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YouTube Videos and the Rip Current Hazard: Swimming in a Sea of (Mis)information?

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Rip currents are strong, narrow, offshore flows found on many global beaches and contribute to hundreds of drownings and tens of thousands of rescues each year. Yet despite long-standing educational efforts, public understanding of rip currents is poor. YouTube represents a new visual-based social media platform with the potential to educate a large and global audience about the rip current hazard. This study analyzed the content of 256 rip current-related YouTube videos with over 5 million total views as of March 2, 2015 finding that the accuracy of information disseminated about rip currents on YouTube is mixed and of varying quality. Existing videos are good at emphasizing correct rip current terminology, visual imagery, and a range of escape strategies, but greater emphasis in future videos must be placed on rip current avoidance, particularly through promoting the need to swim near lifeguards and how to spot rip currents.

Keywords: rip currents, water safety, drowning prevention, lifeguards

Offshore flowing rip currents that initiate along the shorelines of many global beaches are one of the most dangerous hazards to recreational beachgoers (MacMahan et al., 2011; Figure 1) and are responsible for tens of thousands of surf rescues and hundreds of drownings globally each year (Arozarena, Houser, Echeverria, & Brannstrom, 2015; Arun Kumar & Prasad, 2014; Brighton, Sherker, Brander, Thompson, & Bradstreet, 2013; Gensini & Ashley, 2010). While numerous factors lead to rip current drowning (Brander, Bradstreet, Sherker, & MacMahan, 2011), recent studies have shown that despite long-standing education and safety intervention efforts (Brander & MacMahan, 2011), public knowledge about rip currents and how to identify them is poor (Brannstrom, Brown, Houser, Trimble, & Santos, 2015; Caldwell, Houser, & Neyer-Arendt, 2013; Hatfield, Williamson, Sherker, Brander, & Hayen, 2012; Shaw et al., 2014; Sherker, Williamson, Hatfield, Brander, & Hayen, 2010; Williamson, Hatfield, Sherker, Brander, & Hayen, 2012; Woodward, Beaumont, Russell, & MacLeod, 2015).

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Figure 1 — Example of a typical rip current at Marina Beach, California. The rip current can be visually identified as a gap of darker water, due to occupying a deeper channel, between areas of breaking waves and whitewater over adjacent shallow sandbars. Turbulent surface water texture in the rip channel and sediment plumes seaward of the surf zone are also visual identifiers (photo R. Brander).

Traditional rip current safety and educational interventions have typically involved warning signage on beaches, brochures and pamphlets in accommodation and information centers, posters, and highway billboards (Brander, 2015; Hatfield et al., 2012). The recent proliferation of social media provides another valuable tool for promoting rip current awareness. YouTube is a free online Internet video streaming service that allows users to upload, view, and interact with videos. With over 1 billion users (YouTube, n.d.), Internet streaming services are potentially valuable platforms for communication of rip current education and safety globally.

Any user can upload almost any video about rip currents to YouTube or other web streaming services. As a result, a potential exists for the communication of inconsistent and inaccurate information and messaging (Keelan, Pavri-Garcia, Tomlinson, & Wilson, 2007). Surprisingly, YouTube videos have rarely been used as source of information and data in scientific research (Moran, 2014; Pandey, Patni, Singh, Sood, & Singh, 2010; Sood, Sarangi, Pandey, & Murugiah, 2011). This study examines the content of a sample of existing YouTube videos related to the rip current hazard in terms of the variety and consistency of scientific information and safety messaging communicated to the Internet viewing audience. In particular, we consider the degree to which existing YouTube rip current videos represent robust safety intervention and provide suggestions on how future videos may be improved.

Method

Following the methodology of previous academic YouTube-based studies (e.g., Moran, 2014; Stellefson et al., 2014), we used YouTube's search function and the keywords and phrases (in order) *rip current*, *rip safety*, *rip tide*, *undertow*, *how to escape a rip*, and *how to survive a rip* to identify appropriate videos. Rip current-related videos were added to a database between February 25, 2015, and March 2, 2015, where the following information was noted: upload date, number of views, duration, uploader, and URL. Given the relatively small number of likes, dislikes, and comments relative to the number of views, these variables were not considered for analysis.

