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The Anorexic Decision: an Ego-centered Network Data Approach

by

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1. Purpose and scope of the project

The paper specifies a research design aimed to study the influence of the web on socially-structured health behaviors. More precisely, it focuses on whether and how social networks formed on the web can constitute a source of information and advice for members and have potential to support them in their decision-making processes. It does so by comparing computer-mediated communication (CMC) networks with face-to-face (FTF) sociability structures. It has been highlighted that, to the extent it provides additional modalities for health communication and information-seeking, the Internet has the potential to influence health behavior beyond traditional FTF support groups – family, friends, colleagues, schoolmates, etc. [Ginossar 2008]. The paper sets out to study similarities, differences, and possible linkages between individual on-line and off-line networks of personal relationships and acquaintances, with emphasis on their respective roles as suppliers of knowledge and help for decision-making – in particular health-related decisions.

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While the influence of expert medical advice from health professionals is often strong, observed health behavior may diverge from it in multiple ways, depending on the range of available choices and on cultural factors. Most significantly for the purposes of this project, health-related behaviors, as far as they are embedded in wider social contexts, can be affected by non-professional advices and beliefs – which can sometimes dramatically diverge from expert advice. A harvest of recent literature has pointed out the increasing impact of laypersons' significance in health-related decisions [Provost, Perri, Baujard & Boyer, 2003; Bromme, Jucks, & Runde, 2005; Broom, 2005; Guise, Widdicombe & McKinlay, 2007; Wilson, 2007]

To ensure the operational feasibility of the project, we focus on decisions related to one specific health problem, namely *anorexia nervosa*. Medical literature describes it as self-imposed starvation (with or without purge/binge eating), accompanied by an idealization of thinness and an intense fear of gaining weight. For anorexic subjects, the quest for a bodily and personal mastery turns such behaviors into a perceived gain of autonomy and effectiveness. In addition to calorie restriction and food avoidance rituals/vomiting, individuals may exercise intensively and actively collect information as to diuretic and dietetic techniques. Effects may include severe psychological sequelae (depression, suicidal tendencies), as well as physiological consequences (amenorrhea, lowered hearth rate and temperature, anemia, constipation, fainting) (Goldbloom & Garfinkel, 2003). This eating disorder is particularly interesting for our study, in that its clinical aspects cannot be fully dissociated from its social determinants and implications –including the social networks in which the lives and choices of anorexic individuals are embedded. Insofar as this disease prevails in female subjects living in western countries (or in westernized social groupings in emerging countries) it has customarily been defined as a CBS (Culture-Bound Syndrome) (Lee, 1996). Here, we rely on the approach developed by M. Darmon (2003) which acknowledges anorexic disorders as personal and social “careers”. In this perspective, anorexia typically results from a years-long voluntary effort of (primarily) adolescents and young individuals characterized by “steps” and mutually-exclusive choices. The process is aimed at obtaining a renewed social image of oneself, at establishing new social roles within the family and/or in peer groups. A chain of “anorexic decisions” ultimately redefines one’s identity through bodily differentiation and compliance with a rigorous food-intake discipline.

The recent emergence of socializing occasions in online communication networks adds a new dimension to the array of social factors that need to be taken into account to understand the series of decisions that eventually leads to anorexic behaviors. In the last few years, pro-“ana” (shorthand for anorexia) web sites, blogs, and on-line forums have mushroomed, with the participation of both “real” anorexic subjects and of a wider public of advocates and “wannarexics” (Tierney, 2006). Unsurprisingly, this phenomenon has raised concerns among health professionals, who fear that ever more people may be driven to such a life-threatening disorder (Bardone-Cone & Cass, 2007). On the other hand, analyses inspired by third-wave feminism (Dias, 2003) have emphasized the community-creation potential of pro-anorexia websites, blogs and forums. To their participants, these communities are part of an effort to normalize anorexic behaviors and to create a novel – though controversial – health and body culture, in opposition to conventional medical knowledge (Lyons, Mehl & Pennebaker, 2006; Gavin, Rodham & Poyer, 2008).

However, none of these interpretations can be fully reliable without an assessment of the actual impact and importance of CMC networks on health decisions by anorexic persons and their supporters, relative to FTF social networks. Our project sets out precisely to carry out such an assessment, so as to contribute to an in-depth understanding of the social character of

the decisions that lead to anorexia in the long run. We will run a computer-based social study, using an ego-network approach, to identify the on-line and off-line personal networks of anorexics and the relevance of each of them as a support for decision-making on matters related to the disorder. On this basis, we aim to assess the ensuing public-health and social policy implications.

