ORIGINAL ARTICLE

Characteristics of Popular YouTube Videos to Promote or Discourage Use of Vape

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ABSTRACT

Introduction: The growing use of YouTube, push up the popularity of electronic cigarettes (vapes) presenting a new challenge in tobacco control included in Indonesia. This study aims to identify the characteristics of popular vape videos on YouTube, both that promoting and discouraging its use. **Methods:** A case study combining qualitative and quantitative methods was conducted to get the characteristics of vape videos with >1,000 viewers on YouTube that raised health issues about vaping. There were 68 videos collected at 10th of May 2019. Content analysis of qualitative methods applied to understand the characters of each video and the quantitative method applied to measure association between video popularity and video's characteristics using Chi-square, Fisher exact test, and Logistic regression test. Researcher and two media experts were judging the videos on six themes: primary persuasive appeal, dynamic audio-visual components, use of familiar figures or characters, evidence of health claim, valence of video (attitude of vape video message regarding health), and video engagement. **Results:** A popular vape videos use rational appeal (88%), use dynamic audio-visual component (71%), use no figure (27%), without health evidence (41%), are claiming healthful benefits of vaping (82%), and use engaging video that delivering messages interactively (65%). However, only valence of video (OR= 6.67, 95%CI 1.70-26.13) and video engagement factors (OR= 4.86, 95%CI 1.50-15.60) have significant association with videos' popularity. **Conclusion:** Popular vape videos are those claiming healthful benefit of vape and those engaging videos. Thus, developing videos that discourage vape use should consider how to engage the audience.

Keywords: Vaping, Electronic Cigarette, Social media, YouTube, Attractive Approach

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INTRODUCTION

Smoking behaviour is one of the risk factors for various degenerative diseases and a serious burden on public health in Indonesia. The emergence of electronic cigarettes (e-cigarettes, vaporizer, or vape) is a recent phenomenon which has worsened the smoking problem. An electronic cigarette, or vape, is a device that works by evaporating liquids containing propylene glycol or glycerine, nicotine, and scents that are battery-operated to produce aerosol vapours through suctioning (1). The presumption of safe use of vape for health compared to conventional tobacco cigarettes is one of the main reasons for smokers to use it, especially among adolescents (2). The chemicals in the vape are lower, yet there are still health risks in using them (3). Low levels of nicotine in vapes will make the vape user, or vaper, still use tobacco cigarettes (4). Other substances in vape are classified as toxic to humans such as Tobacco-Specific Nitrosamines (TSNA), Diethylene Glycol DEG and carbon monoxide (1, 4).

The number of vaper in the world continues to increase. The United States Centers for Disease Control and Prevention (US CDCP) reported that 2 million teenagers became vapers in 2016 (5). Valid data on the prevalence of vaper in Indonesia is still scarce, but can be reflected from the data of the Indonesian Vaporizer Employers Association (APVI), which states that there are 3,500 vape stores with 40,000 bottles of vape liquid sales per month (6). We have indicated the phenomenon of increasing adolescent vape use as one effect of social media. A study conducted by Pokhrel et al. (2018) found that social media had a significant relationship to vape usage behaviour (7).

Videos are one communications and information media that presents very strong audio-visual messages, presenting 90% of its content by non-verbal communication (8). Videos offer information, describe processes, explain complex concepts, teach skills, shorten or extend time of communication, and influence attitudes (8). A survey by Nielsen Consumer & Media View conducted in 11 cities in Indonesia in 2017, found that consumption of online video content had increased in all age groups by over 30 percent (9). Consumption of content is when someone watching a video, read, comment, like/dislike. In addition, consumers aged 21–49 years old purchase products online after frequent re-viewings of online video ads. The survey results also placed YouTube as the most accessed online video platform in Indonesia (10).

YouTube is a video-based social media that emerged in 2005. It is not only a video storage platform but also serves as a social network where users interact to build trust by commenting and favouring each other (11). Globally, about 100 million people each week do a social action on YouTube, such as likes, shares, and comments (12).