Internet user behavior research indicates that over 90% of users click on results within the first three pages of search results (Stellefson et al., 2014). Since the order of search results varies depending on geographic location (our searches were conducted in Australia), the first 15 pages (300 videos) of each search were examined. We excluded from analysis videos clearly not related to beach rip currents and those that referred to rip currents, but did not show or describe them.

We developed a series of screening questions following initial viewing of the top 25 videos by total views. We grouped questions for a subsequent detailed quantitative and qualitative video content analysis (VCA) of each video title, description, and video content itself (audio, visuals, and text) into several themes: (a) video type and producer, (b) links to further information, (c) descriptions of rips and their features, (d) terminology used to describe rips, (e) rip identification and use of visual images, (f) educational advice messages, (g) footage of people caught in rips, and (h) survivor stories. Questions were designed as binary yes–no answers to ascertain whether a given theme was present in the video. Only one question (“Which of the following advice messages/strategies is the one most emphasised by the video?”) required nonbinary decision-making, requiring some judgment and subjectivity.

Table 1 describes the different categories selected for “video type” and “video producer” based on the VCA. Particular attention was given to themes of rip identification within the videos, particularly the use of visual rip current imagery (e.g., still images, video footage, diagrams, animations) and any information provided on how to spot them. Videos with visual representations were examined for scientific accuracy in their depictions of rips by the second author, an international rip current expert and community beach safety educator. If a visual representation of a rip current was included in the video, details regarding how it was identified, if it was, were noted (e.g., use of arrows, shading, person pointing, colored dye in rip).

Results

The keyword searches yielded 256 rip current-related videos uploaded since May 2006 that were deemed relevant to the study with a total of 5,201,212 views at the time of initial data collection. The database was dominated by 25 videos, each with over 50,000 views, that constituted 88% of the total video views in our sample (Figure 2). Individual video length of the entire sample ranged from 6 s to 1:12:22 hr, with a median of 1:48 min. Number of views of individual videos ranged from one to 1,327,511 with a median of 421 views (Figure 2). We employed the medians, rather than mean, as the measure of central tendency because of the nonnormal

Table 1 YouTube Rip Current Video Type and Producer as Determined by Content Analysis

Category	Video inclusion justification
Video type	
News report—pre-emptive (general information)	Videos part of television news bulletin and filmed radio interviews not related to specific incidents, but provide general information to viewers about rip currents.
News report—pre-emptive (warnings/alerts)	Videos part of television news bulletin not related to specific incidents, but provide warning/forecast of the level of rip current danger in a particular area.
News report—reactive	Videos part of television news bulletin reporting on a specific rip current–related incident.
TV documentary	Videos forming part of a television documentary or other program, excluding news bulletins.
Educational	Any video not a news report or television documentary that contained any sort of educational message and/or safety information about rip currents.
Survival story	Any video not a news report or television documentary which focused solely on someone who had survived being caught in a rip current and his or her recount of that experience.
Rescue footage	Any video not part of a news report or TV documentary consisting solely of footage of a person(s) being rescued from a rip.
Rip current footage	A video not part of a news report or TV documentary and did not involve rescue footage that is made up solely of footage of a rip current.
Simulation/diagrams	A video made up solely of a simulation, animation, or diagram(s) of a rip current. Consists solely of visual images.
Video producer	
News organization/TV channel	Video produced by a news organization or television channel.
Beach safety organization	Produced by an organization whose main focus is on water safety.
Other organization	Organizations which do not have beach/ocean safety as their main focus.
University/academics	University, research institution, or academic in coastal sciences.
Individual	Content created by an individual not associated with any of the above organizations or institutions.

distribution of the sample such as the presence of one video (VID#1: “How to survive beach rip currents”) that had 1,327,511 views and acted as an extreme outlier that would have seriously skewed the mean (Figure 2). We analyzed both the number of videos and the number of views. The latter provided a more accurate metric of the number of people exposed to particular video content messaging and characteristics.

Figure 2 — Rip current-related YouTube videos analyzed in this study ($n = 256$) with associated views ($n = 5,201,212$) as of March 2, 2015.