The remaining of the paper outlines our research design, and is organized as follows. Section 2 presents our two research questions; section 3 is on the methodology envisaged, providing details on recruitment of subjects, data collection method, ethical issues, and data analysis. Section 4 will sum up and conclude, with an opening on potential policy implications and further research developments.

2. Research questions

At the heart of our study are two research questions which can be best understood in light of ongoing controversies on the impact of Internet use on social connectivity and on the formation and maintenance of social capital. Some observers (e.g. Kraut *et al.*, 1998) identified a positive correlation between online activity and anomie, and suggested that heavy CMC users are alienated from FTF sociability and may even cut ties off as the web becomes the predominant social factor in their lives. Most prominently, the work of Putnam (2000) on how old and new media may have weakened FTF relations embedded in community interactions revives a long tradition in sociological theory, which since the writings of Durkheim, Weber, and Tönnies has been concerned with the decline of the sense of community. An alternative interpretation is that use of CMC networks does not necessarily decrease social capital, and may in some cases even increase it. Zhao (2006) claimed that the Internet allows users not only to reinforce existing ties by combining offline and online modes of interaction, but also to form new ties which are sometimes kept exclusively online. These ties add up to, and do not replace, the offline ones. The 2006 Pew report on *The Strength of Internet Ties* pointed out that web and email tools aid users in maintaining their social networks and provide pathways to help when they face important decisions.

The question of whether and how communication networks on the web affect social relationships is in fact more complex, to the extent that such networks bring to light dimensions of social capital which were not previously known. In particular, Ellison *et al.* (2007) suggested that CMC allow for an interpretation of social capital in terms of what they call “maintained” social capital – i.e. the possibility to stay connected with members of a formerly inhabited community long after relocation. Their study concerned students who had moved to college and kept in touch with former schoolmates and other friends via Facebook, a popular online social networking site (SNS). From the notion of maintained social capital, a more general one can be derived: that of “reserve social capital”. Applicable to a wider variety of social contexts, it designates ties to those with whom SNS users do not interact on a daily basis, ties that are kept “sleeping” so to speak and that can be activated only in specific occasions – emergencies, need, new challenges, difficult tasks, etc. (as in Procopio & Procopio, 2007). In this sense, they may comprise not only previously formed ties but also newer ones, to the extent that they basically perform the same functions. Hence by allowing the formation and maintenance of reserve ties, the Internet may allow a non-traditional dimension of social capital to emerge.

Following the classic distinction between strong and weak ties, reserve capital should consist mainly in weak ties. Our measure of tie strength results from an adaptation of Granovetter’s

original definition of tie strength as a “combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and reciprocal services which characterize the tie” (Granovetter 1973, p. 1361). Granovetter also proposed four indicators, which can be interpreted as linear combinations of these four elements, namely: 1) closeness; 2) duration and frequency; 3) breadth of topics; 4) mutual confiding (Petróczi *et al.*, 2007). In the framework of our research design the last three indicators can be regarded as less meaningful. Reserve/maintained social capital can artificially increase duration for all kind of ties – thus not being distinctive of strong ones. Breadth of topics is not applicable to our analysis, as far as our subjects are invited to discuss exclusively health and nutrition-related matters. Finally, ego-network approaches are hardly appropriate for systematic checks of mutuality. Given the diminished relevance of these indicators in this case in point, we will analyze tie strength focusing mainly on network closeness.

Along these lines, our first research question (RQ1) is whether anorexic persons’ behavior tends to form reserve ties online. We expect such ties to be weak, i.e. to connect somewhat close but not very close persons, although they may still have a relatively high probability of being activated in case of need. This should result in a difference between the offline and online personal networks of anorexics, the latter including a higher proportion of weak ties than the former.

The hypothesis to be tested in order to provide an answer to RQ1 would read as follows:

H1: *“In comparing offline and online ego-centered networks, online ones should contain a higher proportion of weak ties”.*

Higher proportion of weak ties in online ego-centered networks would imply that subjects have a significant reserve capital which they do not activate in everyday FTF interactions. Computer-based sociability would thus be a sort of “emergency numbers pool” for them.

