Computers in Human Behavior 110 (2020) 106353

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: http://www.elsevier.com/locate/comphumbeh

Tweeting about mental health to honor Carrie Fisher: How #InHonorOfCarrie reinforced the social influence of celebrity advocacy

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ARTICLE INFO

Keywords:
Carrie Fisher
Mental illness
Mental health
Twitter
Social media
Semantic network analysis

ABSTRACT

The hashtag #InHonorOfCarrie went viral on Twitter within hours of Carrie Fisher's death, as people tweeted about their own mental health experiences to honor Fisher. This study analyzed how the hashtag reinforced the social influence of Fisher. The full sample of 2160 tweets – from the initial use of the hashtag on December 27, 2016 through January 16, 2017 – were analyzed using semantic network analysis and CONCOR (convergence of iterated correlations) block modeling. In addition, the 1157 original tweets were hand coded for personal sharing of mental health conditions, as well as comments about Fisher and mental health. The results of semantic network analysis and CONCOR analysis found that the users generated integrated concepts and frames by sharing similar topics such as honoring Fisher's role in mental health advocacy, specific mental disorders they had, and framing mental illness in a positive way. The findings also suggest that the discourse reinforced Fisher's advocacy by echoing her challenge metaphor and sharing their mental health issues. Content analysis of the original tweets found that when describing their personal experiences, users often reported personal difficulties or challenges of dealing with mental health issues, but also often made positive self-references related to their own self-confidence and pride. Many of the tweets focused on Fisher's openness and honesty, her efforts to challenge stigma, her inspiration to others and the legacy she left. These results imply the positive role of Fisher in users' self-disclosures and sharing of mental health issues.

Following a celebrity's death, honoring or memorializing the deceased celebrity has become a social media ritual (Cohen & Hoffner, 2016; Sanderson & Cheong, 2010). Promoting a cause or charity supported by a celebrity can help preserve their memory and extend their influence. After the deaths of celebrities such as conservationist Steve Irwin and Princess Diana, many fans made charitable donations to causes they had championed (Bae, Brown, & Kang, 2011; Brown, 2010; Brown, Basil, & Bocarnea, 2003). Such public responses to celebrity deaths has the potential to extend the influence of the advocacy efforts they engaged in during their lives. Based on the response following Irwin's death, Brown (2010) argued that "Irwin's ability to fundraise for wildlife conservation causes will likely continue long after his death" (p. 88). The death of Carrie Fisher, who was a passionate mental health advocate, offered the opportunity to explore this type of celebrity influence in the area of mental health.

Carrie Fisher was renowned for her iconic portrayal of Princess/General Leia Organa in the series of *Star Wars* films, but she was also a longtime mental health advocate who was outspoken about her experiences with addiction and bipolar disorder. When she died on December 27, 2016, extensive media coverage and social media posts mourned her death and celebrated her life. For example, more than 3.1 million tweets about Fisher were generated on the day of her death, with fans often referencing *Star Wars* and her role as Princess Leia (Widmayer, 2017). Many news stories and tweets also discussed her mental health advocacy and praised her openness and efforts to destigmatize mental illness (Hoffner & Park, in press; Yagoda, 2016). Within hours of Fisher's death, Ana Marie Cox, a senior political correspondent for MTV who had 1.3 million followers, tweeted "In honor of Carrie Fisher: I'm bipolar, too." Within 10 min, Julie DiCaro (@juliedicaro), a Chicago sport anchor, responded to Cox's post by creating the hashtag #InHonorOfCarrie. DiCaro tweeted that "we need a hashtag. #InHonorOfCarrie I've been in treatment for depression since my 20s." Shortly after, she also tweeted "Can't think of a better way to honor Carrie Fisher's life than for people to talk openly about their mental illness." The hashtag rapidly went viral, as people tweeted about their own experiences with mental illness to honor Fisher's own openness and

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https://doi.org/10.1016/j.chb.2020.106353
Received 10 July 2019; Received in revised form 19 March 2020; Accepted 20 March 2020
Available online 23 March 2020

honesty about her own mental health experiences (Burleson & Parker-Pope, 2016; Murthi, 2016). *The New York Times* described the evolution of the #InHonorOfCarrie hashtag this way: "Carrie Fisher, who spoke openly about her struggles with mental illness, once joked that she wanted to start a "Bipolar Pride Day" to help erase the stigma of the disease. Legions of fans seemed to grant her wish on Tuesday in the hours after her death at age 60. One after another, in words both plain-spoken and deeply personal, admirers paid tribute to Ms. Fisher by "coming out" on Twitter with their own stories of mental illness" (Burleson & Parker-Pope, 2016, para. 1–2). In the same article, Ana Marie Cox described her motivation for the tweet that inspired the hashtag: "I really did think, 'What would Carrie do?' … [W]here she really pushed the boundary of what we could talk about in polite company or impolite company was her mental illness and her openness about that" (para. 4–5). The hashtag #InHonorOfCarrie quickly became a trending topic on Twitter, with over 180,000 unique visitors (Murthi, 2016; Wright, 2016).

Prior research has explored how celebrity deaths led to prosocial public responses, by increasing discussion of and support for causes the celebrities had promoted or spoken about publicly (e.g., Bae et al., 2011; Brown, 2010; Myrick, 2017). Of course, each of those cases is unique, due to the specific characteristics of the public figures, their fans, and the causes they supported. Because Fisher was an iconic mental health advocate, her untimely death offered an opportunity to explore how memorialization of her on social media was used to promote mental health awareness and openness about mental health issues. Mental health is a critical public health issue and more research is needed about factors that increase awareness and lower stigma (Corrigan & Kosyluk, 2014). Therefore, we employed a mixed method analysis to examine the hashtag #InHonorOfCarrie, combining semantic network analysis with CONCOR block modeling and conventional content analysis.

1. Public responses to celebrity deaths

Fisher's unexpected death immediately elicited heartfelt expressions of grief on social media from her friends, public figures, and legions of fans. Since the release of the first *Star Wars* film (*Episode IV: A New Hope*) in 1977, Carrie Fisher has been known primarily for her iconic role as Princess Leia. The *Star Wars* franchise has a huge worldwide fanbase, and has generated a wide range of platforms for fans to read about, create, and interact with characters and settings derived from or inspired by the film series (de Bruin-Mole, 2018; Guitton, 2012; Travis, 2013). As the only major female character in the original trilogy, Princess Leia quickly became an audience favorite (Travis, 2013; Widmayer, 2017). Fans expressed their devotion to Leia in many ways, including cosplay, fan art, fan fiction, and communication in fan communities (Widmayer, 2017). Their bond with Leia likely bolstered their sense of emotional connection or parasocial bond with Carrie Fisher (Stever, 2019; Tal-Or & Papirman, 2007).