Table 2 shows the number of rip current videos and combined number of views for each video category as described earlier in Table 1. “Educational” videos were the most common type, both in number of videos ($n = 94$) and total views (59%), even if VID#1 (45% total views) is excluded. “News reports” (across all three news categories; see Table 1) were the next most common video type with 93 videos (14% of total views; Table 2). In terms of video producer, those uploaded by “individuals” and “news organization/TV channel” were equally dominant with approximately 37% each of total videos (Table 3). Considering total views, however, those produced by individuals were equally dominant compared with those produced by “University/academics” (approximately 32% of total views) although the latter category only had nine videos and was dominated by VID#1. Without VID#1, University/academics videos had under 7% of the total views. Beach safety organizations had 14.7% of total views (Table 3).

Rip Currents as a Hazard

About half of the videos (52%; $n = 133$), with 62% of the total views, explicitly stated that rips were dangerous. The vast majority of videos (80%; $n = 204$) also made no reference to any specific group(s) of people at risk in relation to rip currents. Of the 20% that did, the majority (87%; $n = 45$) stated that “everyone” was at risk. The majority of videos (74%; $n = 189$) did not mention any statistics involving either the number of drowning deaths or rescues caused by rip currents. Only 9.4% ($n = 24$) of videos made references to both death and rescue statistics; these accounted for 31% of total views while 46% of total views mentioned one of the two statistics.

Rip Current Definitions and Behavior

Over 53% ($n = 136$; 41% total views) of videos did not provide any definition of a rip current (Table 4). The most common definition, used by 104 videos (59% total

Table 2 Number and Views of YouTube Rip Current Videos for Each Video Type

Type	# of videos	% of total videos	Combined views	% of total views
News (general)	42	16.4	450,302	8.7
News (warnings)	22	8.6	14,959	0.3
News (reactive)	29	11.3	284,924	5.5
<i>Total news</i>	93	36.3	750,185	14.4
Documentary	4	1.6	170,876	3.3
Educational	94	36.7	3,070,162	59.0
Survival story	7	2.7	376,268	7.2
Rescue footage	23	9.0	626,526	12.0
Rip current footage	30	11.7	201,301	3.9
Simulation/diagrams	5	2.0	5,894	0.1
<i>Total^a</i>	256	100	5,201,212	100

Note. See Table 1 for video type categories. "Total news" category includes all three news categories. Bold denotes maximums.

^aDoes not include "total news" category.

Table 3 Number and Views of YouTube Rip Current Videos for Each Category of Video Producer

Producer	# of videos	% of total videos	Combined views	% of total views
News producer/TV channel	95	37.1	920,613	17.7
Beach safety organization	42	16.4	762,334	14.7
Other organization	7	2.7	182,276	3.5
University/academics	9	3.5	1,666,871	32.0
Individual	97	37.9	1,663,598	32.0
Local government	6	2.3	5,520	0.1
<i>Total</i>	256	100	5,201,212	100

Note. See Table 1 for producer categories. Bold denotes maximums.

views), was that a rip current is a "current which flows offshore" (or close equivalent) followed by "often sit in channels or between sandbars" in 52 videos (17% total views). Only 47% of total views involved more than two of the rip current descriptors listed in Table 4. Videos that typically did not provide any description of what rip currents are were rescue footage videos (100% of this category and 12% of total views), rip current footage (93% and 4% of total views), and reactive news reports (72% and 1% of total views). Of note, 33% of educational videos (n

Table 4 Number and Views of YouTube Rip Current Videos Containing Different Descriptors of a Rip Current Definition as Determined From Video Content Analysis of Top 25 Videos by Views

Rip current definition/ descriptor	# of videos	% of total videos ^a	Views	% of total views ^a
Current which flows off-shore	104	40.6	3,076,587	59.2
Return water brought in by waves back offshore	48	18.8	303,848	5.8
Can have longshore currents leading to rip current	8	3.1	137,942	2.7
Rips can occur on any beach with breaking waves	18	7.0	367,070	7.1
Often sit in channels or between sandbars	52	20.3	904,638	17.4
None of the above mentioned	136	53.1	2,120,078	40.8

Note. Bold denotes maximums.

^aTotal % exceeds 100% due to several videos referring to more than one definition.

= 31) did not provide any definition, suggesting an a priori assumption that viewers already had a basic understanding of rip currents. This is potentially problematic because people may be less likely to understand the information provided if they do not understand what a rip current actually is.

