



Differences in physical status, mental state and online behavior of people in pro-anorexia web communities



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ARTICLE INFO

Article history:

Received 2 December 2015

Received in revised form 7 April 2016

Accepted 9 May 2016

Available online 10 May 2016

Keywords:

Pro-anorexia
Search engines
Social networks
Harm

ABSTRACT

Background: There is a debate about the effects of pro-anorexia (colloquially referred to as pro-ana) websites. Research suggests that the effect of these websites is not straightforward. Indeed, the actual function of these sites is disputed, with studies indicating both negative and positive effects.

Aim: This is the first study which systematically examined the differences between pro-anorexia web communities in four main aspects: web language used (posts); web interests/search behaviors (queries); users' self-reported weight status and weight goals; and associated self-reported mood/pathology.

Methods: We collected three primary sources of data, including messages posed on three pro-ana websites, a survey completed by over 1000 participants of a pro-ana website, and the searches made on the Bing search engine of pro-anorexia users. These data were analyzed for content, reported demographics and pathology, and behavior over time.

Results: Although members of the main pro-ana website investigated appear to be depressed, with high rates of self-harm and suicide attempts, users are significantly more interested in treatment, have wishes of procreation and reported the highest goal weights among the investigated sites. In contrast, users of other pro-ana websites investigated, are more interested in morbid themes including depression, self-harm and suicide. The percentage of severely malnourished website users, in general, appears to be small (20%).

Conclusions: Our results indicate that a new strategy is required to facilitate the communication between mental health specialists and pro-ana web users, recognizing the differences in harm associated with different websites.

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1. Introduction

"Pro-ana" websites are sites that promote anorexia and advise people how to maintain the disorder (Yom-Tov et al., 2012). These websites are usually visited by individuals with an eating disorder (Lyons et al., 2006; Knapton, 2013). Indeed, around a third of patients with eating disorders have used these websites (Christodoulou, n.d.).

For some professionals in the field, censorship of pro-ana sites might seem to be the most logical step, but a censorship campaign in 2010 showed that despite regulatory pressures and social stigma, the pro-ana network has not shrunk (Casilli & Pailler, 2013). One might assume that individuals with an eating disorder experience negative effects

from viewing these websites. Research, however, suggests both negative and positive effects (Lyons et al., 2006; Harper et al., 2008). Some studies indicate that individuals who actively participate in these sites are more likely to hold anti-recovery attitudes, engage in pathological behaviors, and hold higher levels of body dissatisfaction than those who do not take part in these sites (Harshbarger et al., 2008; Harper et al., 2008; Csipke & Horne, 2007; Wilson et al., 2006). Other studies, however, have shown that these sites provide those with active eating disorders a temporary relief from hostile reactions and increases feelings of being understood, especially in participants who are actively engaged in the website and seek out emotional support from other members (Csipke & Horne, 2007; Yeshua-Katz & Martins, 2013; Brotsky & Giles, 2007; Tong et al., 2013).

The aim of the current study is to explore the characteristics of people who participate in different pro-anorexia web communities and the differences between them. We hypothesized that different pro-ana web communities vary with regard to their users' profiles and behaviors, and

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may explain the apparent differences between websites (Juarascio et al., 2010).

2. Methods

Several sources of data were used in this study, as detailed below. If the same person appeared in two datasets, investigators had no way of identifying the same user in both datasets. This was done to maintain the privacy of users.

2.1. Pro-anorexia website data

We extracted all available posts from the discussion board of the myproana.com website. A total of 57,911 posting threads totaling 530,451 posts were extracted. These postings span a period from December 3rd 2012 to May 9th 2014 (522 days). This site was chosen as it is (at the time of writing) one of largest pro-anorexia communities on the Internet.

One of the postings¹ initiated by a user of the myproana website, which began on December 11th 2013, included a detailed questionnaire about eating disorders. The questionnaire was uploaded by the user, and was copied and filled by other users of the site. The questionnaire included questions on the following:

1. Demographics: age, gender, weight (starting, current goal, ultimate goal, lowest, and highest).
2. Self-harm: suicide attempts and self-harm.
3. Substance abuse: illicit drugs and alcohol use.
4. Sexuality.
5. Eating disorder status and diagnosis.
6. Family status.