YouTube increasingly being used as a platform for providing and disseminating health information (13). Everyone can create and upload videos they have regardless of the quality of the information (14). Majority of videos were narrative experiences that show their own perspectives and experiences (13), included health information about vaping. The growing use of YouTube, push up the popularity of electronic cigarettes (vapes) presenting a new challenge in tobacco control included in Indonesia. A study by Luo et al. in 2014 found that most of vape video messages on YouTube were vape promotions (94%) and 71.4% used incorrect health claims (15). Similarly, the results of Sears, et al. (2017) about vape videos in English found that 52% of the 50 videos on YouTube conveyed marketing claims that vape was safer, cheaper, and healthier than tobacco cigarettes (16).

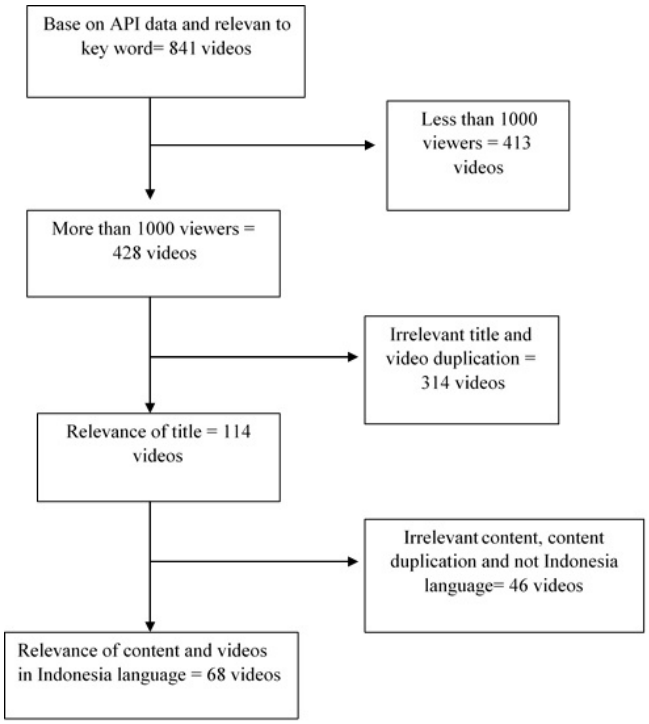
Globally, based on Google Trends, Indonesia ranks 9th for internet information-seeking using vape keywords, and ranks 3rd via YouTube (17). The potential for the dissemination of health information related to vapes on YouTube and the high use of YouTube in Indonesia calls for an investigation of what characterizes a popular video about health issues of vapes on YouTube in Indonesia. Most videos about vape that attract the viewers are those that promote vape use (15, 16), thus knowing the characteristics of popular YouTube vape videos, regardless promoting or discouraging vape use is beneficial in developing an attractive video that discouraging vape use. This study aims to identify characteristics of popular vape videos on YouTube, both that promoting and discouraging its use.

MATERIALS AND METHODS

The current study is a case study combining qualitative and quantitative research methods. We applied the qualitative method on the content analysis of videos and the quantitative method on the association between video popularity and video's characteristics. Videos included in the study were all vape videos uploaded on YouTube (www.youtube.com) that providing information concerning health effects of vape (both promoting or discouraging its use), including three vape health effects (systemic disorders, nicotine poisoning, and mechanical injury) (4). The author collected those videos using the keywords "bahaya vape bagi kesehatan" (the danger of vape for health), "apakah vape berbahaya bagi kesehatan" (is vape dangerous for health), and "efek vape bagi kesehatan" (vape effect for health). Those keywords were determined based on Google Trends 2018, accessed on December 21, 2018. Google Trends provides a sample of search queries people made to Google in real time (last seven days) and non-real time data (2004 to 36 hours before the search). Google trends has statistical correlation when compared with other parameters of surveillance research (18). This tool is widely used for research in monitoring and predicting population behaviour (19). The author collected videos using the YouTube Application Programming Interface (YouTube API) which allows access to video statistics and data from YouTube channels. An informatics technology expert performed the videos retrieval from YouTube API (20).

There were 841 videos fulfil the inclusion criteria (Fig 1). The exclusion criteria were: a) viewed less than at least 1000 times (413 videos), b) had irrelevant title or duplication (314 videos), and c) non-Indonesian language (56 videos), resulted in 68 videos included in the analysis. Content analysis was used to understand the characteristics of the popular videos to deliver information.