The majority (59%) of videos (39% of total views) did not describe any aspect of different types of rip current flow behaviors (Table 5). The dominant flow characteristic reported (32% of videos; approximately half of total views; Table 5) was that rip currents move fast. Only 16% of videos (albeit with 45% of total views) referred to more than one of the flow behavior descriptors (Table 5). VID#1 had a strong influence in terms of total views as it referenced five of the descriptors. Notably, only three videos with 864 total views incorrectly stated that rips “pull you under the water,” suggesting that relatively few viewers were exposed to incorrect assertions about the flow behavior of rip currents in our sample (MacMahan et al., 2011). Such misinformation may contribute to a panic response when caught in a rip (Brander et al., 2011).

Rip Identification and Use of Visual Images

Because rip currents contain obvious visual features (Figure 1) and YouTube is a visually based communication platform, it is not surprising that most videos ($n = 191$; 98% of total views) provided some sort of visual representation (Table 6). Unfortunately, 46% of these videos ($n = 87$; 41.9% total views) did not actually identify the location of the rip current shown, substantially reducing their usefulness in terms of educating viewers about how to spot rip currents (Table 6). The remainder used one or more variations of a person pointing to the rip ($n = 23$), a

Table 5 Number and Views of YouTube Rip Current Videos Containing Descriptions of Rip Current Flow Behavior as Determined From Video Content Analysis of Top 25 Videos by Views

Rip current flow descriptors	# of videos	% of total videos ^{a*}	Views	% of total views ^a
Can move fast	83	32.4	2,667,250	51.3
Can circulate or curl back on themselves	14	5.5	1,747,376	33.6
Can return you onto the sandbar or into shallower water	11	4.3	1,757,317	33.8
Flow just past the surf zone	31	12.1	2,508,673	48.2
Pull you under the water	3	1.2	864	<0.1
Will NOT pull you under the water	16	6.3	1,459,604	28.1
Can be influenced by the tide (e.g., flow faster at low tide)	8	3.1	4,087	0.1
None of the above mentioned	150	58.6	2,020,912	38.9

Note. Bold denotes maximums.

^aTotal % exceeds 100% as several videos referred to more than one flow behavior.

colored dye released into the rip ($n = 20$), and/or arrows or highlights ($n = 81$) to identify the location of the rip current (Table 6). Videos that did not contain any type of visual representation of rip currents only accounted for 1.5% of the total views and were generally associated with news reports with visuals focusing on a person(s) speaking.

Although rip currents contain visual features (Figure 1; Table 7), 73% of videos ($n = 186$) with almost half (49%) of total views did not provide any information on rip current identification. Videos that did ($n = 70$; 51% of total views) emphasized that rips have a “foamy/choppy surface” (50% of videos; 38% of views), followed by “no waves (or hardly any) breaking” in the area of the rip current (43% of videos; 70% of views). These results differ when compared with the number of total views where three visual identifiers were equally dominant (Table 7), all of which relate to channelized rip currents (Figure 1), which are considered the most common type of rip (Dalrymple, MacMahan, Reniers, & Nelko, 2011; Short, 2007): “dark gaps,” “located in channels/between sandbars,” and “no waves (or hardly any waves) breaking.” While these results were influenced by VID#1, they indicate that no single dominant visual rip current identifier was being promoted through existing videos. This was evident by videos with three or more visual identifiers accounting for over 85% of views of videos with rip identification information (Table 7).

Safety Advice About Rip Currents

Safety advice in the rip current videos typically included aspects of prevention and how to react/respond if caught in a rip current. Table 8 lists the various categories

Table 6 Methods of Identification of Rip Current Location in YouTube Rip Current Videos Containing Visual Images of Rips (n = 191)

Visual descriptor	# of videos	% of total videos ^{a*}	Views	% of total views ^a
Person pointing to the rip	23	12.0	383,886	7.5
Release of colored dye into the rip	20	10.5	2,076,169	40.5
Arrows or highlighting on top of the video/picture	81	42.4	2,619,851	51.2
Rip location not identified	87	45.6	2,147,878	41.9

Note. Bold denotes maximums.

^aTotal % exceeds 100% as several videos use more one identification method.