This questionnaire totaled over 200 questions and was filled by 1024 users. We extracted the filled questionnaires and their analysis is reported below.

For comparison, we also extracted postings from two additional pro-anorexia websites: Pro-ana nation (<http://pro-ana-nation.livejournal.com>) and Proanorexia (<http://proanorexia.livejournal.com>). A total of 15,239 posts were extracted from the first and 40,018 from the second of these.

In many of the postings on all three sites, users added weight information at the bottom of their postings. These typically included one or more of the following (for each user):

1. High weight: the maximal weight ever achieved.
2. Low weight: the minimal weight ever achieved.
3. Current weight.
4. Goal weight: the current weight which the user is striving to reach.
5. Ultimate goal weight.

Posts were automatically categorized into five not mutually-exclusive categories according to whether the following keywords appeared in them:

1. Pro-anorexia: proana, thinspiration, thinspo, ana buddy.
2. Suicide: suicide, suicidal, kill myself.
3. Self-harm: cut my, self-harm, self-injury, self-poisoning, pulling hair.
4. Treatment: psychologist, psychological, hospital, clinic.
5. Depression: hopeless, helpless, depressed, depression.

Note that minor variations in spelling were also considered (e.g., “pro-ana” and “pro ana” were considered in addition to “proana”).

2.2. Search queries

We extracted all English-language queries submitted to the Bing search engine from US users between July 2014 and February 2015. Each query included an anonymized user identifier, time and date, and query text.

We identified users who used the terms in the 5 categories above. For those users, the most popular terms were categorized as follows:

1. Myproana: users who queried for the myproana.com website.
2. Tumblr: users who queried for the social network tumblr.
3. Manorexia: users who queried for the term “manorexia”, meaning anorexia in males.
4. Thinspiration.
5. Yahoo Answers: visitors to the popular Yahoo Answers website.

The overlap of users who made queries in the first three categories was the lowest, with under 2% of users. Therefore, we focus on these three, categorizing users into one of these three, according to the most commonly queried category per user. In our data we identified 4790 users in the “myproana” category, 7698 users in the “tumblr” category, and 627 users in the “manorexia” category.

Queries were categorized according to the same keywords as those used for website postings.

3. Results

3.1. Transition graphs

We computed the probability that a user would query about one of the five categories outlined above (see [Methods](#) section), given the previous category they asked in. From this transition matrix we computed the stationary probability of each category: we ran a random walk along the transition matrix, with a restart probability of 15%. The stationary probability represents the most likely category that a person will end at, at the end of their search.

Treatment is the most common query category for people in the Myproana and Manorexia groups (43% and 56%, respectively), and significantly more than in the Tumblr group (19%). The Tumblr group tends to query more in the suicide (31%), self-harm (18%) and depression (32%) categories, compared to the two other groups. This is also evident in the stationary probabilities. Here too, the most common stationary state for the Myproana group is treatment (32%), whereas for the Manorexia group it is suicide (34%) and for the Tumblr group – depression (30%). Thus, whereas the Tumblr and Manorexia groups are associated more with self-harm and depression, the Myproana group is relatively more interested in treatment.

3.2. Analysis of weights

Many of the users of the three websites provide their weights in their postings, as footnotes or signatures. A comparison between the survey respondents and the entire website population showed no statistically significant differences for the high weight category, and statistically significant differences (of up to 6 kg) for low, goal, and ultimate goal weight categories (ranksum test, $P = 0.05$). Comparing the three websites, we found that the Proanorexia website has the lowest current and goal weights. We interpreted this finding to indicate that users on this site are significantly more at risk than those on the two other websites.

The percentage of people with a calculated BMI of under 18.5 is similar across sites, with only around 20% of participants in these pro-ana websites reporting weights that would be considered clinically underweight.