The death of a beloved celebrity often elicits deep feelings of sadness and loss from the public, even though most have never personally met the individual (e.g., Brown et al., 2003; Cohen & Hoffner, 2016; Sanderson & Cheong, 2010). In recent years, it has become common to respond to celebrity deaths by memorializing the person online (Cohen & Hoffner, 2016; Sanderson & Cheong, 2010). This offers a way to connect with a community of people who share a devotion to the deceased individual, exchange stories about them, and honor their lives (Harju, 2015; Van den Bulck & Larsson, 2019). Such mourning practices reinforce the psychological bond with the deceased and help establish the meaning of their life (Neimeyer, Klass, & Dennis, 2014). Celebrity deaths appear to have motivated sharing of health information related to the individual's cause of death (e.g., suicide, cancer), perhaps as a way to honor them or bring meaning to their death (Cohen & Hoffner, 2016; Hoffner & Cohen, 2018; Myrick, 2017). Promoting or contributing to a charity or social cause that a deceased individual championed can extend their efforts for the public good into the future. For example, after the death of conservationist Steve Irwin, there was a dramatic increase in donations to his wildlife foundation (Brown, 2010). Studies conducted following the deaths of other celebrities have documented public responses that furthered health causes they had advocated for, such as HIV/AIDS, cornea donation, and diabetes (Bae et al., 2011; Brown et al., 2003; Myrick & Willoughby, 2019). In the case of Carrie Fisher, sharing about mental health following her death could be a way to honor her and continue her mental health advocacy (Hoffner, 2019).

2. Celebrity mental health disclosures

Many celebrities have recently disclosed their experiences with mental health disorders and have advocated to increase awareness, reduce stigma, and improve public policy related to mental health (e.g., Francis, 2018; Gekoski & Broome, 2014; Wong, Lookadoo, & Nisbett, 2017). Carrie Fisher was one of the first public figures to disclose about her mental health issues, specifically addiction and bipolar disorder. She openly discussed her mental health experiences in memoirs, autobiographical novels, and interviews, including an appearance on *PrimeTime* with Diane Sawyer in 2000, in which she first disclosed her diagnosis with bipolar disorder. Throughout the rest of her life, she worked to promote mental health awareness, lower stigma, and advocate for treatment, using her status as an icon in the *Star Wars* franchise as a way to reach a wide range of people. Celebrity mental health disclosures may be especially important for public health because mental illness is stigmatized and is often concealed and avoided in communication with others (Corrigan & Kosyluk, 2014; Smith, 2007a). Media coverage of celebrity health disclosures and advocacy efforts can motivate health information seeking and sharing (e.g., on social media), which is one way that celebrity influence can be extended (e.g., Brown, 2010; Brown & Basil, 1995; Kim, 2015; Myrick, 2017; Myrick, Noar, Willoughby, & Brown, 2014).

During her lifetime, Fisher received numerous awards for her mental health advocacy, culminating in the Outstanding Lifetime Achievement Award in Cultural Humanism from Harvard College in April 2016, for openness about her experience with addiction and bipolar disorder and her work to destigmatize mental illness (Chase, 2016). Her advocacy efforts may have been effective in lowering stigma and inspiring others in part due to her role as Princess Leia, which fostered a strong emotional connection or parasocial bond to her among many fans (Brown, 2015; Stever, 2017). But the way she spoke about mental health issues was undoubtedly a key factor. First, Fisher was remarkably open about her own experiences with mental illness. The sense that personal characteristics or experiences must be kept secret or hidden tends to reinforce stigma (Boudewyns, Himelboim, Hansen, & Southwell, 2015). Goffman (1963) referred to people who have a concealable stigma (such as mental illness) as "discreditable" because revealing the stigma may lead others to discredit them. Yet keeping important aspects of one's identity secret can have negative consequences, such as isolation, fear of disclosure, and self-stigma (Corrigan, Kosyluk, & Rüsch, 2013; Link & Phelan, 2013). Fisher's openness about her mental health issues is seen as a central component of her anti-stigma efforts (Chase, 2016; Hoffner & Park, in press; Yagoda, 2016). Moreover, given her open discussion of her treatment, people dealing with similar issues may be more inclined to seek treatment as well, due to her example and to lowered self-stigma (Alonso, 2006; Corrigan et al., 2013; Francis, 2018; Jain, Pandey, & Roy, 2017).

Second, Fisher framed her mental health experiences in ways that highlighted challenge and optimism rather than stigma, to use language proposed by Smith (2007b). A frame promotes a particular definition, interpretation, or evaluation of social issues (Entman, 1993). In Fisher's writing, interviews and public appearances, she challenged the negative frames often attached to mental illness. Informal review of her writing and media coverage suggests that she emphasized her strength, pride, and resilience, she rejected shame, and she encouraged mental health treatment (e.g., Murthi, 2016; Yagoda, 2016). She framed mental health

issues in a positive, optimistic way, used humor when discussing her own experiences, and actively challenged the stigma associated with mental illness (Hoffner & Park, in press).

3. The role of celebrities in social sharing

It has been noted that celebrities are at the center of trending topics and interactions among users on social media (Cha, Haddadi, Benevenuto, & Gummadi, 2010; Hsu, Park, & Park, 2013). The reach and influence of celebrity advocacy can be expanded by prompting interpersonal communication about the topic (Kümpel, Karnowski, & Keyling, 2015; Myrick & Willoughby, 2019). Social media offer tools for social actors to publicize their goals, invite supporters, and intensify connectivity among people (Park, Lim, & Park, 2015). Hashtag-based discourse boosts health knowledge sharing, social support, and public interest and engagement in taking actions such as making donations, disseminating information, and signing petitions (Xu, Chiu, Chen, & Mukherjee, 2015). Celebrity deaths typically lead to a huge online and social media response, which often includes discussion of the social causes they supported (Brown, 2010; Myrick & Willoughby, 2019).

Fisher's death on December 27, 2016 received extensive media coverage, which often addressed her struggles with addiction and bipolar disorder, and her mental health advocacy (e.g., Weaver & Carroll, 2016; Yagoda, 2016). Many people turned to social media to express their grief and to talk about how she had personally impacted them. Their disclosure about personal experience with mental illness could be seen as a way of honoring her memory and reinforcing her advocacy message. Sharing about mental health issues in social media has the potential to increase or reduce stigma, depending on the frames (Gwarjanski & Parrott, 2018). In order to learn more about the role of celebrities and social media in public discourse about mental health, it is important to investigate the frames used.

4. The current study

The hashtag #InHonorOfCarrie, created to pay tribute to Carrie Fisher by speaking out on mental health issues and sharing personal stories, quickly sparked a flood of tweets by other users (Burleson & Parker-Pope, 2016). This study examines the role of the hashtag #InHonorOfCarrie in responding to Carrie Fisher's death and her longtime mental health advocacy by tracking the topical trends and major frames that emerged in tweets using the hashtag. The study also addresses use of the hashtag for self-disclosure of mental health issues and to challenge mental illness stigma. Concealing mental illness and avoiding communication with others about mental health issues reinforces self-stigma. So the investigation of self-disclosure and social sharing about mental illness on the hashtag created to honor Fisher is a way of assessing how her advocacy efforts inspired others after her death (cf. Brown, 2010). Thus, this study proposes the following research questions:

RQ1: What topical trends and major frames emerged from the semantic network of #InHonorOfCarrie on Twitter?

RQ2: What is the role of Carrie Fisher's mental health advocacy in users' self-disclosure and social sharing of mental health issues on Twitter?