Content analysis was done by adapting the World Health Organization (WHO) monitoring tools for Food and Beverage Marketing to Children via Television and Internet (21) that emphasize the qualitative analysis of a video should consider the aspects: primary persuasive appeal, dynamic audio-visual components, using figure and/or character and health claims. We proposed two additional concepts of valence of video and video engagement, as those concepts emerged frequently from qualitative analysis. We adjusted the tools to focus on the analysis of those six characteristics. We defined: 1) Primary persuasive appeal is convincing arguments youtuber uses to appeal to the viewers' sense of logic, ethic and emotion. The main appeal is used to persuade the viewer to take action or agree with the video-maker goal (22). We classified primary persuasive appeals in rational appeal and fear appeal. Rational appeal is used



*API (Application Programming Interface)

Figure 1: Sample selection flow

to persuade viewers to act, agree, or change behaviour on something by appealing to their sense of reason or logic, in such a way that it really can't be argued. Fear appeal is used to persuade viewer about the potential harm that may happen to them if they do not accept the messages recommendation (23), 2) dynamic audio-visual components, is the support of sound dynamics (music, tone, timbre), images (animation, snippets and image editing) and text in a video for more expressive convey of feeling. We categorized dynamic audio-visual component as dynamic audio-visual if using entertaining audio and visual with audio-visual effect, while non-dynamic audio-visual if otherwise, 3) use of familiar figures and characters, if the video is using certain figures or special characters, in the form of popular figures (celebrity, youtuber/social media influencer), scientific figure (doctor, scientist, medical expert), vaper, and no figure (not use specific figure), 4) evidence of health claims, is the proof underline the statement of the health claims, classified as scientific evidence (use scientific references from health organization or medical journal), experiments (show evidence from simple experiment to compare cigarette and vape), or without evidence. 5) Valence of video or the attitude of video messages regarding vape (24), is the extent to which a video claims that vape using will harm, no effect or benefit for the health of the user. We classified valence of video as pro-to-health means that vape using is harmful for health, and anti-pro-to-health if otherwise (25). 6) Video engagement is the extent to which a video tries to involve the audience to understand the message being communicated. A disengaging video puts the audience passively just getting the message, while an engaging video invites the audience to interact actively in discussing and approving the message. Engaging video using personal talk that made viewers feel as if they were close friends of the vlogger and by that being entertained (26).

Based on data from YouTube API, the researchers collected video information, such as number of views and number of viewer's likes/dislikes. To determine the data validity, two multimedia experts made their own separate judgments based on the same criteria. We then compared the judgment results. Whenever differences arose, they discussed to reach the most logical explanation behind different judgments, assuming the perspective of the audience. We classified the videos as popular if views count > 75% percentile (165,397 views count), and non-popular if otherwise (26). We measure the association between video popularity and factors: primary persuasive appeal, dynamic audio-visual component, the use of figure, evidence of health claims, valence of video and video engagement using Chi-square test and Fisher exact test if variables with expected value <5, and Logistic regression to generate odds ratio and 95% Confidence Interval.

RESULTS

We sorted the 68 videos by their views ranks, and named as #1 (video 1) for the highest view rank, and so on until video #68. Table I shows the distribution of videos according to their popularity and their characteristics. A popular vape videos have characteristics use rational appeal (88%), use dynamic audio-visual component (71%), use no figure (35%), without evidence (43%), claiming healthful benefits of vaping (82%), and use engaging method to deliver messages interactively (65%). Characteristics of vape video significantly associated with videos' popularity are valence of video (OR= 6.67, 95% CI 1.70-26.13) and video engagement (OR= 4.86, 95% CI 1.50-15.60).