¹ <http://www.myproana.com/index.php/topic/97075-eating-disorder-questionnaire/>.

Table 1

Frequency of risk, protective factors reported in the user survey, and answerer demographics. Items are given as in their original phrasing in the questionnaire, while the categorization into risk and protective factors is made by the authors.

	Items	Yes (percentage)	No (percentage)	No response (percentage)
Risk factors				
Depression	Are you depressed	412 (54.1)	92 (12.1)	257 (33.8)
	I have been diagnosed with depression	346 (45.5)	370 (48.6)	45 (5.9)
Self-harm	Tried to commit suicide	351 (46.1)	404 (53.1)	6 (0.8)
	Cut yourself	633 (83.2)	121 (15.9)	7 (0.9)
	I've hurt myself on purpose	589 (77.4)	82 (10.8)	90 (11.8)
Bad times	I work out daily	222 (29.2)	501 (65.8)	38 (5.00)
	I look at thinspo	600 (78.8)	54 (7.1)	107 (14.1)
	I count calories	612 (80.4)	44 (5.8)	105 (13.8)
Drugs	Ecstasy	100 (13.1)	646 (84.9)	15 (2.00)
	LSD	64 (8.4)	692 (90.9)	5 (0.7)
	Cocaine	99 (13.1)	651 (85.5)	11 (1.4)
	I keep my eating habits a secret	700 (92.0)	49 (6.4)	12 (1.6)
Protective factors				
Family	My biological parents are together	377 (49.5)	381 (50.1)	3 (0.4)
	I want to have kids someday	355 (46.6)	335 (44.1)	71 (9.3)
Habits	I am in treatment	55 (7.2)	696 (91.5)	10 (1.3)
Relationship	I'm in a relationship	219 (28.8)	516 (67.8)	26 (3.4)
Demographics				
Gender	Female	535 (70.3%)		
	Male	11 (1.4%)		
	No answer	215 (28.3%)		
Condition	Anorexia	100 (13.1%)		
	Bulimia	44 (5.8%)		
	EDNOS	610 (80.2%)		
Sexual orientation	Straight	489 (64.3%)		
	Gay	11 (1.4%)		
	Lesbian	33 (4.3%)		
	Bisexual	223 (29.3%)		

3.3. Characteristics of the myproana users

A total of 1024 people completed the user survey, of which 303 were excluded due to duplication or more than one diagnosis. Therefore, the final sample included 761 responders.

As Table 1 indicates, 45.1% of survey respondents report being diagnosed with depression, 77.4% report hurting themselves on purpose, and 46.1% report attempting suicide. Only 7.2% of respondents reported being in treatment.

3.4. Engagement and optimism

One of the survey items was phrased: “I want to have kids someday” (indicated by 46.6% of the respondents). We rationalized that a positive response to this item may imply a certain optimism by the respondent. Therefore, we analyzed whether responses to this item correlated with engagement on the site, as measured by:

1. Length of time that the respondent was registered to the site, as measured in the number of days between registration date and the date responding to the survey. This variable was log-transformed to approximate uniform distribution.
2. The average number of posts per day by the user.

We further used age as a control variable for this analysis. The profile page of 382 survey participants was available for extraction of registration date.

A logistic regression model to predict a positive response to the above survey item shows that length of time and age were significantly correlated with a positive response: longer periods of being registered to the site were positively correlated with wanting to have children, while age was negatively correlated. We understood this finding to either suggest that people on this site self-select as being more optimistic and more engaged with the site, or that being on the site (if only passively) provides site users with a more optimistic outlook.

4. Discussion

Our findings reveal that there are significant differences between some of the most popular pro-ana websites, as reported before (Bardone-Cone & Cass, 2007; Juarascio et al., 2010; Casilli et al., 2013; Curry & Ray, 2012). However, the current study adds in examining the actual language used (posts), online behavior (queries), stationary probabilities (search end-point), weight information and desired weight goals (self-reports on high, low, goal and ultimate weights), as well as reported mood and procreation wishes (i.e. self-reported depression and wish to have children in the future).

