An analysis of Australian news and current affair program coverage of sharks on Facebook

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Abstract
As most people will never encounter sharks in the wild, the media’s portrayal of these animals is a key contributing factor to public perception of these species. Facebook is a common way for people to engage with news in Australia. Therefore, content and thematic analysis was conducted on a novel dataset comprising of 2,643 Facebook posts made by Australian news and current affairs media outlets during 2016. To allow for an understanding of the general public’s reaction to the media coverage, 40,373 public Facebook user’s comments were also analyzed. Shark-related posts were common, with 87% of all the news-related Facebook pages analyzed having published at least one post related to sharks and only 49 days had no published shark-related posts. Shark and human interactions were overwhelmingly the most common theme in the Facebook posts with 45.6% falling into this category and none of these posts labelled the interactions using the Australian Shark Attack File categorization. A common theme emerging from the user comments was that the ocean is dangerous (n = 2,493), suggesting that people may perceive the risk of shark attacks to be high. Because human behaviors negatively impact shark populations, social science research, including media analyses, is an important tool for understanding perceptions of sharks and may guide strategies that could support conservation efforts, including suggestions for how the media should report shark and human interactions.

KEYWORDS
conservation psychology, Facebook, media analysis, risk perception, shark attacks, sharks in media

1 | INTRODUCTION
Numerous anthropogenic actions are threatening global shark populations, including commercial fishing practices, the shark finning industry, and habitat destruction (Muter, Gore, Gledhill, Lamont, & Huveneers, 2012). While these threats affect all ocean dwelling species (Halperrn et al., 2008), they have a particularly devastating consequences for sharks, because of their slow life history strategies (e.g., late maturity and low reproduction rates; Chin, Kyne, Walker, & McAuley, 2010; Muter et al., 2012). A further threat impacting shark populations, particularly in Australia, is aggressive shark attack mitigation (Crossley, Collins, Sutton, & Huveneers, 2014). For the purpose of this study, aggressive mitigation refers to mitigation or deterrents that harm/or potentially harm sharks (e.g., shark nets and drumlines) and includes lethal culling. Non-aggressive mitigation refers to non-lethal deterrents or techniques that do not harm sharks (e.g., ecobarriers and
shark conservation is essential. Recent studies focus on the conservation of global shark populations, including studies of their behavioral ecology (see review Kraska & Gaskins, 2015), and analysis of commercial fishing trends to identify sustainable practices (Clarke, Harley, Hoyle, & Rice, 2012). This research must continue, but as the principle threats to shark populations are human behaviors (Muter et al., 2012), research aimed at understanding the human dimensions of shark conservation is essential.

The media has the potential to impact how people feel about an event and typically highly publicized events (e.g., tornadoes and homicides) are reported in a sensational way (sensationalism) which may contribute to overestimated frequency of risk (Slovic, Finucane, Peters, & MacGregor, 2004). As most people will never encounter large carnivores (including sharks) in the wild, the media's portrayal of these animals is a key contributing factor to public perception of these animals (Jacobson, Langin, Carlton, & Kaid, 2011). This is in part through agenda-setting by the media, which directs audience attention towards topics that the media frequently reports on (Sabatier & Huveneers, 2018). While the media has been acknowledged for its ability to encourage participation in conservation initiatives, through the field of conservation marketing (Massé, 2019; Moglia, Cook, & Tapsuwan, 2018), it also potentially can hinder conservation initiatives which needs to be understood (Neff, 2015).

Although there is now a large body of evidence that shows that many shark species are at risk of extinction, newspaper coverage still emphasizes the threats from sharks to humans, rather than from humans to sharks. An analysis of shark-related newspaper articles published in Australian and the United States found that over half emphasized negative impacts of sharks (Muter et al., 2012). It was also found that almost half of the articles reported elevated public risk perceptions or fear of sharks (Muter et al., 2012). The most frequently reported shark species were white sharks \((n = 75)\), bull sharks \((n = 32)\), and tiger sharks \((n = 13)\), which are the species most often involved in shark attacks (Ricci, Vargas, Singhal, & Lee, 2016). Another analysis of newspaper coverage focused on 361 Western Australian articles published between 2011 and 2013. The most frequent topic in the articles was shark bites and threats from sharks, and 60% of articles analyzed were framed towards the negative impacts of sharks on humans. Further, like the Muter et al. (2012) study, white sharks and tiger sharks were cited most frequently (Sabatier & Huveneers, 2018).

The popular entertainment media has also long been recognized to promote negative portrayals of sharks (Peschak, 2006), including the long-term impact of the 1975 film *Jaws*. The “Jaws Effect” states that politicians use fictional film representations to describe shark attacks and justify lethal mitigations (Neff, 2015). *Jaws* is not the only film franchise to portray sharks negatively; a search on the comprehensive catalogue of film and television program site (IMDb, 2019 reveals there are over 100 shark films, including the recent releases portraying rogue sharks (*The Shallows, released 2016*), killer prehistoric sharks (*The Meg, released 2018*), dangerous flying sharks (*Sharknado franchise, released between 2013–2018*), and deadly cage-dive experiences (*47 Metres Down, released 2017*), all of which may maintain negative portrayals of sharks.

Although the most frequently mentioned shark species are the ones viewed as dangerous, not all media portrayals focus on these species of sharks. Articles published in Australia between 1969 and 2003 about grey nurse sharks, a species that is not commonly involved in shark attacks on humans, were mostly positive (49%) or neutral (39%) in tone, and only 12% were negative (Boissonneault, Gladstone, Scott, & Cushing, 2005). Plankton-eating sharks are not dangerous to humans (Kraska & Gaskins, 2015). Muter et al. (2012) found that plankton-eating sharks were cited only a handful of times (whale shark \(n = 6\), basking shark \(n = 2\), Editorial pieces, which express reader's opinions, have also been found to be largely positive (82%) about sharks (Boissonneault et al., 2005).