5. Method

5.1. Data collection

To explore how users responded to Fisher's death with the hashtag #InHonorOfCarrie on Twitter, this study conducted a mixed method analysis, combining an automated text analysis using semantic network analysis and conventional content analysis with human coders. Tweets that used the hashtag #InHonorOfCarrie were collected from December 27, 2016, when Fisher died, to January 16, 2017. The tweets were collected using a social media analytics tool NUVI through the Twitter's full-archive search API. A total of 2160 tweets generated by 964 users, including original tweets, retweets, mentions, and replies, were collected.

5.2. Automated text analysis

5.2.1. Semantic network analysis

Semantic network analysis is a "meaning-centered network approach" to examine the relationship between textual components within corpus (Doerfel & Barnett, 1999, p. 589). Semantic network analysis is not only a research method, but also offers a useful theoretical framework to identify "shared meanings of symbols" through the structure of a system and interaction among a system's components (Doerfel & Barnett, 1999, p. 589). In semantic network analysis, two nodes are linked when they share concepts or interpretations (Monge & Eisenberg, 1987). The combination of two nodes can also create a new concept.

To examine the topical trends and framing process that emerged on the #InHonorOfCarrie hashtag on Twitter, semantic network analysis, including co-word analysis and cluster analysis, was employed. A total of 2160 tweets generated by 964 users were analyzed. First, a top word list using TextSTAT was created based on word frequency counts. Articles, prepositions, conjunctions, and personal pronouns were manually eliminated in this process. In addition to filtering meaningless words, we found that "mentalillness" (101) and "mentalhealth" (66) were popular hashtags in the corpus and people used it with and without a space (e.g. mental illness or mentalillness). Thus, the terms "mental illness" and "mental health" were recoded as single words: "mental illness" and "mentalhealth." Then, Fulltext.exe (https://www.leydesdorff.net/software/index.html), a content analysis software package, was used to produce a co-occurrence matrix based on the top 87 words, which occurred 20 or more times within the set of messages (Leydesdorff & Welbers, 2011). Semantic network analysis is especially useful to identify key themes and framing patterns in the texts, as frames can be detected by whether a certain theme is presented or not (Entman, 1993). The semantic interrelations between any kinds of concepts (e.g., issues, actors, evaluations, problems) can represent frames inductively (Schultz, Kleinnijenhuis, Oegema, Utz, & Van Atteveldt, 2012; Tian & Stewart, 2005).

In addition, a CONCOR (CONvergence of iterated CORrelations) block modeling using UCINet6 was carried out to uncover mutually exclusive subgroups in the semantic network (Wasserman & Faust, 1994). CONCOR partitions nodes into subsets on the basis of structural equivalence, determined by the extent to which actors have identical relations with other actors. CONCOR repeatedly computes the Pearson correlation coefficient between rows of a matrix until the matrix only comprises $+1$ and -1. The initial network is first split into two structurally distinct groups and the distinct groups can be continuously divided into two more groups. In a semantic network, words within a subgroup are structurally equivalent if they are connected to other identical words. Structural equivalence can represent thematic positions of words.

Structural properties of semantic networks were also determined. Major network indicators, including network density, centralization, and eigenvector centrality of individual nodes were calculated on the basis of valued matrices using UCInet6. Tie strengths between the words were computed with NodeXL. Network density measures the extent of connectedness between nodes in a network. For a valued network, this index represents the total of all values divided by the number of possible connections (Borgatti, Everett, & Freeman, 2002). The centralization of the network measures to what extent the ties are concentrated to a focal node in a network (Wasserman & Faust, 1994). Eigenvector centrality of a node is considered as a ranking measure that assesses the influence of the node in a network. As an extension of degree centrality, which counts the total number of ties a node has, eigenvector centrality also

considers the importance of the adjacent nodes. This index measures the relative ranking of a node according to its connection to central nodes in a network (Bihari & Pandia, 2015). In addition, multiple cohesion measures of the binarized matrices were computed. UCInet6 was used for visualization.

5.3. Hand coding of original tweets

A coding scheme was developed based both on existing work on mental health and stigma (Corrigan & Kosyluk, 2014; Corrigan et al., 2013; Link & Phelan, 2013; Smith, 2007a, 2007b) and on an inductive review of the tweets. The coding scheme was designed to capture both positive and negative content related to personal experience of mental health issues, responses to Fisher, and general responses related to mental health and stigma in society. Each category in the coding scheme (presented later) was classified as present/absent by one coder (one of the authors). Intercoder reliability scores were calculated based on coding of 20% of the sample (randomly selected) by a second independent coder using Scott's Pi for each coding category (Holsti, 1969). Scott's Pi scores ranged from 0.66 to 1.00.

6. Results

6.1. Semantic network analysis of #InHonorOfCarrie

A total of 2160 tweets with the hashtag #InHonorOfCarrie were posted by 964 unique users from December 27, 2016 to January 16, 2017. A descriptive analysis shows that on average, 102.86 tweets were posted per day (SD = 243.93). Fig. 1 presents a daily time series of the tweets throughout the period under study.

The data were highly right-skewed with heavy tails (skewness = 2.95; Kurtosis = 7.93). More than 90% of the tweets were produced within 4 days of her death, and the number of tweets sharply decreased after that. The peak of the hashtag mentions (925) occurred on December 28, one day after her death.

To address RQ1, semantic network analysis was employed to reveal the topical trends and the major frames in the tweets generated for the #InHonorOfCarrie hashtag. The word frequency analysis from the total of 2160 tweets resulted in the top 87 words (Table 1).

The most frequently used word in the tweets was "mentalillness" (718), followed by "Carrie" (706), "depression" (440), "fan" (410), "anxiety" (347), "mentalhealth" (299), "tweet" (294), "not" (243), and "bipolar" (220). Semantic network of #InHonorOfCarrie was constructed based on a word x word co-occurrence matrix (87 × 87 words). Table 2 presents the top word pairs in terms of their co-occurrence in the tweets and tie weights.

The results indicate that the strongest word pair was "mentalillness" and "Carrie" (506,908); "Carrie" was also associated with "mentalhealth" (211,094). These uses reflect the goal of the hashtag to address Fisher's mental health advocacy. Other prevalent words pairs were "Carrie" with "fan" (289,460) and with several mental health conditions, including "depression" (310,640), "anxiety" (244,982), and "bipolar" (155,320). It is also important to note that the term "fan" was associated not only with "Carrie" but also with "mentalillness" (294,380) and "mentalhealth" (122,590), as well as "depression" (180,400) and "anxiety" (142,270).

In addition, some negative words such as "fault" (8262), "weakness" (8019). "ashamed" (7290), and "afraid" (4850), were connected to the negator "not". In other words, the negative terms were proceeded by the negator "not". For example, "I will spread awareness by not being afraid to speak up about mental illness and what i've been through" and "mental illnesses are nothing to be ashamed of, they are illnesses, not weaknesses." Thus, this suggests that the term "not" was used to negate negative feelings related to mentally illness and to show their self-esteem.

As summarized in Table 3, it is noteworthy that the results of eigenvector centrality measures indicate that the frequently used words mentioned above were also influential nodes in the semantic network. This means that the terms with high eigenvector centralities contribute to creating major concepts and meanings in the tweets as they were connected to many other frequently used terms. Terms, referring to mental illness disorders, sharing-oriented terms, openness and sharing related terms construct the major topics in the tweets.