A second aspect that should be taken into account to understand the effects of Internet use on interpersonal relationships and on social capital, is the extent to which CMC networks offer different forms and modes of socialization with respect to FTF relations (RQ2). This calls for differentiated analyses of online and offline ties and of their impact on users’ sociability. In particular, CMC and FTF networks can be expected to channel different types of advice-seeking relationships and to offer different forms of support for decision-making when it comes to health-related choices. Accordingly, we will look at the respective role of CMC and FTF personal networks in providing advice and support to individuals who face decisions which, though always related to anorexia, have different potential impact on their life. Specifically, we will compare the advice-seeking behavior of anorexic persons in two situations, namely a crisis situation in which a major life decision must be made and a choice concerning day-to-day life matters. If Internet reinforces existing ties by providing an additional channel for communication, while also allowing to form new ties, then in a critical decision-making situation, people can well be expected to activate as many of their ties as possible, whether they be offline or online. When faced with a more mundane choice, instead, people can be expected to mobilize only a subset of their contacts; if they are accustomed to computer-mediated interactions, they are more likely to activate their online ties.

In this perspective, the hypothesis we need to test in order to answer RQ2 concerns the extent to which anorexic persons activate different types of ties in critical and in non-critical situations.

H2: *“In critical situations, individuals’ health-advice networks should substantially overlap with the networks of all their personal contacts both online and offline; in everyday situations, instead, advice networks should to a large extent mirror typical online contacts networks”.*

3. Methodology

To study the complex decision-making process that leads some subjects to become anorexic over time, we will run a computer-based social study, using a personal network approach. A personal network is the social network of an individual, who is at its center; broadly speaking, it encompasses all ties to those with whom this individual has some kind of social contact (Wellman 1999; 2007).

3.1 Recruiting

To begin with, a search for anorexia-related discussion groups, mailing lists, and generalist SNS has allowed us to identify a first core sample of potential respondents. Participants of French online discussion forum doctissimo.fr and Facebook groups devoted to discussion of anorexia nervosa and other eating disorders have been selected as two possible target populations. The choice, so far, has fallen on doctissimo’s “anorexie et bulime” forum, mainly to minimize biases due to users’ traceability and need for privacy protection in online interaction. Subsequently, we will enlarge it through standard snowball sampling. Respondents will receive compensation.

3.2 Data collection

Once our sample established, we envisage building a web-based application to elicit the personal networks of respondents. Recent studies in online field methodology and data collection have highlighted the efficacy and reliability of this approach (Lozar Manfreda, Vehovar & Hlebec, 2004).

The application will be an extension of the name generator method allowing for real-time visualization during data collection. What follows is a description of the design of the application, which basically consists in eliciting three successive personal networks.

1) Building FTF ego-networks.

The first step is a standard name generator, in which respondents (referred to as “egos”) are asked to complete a table with names of other people (“alters”) they are close with, be they family members, friends, or school/workmates, in order of free recall. Contextually, respondents will be asked to provide information on alters. Because this procedure may impose an extreme burden on respondents, we will ask only a few basic questions, namely the kind of relationship (distinguishing between family members, friends, and school/workmates), age, gender, and geographic location of each alter.