Media is also analyzed through the use of framing, which can include devices such as metaphors and depictions used to evoke certain reactions in audiences (McCagh, Sneddon, & Blache, 2015). When articles in the online newspaper “West Australia” discussing the implementation of drum lines, which area form of mitigation against shark attack, were analyzed, it was identified that there were both anthropocentric-based (prioritizing human safety) and conservation-based (prioritizing shark safety) frames. These include that while the public expressed beach safety concerns (anthropocentric-based), they did not accept this concern as justification for the use of drum lines (conservation-based). Such comments indicate that a large proportion of the public did not accept the government’s anthropocentric views. However, McCagh et al. (2015) acknowledge that their conclusions are speculative as they did not communicate directly with the public.

One important consideration when analyzing shark and human interactions in the media is the categorization or label of the interactions used. Vivid terms including “attack,” “man-eater,” and “rouge” have long been used to describe sharks in literature, films, and the media (Neff & Hueter, 2013). Pepin-Neff (2019) analyzed newspaper articles from Sydney (Australia), Cape Town (South Africa), and Florida (United States) to determine how they used the word
“attack” in the context of sharks. Newspaper articles in Cape Town included the word “attack” once for every 107 words, while Sydney articles used the word “attack” most often, an average of six times per article. Overall, irrespective of city, the term “attack” was used for a variety of human–shark interactions, which included those that resulted in minor bites by sharks (Pepin-Neff, 2019). In the 1960s Schultz (1963) proposed to classify shark and human interactions as either a “provoked attack” or an “unprovoked attack” (see Table 1), and these labels are still used by the Australian Shark Attack File (ASAF) (Australian Shark Attack File, 2018). Neff and Huetter (2013) have highlighted the problems of using the term “attack” and suggest that it can amplify perception of risks of a shark attack as it does not allow for the distinction between minor and fatal incidents or interactions. To address the shortcomings of the ASAF categorization, Neff and Huetter (2013) propose a new type of classification with the categories “sightings” to include sightings of sharks when they are not in proximity to people, “encounters” to include shark–human interactions where no physical contact occurs, “bite” to include incidents where a shark bites a human and the bite results in minor or moderate injuries, and “fatal bites” to include where a shark bite results in fatality. It is currently not known what type of terminology the Australian media uses when discussing various types of shark–human interactions.

There are some notable limitations of the media analyses mentioned, including a focus on a single media source (e.g., Boissonneault et al., 2005; McCagh et al., 2015; Muter et al., 2012) and a lack of measurement of public responses to media reports (e.g., McCagh et al., 2015). Our study aimed to overcome those limitations by analyzing how sharks were portrayed by Australian media outlets on Facebook, which is a logistically efficient way to collect data from multiple media sources including radio, newspaper, and television. Facebook allows for a 24/7 news cycle in which people are exposed to more media content more often (Pepin-Neff & Wynter, 2018). Therefore, investigating social media is an important step in understanding the media’s influence, since public responses to news through comments posted by readers can provide a “snapshot” of public opinion. It may be unclear who reads a newspaper article or views a television news segment but on social media platforms like Facebook there is a more immediate and interactive relationship between news provider and consumer. An analysis of public Facebook user’s comments on the Facebook posts would help identify public reactions to the media reports. Furthermore, social media usage is growing exponentially (Giovos, Ganias, Garagouni, & Gonzalvo, 2016), and no research has been conducted into how sharks are portrayed via this platform. Facebook is the world’s largest social media network, and therefore it is a particularly common way that the public with news (Davalos, Merchant, Rose, Lessley, & Teredesai, 2015), including human–animal conflicts.

The main aims of our research were (a) to identify how frequently sharks were mentioned on Australian media Facebook pages; (b) to identify the content and themes evident in the posts; (c) to identify the way that the Australia media described shark and human interactions; and (d) to analyze the comments made by public Facebook users on the posts. This information will facilitate our understanding of how media portrayals of sharks extend to social media and allow for a greater understanding of how sharks are portrayed in the Australian media and how the general population reacts to this media coverage.

### 2 METHODS

To investigate how sharks are portrayed on Australian media outlets Facebook pages the following steps were followed

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**Table 1** Operational definitions for human/shark interactions, adapted from the Australian Shark Attack Files (2018) with the inclusion of the “encounter” category being an adaptation

| Category               | Definition                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Unprovoked attack by shark | An unprovoked attack by a shark occurs in the shark's natural “wild” environment and includes bites or attempts to bite that are directed towards: (a) a human *not engaged in activities to provoke the shark*, or (b) equipment worn (e.g., wetsuit), held, or used by a human (e.g., kayak or surfboard) |
| Provoked attack by shark | A provoked attack by a shark occurs in the shark's natural “wild” environment and includes bites or attempts to bite that are directed towards: (a) a human *engaged in activities to provoke the shark*, such as attracting or provoking physical contact with the shark either accidently (other fish are the target) or on purpose (sharks are the target of fishing, spearing, feeding and/or handling activities), or (b) equipment worn (e.g., wetsuit), held, or used by a human (e.g., kayak or surfboard) |
| Encounter               | An encounter is any interaction between a human and shark in the shark's natural “wild” environment that does not fall into either the “unprovoked attack by shark” or “provoked attack by shark,” which includes near proximity of shark to human without bites or attempts to bite a human or equipment worn, held, or used by a human |

*“Encounter” is an additional category added to include posts that discussed interactions that do not fall into either “unprovoked attack” or “provoked attack.”*
by one coder (B.R.L., see Figure 1 for deleted selection criteria and methodology):