Fig. 2 visualizes the semantic network map of #InHonorOfCarrie using spring embedding algorism based on geodesic distances between nodes. As such, words with smallest path lengths to one another was closely located in the graph. The node size is proportional to the frequency of a word in which a bigger node represents more frequently used word. The tie between words indicates a co-occurrence of the words. The weighted matrix was transformed to the binarized matrix in terms of the average density value to only indicate the connections between nodes if the connection is greater than the density value. Both the node color and shape represent subgroups identified by the CONCOR analysis.

The average density of the semantic network was 9102.697 with the centralization value of 11.09%, which suggests that terms used on the

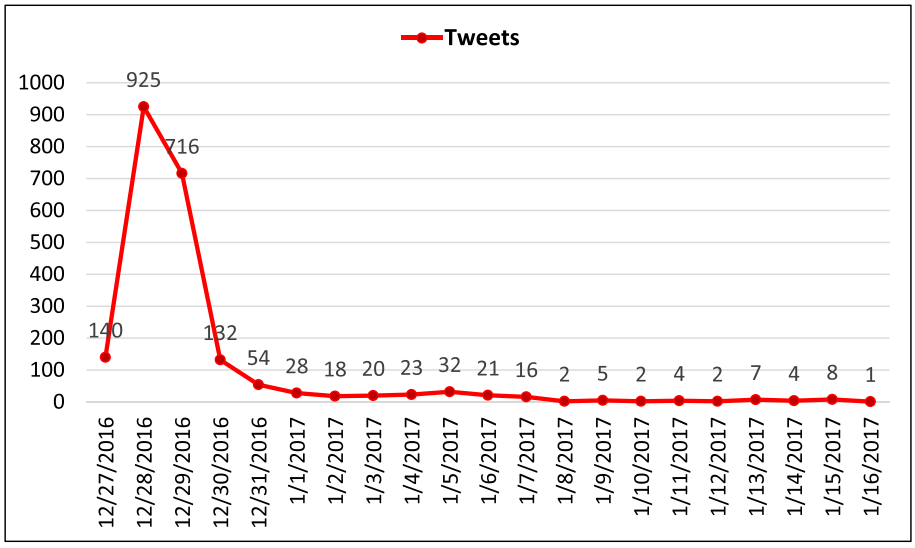

Fig. 1. Tweets per day after Fisher's death.

Table 1
The list of top words in the #InHonorOfCarrie network.

Rank	Word	Frequency	Rank	Word	Frequency	Rank	Word	Frequency
1	mentalillness	718	31	condition	76	61	fault	34
2	Carrie	706	32	ana	72	62	proud	34
3	depression	440	33	need	72	63	weakness	33
4	fan	410	34	treatment	71	64	support	33
5	anxiety	347	35	movement	67	65	selfcontrol	32
6	mentalhealth	299	36	great	67	66	world	32
7	tweet	294	37	open	62	67	ashamed	30
8	not	243	38	day	62	68	read	30
9	bipolar	220	39	media	60	69	adhd	29
10	story	215	40	ptsd	52	70	major	29
11	honor	169	41	death	50	71	illness	28
12	hashtag	161	42	brave	46	72	better	28
13	disorder	159	43	courage	45	73	break	28
14	help	143	44	like	45	74	coming	28
15	share	136	45	say	44	75	battle	26
16	people	133	46	therapy	44	76	beautiful	26
17	year	123	47	ocd	43	77	med	25
18	inspire	121	48	talk	41	78	barrier	24
19	honesty	120	49	fight	40	79	panic	24
20	speak	111	50	twitter	39	80	try	24
21	suffer	109	51	seek	39	81	feel	24
22	today	107	52	gift	38	82	know	23
23	stigma	102	53	taught	38	83	disease	21
24	family	96	54	severe	38	84	strong	21
25	good	91	55	alcoholism	37	85	sufferer	21
26	thank	87	56	issue	36	86	afraid	20
27	life	86	57	live	36	87	person	20
28	diagnosed	85	58	understand	36			
29	struggle	81	59	character	35			
30	social	80	60	time	35			

Table 2
Top word pairs in the #InHonorOfCarrie network.

Rank	Word 1	Word 2	Tie Weight	Rank	Word 1	Word 2	Tie Weight
1	mentalillness	Carrie	506,908	26	Carrie	honor	119,314
2	mentalillness	depression	315,920	27	mentalillness	hashtag	115,598
3	Carrie	depression	310,640	28	mentalillness	disorder	114,162
4	mentalillness	fan	294,380	29	Carrie	hashtag	113,666
5	Carrie	fan	289,460	30	Carrie	disorder	112,254
6	mentalillness	anxiety	249,146	31	depression	not	106,920
7	Carrie	anxiety	244,982	32	anxiety	mentalhealth	103,753
8	mentalillness	mentalhealth	214,682	33	mentalillness	help	102,674
9	Carrie	mentalhealth	211,094	34	anxiety	tweet	102,018
10	mentalillness	tweet	211,092	35	Carrie	help	100,958
11	Carrie	tweet	207,564	36	fan	not	99,630
12	depression	fan	180,400	37	mentalillness	share	97,648
13	mentalillness	not	174,474	38	depression	bipolar	96,800
14	Carrie	not	171,558	39	Carrie	share	96,016
15	mentalillness	bipolar	157,960	40	mentalillness	people	95,494
16	Carrie	bipolar	155,320	41	depression	story	94,600
17	mentalillness	story	154,370	42	Carrie	people	93,898
18	depression	anxiety	152,680	43	fan	bipolar	90,200
19	Carrie	story	151,790	44	mentalillness	year	88,314
20	fan	anxiety	142,270	45	fan	story	88,150
21	depression	mentalhealth	131,560	46	tweet	mentalhealth	87,906
22	depression	tweet	129,360	47	mentalillness	inspire	86,878
23	fan	mentalhealth	122,590	48	Carrie	year	86,838
24	mentalillness	honor	121,342	49	mentalillness	honesty	86,160
25	fan	tweet	120,540	50	Carrie	inspire	85,426

#InHonorOfCarrie" hashtag formed a dense and decentralized semantic network. These results mean that the words were densely connected to each other and the words tend to be less centralized around specific words. Table 4 presents the binarized multiple cohesion measures of the sematic networks. The results show that only one component was observed with fragmentation value of 0. The average degree and the average distance in the network were 19.379 and 1.775 respectively. This means on average, each word had around nineteen ties, and only around 1.88 steps were necessary to reach any other randomly chosen word in the network. The diameter value of 2 also suggests that it took around two steps at most to reach any word in the network. The findings also indicate that the network exhibited a very small closure value of 0.458, indicating high interconnectivities among concepts in the network. These structural properties of the network can be interpreted to mean that users generated closely integrated concepts rooted in shared agendas and interests in the tweets under the hashtag (Park et al., 2015; Rafferty, Stanton, & Walker, 2013).

The structure of the semantic network in Fig. 1 resembles a well-

Table 3
Eigenvector centrality of the top words on the semantic network of #InHonorOfCarrie.