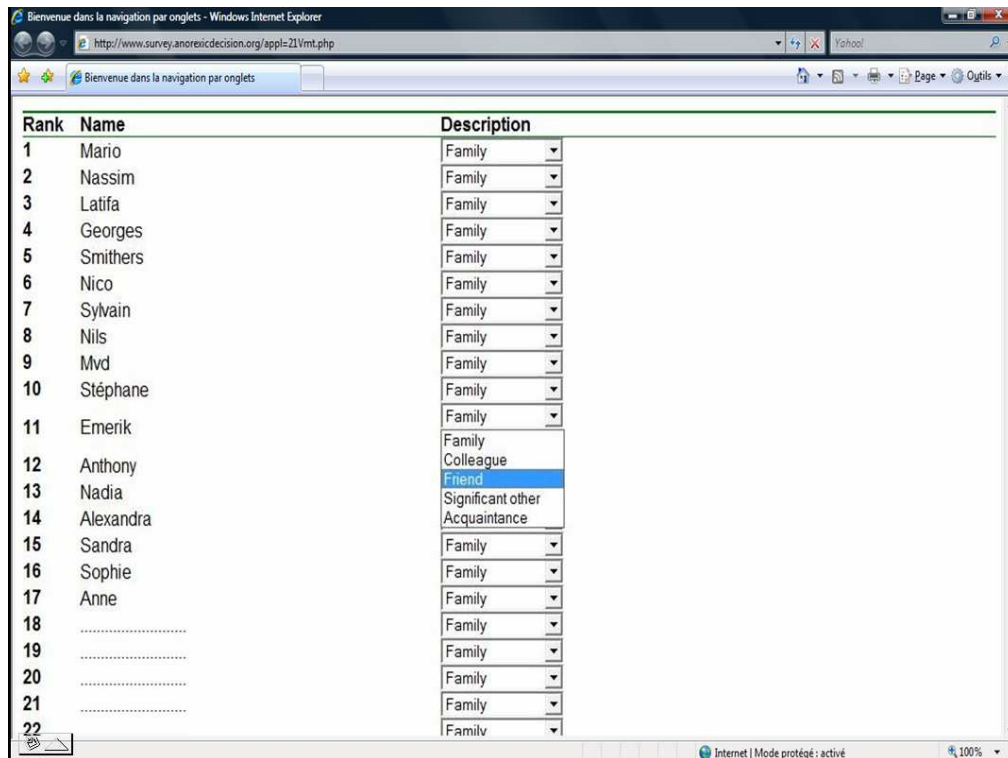


Figure 1 – Name generator page

After respondents have filled out alters' names, they are asked to assess how close they are with their alters, using a scale known as "Continuous IOS" (Inclusion of Other in the Self) which was originally designed by Aron, Aron, and Smollan (1992) as a measure of self-other inclusion and relationship closeness, and was then improved to allow the output values to be continuously scaled and the measure to be embedded within a web-based questionnaire (Moss and Le, 2005; Le, Moss and Mashek, 2007). The measure uses the metaphor of overlapping circles and the distance between them to indicate the amount of closeness in a relationship. The respondent views a set of two adjacent circles labeled as ego and alter, and is instructed to click and drag the mouse to overlap the two circles until reaching the position that best represents his or her current relationship with alter. The system then automatically calculates the percentage of overlap (from 0 to 100%) between the two circles and the distance that separates them. Overlap and distance are measures of closeness, highly correlated to each other; we will mainly refer to overlap unless the circles are non-overlapping and physically disjoint, because in this case distance will be a more meaningful measure. With this method, we aim to differentiate strong ties from weak ties, placing them on a continuous scale. The graphical and interactive application developed by Moss and Le is likely to be intuitively more appealing than traditional methods to distinguish different degrees of closeness, which sometimes seem unclear or tiresome to respondents (Hogan, Carrasco, and Wellman, 2007).

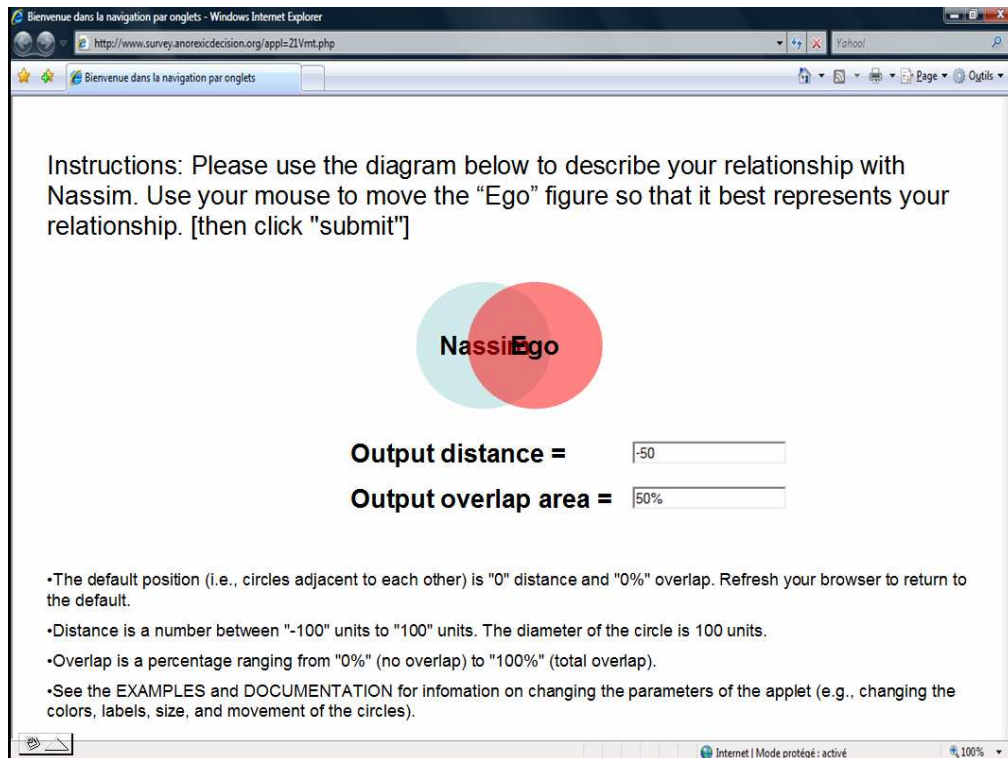


Figure 2 – Ego-alter tie strength measuring applet.