1. Primary persuasive appeal

There were two kinds of primary persuasive appeal used to inform the health aspects: rational appeal and fear appeal. Most of the popular videos were using rational appeal as their primary persuasive appeal, there was no significant association between primary persuasive appeal and video popularity. The description of the use of rational and fear appeal in vape videos is:

a. Rational appeal

Most of the videos used rational appeal as their primary persuasive appeal. Video #1 uses phrases reflecting rational appeal, such as "smart people" as a greeting to viewers and statements to encourage viewers to think and choose the most logic ideas/point of views such as a statement in a popular video:

"Among smokers who get lung cancer just 25% of smokers, its mean 75% of smokers without lung

Table I: The popularity of vape videos according to video's characteristics

Characteristics of Video	Popularity†						p value	OR (95% CI)
	Popular			Unpopular				
	n	% (row)	% (Column)	n	% (row)	% (Column)		
Primary Persuasive Appeal								
Rational appeal	15	24.59	88.24	46	75.41	90.20	1.000	0.82 (0.14-4.65)
Fear appeal	2	28.57	11.76	5	71.43	9.80		1
Dynamic audio-visual components								
Dynamic audio-visual	12	35.29	70.59	22	64.71	43.14	0.050	3.16 (0.97-10.31)
Non-dynamic audio-visual	5	14.71	29.41	29	85.29	56.86		1
Use of familiar figures and characters								
Popular figure	3	37.50	17.65	5	62.50	9.80	0.518	1.6 (0.29-8.86)
Scientific figure	3	14.29	17.65	18	85.71	35.29		0.44 (0.09-2.07)
Vape user	5	29.41	29.41	12	70.59	23.53		1.11 (0.27-4.52)
No figure	6	27.27	35.29	16	72.73	31.37		1
Evidence of Health Claims								
Scientific-based	6	18.18	35.29	27	81.82	52.94	0.456	0.51 (0.15-1.78)
Trial/experiment show	4	33.33	23.53	8	66.67	15.69		1.14 (0.26-5.09)
Without evidence	7	30.43	41.18	16	69.57	31.37		1
Valence of Video								
Pro-to-health	3	9.09	17.65	30	90.91	58.82	0.005	1
Anti-pro-to-heath	14	40.00	82.35	21	60.00	41.18		6.67 (1.70-26.13)
Video Engagement*								
Engaging	11	44.00	64.71	14	56.00	27.45	0.006	4.86 (1.50-15.60)
Disengaging	6	13.95	35.29	37	86.05	72.55		1

† Popular if > 75% percentile of views count
* p<0.05 using Chi-square test
‡ p<0.05 using Fisher exact

cancer… if observed from statistic were 75% of smokers without lung cancer, therefore we cannot say that smoking causes lung cancer because the majority do not get cancer"

To appeal to viewers' sense of reason or logic, some videos also comparing the lung X-rays of a vaper and non-vaper (Figure 2a).

b. Fear Appeal

Another appeal used in vape videos was fear appeal. Fear appeal was delivered in the scenes or pictures recording incidents while using vape and image of the victim's injured body because of vape explosion to induce fear in viewers' mind, as shown in the videos #11 and #30 (Figure 2b).

2. Dynamic audio-visual component

The statistical analysis shows that a dynamic audio-visual component is almost significant (p value= 0.050, OR= 3.16, 95% CI 0.97-10.31) for delivering health information of popular video (Table 1). YouTuber presented images or scenes snippet with related audio clips for example in vlog videos #14 (https://www.youtube.com/watch?v=8eAci54ZQMg). The most popular genre from the 68 selected videos displayed visual images with music accompaniment. Examples of these are videos #16 (https://www.youtube.com/watch?v=5_7fgoIARvc). Some of these displayed subtitles in Indonesian that made it easier for viewers to understand the message. Videos that had sympathetic responses from viewers, though did not use dynamic audio-visual effects, were videos with audio recordings from the time of shooting. Most of those were experimental vlog videos, personal vlogs, news clips, and a CCTV recording a vape explosion.