1. Criteria for inclusion as an authentic Australian media outlet Facebook page: The possible media outlets for inclusion were selected from three sources: (a) Australian newspapers frequently read during 2016 were taken from a list prepared annually through a readership survey by Roy Morgan Market Research (2019); (b) radio stations with the largest audiences in five capital cities in Australia were taken from a list prepared by Radio Alive Metro Surveys (2016); and (c) television free-to-view “news” and “current affair” genre programs (shows) in 2016 as listed by Freeview Australia Limited (2018). The final list consisted of 185 pages (see Supporting Information). The next step
involved checking that each Australian based media outlet on the list had a verified page available on Facebook, which is indicated by Facebook with a blue or grey tick. As part of this process, a further 14 pages were included because Channel 9 and Channel 7 News separate Facebook pages for different Australian states. Another page was added as ABC News has a second Facebook page for ABC News 24.

2. Criteria for inclusion as an Australian media outlet post about sharks: Australia media outlet Facebook pages were searched for shark-related Facebook posts by typing “shark” and “sharks” into the Facebook search bar. A “post” was defined as being any caption that the media outlet published on their Facebook pages. These posts (captions) sometimes were paired with an image, video, or link to an article. However, our analysis only used the actual post (caption).

3. Criteria for inclusion as a public Facebook user comment in response to the Australian media outlet post about sharks: Public Facebook users can make comments about posts made by Australian media outlets. All comments on the posts about sharks were included for analysis unless the post had more than 52 comments. If the post had more than 52 comments then (a) the “most relevant” filter was selected/clicked and (b) view more comments was selected/clicked once. This limits the number of visible comments to 52. Facebook allows users to “reply” to comments, however replies were not included in our analysis (see Supporting Information for screenshot instructions of this step).

4. Analysis of Australian media outlet posts about sharks: Four steps were followed for analysis of posts. Step 1: Content analysis (Krippendorff, 2004) for each post the media outlet, date, type of shark species mentioned (if any), number of shares, and number of “reactions” were recorded. A “Reaction” refers to a Facebook user selecting/clicking the “like” link or selecting/clicking on one of the Facebook reaction emojis (love, humor, surprised, sad, or angry; see Supporting Information for screenshot instructions of these steps). In 2016, Facebook implemented a change to the type of reactions a Facebook user could make in response to a post (Guynn, 2016). Facebook developed new reaction emojis (love, humor, surprised, sad, or angry) to allow users to more accurately rate posts as positive or negative, whereas prior to this the simple “like” reaction was the only option available, which meant that the emotional valence (e.g., positive, negative) of the reaction could not be determined. Therefore, we classified reactions made using different reaction emojis simply as a reaction, just as we had done for the earlier “like” reactions. During this recording process, any post that an Australian media outlet made that was not related to shark species were removed. For example, some posts were about sports teams called the sharks. Step 2: Inductive thematic analysis (Braun & Clarke, 2013) was then used to determine the themes in the Australian media outlet posts. Step 3: The Australian media outlet posts were analyzed using NVivo software to determine the most frequent words used. Step 4. To identify the way in which the Australian media reports on shark–human interactions, all the posts discussing shark–human interactions were further analyzed to determine which specific interaction they were referring to (e.g., details about location or species of shark). This was done by checking the ASAF data set for 2016 for an interaction occurring on a specific date, at a specific location, and if reported, then also the species of shark(s). If they media post matched the ASAF data, then the post was classified as “ASAF reported interaction.” Likewise, if it was unclear which interaction was being referred to, meaning it did not match up with the ASAF data reported, then these posts were classified as “non-ASAF reported interaction.”

5. Analysis of public Facebook user comment in response to the Australian media outlet post about sharks: Comments made in response to Facebook posts were analyzed using inductive thematic analysis (Braun & Clarke, 2013) to determine themes. Comments were removed from analysis if they were related to topics other than sharks or could not be interpreted (e.g., were nonsense).