Rank	Word	Eigenvector Centrality
1	mentalillness	0.432
2	Carrie	0.428
3	depression	0.305
4	fan	0.287
5	anxiety	0.249
6	tweet	0.218
7	mentalhealth	0.214
8	not	0.18
9	story	0.163
10	bipolar	0.16
11	honor	0.127
12	hashtag	0.121
13	disorder	0.12
14	help	0.108
15	share	0.103
16	honesty	0.1
17	inspire	0.093
18	people	0.091
19	speak	0.091
20	suffer	0.084

known butterfly network topology, which represents central hubs and two major fragmented components from the hubs in the network. The central nodes were "mentalillness" and "Carrie". In the left wing, words related to confidence of dealing mental illness disorders and self-esteem such as "strong", "try", "proud", "battle", and "break" were mainly appeared. In the right wing of the figure, words related to Fisher's role in mental health advocacy, such as "fan," "fight," "courage," "support," "brave," "taught," and "open," and social movement-related words, including "hashtag," "Twitter," "tweet," "honor," "media," and "movement," were densely connected to "Carrie".

6.2. Semantic network analysis of the concepts "mentalillness" and "mentalhealth"

We found that mentalillness and mentalhealth were central concepts in the semantic network of #InHonorOfCarrie. To compare the semantic pattern of conceptualization between the terms, an ego-network of the words "mental illness" and "mental health" were generated. Fig. 3 shows a 2-mode network of the concepts "mental illness" and "mental health" using spring embedding algorism based on geodesic distances between words.

Squares represent "egos", focal nodes within a network, and circles denote "alters", the nodes directly connected to egos. A node size refers to the frequency of word in the entire tweets and the node color refers to the sentiment of each word. Node colors indicate the sentiment polarities of words (red: negative; yellow: neutral; blue: positive). A tie between words shows the co-occurrence of words in the tweets and the thickness of lines indicate the strength of the tie. To compare the associated words between the two concepts, the ties between the other words were not displayed in this map.

The semantic network suggests that the concepts of mental health and mental illness share most of the words. However, mental illness was more closely associated with disease-related terms, such as "disease," "anxiety," "depression," "PTSD," "ADHD," and "alcoholism," and with Fisher's role in mental health advocacy. The results also indicate that mental health was more closely connected to action- and solution-oriented terms to communicate about and deal with mental disorders. Examples include openness-related words such as "speak," "say," and "share," and treatment-related words such as "treatment," "therapy," and "meds."

As summarized in Table 4, the semantic network for mental illness was denser and more centralized (Average Density = 8959.34 with centralization value of 58.16%) than was the semantic network for mental health (Average Density = 4459.32 with centralization value of 41.93%). This result indicates that users addressed a greater variety of topics when they referred to mental health than mental illness.

6.3. Major frames in the semantic network of #InHonorOfCarrie

To examine the major frames employed by the users, the CONCOR analysis identified eight subgroups in the semantic network (Fig. 4).

The main frames found in each subgroup were "honoring Fisher and discussing her mental illness" (pink), "fans' tweets to honor Fisher and sharing their stories" (light blue), "the role of Fisher in reducing stigma

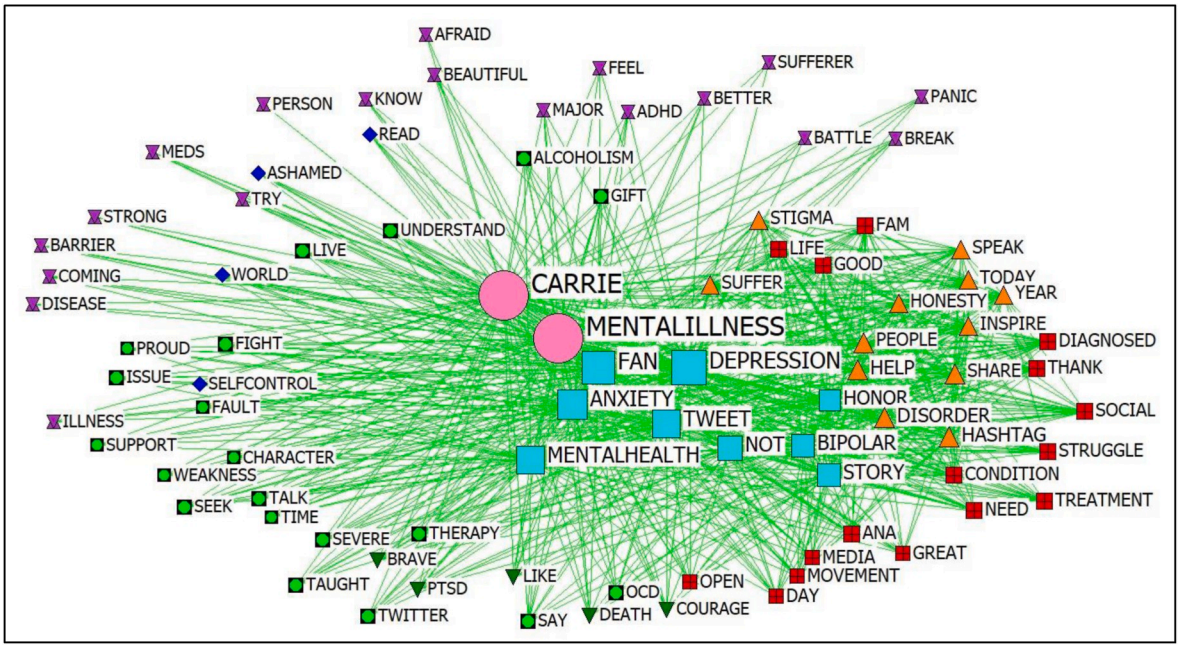

Fig. 2. The Semantic Network of #InHonorOfCarrie. Node color and shape: Subgroups classified by the CONCOR analysis. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Table 4
Multiple cohesion measures of semantic networks.

Measures	Definitions	InHonorOfCarrie Network	Mental Illness Network	Mental Health Network
Avg degree	Average number of links each node has	19.379	21.800	19.178
H-Index	Largest number x such that there are x vertices of degree at least x in the underlying graph	23	29	23
Degree Centralization	Sum of the squares of the proportion of the total centrality held by each node	0.793	0.692	0.791
Components	Number of weak components	1	8	2
Components ratio	Number of components minus one divided by the number of actors minus one.	0	0.079	0.011
Connectedness	1 minus the fragmentation	1	0.850	0.978
Fragmentation	Proportion of pairs of nodes that are unreachable.	0	0.150	0.022
Closure	Number of non-vacuous transitive triples divided by number of paths of length 2	0.458	0.556	0.448
Avg distance	Average geodesic distance amongst reachable pairs	1.775	1.712	1.780
SD distance	Standard deviation of the geodesic distances amongst reachable pairs	0.418	0.453	0.415
Diameter	Length of the longest geodesic distance	2	2	2
Wiener Index	Average shortest path distance	13,278	00650	13,938
Dependency Sum	Sum of the betweenness proportions of Y for all pairs which involve node X	5796	4844	6106
Compactness	Mean of all the reciprocal distances	0.613	0.547	0.597

Note. Definitions compiled and modified by the authors for this study based on several sources, including Park et al. (2019) and Park, Yoon, and Leydesdorff (2016).