3. Use of familiar figures and characters

The result shows that the use of special figures in a

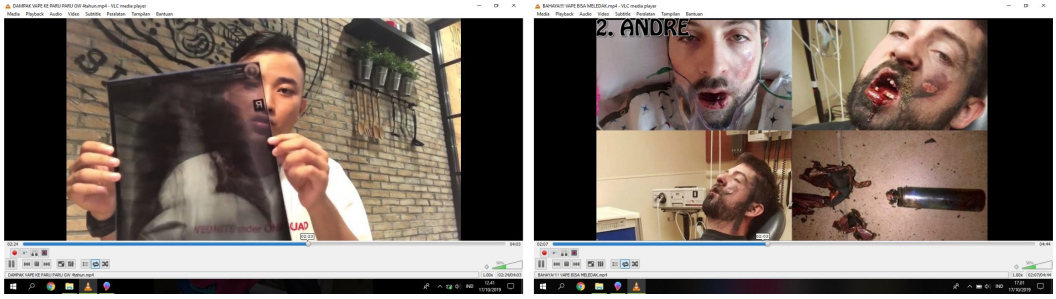


Figure 2: Video capture showing primary persuasive appeal. (a) Lung X-rays of a vaper (cognitive rationale evidence). Source: https://www.youtube.com/watch?v=w8NCGmOyLYI. (b) Victim's injured body (Fear appeal). Source: https://www.youtube.com/watch?v=LQG3O1JLQA4

vape video has no significant association with video popularity (Table 1). Most videos are video clips that did not use special figures and only displayed snippets of images and text. Vape videos used special figures (celebrity, vaper, and scientific figures such as doctor) to improve the credibility of claiming the harm and benefit of vape. For example, video #43 uses a doctor's figure in an animated cartoon that describes the message of medical facts about the benefits of vaping (Figure 3a). They mainly use the figure of the vaper in the videos of vape reviews, which are made by vapers, vape investor and vaper communities, both in the form of vlogs and interview vlogs. One video used both the figure of doctors and patients (vapers) in a question-and-answer format about vaping and health (Video #60 by Go Doc Indonesia) (Figure 3b). There were only three videos use celebrity figures, yet they reached the highest rank with the largest number of viewers. Videos #1 used an Indonesian celebrity Dedy Corbuzier as an example of celebrities who take advantage of his popularity (Figure 4a). A YouTube celebrity named Clarin Hayes (video #4), who has over 600,000 subscribers, encourages the acquisition of a high number of views among pros-to-health videos (Figure 4b).

Besides figures of doctors, vapers, and celebrities, there were many ways the content creator do to attract viewers. There was a figure of a young pastor dressed in a casual style in a video titled "Trending topic- Is vaping safe?". Another interesting figure is the vlog of a health promoter who says he holds a Bachelor of Public Health degree to legitimate his opinion. Also, some videos refer to some national and international scientists from like-formal affiliation (YPKP or the Indonesia Public Health Observer and the National Institute for Health and Care Excellence) to improve the credibility.

4. Evidence of health claims

Content creators used information in the form of health claim on their vapes videos. Some claims appear in the form of statements based on research from medical experts, such as professors and doctors (videos #34), with images of scientific journals (videos #1) and answers to medical questions by doctors and news articles (Figure 5a and 5b). Other videos provide indirect health claims by showing vaping hazards on CCTV recordings or video footage (for example, video #40) (see Figure 5c). Many videos claim health benefits/anti-pro-to-health without appropriate scientific evidence, with many examples of vlogs favourably comparing cigarettes with vape (for example videos #2). There is even a vlog reviewing and criticizing the statements of health experts, although the vlogger has neither medical background nor evidence. The statement by scientists from YPKP become evidence of many videos that are anti-pro-to-health. In summary, a popular video should deliver messages based on

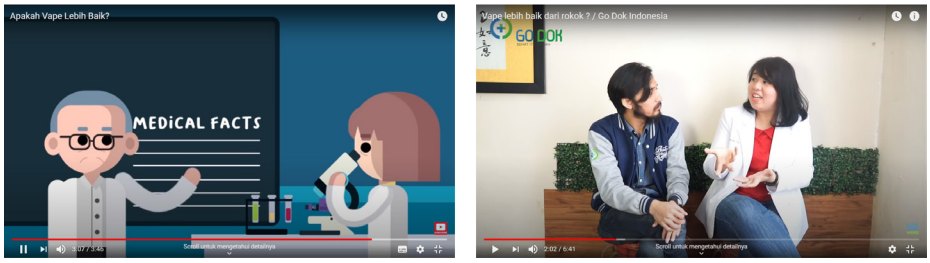


Figure 3: Using doctor figure to attract viewer. (a) A doctor figure in an animated cartoon. Source: https://www.youtube.com/watch?v=pCjSM6wGl8I (b) A doctor figure in a video. Source: https://www.youtube.com/watch?v=3zNcFSpMlPE