6. Inter-coder reliability testing: A second coder was involved as part of the inter-coder reliability analysis, who analyzed 10% of randomly selected Australian media outlet Facebook posts and the public Facebook user comments in response to these posts. The second reviewer was provided the theme framework developed by the first coder (those listed in Table 2). Results yielded 100% consistency in the content analysis and thematic analysis on the Australian media Facebook posts, and 89.4% consistency on the public Facebook user comments, which is deemed acceptable (Neuendorf, 2016). This lower inter-reliability percentage may be attributed to the following: (a) the Australian media Facebook posts most likely were vetted by someone in the organization or written by a staff member with suitable qualifications and there were fewer posts; (b) each Australian media Facebook post included in this reliability testing resulted in up to 52 public comments by Facebook users, which means that more posts were included for analysis, and as Facebook user comments are not checked for accuracy, clarity, or indeed whether they made sense or not, this allowed some subjective bias to occur in the coder’s interpretation of comments. Despite this, 89.4% consistency is considered acceptable.
| Theme in media post                                      | Definition                                                                 | Example                                      | Frequency | %  |
|---------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------|-----------|----|
| Shark/human interaction                                 | Discussion of interactions between sharks and humans (i.e., attacks and encounters) | “Surfer fighting for his life after losing his leg in a shark attack” | 1,017     | 50.4 |
| Shark mitigation                                        | Discussion of shark attack mitigation strategies (e.g., nets, culling, drumlines, and shark spotting) | “Shark barrier approved for Sorrento beach”  | 369       | 18.3 |
| Shark sighting                                          | Discussion of a shark sighting                                             | “Shark sighting—Derwent River, Tranmere—12:05 p.m. today” | 220       | 11.0 |
| Shark fishing                                           | Discussion of shark fishing                                                | “MASSIVE sharks caught off WA coast”         | 95        | 4.7 |
| Shark research                                          | Discussion of shark research (e.g., the science behind shark attacks)       | “Australian scientists are undertaking a world-first study to better understand how shark populations are changing” | 94        | 4.7 |
| Shark footage                                          | Discussion of footage of shark(s)                                           | “Drone captures shark feeding frenzy”        | 79        | 3.9 |
| Popular culture reference                               | Discussion of popular-culture related to sharks (e.g., jaws, the shallows, and finding Nemo) | “Critics say Blake Lively in ‘The Shallows’ is the best shark movie since ‘Jaws’” | 59        | 2.9 |
| Discussion of professional surfer(s)                    | Discussion of professional surfer(s) impacted by sharks (e.g., Mick Fanning and Bethany Hamilton) | “Mick Fanning wins J-Bay one year after shark encounter” | 59        | 2.9 |
| Shark infested water                                    | Discussion of the potential of shark interaction, due to the concern that many sharks live in a particular location | “Schoolies rescued in shark infested water while trying to ‘float to Tassie’” | 50        | 2.5 |
| Shark conservation                                     | Discussion of shark conservation (e.g., protests and activists)             | “ICYM: Sunrise speaks to 22-year-old activist Madison Stewart who is working to change our views on sharks” | 46        | 2.3 |
| Shark tourism                                           | Discussion of shark tourism experiences (e.g., cage diving and aquariums)  | “FYI you can now sleep in a room surrounded by actual sharks” | 44        | 2.2 |
| Animal (other than shark) impacted by shark attack mitigation measures | Discussion of animals (other than sharks) being impacted by shark nets and/or drumlines (e.g., whales and dolphins) | “Whale frees itself from shark net” | 44 | 2.2 |
| Debate initiated                                        | Debate deliberately initiated (e.g., asking readers their views on shark culling) | “Are nets the answer?” | 39        | 1.9 |
| Shark activity increase                                 | Discussion of how shark activity (e.g., interactions and sightings) is high or increasing | “The simple reason why we are having more shark attacks this year than ever before” | 28        | 1.4 |
| Shark found somewhere other than the ocean              | Discussion of sharks being found outside of the ocean (e.g., in a puddle)  | “How the hell did a shark end up here? A small shark was found barely alive in a freshwater roadside puddle at One Tree Hill—many kilometers from the ocean” | 18        | 0.9 |
| Shark activity low                                      | Discussion of how shark activity (e.g., interactions and sightings) is low or decreasing | “10 things more likely to kill you than a shark” | 15        | 0.7 |
| Animal attacked by shark                                | Discussion of another animal (e.g., seal) being attacked by a shark         | “Sea World veterinarians are fighting to save a baby seal that washed up on a Gold Coast beach after being mauled by a shark” | 12        | 0.6 |

(Continues)
3 | RESULTS

A total of 2,643 posts were analyzed, with 625 deleted as they did not relate to shark species, resulting in 2,018 Facebook posts being analyzed.

3.1 | Australian media outlets

Of the 100 Facebook pages analyzed, 12 had no posts relating to sharks. Most of the shark-related posts came from Australia-wide media outlets (530 posts), followed by media outlets located in Queensland (344 posts), Western Australia (338 posts), New South Wales (334 posts), Victoria (227 posts), South Australia (192 posts), Tasmania (29 posts), and Northern Territory (24 posts). Western Australia had fewer Facebook pages (n = 8), so had the most posts per Facebook page (average of 48.5). The majority of posts came from television media outlets (1,177 posts), followed by newspaper (568 posts), and then radio (273 posts), however, newspapers had the most per Facebook page (average 31.5).

3.2 | The media posts

3.2.1 | Frequency of mentions of sharks in the media posts

The 2018 posts were published on 317 out of the 366 days during the leap year.

3.2.2 | Content and themes in the media posts

Species of shark mentioned in the media posts
The majority of the posts (n = 1,476) did not mention a specific shark species, rather they discussed sharks generally. Of those that specified a species, white sharks were mentioned most frequently (n = 359), followed by tiger sharks (n = 57), then hammerhead sharks (n = 29).

Themes in the media posts
Shark/human interactions was overwhelmingly the most frequent theme in the shark-related posts (n = 1,017), followed by shark mitigation (n = 368) and shark sightings (see n = 220; Table 2 for full list of themes).

Australian media posts about shark and human interactions
Further analyses were conducted on the most frequent theme, shark/human interactions, to identify how the Australian media described these interactions and determine if the media use the Australian Shark Attack File (2018) categorizations. Of the 1,017 posts discussing shark/human interactions, 40 discussed shark/human interactions generally, 48 discussed previous shark/human interactions that did not occur during 2016, and 128 discussed shark/human interactions that occurred outside of Australia (these are listed under the “other”; category in Figure 3). Of those that discussed shark/human interactions that occurred during 2016, 518 posts discussed shark/human interactions that were listed on the ASAF (henceforth referred to as “ASAF reported interactions”), and 283 discussed interactions that occurred in Australia that were not listed on the ASAF (henceforth referred to as “non-ASAF reported interactions”).

To provide context, Figure 2 shows the location where the ASAF reported attacks occurred, the 2016 population of each Australian state, and the outcome of the attack (i.e., person uninjured, person injured, or fatality). The two fatal attacks occurred in relatively close proximity (approximately 180 km apart) off the coast of Western Australia, while most of the attacks occurred in the eastern part of Australia, off the coast of New South Wales, which has the highest human population.

