions.

Thank you for your review of this work and your support of its contribution to the literature.

Reviewer 2

Overall, the authors have done a very good job of responding to my comments. The paper is now much clearer and I particularly appreciate the better elucidation of the analysis of textual commentary. The paper well documents a contemporary phenomenon of potential clinical significance (cheatmeals), and one that is bound to be of interest to many readers of the journal.

My only remaining concern still lies with the analysis of body type. Just as there is an analysis of gender by action, there should surely be an analysis of body type by gender (around p.10 para.1). In their response (Reviewer 1 Point 7), the authors argue that the idea that more of the muscular bodies are likely to be male and more of the slender bodies are likely to be female "represents an implicit bias" that "narrows" the enquiry. The point is that the authors have the data to actually show the distributions by gender, so noone has to assume anything. The reviewer actually does know that some women have muscularity concerns and that some men have leanness concerns and that men are increasingly objectified etc etc. In arguing that "coding for body type, in addition to coding for gender", is a strength of the study, the authors need to make use of this strength.

Thank you for your additional feedback. We have included an analysis of body type by gender (pg., 10-11, line 18-2), and have integrated these additional analyses in the context of the overall study findings (pg., 15, line 2-3). We agree with the reviewer, that the inclusion of this data provides a more well rounded analysis.

Notably, we report that "Content depicting normative bodies was more likely to feature both genders, but this association was only significant for females, χ^2 (1, N = 98) = 4.55, p = .03, and not males (p = .13). Meanwhile, content depicting muscular bodies was more likely to feature males, χ^2 (1, N = 98) = 19.72, p < .001, and less likely to feature females, although the association for females was not significant (p = .12). Content with slender bodies was less likely to include males, χ^2 (1, N = 98) = 11.26, p < .001, and more likely to include females, χ^2 (1, N = 98) = 10.10, p = .002."

P.16 line 13: should be "has", not "was".

Typo has been corrected.