With this information, the system will be designed to draw a graph $[G_{1_i}]$ representing the resulting personal network of respondent i . The respondent will then be presented with the network centered on him/her, with alters placed at a distance proportional to the degree of closeness as measured through the IOS method. Alters' attributes are included in labels which respondents can visualize by clicking on nodes.

The appeal of visual depictions of relationships among individuals in social network analysis is known; we follow the recent tendency to exploit the advantages of visualization not only at data analysis stage, but also during data gathering (McCarty and Govindaramanujam, 2005; Hogan et al., 2007). Providing respondents with diagrammatic representations of their relations has been found to improve their interview experience as they may gain personal insight on their social connectivity.

More significantly for our purposes, visualization is of help for the next (and last) step of the procedure, consisting in eliciting ties among alters and fine-tuning weak and strong ties. Because respondents can view the whole set of their ties to others, it is easier for them to indicate which alters are related to each other, and to identify cohesive subgroups where they exist (Hogan et al., 2007). As respondents add new inter-alter ties, the system will reconfigure the sociogram so as to draw related alters near each other, at a distance that depends on their degree of closeness.

Importantly, respondents will not be allowed to modify data submitted in previous pages. At this point by clicking on the "Done" button, the $[G_{1_i}]$ graph is saved.

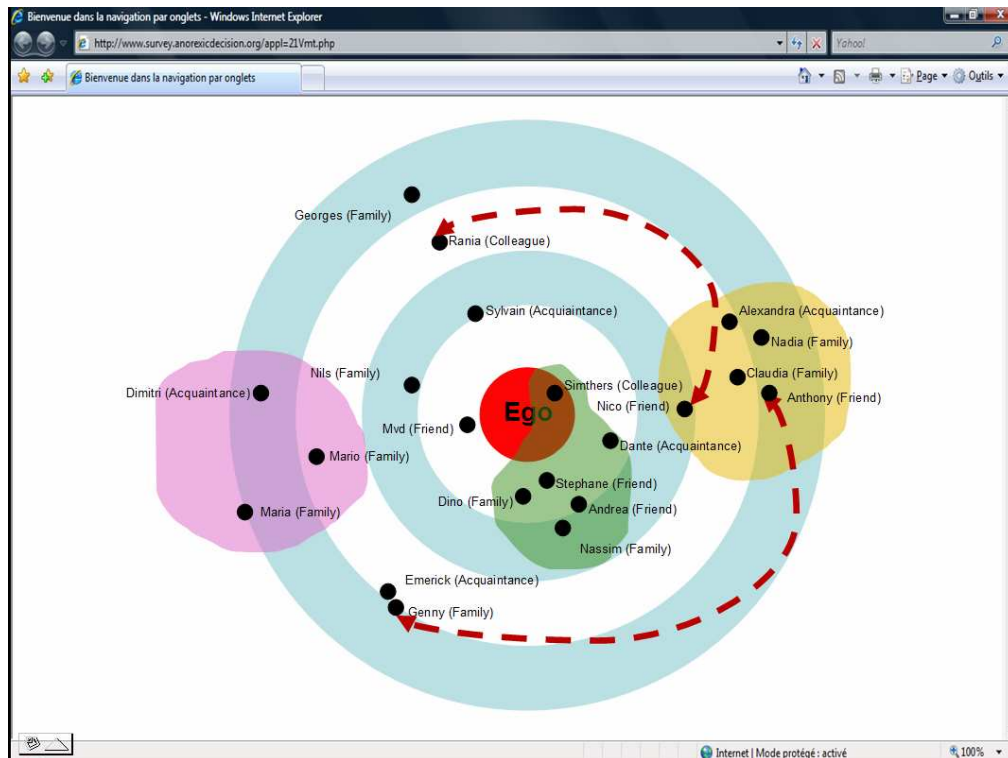


Figure 3 - A sample ego network.

2) Building CMC ego-networks.