The Australian Shark Attack File (2018) categorize attacks as either provoked or unprovoked, however none of the Facebook posts used these labels, instead combining these two categories together as “attacks” (47%) or using another descriptive word such as “mauled” or “bitten” (27.7%; see Table 3).
FIGURE 2  The location of the ASAF reported attacks that occurred in Australian waters during 2016 and the 2016 human population of each Australian state

TABLE 3  How human/shark interactions were described in the media posts

| Description of human/shark interaction                                      | ASAF reported attack | Non-ASAF reported interaction | Combined |
|---------------------------------------------------------------------------|----------------------|-------------------------------|----------|
|                                                                           | Frequency | %    | Frequency | %    | Frequency | %    |
| **Unprovoked attack by shark**                                            |           |     |           |     |           |     |
| Unprovoked attack (same operational definition)                           | 0.0       | 0.0  | 0.0       | 0.0  | 0.0       | 0.0  |
| Attack but falls into “unprovoked attack” category                       | 387       | 72.5 | 33        | 8.0  | 420       | 44.4 |
| Encounter but falls into “unprovoked attack” category                    | 7         | 1.3  | 10        | 2.4  | 17        | 1.8  |
| Use of single word other than attack (e.g., bite, mauled) but falls into “unprovoked attack” category | 123       | 23.0 | 40        | 9.7  | 163       | 17.2 |
| **Provoked attack by shark**                                             |           |     |           |     |           |     |
| Provoked attack (same operational definition)                            | 0.0       | 0.0  | 0.0       | 0.0  | 0.0       | 0.0  |
| Attack but falls into “provoked attack” category                         | 12        | 2.2  | 13        | 3.2  | 25        | 2.6  |
| Encounter but falls into “provoked attack” category                     | 0.0       | 4    | 1.0       | 0.4  | 4         | 0.4  |
| Use of single word other than attack (e.g., bite, mauled) but falls into “provoked attack” category | 5         | 1.0  | 94        | 22.8 | 99        | 10.5 |
| **Encounter**                                                            |           |     |           |     |           |     |
| Encounter (same operational definition)                                  | 0.0       | 65   | 15.8      | 65   | 65        | 6.9  |
| Use of single word other than encounter (e.g., menacing, lurking) but falls into “encounter” category | 0.0       | 148  | 36.0      | 148  | 148       | 15.7 |
| **Attack by, or encounter with shark (unable to categorize type)**       |           |     |           |     |           |     |
| Attack reported (not enough information to categorize as provoked or unprovoked) | 0.0       | 3    | 0.6       | 3    | 3         | 0.3  |
| Encounter reported (not enough information to categorize as attack: Provoked or unprovoked or encounter) | 0.0       | 2    | 0.5       | 2    | 2         | 0.2  |
| **Total**                                                                | 534       | 100.0 | 412       | 100.0 | 946       | 100.0 |
Frequency of shark/human interaction reporting

Figure 3 displays the number of Facebook posts discussing shark/human interactions published during each month of 2016. Figure 3 shows the number of ASAF reported interactions and non-ASAF reported interactions that occurred during each month which importantly highlights that the media discusses many shark and human interactions not listed on the ASAF.

Twenty-six ASAF reported attacks occurred during 2016 in all months other than July, August, and November. Furthermore, 69 non-ASAF reported interactions occurred throughout all the months of 2016. For the most part, more posts were published in the months when there was a higher frequency of ASAF reported and non-ASAF reported interactions. During October, there were three ASAF reported interactions all resulting in the person being injured, five non-ASAF reported interactions, and one non-Australian interaction which was when a white shark entered a dive-cage in Mexico, and the highest number of posts published. Conversely, August had no ASAF-reported interactions, three non-ASAF reported interactions, and had the least number of posts published. Additionally, the large number of posts in June may be attributed to the fatal attacks which occurred on May 31 and June 5.

Word frequency analyses were also conducted to determine which descriptive words were used to report all interactions. “Attack” was the most frequent word, followed by “bitten” and “terrifyingly” (see Figure 2).

3.3 | The Facebook users

3.3.1 | Facebook user's reactions in response to media posts

When the Facebook posts elicited over 1,000 reactions (e.g., “likes”) the exact number of reactions was not provided by Facebook, instead they were rounded down to the nearest hundred (e.g., 2.1 k). Given these limitations we estimate there were at least 614,000 “reactions” on the media posts. The posts were shared a total of 201,524 times, and 8,345 people were tagged in the posts, these numbers are reported exactly.

3.3.2 | Themes in the user comments

A total of 41,656 comments were analyzed, with 6,103 comments being deleted, for being related to topics other than sharks, due to lack of detail, or spelling errors making them uninterpretable leaving 35,553 comments in the analysis. The analysis resulted in 11 themes split into “positive,” “neutral/other,” “negative” (see Figure 4). Three themes (jokes, frequency of shark interactions, and popular culture) were treated as individual themes rather than the “positive,” “neutral/other,” “negative.” Short comments which were comments less than three words that could not fit into the other themes (e.g., acronyms or emojis) were not included in the figure (see Supporting Information).

The themes “shark fishing” and “sharks generally” have a relatively even split between positive and negative comments. Other themes had large differences, including themes relating to going in the ocean where there were 2,493 negative comments compared to 116 positive comments. These negative comments relate to how people are afraid of the ocean due to sharks and that they therefore will not enter the ocean. Further, comments discussing aggressive shark mitigation were mostly negative (3,540), meaning that people did not approve of these techniques, while 846 comments approved of them. Most comments in the theme “people involved in shark interactions” were positive (1,693;
compared to 495 negative comments), which related to well wishes and praise for people involved in the interactions. In the themes “shark/human interaction” and “environmental conservation” most of the comments fell into the “neutral/other” category, meaning they discussed the theme generally and did not take a positive or negative stance.