Our findings reveal that a significant percentage of people who use the myproana website are interested in treatment, as indicated by their language (see Fig. 1) and behaviors. Moreover, treatment queries represent their most frequently end-point web search (stationary state). We interpret this finding as an indication for participants' actual treatment seeking behavior, or at least their wish for treatment (Yom-Tov, 2013; Ofra et al., 2012; Yom-Tov et al., 2015). At the myproana website, the lowest percentage of members (37.5%) show BMI at the underweight range, as compared to the other web pro-ana communities.

The survey from the myproana website indicated that although the (relatively small) sample appears to be seriously depressed, with high rates of self-harm and suicide attempts and usually not in treatment (see Table 1), these users have the highest goal weights. In addition, 46% of them indicated long-term life goals, and even an optimistic outlook. However, the differences between the users of the different sites with regard to weight were not statistically significant, indicating that mental factors rather than physical, may be central to their characteristic choices and web behavior. Additionally, wanting to have children was correlated with longer durations spent on site, indicating that being active on the site may be a protective factor. The combination of distress and treatment seeking among users may represent the ambivalence that characterizes people who suffer from eating disorders (Darcy et al., 2010; Cockell et al., 2003; Vitousek et al., 1998) possibly even the ‘healthy’, ‘optimistic’ side of this ambivalent position (Nordbø et al., 2008). This ambivalence may provide an opportunity for professionals to intervene.

These findings comparing topics of search are in line with studies that already reported the less favorable influences of Tumblr (De Choudhury, 2015; Yom-Tov, 2014; Borzekowski et al., 2010).

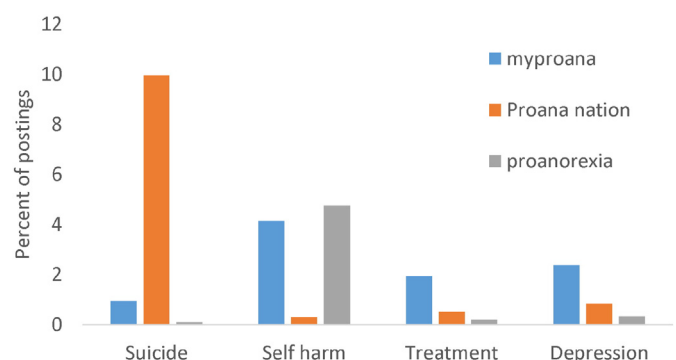


Fig. 1. Percentage of postings on four keyword categories.

Interestingly, although treatment was the most common search category in the manorexia site, suicide was the most likely stationary point, perhaps reflecting previous findings that although men may ask for treatment (but use it less; Canetto and Sakinofsky, 1998; Winerman, 2005), they tend to commit suicide more than women (Callanan & Davis, 2012). The more negative queries (i.e. suicide, self-harm, and depression) in Tumblr and manorexia categories can be somewhat explained by the type and characteristics of the sites visited by these users, i.e. it may be that these sites are more preoccupied with harm and depressive content and less ambivalent compared to myproana. On the other hand, it may be that there is a self-selection bias, according to which users who present with more severe pathology search in these categories more often.

The study has several limitations that should be noted. First, it is a cross sectional study and therefore causality cannot be determined. Second, the extent of the correlation between internet behavior and actual behavior cannot be exactly determined by the data available in the study.

The clinical implication of our study, is that people seek treatment in myproana, and therefore, this may be an opportunity for intervention. According to our results, the percentage of severely malnourished proana users seems to be small. Thus, a new strategy is required to approach web users at the pro-ana sites recognizing their ambivalent behavior at the web.

Author disclosures

All work described herein was conducted as part of the authors' regular employment, without specific funding.

EYT initiated the study, collected the data, analyzed the query log and user group data, and wrote the article. ABK and AH helped analyze all data and wrote the paper. OT analyzed the survey data and wrote the paper. SF helped initiate the study, analyzed the results, and wrote the paper. All authors approved of the final version of the manuscript.

The authors declare no conflict of interest.

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