Table 7 Visual Rip Current Identifiers Mentioned in YouTube Rip Current Videos Containing Rip-Spotting Information (n = 70)

Visual rip current identifiers	# of videos	% of total videos ^a	Total views	% of total views ^a
Dark gaps	20	28.6	1,887,752	70.7
Foamy/choppy surface	35	50.0	1,003,558	37.6
Sand clouds in water/sand mixed up	16	22.9	362,855	13.6
Debris moving out to sea	13	18.6	320,057	12.0
Different color to rest of water	25	35.7	784,883	29.4
Located in channels/between sandbars	21	30.0	1,884,155	70.5
No waves (or hardly any waves) breaking	30	42.9	1,863,087	69.7
Variations in wave patterns	11	15.7	157,525	5.9
Easier to try and spot rips from headlands/up high/vantage points	4	5.7	1,613,411	60.4

Note. Bold denotes maximums.

^aTotal % exceeds 100% as several videos mention more one visual identifier.

of advice given by the videos in relation to rip current avoidance, escape, and survival. In general, 65% of videos (n = 166; 82% total views) gave some form of advice. Of these, more videos (n = 143; 61% of total views) provided advice on how to react once caught in a rip rather than advice on avoiding being caught in a rip (n = 124; 48% of total views; Table 8). Over 35% (n = 90; 18% of total views) of videos, mostly rip current footage, rescue footage, and reactive news reports, did not provide any advice at all.

The dominant avoidance advice provided in videos related to “swim only at lifeguard protected beaches” (n = 46; 38.7% of total views), or “swim in lifeguard

Table 8 Safety Advice Given by YouTube Rip Current Videos in Relation to Avoidance, Escape Strategies, and Other Rip Survival Strategies

Rip current safety advice	# of videos	% of total videos ^a	Total views	% of total views ^a
<i>Rip avoidance advice given?</i>				
Know how to spot a rip	34	13.3	2,111,217	40.6
Swim in lifeguard designated areas	67	26.2	1,991,436	38.3
Swim only at lifeguard protected beaches	46	18.0	2,015,166	38.7
Don't go into the water if unsure	26	10.2	95,810	1.8
Don't go in past your waist	3	1.2	314	0.0
Don't go in if you can't swim/inexperienced	27	10.5	1,931,030	37.1
Don't go out alone	27	10.5	1,607,976	30.9
None of the above	133	52.0	1,932,013	37.1
<i>Rip escape strategies mentioned^b</i>				
Float	67	46.9	2,815,154	54.1
Swim parallel to the beach/shore	118	82.5	1,374,235	26.4
Swim to "the sides" of the rip	10	7.0	1,578,859	30.4
Swim toward breaking waves/whitewater	14	9.8	1,551,499	29.8
Swim at an angle to the shore	17	11.9	353,749	6.8
<i>Other rip survival advice^c</i>				
Signal for help	50	39.1	3,097,935	59.6
Don't panic/stay calm	87	68.0	3,833,311	73.7
Don't swim against the rip	91	71.1	3,190,039	61.3
Don't swim against the longshore current	6	4.7	259,875	5.0
Don't let go of board/hang onto floating object	7	5.5	416,859	8.0

Note. Bold denotes maximums.

^aTotal % exceeds 100% as several videos gave multiple pieces of advice for avoidance, escape, and survival.

^bPercentages refer only to number of videos mentioning rip escape strategies ($n = 143$). ^cPercentages refer only to videos mentioning other survival strategies ($n = 128$).

designated areas" ($n = 67$; 38.3% of total views). Videos that suggested that people should "know how to spot a rip" accounted for 40.6% of total views (Table 8). Only 38% of views were associated with videos that gave more than one of the avoidance advice messages in Table 8. Of note, almost one third of "educational" videos ($n = 32$; 11% total views) and 40% of "news reports—preemptive (general information)" ($n = 17$; 4% total views) did not contain any avoidance messages.

The most common rip escape strategies mentioned in videos were “swim parallel to the beach/shore” ($n = 118$) and “float” ($n = 67$) although the latter was mentioned in 54% of total views. Overall, 93% ($n = 133$) of videos that provided escape advice referred to active swim strategies as ways of escaping a rip current (Table 8). Half of the videos containing rip escape advice (85% of total views) referred to more than one of the escape strategies in Table 8. Half of the videos in the study gave some sort of further “survival” advice in relation to how people should behave if they become caught in a rip current, the most common being “don’t swim against the rip,” “don’t panic/stay calm,” and “signal for help” (Table 8). Sixty-six percent of views referred to three or four of the survival messages listed in Table 8.