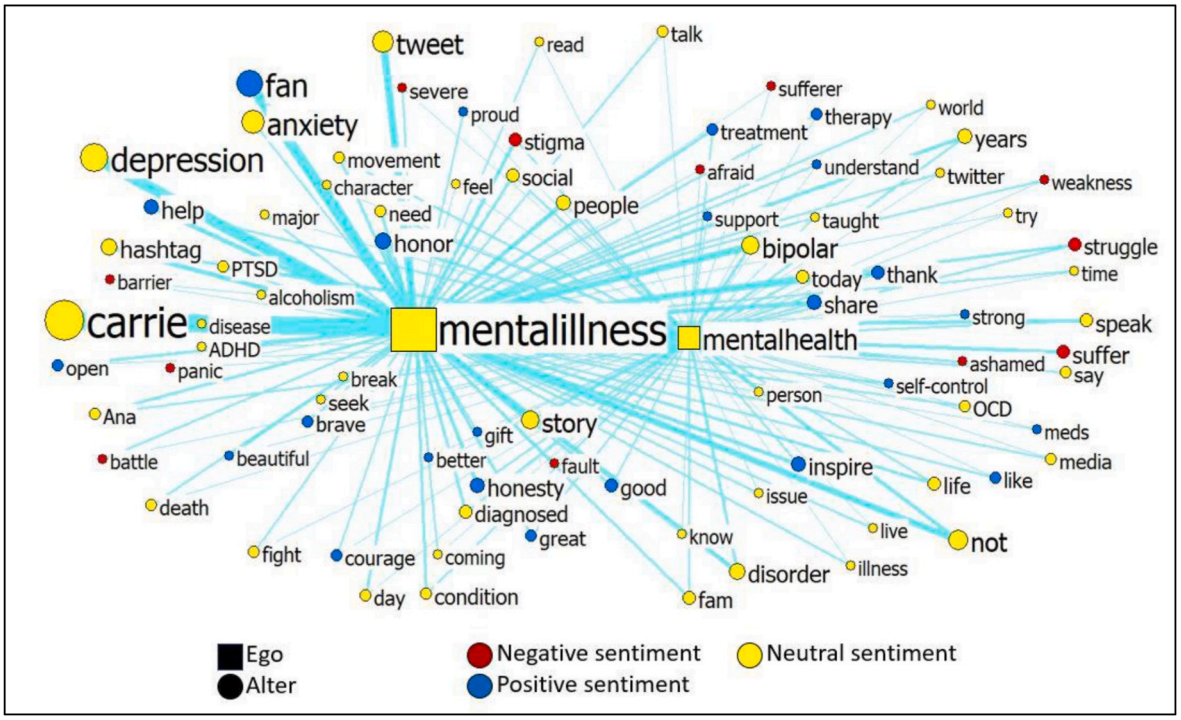

Fig. 3. The semantic network of mental illness and mental health.

related to mental disorders and voicing optimism regarding living with mental illness" (right green), "gratitude to the hashtag" (yellow), "the role of Fisher's death in inspiring people with mental illness to come out and share their stories" (green), "confidence of overcoming mental disorders" (purple), "expressing no shame and confidence of living with mental disorders and increasing awareness of the hashtag" (blue), and Fisher's challenge to stigma and inspiring people to join in mental health advocacy" (red). Interestingly, the subgroups "gratitude to the hashtag" and "fans' tweets to honor Fisher and sharing their stories" are strongly connected.

6.4. Users' self-disclosure and social sharing of mental health issues on twitter

To address RQ2 which asks the role of Fisher's mental illness advocacy in users' self-disclosure and social sharing of mental health issues on Twitter, a content analysis was conducted for the original tweets. The number and percentage of the 1157 original tweets that mentioned each coded category are presented in Tables 5 and 6. The tables also report Scott's Pi for each category (percent agreement exceeded 95.0% for all).

Table 5 shows that the most common disorders reported were depression and anxiety, followed by bipolar disorder. A total of 482 of the 1157 tweets (41.7%) included a personal disclosure of one or more mental health conditions (e.g., "Been dealing with anxiety since I was 13; " "I am being treated for severe depression; " "I have bipolar disorder too"). Just under half of these users reported dealing with more than one mental health issue.

As Table 6 shows, openness, honesty and sharing was common topics in the tweets. Some people commented on their own openness (e.g., "#InHonorOfCarrie I'll be open about my own mental illness; " "I decided to join the movement and come out; " "I will continue to proudly speak openly about my bipolar"), and a few acknowledged some

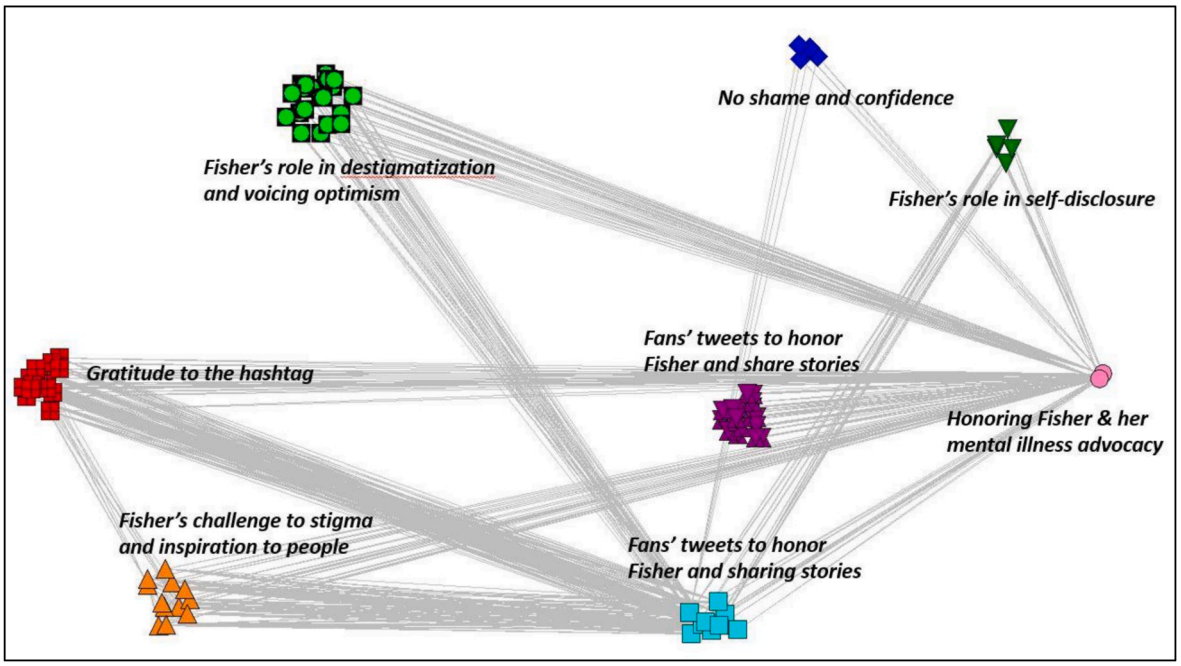

Fig. 4. CONCOR network of #InHonorOfCarrie.

Table 5
Mental health conditions self-reported by users on #InHonorOfCarrie.