4 | DISCUSSION

The content analysis results showed that shark news stories in the Australian media are widespread and frequent.

4.1 | The media Facebook posts

Consistent with previous research (Sabatier & Huveneers, 2018), the majority of the media Facebook posts discussed “shark/human interactions.” This is not surprising as shark/human interactions make for interesting news stories, as the media often covers low-incidence, high-consequence events (Muter et al., 2012). The media tended to label interactions as “attacks” and not specify if they were provoked or unprovoked. It is important for the media to label provoked attacks correctly as the public should be informed that the person involved in the attack was, deliberately or accidently, attracting sharks by performing an activity such as fishing, spearfishing, or handling a shark (Australian Shark Attack File, 2018). This is important both to highlight that not all shark attacks occur randomly and to educate the public about activities that may increase their chance of a shark attack.

Interestingly, our analysis also found that some shark and human interactions discussed in the media, which met the Australian Shark Attack File (2018) criteria, were not included on the report. According to the ASAF website, people report a shark interaction which is then assessed against the inclusion criteria, but information about how interactions are reported to the ASAF is vague. According to our analysis, this procedure may result in the ASAF underestimating the amount of shark/human interactions that occur in Australia. The report does provide essential information about patterns in shark attacks and tips for reducing the chance of an attack; however, this information could be more accessible by publishing reports similar to that of the Australian National Drowning Reports (Royal Life Saving Society Australia, 2016). Further, there are many unknowns when it comes to the reported shark attacks including that out of the 26 attacks that occurred during 2016, the time these attacks occurred is only known for nine of them. There are predictions that shark attacks occur more frequently at dawn and dusk (West, 2011) and more detailed information about when attacks occur will add to this knowledge. This information is important to determine patterns in shark

![FIGURE 4](image_url) List of themes in the user comments categorized as negative, neutral/other or negative
attacks and understand how to prevent shark and human interactions.

Consistent with previous research (Muter et al., 2012; Sabatier & Huveneers, 2018), if a shark species was named in the Facebook posts, it was most frequently a white shark or tiger shark, which are dangerous species. This is not surprising as these two species are commonly involved in shark/human interactions (Ricci et al., 2016), which was the most common theme in the posts. Another common theme that emerged from the posts was “shark sightings,” while “shark research” and “shark conservation” were discussed much less frequently. Shark conservation issues also emerged as a theme in an earlier media analysis (McCagh et al., 2015). The three existing shark media analyses have focused on themes in the content (Boissonneault et al., 2005; McCagh et al., 2015; Muter et al., 2012) without conducting word analyses. By including this in our study, we found that the Australian media outlets frequently incorporated words relating to human and shark interactions including “mauled,” “terrifyingly,” “fatal,” and “savaged.” By utilizing technologies like NVivo, the type of language used can be checked to see how emotionally-charged it is, as this has been found to evoke fear responses (Slovic, 2010). Evoking fear responses about sharks may harm conservation efforts. Indeed, our results showed that the media did use emotionally-charged language when discussing shark and human interactions or sightings, and they focused on dangerous shark species, which in combination could evoke fear responses in the general public.

4.2 | The Facebook users

Previous shark media analyses have not assessed the reactions or responses of readers/viewers/listeners to the media new and current affairs content about sharks, apart from Boissonneault et al. (2005), who analyzed letters to the editor in an analysis of newspaper content. Many of the public Facebook user comments made in responses to Australian media posts in our study discussed aggressive shark mitigation, with most people not in favor of aggressive mitigation techniques, including use of drum-lines and culling. This result is consistent with the findings of Boissonneault et al. (2005). This is interesting, since the general public may appear to be afraid of sharks and exposed to emotionally charged negative commentary in the media, but even so they are opposed to aggressive mitigation, which is currently used in some Australian states (WA, QLD, and NSW; Gibbs & Warren, 2015).

Within the theme “going in the ocean,” majority of the comments were also negative relating to how people are afraid of going in the ocean because of sharks. Shark/human interactions in Australian waters are rare, particularly fatal ones, however, many Facebook users commented on how the risk of sharks make the ocean dangerous and that people should not enter it. Howard (1989) proposed a scale for “risk of death” when faced with a choice of medical treatments, using microprobability or micromorts. MicroMorts are units of acute risk where one MicroMort is a one-in-a-million chance of death (Keage & Loetscher, 2018). Using this quantification of likelihood of death, in Australia the risk of drowning is approximately 12 MicroMorts per year, the risk of dying from falling/slipping is 13 MicroMorts per year, and the risk of death by shark attack is 0.125 MicroMorts per year (Vally, 2017). The many comments discussing fear of the ocean due to potential shark interactions suggest that people are overestimating the risk of an interaction with a shark.

4.3 | Application of our findings to conservation practice

Most people are likely to access information about global and local events through news media (Joffe, 2003), which may be through traditional sources (e.g., newspapers, radio, or television) or social media platforms. The way in which media stories report on human–animal conflict can impact on general public acceptance of species involved in these conflicts, which in turn effects the general public’s support of conservation initiatives (Karanth & Chellam, 2009). While our study focused on how sharks are portrayed by Australian news media outlets, the methodology could be replicated for investigating how news media outlets report on other species that are involved in human–animal conflict.