Although many videos gave a variety of advice messages and strategies, part of the data recorded for each video involved an assessment of that video’s “dominant” advice message or strategy (Table 9). The most frequently emphasized safety advice message (if given) was “if caught in a rip, swim parallel” (25% of videos). Videos emphasizing rip avoidance (23% of videos) had the highest proportion of total views (39%). It is interesting to note that reactive news reports, which also reached a broadcast television audience before being uploaded on YouTube, generally contained no safety advice at all.

Discussion

To improve awareness of rip currents and safety, beachgoers need to have a correct understanding of what rip currents are and how they behave. Despite recent assertions that the incorrect and misleading terms “rip tide” and “undertow” are commonly used to describe rip currents (Leatherman, 2012), the majority of YouTube videos (93%, with 96% of total views) correctly used the term “rip current.” Many videos that did use the terms “rip tide” and “undertow” did so explicitly to distinguish them from the correct terminology. Leatherman (2012) suggested that

Table 9 Safety Advice Message Most Emphasized by Each YouTube Rip Current Video

Most emphasized safety advice message	# of videos	% of total videos	Views	% of total views
No advice given	92	35.9	949,584	18.3
Avoid being caught in rips	59	23.0	2,039,965	39.2
If caught in a rip, float	9	3.5	117,452	2.3
If caught in a rip, swim parallel	65	25.4	617,617	11.9
If caught in a rip, swim out of it (any direction except parallel)	7	2.7	393,776	7.6
If caught in a rip, don’t panic	13	5.1	666,295	12.8
If caught in a rip, don’t swim against current	5	2.0	47,277	0.9
If caught in a rip, signal for help	6	2.3	369,245	7.1

Note. Bold denotes maximums.

news reporters often used incorrect terminology when referring to rip currents. Eighty-four percent of videos produced by news/television networks ($n = 80$) used neither “rip tide” nor “undertow” interchangeably with the term “rip current.” While recognizing that the videos in this study do not accurately represent all broadcast television and news reports (because not all were uploaded to YouTube), it seems that news and television networks, like the majority of YouTube videos, have used correct terminology to describe rip currents.

A large proportion of rip current videos referred to multiple rip escape strategies such as an active swim action (e.g., swimming parallel to the beach) and a passive float action (e.g., go with the flow). While this could be considered potentially contradictory and confusing to viewers, recent research on rip current escape strategies and responses of people caught in rip currents have highlighted the unpredictability and variability of rip current flow and bather response (Drozdowski et al., 2012; Drozdowski, Roberts, Dominey-Howes, & Brander, 2015; McCarroll et al., 2014, 2015; Van Leeuwen et al., 2016). This, in turn, has influenced Surf Life Saving Australia, Australia’s largest beach safety organization, to adopt and communicate a “combined approach” message to the general public regarding how to react when caught in a rip current (Bradstreet et al., 2014). While the use of multiple messages in videos may aid in the recollection of a variety of rip escape actions, future videos should stress that no single escape strategy is appropriate for all situations and that a combined approach should be adopted.

Prevention and avoidance messages remain paramount as a person will not drown in a rip if he or she does not enter one. Given the high proportion of beaches, and sections of beaches, unpatrolled by lifeguards globally, the ability of beachgoers to identify rip currents becomes essential to avoid rip currents. It is therefore encouraging to see the high proportion of YouTube videos (75% of videos; 98% of total views) that include one or more visual representations of a rip current. Most videos (64%) which provided rip identification advice gave multiple rip-spotting tips, which is important given that for different types of rips, particular identifiers may be less pronounced than others (Brander, 2015).

Despite the positive attributes described above, the results of this study highlight several important flaws of existing videos that should be considered when using YouTube as an educational medium, or in the development of future educational videos about the rip current hazard. First, most existing videos place emphasis on what to do when caught in a rip current rather than providing advice on rip avoidance. Indeed, one third of “educational” videos do not contain any avoidance messages (11% total views). While escape and survival advice is clearly useful and important, more videos should communicate rip avoidance strategies. The importance of swimming in the presence of lifeguards is well established (Branche & Stewart, 2001) and is the favored rip current safety advice advocated by most beach safety organizations (Brander, 2015). Yet only 38% of the total views of rip current–related YouTube videos emphasize that people should swim at lifeguard-protected beaches or designated safer swimming areas. Advising people on how to spot rips is also important for promoting rip avoidance, but 72% of all videos (with 49% of total views), including more than half of the “educational” videos, did not provide rip identification information.