	Frequency	Percent of Sample	Scott's Pi
Depression	283	24.5	0.99
Anxiety/Generalized Anxiety Disorder	222	19.2	1
Bipolar Disorder	109	9.4	0.95
Post-Traumatic Stress Disorder	49	4.2	1
Obsessive Compulsive Disorder	38	3.3	1
Mental Illness (unspecified)	24	2.1	1
Panic Disorder	20	1.7	1
ADHD/ADD	19	1.6	1
Addiction	17	1.5	1
Personality Disorder	14	1.2	1
Eating Disorder	12	1.0	0.8
Suicidal Ideation	11	1.0	1
Seasonal Affective Disorder	3	0.3	–
Dissociative Identity Disorder	3	0.3	1
Schizoaffective Disorder	1	0.1	–

Note. N was 1157. The conditions for which no reliability is reported did not appear in the selected tweets that were coded for reliability.

reluctance (e.g., "Sometimes it's hard for me to voice …").

A large number of tweets – nearly one quarter – referred to the value of people sharing on the hashtag #InHonorOfCarrie. For example, one person wrote: "#InHonorOfCarrie Such a powerful crowdsourced initiative in raising awareness & ending the stigma around mental health." Another stated: "This is a great hashtag as people come out about their mental illness in the wake of Carrie Fisher's death." One tweet imagined Fisher's reaction: "I bet Carrie Fisher would love the impact she has in fighting the stigma of mental illness even after her passing."

Table 6 also shows that when describing their personal experiences, users often reported personal difficulties or challenges of dealing with mental health issues, but often made positive self-references as well. Many used words like "struggle" and "suffer" to describe challenges they faced. For example, one tweet stated: "I suffer horribly from BPD." Another said: "I struggled with anxiety for years but didn't seek help until it was almost too late." But people also often referred to their own self-confidence and pride (e.g., "Bipolar disorder will not beat me"; "I'm proud of how far I've come; " "I finally feel like I'm able to win"). Negative self references were rare. Some people specifically spoke of the positive influence that Carrie Fisher had on them personally (e.g., "Thanks, Carrie for teaching me to accept myself; " "Carrie Fisher's honesty helped me open up"). Others commented on personal successes in overcoming challenges. For example: "My PTSD was so severe docs said I would never go to college or hold down a job. Today I have a degree and a career."

Treatment was also a topic of some tweets. Some people described their own treatment (e.g., "I'm in treatment, I'm on meds, finally getting help; " "All under control thx to meds and right therapist and doctor."), and others advised those in need to seek help and support (e.g., "It's OK to get help. You're NOT alone; " "Seek help. It's worth it; " "If you're there and need someone to talk to, reach out."). Comments also endorsed pride ("I'm proud to say I'm in recovery for addiction/alcohlism"), and rejected stigma ("erase the stigma; " "let's break the stigma") and shame ("I am not and never will be ashamed; " "There's no need to be ashamed").

Many of the posts focused on Fisher's own openness and honesty, her efforts to challenge stigma, her inspiration to others and the legacy she left. Selected comments include: "Carrie Fisher's unabashed honesty was an inspiration to all of us; " "Carrie Fisher's bravery about #mentalillness gave so many permission to also share their stories; " "Thank you, Carrie for being an inspiration; " "She left such a legacy; " "Thankful for Carrie's role in fighting the stigma!" Some posts referred to Fisher as Princess or General, and made references to *Star Wars*. Others expressed sadness about her death (e.g., I'm so sad she is gone; " "Princess Leia, you will be missed"), but this was not a major focus of those using the hashtag.

7. Discussion

Following Fisher's death, the hashtag #InHonorOfCarrie was created by well-known media figures, Ana Marie Cox and Julie DiCaro, to honor her legendary role as a mental health advocate by sharing their own experiences of mental illness as Fisher did in many media forums (Murthi, 2016; Yagoda, 2016). The hashtag quickly spread and began trending on Twitter. This study investigated use of the hashtag in

Table 6
Comments included in original tweets using #InHonorOfCarrie.

	Frequency	Percent of Sample	Scott's Pi
Self-Relevant Statements			
Personal difficulties/challenges associated with mental illness	159	13.7	0.9
Positive internal self-reference (e.g., self-confidence, pride)	128	11.1	0.76
Seeking/sought therapy or treatment	122	10.5	0.88
Personal openness/honesty/sharing	66	5.7	0.93
Personal successes/achievements in life or therapy	53	4.6	0.85
Beneficial personal impact of Fisher	53	4.6	0.77
Personal reluctance to share or be open about mental illness	19	1.6	1
Personal reluctance to seek treatment	12	1.0	1
Negative internal self-reference (e.g., no confidence, shame)	3	0.3	–
Harmful personal impact of Fisher	0	0	–
Statements About Carrie Fisher			
Fisher's legacy/inspiration to others	130	11.2	0.84
Fisher's openness/honesty	83	4.6	0.91
Refers to *Star Wars*/Princess Leia	57	4.9	0.89
Expresses grief/Refers to Fisher's death as a loss	55	4.8	0.82
Expresses gratitude/thanks to Fisher	45	3.9	0.91
Expresses affection/admiration for Fisher (not related to above)	30	2.6	0.79
Fisher's efforts to de-stigmatize mental illness	25	2.2	0.85
Negative comment/criticism of Fisher	1	0.1	1
General Statements			
Gratitude to others for sharing/Praise for #InHonorOfCarrie	248	21.4	0.83
Rejects stigma, calls for destigmatization	79	6.8	0.88
Uses fight/active challenge metaphor	68	5.9	0.92
Endorses pride for people with mental illness	34	2.9	0.91
Challenges/rejects shame related to mental illness	32	2.8	0.71
Encourages seeking support, offers encouragement	23	2.0	1
Encourages others to seek treatment	21	1.8	0.92
Endorses benefits of openness/honesty/sharing	17	1.5	0.66
Personally endorses stigma related to mental illness	0	0	–

Note. N was 1157. The statements for which no reliability is reported either did not occur at all or did not appear in the selected tweets that were coded for reliability.

responding to Fisher's death by employing mixed text analysis approaches. The results of semantic network analysis suggest that people openly discussed about mental health issues as intended by the hashtag creators. Users' voices also supported anti-stigmatization, just as Fisher had done. The frequently used words and major frames included feeling unashamed and denying weakness regarding their mental disorders. At the same time, users regularly employed positive-self references such as "strong" and "proud" when expressing themselves about their mental health.

Social network measures indicate that the hashtag constructed a cohesive semantic network. This means that users generated closely connected and integrated sets of themes and frames such as honoring Fisher's role in health advocacy, specific mental disorders they had, and framing mental illness in a positive way. The hashtag discourse on Twitter was characterized by "performative commemoratives" in which the mourners memorialized Fisher and advocated for public issues related to her (Santino, 2004). The users continued Fisher's framing of mental health in a positive way that reflected her challenge metaphor and her openness and honesty about mental illness (Kümpel et al., 2015).

The comparison of semantic patterns of the concepts mental health and mental illness showed that while mental illness was more closely associated with disease-related terms, mental health was more connected to action- and solution-oriented terms such as openness towards mental illness to combat stigma or treatment. Compared to mental illness, the users also discussed broader issues when addressing mental health. These results imply that labeling "mental health" rather than "mental illness" in mental health advocacy on social media can activate more discussion about healthy behaviors or ideas to reduce stigma and facilitate a public discussion of users' experiences and ideas on wider range of mental health related issues.