It is important to move beyond analysis of traditional media sources to include social media platforms as they are recognized as being a major source of engagement with news media globally (Giovos et al., 2016). Specifically, in terms of media reporting and impact on conservation, scientists and practitioners should be aware of the way in which news media are reporting about “dangerous” species or human–animal conflict and whether they are saturating the issue (i.e., over-reporting of interactions), and whether emotionally charged language is being used. We recommend that the classifications proposed by Neff and Hueter (2013) be used to avoid over reporting of “attacks,” when they may be interactions of another type, or assumptions being made about whether an attack is “provoked” or “unprovoked.” These classifications should be used by multiple stakeholders, including scientists and media reporters. Ideally, scientists would also be more involved with media reporting and commentary (Sabatier & Huveneers, 2018).
4.4 Strengths and limitations of the current study and suggestions for future research

The current study used thematic analysis, which is an active process in which the researcher examines the data and searchers for themes and patterns (Braun & Clarke, 2013) which is somewhat subjective as the themes identified could be influenced by researcher bias. To minimize this potential bias, thematic analysis uses a formalized coding scheme and we employed a second coder to review 10% of the data to ensure inter-coder reliability. We also utilized the content analysis program NVivo, to provide additional information, including frequency of word usage.

This study collected data for 1 year, which provides a snapshot of how the news media portrayed sharks in Australia during 2016. It should be noted that this resulted in more than 40,000 comments being analyzed. This emphasizes the fact that 99 Australian news media outlets reported on sharks and that even with the restriction of the top 52 comments being analyzed, thousands of different Facebook users were engaged in issues about sharks. Future research could replicate this study to determine if reporting patterns change in say another 5 years’ time. We chose Facebook as it is recognized as a popular platform for people to engage with news (Davalos et al., 2015), which allows users to respond in various ways, including sharing of news posts, which reaches an even greater audience. Future research should also include other social media platforms, such as Twitter and Instagram, which are gaining in popularity and reach potentially different audiences. Reporting of new media may be similar on Twitter, as news media outlets also may post their stories on Twitter (e.g., 7 News Adelaide) but user “tweets” may differ. Instagram may reach a very different audience, as news media outlets may not post their stories on this platform but there are shark conservation non-government organizations or NGOs that use Instagram (e.g., Sea Shepherd or Shark Conservation Australia).

To the best of our knowledge, this is the first Facebook media analysis conducted on shark conservation and serves as a first glimpse of the reporting done by Australian news media outlets and the subsequent comments made by users who viewed these posts. This provides a way of gauging public reactions to news reports about sharks posted on Facebook. Future research could also survey public reactions to news media posts about sharks through surveys or open-ended questions. This study is exploratory but provides preliminary evidence that news media posts influence people's perceptions of risk of human–shark interactions, and that people's attitudes towards sharks change when they are exposed to different types of headlines.

5 CONCLUSION

Anthropogenic actions are having serious consequences for shark conservation (Muter et al., 2012) and therefore research into understanding the human dimensions of shark conservation is essential. Analyzing the Australian news and current affairs Facebook pages contributed both to the understanding of how sharks are portrayed and also the public’s views of sharks. The way the media reports on shark and human interactions can impact peoples’ perception of risk. Reporting on interactions frequently and often using emotionally charged language can result in the public having negative affect towards sharks and perceiving the risk of shark attacks to be high (risk amplification; Slovic, 2010). According to the affective heuristic, if the media used neutral language when reporting on shark and human interaction, specified when an interaction was “provoked,” and reported on “positive” interactions more frequently, members of the public may have a positive affect towards sharks and perceive the risk of shark attacks to be lower (in-align with the scientific probability; Slovic, 2010). As a barrier to conservation of large carnivores is social acceptance (Karanth & Chellam, 2009), which can be impacted by people fearing sharks, trying to reduce risk amplification is an important step towards acquiring public acceptance of conservation initiatives.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.
AUTHOR CONTRIBUTIONS
B.R.L. and C.L. developed the idea and methods for this research. B.R.L. collected and analyzed data. B.R.L. and C.L. wrote the manuscript. J.D. assisted with statistics and reviewed manuscript. P.R. reviewed manuscript.