At this stage, respondents will be invited to repeat the procedure in order to constitute their on-line ego-network, identifying the people with whom they interact most when they are on the web. As before, they will start with a name generator, and will provide alters' attributes, but only for those alters who are not already included in $[G1_i]$, so as to optimize respondents' interview experience. Also, they will be asked to assess their closeness to alters. A graph representing the online personal network of i will then be drawn $[G2_i]$, serving as a basis for eliciting ties among alters. As ties among alters in CMC can conspicuously diverge from FTF, respondents will need to specify inter-alter ties anew. Again, the system reconfigures the sociogram at each time the respondent adds a new tie, so as to draw related alters next to each other, at a distance that depends on their degree of closeness. Once the respondent is satisfied, s/he clicks on the "Done" button to save the $[G2_i]$ graph and proceeds to the third and final task.

3) Building health (anorexia)-related ego-networks.

Finally, respondents will be asked to name alters they consult, or would consult, in facing anorexia-related decisions. Those decisions spread from simple dietary choices to finding the best way to address severe pathological consequences of anorexic disorders. Respondents will be randomly assigned to two groups, with a different question for each group. One will be a "crisis" question such as: "Suppose you are diagnosed with severe intestinal occlusion. This is potentially fatal and requires your immediate hospitalization. You enter the hospital tomorrow morning. Who are the people you would talk to, or ask advice to, before that?". The other will be a more mundane question such as "You want to explore more efficient dietary options for yourself. You want your new diet to better reflect your expected goals in terms of

weight management, bodily shape, physical performance. Your new ideal diet has to start tomorrow morning. With whom would you talk about your planned choice of meals for tomorrow?”. The steps of the procedure described above (i.e. assessing closeness to alters, and eliciting alters’ attributes as well as ties among alters), will be repeated. Of course, this information will only be asked for any alters not already included in [G1_i] and/or [G2_i]. As a result graphs [G3_i] will be drawn, as indicated above.

We will also add some control questions, aiming to assess the seriousness of respondents’ eating disorder and their degree of health literacy. Standard questions on age, gender, educational level, and occupational status will be included as well.

3.3 Ethics

The subject treated, as well as the population addressed, raise grave ethical concerns in the data collection phase. As a general rule, we will conform to the ethical guidelines adopted by the American Sociological Association, and the British Sociological Association. Additionally, the funding body’s ethical review board will be involved in the preliminary evaluation and implementation of ethical best practices while dealing with this sensitive population.

3.4 Data analysis

Analysis of survey data will mainly rely on comparisons of the three sets of graphs representing each respondent’s ego-networks, with the ultimate aim of addressing the two research questions outlined above. Recall that RQ1 concerns possible differences between the offline and online personal networks of anorexic subjects and the proportion of weak ties in each of them. In terms of the sociograms just described, this question involves a comparison of [G1_i] and [G2_i], and implies that graph [G1_i] should exhibit perceivable differences with respect to [G2_i]; in particular, the latter should contain a relatively higher proportion of weak ties (alters located in network regions further away from ego). Instead, RQ2 is about the extent to which anorexic persons activate different types of ties in critical and in non-critical situations. In terms of our sociograms, the question is about similarities, differences, and degree of overlap between [G3_i] on the one hand, and [G2_i] as well as [G1_i] on the other hand. (Whether [G3_i] must be compared to [G2_i] only, to [G1_i] only, or to both of them separately, depends on the answer to RQ1.) In any case we expect subjects to mobilize a maximum number of ties in case of crisis, and to stick to their standard online network in more ordinary situations, as outlined above. Put differently, [G3_i] should strongly overlap with both [G2_i] and [G1_i] in the critical case, and should be very similar to [G2_i] in the non-critical case.

To assess similarities and differences among the three different ego-networks of each subject, we will use indicators and measures (such as centrality indexes) that can be calculated with the help of standard network analysis software, notably Pajek (Batageli & Mrvar, 1996-2008) and UCINET (Borgatti, Everett, & Freeman, 1999-2008).

4. Expected results and future extensions of the study

The results of our study can be expected to provide guidance for public-health and social policies aimed at managing anorexic behavior, especially among young people and

adolescents. CMC can also represent an important factor in foreseeing the impact of information campaigns dealing with prevention, risk-management and damage control: those policies can profit greatly from the assessment of the extent to which web-based sociability intersects with FTF social interactions.

Although our study concerns a specific health problem, the raising advocacy of the need for expanded diagnostic criteria of eating disorders (Zimmerman *et al.*, 2008), should suggest a possible transfer of our results to other food-related pathologies. Conclusions would possibly be extendable to other health issues. Hence, a possible future development of the project may consist in applying a similar approach to a variety of diverse health matters, raising different challenges to the social scientist, and commanding a different set of policy recommendations.

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