In addition to computerized text analysis, conventional content analysis captured more nuanced personal experiences of mental health issues, responses to Fisher, and responses related to mental health and stigma in society. Users most often specified their past or current mental disorders. The most common disorders reported were depression and anxiety, followed by bipolar disorder. This suggests that people with similar mental illnesses to Fisher actively engaged in the hashtag discourse, which may be partially due to identification with her. These results are consistent with the findings of Myrick's (2017) study, which showed that identification with a celebrity drove information sharing and engagement in pro-social actions related to his death.

Many tweets addressed Fisher's legacy in inspiring others with mental illness and honored her openness and honesty. Some expressed grief about her death and referenced *Star Wars* or her character Princess Leia. This suggests that fans' involvement with Fisher's iconic media persona might have influenced users' participation in the hashtag discourse (de Bruin-Mole, 2018; Widmayer, 2017). These findings reinforce the role of celebrity involvement in motivating people's support for causes that celebrities championed prior to their death (Brown, 2010; Brown et al., 2003).

This study also provides practical implications about the potential value of using celebrities in mental health campaigns. The results suggest that a celebrity's extensive media presence, emotional bond with the public, and open disclosure of mental illness may stimulate social media discussion about mental health issues and self-disclosure of mental illness experiences. It is noteworthy that many users expressed gratitude to others who used the hashtag and praised the value of the hashtag. Following Fisher's lead, they also rejected stigma and called for support for destigmatization of mental health issues. These results show the role of social media and hashtag use in reducing both self stigma and public stigma by encouraging open discussion and active seeking of support (Boudewyns et al., 2015).

The findings also suggest that the #InHonorOfCarrie hashtag successfully shifted the discourse on mental illness from a stigmatized narrative or negative framing to a positive conversation, with users often expressing self-esteem and optimism about dealing with mental disorders. This indicates the potential of social media, especially Twitter, as an alternative platform in tackling major media frames that have contributed to increasing stigma and stereotypes of people with mental illness (Smith, 2007b). This study offers additional insight into the public influence of celebrity advocacy, especially the ways that a celebrity death can promote social sharing to support a cause they championed (e.g., Bae et al., 2011; Brown, 2010; Myrick & Willoughby, 2019). Overall, this study suggests that Fisher's openness and advocacy empowered people dealing with mental health conditions and inspired others to continue her efforts via social media.

This study also provides important methodological insights by adapting the computer-assisted text analysis and conventional content analysis with human coders to complement each other. We demonstrated that semantic network analysis is useful to systemically reveal topical trends as well as distinctions across texts, as generated from a large unstructured set of social media posts (Kwon, Barnett, & Chen, 2009). Given the unit of the analysis was a short message of up to 140 characters, this approach helps identify subtle aspects of message framing among users for the advocacy. Semantic network analysis can supplement conventional content analysis, which usually relies on an

analytical framework that is heavily determined by meaning categorization of researchers (Doerfel & Barnett, 1999; Kwon et al., 2009). While computer-assisted text analysis is valuable for exploring users' conceptualizations of critical concepts and issues based on co-occurrence of terms, conventional content analysis allows more in-depth analysis and interpretations of the meanings within the specific context of the messages, which could be overlooked in computerized text analysis (Park, Chung, & Park, 2019).

8. Limitations and future research

Although this study demonstrated useful and innovative analytical frameworks for exploring the function of hashtag discourse in the social influence of celebrity mental health advocacy, it is not without limitations. First, while the study only considered Twitter for the hashtag discourse, people also used other social media platforms to memorialize Fisher, such as Facebook and Instagram. Future studies should investigate different social media platforms to increase our understanding of the way that online discourse develops to honor deceased celebrities and promote health issues they supported. Second, this study does not address the impact of this hashtag on the public, especially on those who are not dealing with mental health issues. Third, the study only considered Twitter data in English. Given that Carrie Fisher was an internationally well-known star, fans who speak other languages might have used social media to share about her mental health advocacy.

In this study, we only investigated the text of the tweets that users created, but they often added links to information sources such as news articles. For future studies, the information and contents shared via tweets need to be analyzed for more fruitful discussion about what users shared. In addition, a substantial portion of the tweets on the #InHonorOfCarrie hashtag were retweets rather than original contents. It is important to analyze content that is widely distributed, because a small number of people with influencer status generate most of the popular contents on social media and influence issue dissemination and content framing (Park, Park, Lim, & Park, 2016). Future studies need to analyze the influencers who play critical roles in promoting mental health advocacy and which messages are more likely to be circulated and referred by users on social media.

Finally, hashtag users often referenced *Star Wars*, Princess Leia, or grief about Fisher's death, and many reported that they had dealt with depression and bipolar disorder, as Fisher had. These findings suggest that involvement with Fisher (e.g., through parasocial bonds, identification) may have encouraged them to participate in the Twitter discourse (Brown, 2015; Stever, 2017). However, as this study was descriptive and did not assess users' perceptions or intentions, future research needs to explore users' perspectives in conjunction with analyses of social media posts. Further study of what motivates people to participate in social media advocacy – as well as responses to those efforts – would increase our knowledge of the potential contribution of social media to beneficial social outcomes.

9. Conclusions

Carrie Fisher's death led to mourning and honoring her through use of a social media hashtag intended to promote social change related to mental health. This study examined the role of the hashtag #InHonorOfCarrie, created on Twitter soon after Carrie Fisher's death, in social sharing and self-disclosure about mental health issues. The results of our study shed light on the social influence of Carrie Fisher, a cultural icon who devoted extensive effort during her lifetime to challenging stigma and encouraging public discussion about mental health issues (Hoffner & Park, in press). The findings indicate that hashtag users were inspired by Fisher's mental health advocacy and honored her legacy by disclosing about their own mental health experiences. Consistent with Fisher's approach, users not only challenged the stigma of mental illness, but also framed it in a positive and optimistic way by expressing confidence in coping with mental disorders.

The findings contribute to the growing body of work showing that celebrity deaths can prompt public responses that further social causes the celebrities promoted during their lives (Bae et al., 2011; Brown, 2010; Myrick & Willoughby, 2019). Fisher's legendary role as Princess Leia and the active fan community of *Star Wars* (Guitton, 2012; Widmayer, 2017) likely fostered a strong emotional connection to her, leading to virtual tributes that furthered her mental health advocacy. The hashtag #InHonorOfCarrie is an example of how a celebrity death can stimulate a cascade of social media posts that not only memorialize the person's life but also promote prosocial actions or positive social change associated with the celebrity.

CRediT authorship contribution statement

Sejung Park: Conceptualization, Methodology, Data curation, Formal analysis, Software, Visualization, Investigation, Writing - original draft, Writing - review & editing. **Cynthia A. Hoffner:** Conceptualization, Formal analysis, Data curation, Software, Investigation, Writing - original draft, Writing - review & editing.

Acknowledgement

The authors would like to thank Blake Cravey, an MA student in the Department of Communication, Georgia State University, for his help with the hand coding of the tweets.

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