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REFERENCES
Australian Shark Attack File. (2018). Taronga Zoo. Available from https://taronga.org.au/conservation/conservation-science-research.australian-shark-attack-file
Boissonneault, M., Gladstone, W., Scott, P., & Cushing, N. (2005). Grey Nurse Shark human interactions and portrayals: A study of newspaper portrayals of the Grey Nurse Shark from 1969–2003. Electronic Green Journal, 1, 1–21.
Braun, V., & Clarke, V. (2013). Successful qualitative research: A practical guide for beginners. Portland, OR: Sage.
Chin, A., Kyne, P. M., Walker, T. I., & McCauley, R. B. (2010). An integrated risk assessment for climate change: Analysing the vulnerability of sharks and rays on Australia’s Great Barrier Reef. Global Change Biology, 16, 1936–1953.
Clarke, S. C., Harley, S. J., Hoyle, S. D., & Rice, J. S. (2012). Population trends in Pacific Oceanic sharks and the utility of regulations on shark finning. Conservation Biology, 27, 197–209.
Crossley, R., Collins, C. M., Sutton, S. G., & Huveneers, C. (2014). Public perceptions and understanding of shark attack mitigation measures in Australia. Human Dimensions of Wildlife, 19, 154–165.
Davalos, S., Merchant, A., Rose, G. M., Lessley, B. J., & Teredesai, A. M. (2015). “The good old days”: An examination of nostalgia in Facebook posts. International Journal of Human-Computer Studies, 83, 83–93.
Freeview Australia Limited. (2018). Free-to-air television news and current affairs programs. Note: The Freeview service has since changed to be a platform for viewing content and archived material should be requested by email. Retrieved from http://www.freeview.com.au/
Gibbs, L., & Warren, A. (2015). Transforming shark hazard policy: Learning from ocean-users and shark encounters in Western Australia. Marine Policy, 58, 116–124.
Giovos, I., Gianias, K., Garagouni, M., & Gonzalez, J. (2016). Social media in the service of conservation: A case study of dolphins in the Hellenic Seas. Aquatic Mammals, 42, 12–19.
Guynn, J. (2016). Meet Facebook’s new emoting emojis: Love, haha, wow, sad and angry. USA Today. Retrieved from https://www.usatoday.com/story/tech/news/2016/02/24/facebook-reactions-launch/80803468/
Halpern, B. S., Walbridge, S., Selkoe, K. A., Kappel, C. V., Micheli, F., D’Agrosa, C., … Watson, R. (2008). A global map of human impact on marine ecosystems. Science, 319, 948–952.
Howard, R. A. (1989). Microrisk for medical decision analysis. International Journal of Technology Assessments in Health Care, 5, 357–370.
IMDb. (2019). Available from https://www.imdb.com/
Jacobson, S. K., Langin, C., Carlton, J. S., & Kaid, L. L. (2011). Content analysis of newspaper coverage of the Florida panther. Conservation Biology, 26, 171–179.
Joffe, H. (2003). Risk: From perception to social representation. British Journal of Social Psychology, 42, 55–73.
Karanth, K. U., & Chellam, R. (2009). Carnivore conservation at the crossroads. Oryx, 4, 2287–2295.
Keage, H. A. D., & Loetscher, T. (2018). Estimating everyday risk: Subjective judgments are related to objective risk, mapping of numerical magnitudes and previous experience. PLoS One, 13, 1–17.
Kraska, J., & Gaskins, L. (2015). Can sharks be saved? A global plan of action for shark conservation regime of the convention on migratory species. Seattle Journal of Environmental Law, 5, 415–439.
Krippendorff, K. (2004). Content analysis: An introduction to its methodology (2nd ed.). Thousand Oaks, CA: Sage.
McCagh, C., Sneddon, J., & Blache, D. (2015). Killing sharks: The media’s role in public and political response to fatal human-shark interactions. Marine Policy, 62, 271–278.
Massé, F. (2019). Anti-poaching’s politics of (in)visibility: Representing nature and conservation amidst a poaching crisis. Geoforum, 98, 1–14.
Moglia, M., Cook, S., & Tapsuwan, S. (2018). Promoting water conservation: Where to from here? Water, 10, 1–17.
Mutir, B. A., Gore, M. L., Gledhill, K. S., Lamont, C., & Huveneers, C. (2012). Australian and U.S. news media portrayal of sharks and their conservation. Conservation Biology, 27, 187–196.
Myers, R. A., Baum, J. K., Shepherd, T. D., Powers, S. P., & Peterson, C. H. (2007). Cascading effects of the loss of apex predatory sharks from a coastal ocean. Science, 315, 1846–1850.
Neff, C. (2015). The jaws effect: How movie narratives are used to influence policy responses to shark bites in Western Australia. Australasian Journal of Political Science, 50, 114–127.
Neff, C., & Hueter, R. (2013). Science, policy and the public discourse of shark “attack”: A proposal for reclassifying human–shark interactions. Journal of Environmental Studies and Sciences, 3, 65–73.
Neuendorf, K. A. (2016). The content analysis guidebook (2nd ed.). Thousand Oaks, CA: Sage.
Pepin-Neff, C. L. (2019). Flaws, shark bites and emotional public policy making. Cham, Switzerland: Palgrave Macmillian.
Pepin-Neff, C. L., & Wynter, T. (2018). Reducing fear to influence policy preferences: An experiment with sharks and beach safety policy options. Marine Policy, 88, 222–229.
Peschak, T. (2006). Sharks and shark bites in the media. In D. Nel & T. Peschak (Eds.), Finding a balance: white shark conservation and recreational safety in the inshore waters of Cape Town, South Africa (pp. 159–163). Cape Town, South Africa: World Wildlife Fund.
Radio Alive Metro Surveys. (2016). Survey 8: Five Capital Cities. Retrieved from http://www.radiolive.com.au/RA/media/General/Documents/Surveys%20for%20Metro/GfK_SummaryReport-Survey-8-2016.pdf?ext=.pdf
Ricci, J. A., Vargas, C. R., Singhal, D., & Lee, B. T. (2016). Shark attack-related injuries: Epidemiology and implications for plastic
surgeons. *Journal of Plastic, Reconstructive & Aesthetic Surgery*, 69, 108–114.

Roy Morgan Market Research. (2019). Australian newspaper readership, 12 months to December 2018. Note: The archived data for 2016 is available by emailing the company. Retrieved from http://www.roymorgan.com/industries/media/readership/newspaper-readership

Royal Life Saving Society Australia. (2016). National drowning report 2016. Retrieved from https://www.royllifesaving.com.au/__data/assets/pdf_file/0004/18085/RLS_NDR2016_ReportLR.pdf

Sabatier, E., & Huveneers, C. (2018). Changes in media portrayal of human-wildlife conflict during successive fatal shark bites. *Conservation and Society*, 16, 338–350.

Schultz, L. (1963). Attacks by sharks as related to the activities of man. In P. Gilbert (Ed.), *Sharks and survival*. Boston, MA: D.C. Heath & Co.

Slovic, P. (2010). *The feeling of risk: New perceptive on risk perception*. New York, NY: Earthscane.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, 24, 311–322.

Vally, H. (2017). What’s most likely to kill you? Measuring how deadly our activities are. Retrieved from https://theconversation.com/whats-most-likely-to-kill-you-measuring-how-deadly-our-daily-activities-are-72505

West, J. G. (2011). Changing patterns of shark attacks in Australian waters. *Marine and Freshwater Research*, 62, 744–754.

**SUPPORTING INFORMATION**

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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