Furthermore, 42% of videos that contained imagery of rip currents did not actually indicate the location of a rip, thereby greatly reducing their overall effectiveness.

Future efforts should include an arrow (or another indicator) showing the location of the rip. Improvement could also be made using particularly visually captivating imagery, such as the release of colored dye into a rip current, which has previously been described as being particularly effective in providing a longer term recall and understanding of the speed and trajectory of rip currents (Brander et al., 2014). As outlined by Bradstreet et al. (2014), presenting information about rip avoidance and identification is arguably simpler than trying to communicate multifaceted and situation-specific escape strategies (Bradstreet et al., 2014), particularly given the varied nature and flow behavior of rip currents.

A second major limitation of existing rip current videos is that over 50% did not provide any basic rip current definition and almost 60% did not describe any aspect of rip current flow behavior. Describing rips and how they behave emphasizes the dangerous nature of rip currents and provides motivation to avoid them. It may also help develop informed reactions and reduce the likelihood of panic, which is the main emotional response of people caught in rips (Attard, Brander, & Shaw, 2015; Drozdowski et al., 2012; McCarroll, Castelle, Brander, & Scott, 2015). Educational campaigns should not assume the target audience already understands what a rip current is as infrequent beachgoers, migrants, and tourists from noncoastal areas may lack knowledge of rip currents (Ballantyne, Carr, & Hughes, 2005; Brannstrom et al., 2015; Williamson et al., 2012). Future producers of YouTube videos should therefore try to include basic definitions and descriptions of rips to improve overall rip current understanding and awareness and could also attempt to target, or at least highlight, particular demographic groups that may be at more risk.

A third major limitation is that only 11% ($n = 28$) of the YouTube videos contained links (URLs) to websites containing further information about rip currents. This is perhaps not surprising given the number of videos created by “individuals” (Table 2) with no affiliation to any beach or water safety organization. It would be useful for all types of rip current videos to link to further information that would enhance viewer knowledge of rip currents and possibly resolve any confusion experienced from mixed messaging via watching multiple YouTube videos. While it is acknowledged that there are many potential online sources of rip current information that may suffer from some of the same information and accuracy limitations as some of the YouTube videos described, most videos that did provide links to rip-specific information referred viewers to reliable website sources such as NOAA in the United States (www.ripcurrents.noaa.gov), Surf Life Saving Australia (<http://beachsafe.org.au/surfed/ripcurrents>), and coastal academics (e.g., www.scienceofthesurf.com). Finally, it should be noted that only 16% of videos ($n = 42$) and 15% of total views ($\approx 750,000$) were associated with videos uploaded by recognized (global) beach safety organizations. Clearly, these organizations must find ways to promote and “tag” their videos to optimize and increase the number of views their videos receive on YouTube.

Conclusions

This study provided a detailed content analysis of 256 (English language) YouTube videos related to the rip current hazard with over 5 million combined views. The most common type of rip current YouTube video, in terms of number of videos and

total views, can be described as “educational,” and most of the views were associated with videos produced by “individuals” and “University/academics.” In general, information disseminated about rip currents on YouTube, a highly accessed Internet information platform, was mixed and of varying quality. Our study highlights that the YouTube social media outlet can be an effective educational tool for the rip current hazard with a potentially large global audience; however, its open-access nature means that information is not always accurate or reliable.

There were a number of things that existing YouTube rip current videos were doing well such as using visual images of rip currents, using generally correct terminology, and advocating a range of rip escape strategies. There were a number of areas that could be improved upon to improve their educational safety messaging. These included emphasizing rip avoidance, particularly promoting the need to swim near lifeguards, but also how to spot a rip current, including descriptions of rip currents and their behavior, and using existing rip current educational resources by providing links to further online information. Producers of future rip current YouTube videos need to be aware of these existing limitations, particularly if the videos are designed specifically for educational purposes. Finally, we hope that the findings of this study can be applied to consideration of YouTube videos, both existing and future, relating to other water-related hazards.

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