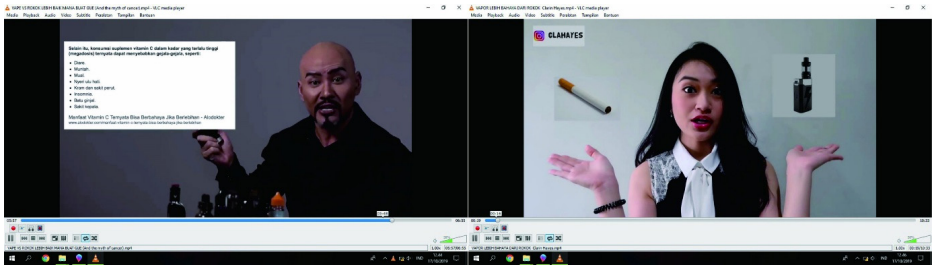


Figure 4: Using celebrity figure to attract viewer. (a) A television Celebrity figure. Source: https://www.youtube.com/watch?v=cKV4prd6g24 (b) A YouTube celebrity figure. Source:https://www.youtube.com/watch?v=zYgywwb66b8

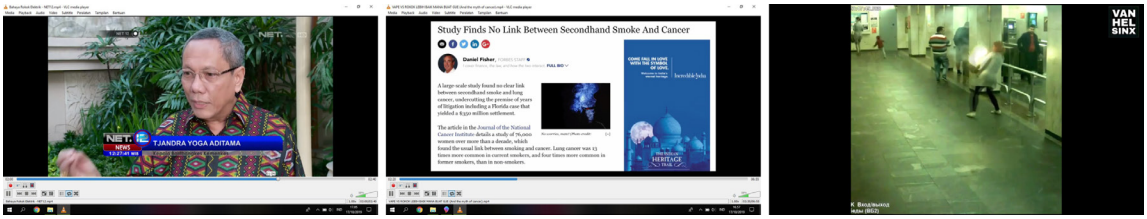


Figure 5: Examples of evidence to health claims. (a) Referring to the Head of Health Research and Development Agency, Ministry of Health of Indonesia. Source: https://www.youtube.com/watch?v=osWtbtFYmQc (b) Referring to a scientific journals. Source: https://www.youtube.com/watch?v=cKV4prd6g24 (c) Referring to a CCTV recording showing vaping explotion. Source: https://www.youtube.com/watch?v=zdh8XO15V1M

perceived as credible evidence. This study found that evidence of health claims shows no significant association with video popularity (Table I).

5. Valence of Video

The proportion of popular videos majority were anti-pro-to-health videos (82%) (See Table 1). For example, video #1 is an anti-pro-to-health, it's having over 5 million views, while video #4 is the highest views among pro-to-health videos, only gets 1.5 million views (Figure 4). The Fisher exact test shows a significant association between valence of video and video popularity (Table I). Anti-pro-to-health videos were 6.67 times more popular than pro-to-health videos (OR= 6.67 95% CI 1.70-26.13) in Logistic regression analysis.

To those anti-pro-to-health videos, the principal argument was vape is a potential gateway from the nicotine addiction trap. The pro-to-health videos the principal argument was vape is a potential trap to the nicotine addiction and lead to a new nicotine-dependent epidemic, with widespread use of vape among non-smokers and vape use by smokers without medical guidance

6. Video engagement

Further observations on the video's genre, we found that the pro-to-health videos used more video clips, while the anti-pro-to-health videos used more vlogs. Pro-to-health videos generally packaged in video clips with text or static pictures about warning messages, which are informative but "disengaging". Figure 6a is an example of a disengaging video, only showing a text message said "There are many ways people try to cope with smoking. One of the most popular alternatives today is vape. Many people trust that vape is safer than cigarette".

On the contrary, anti-pro-to-health videos packaged messages in engaging and more passionate involving the viewers, although using simple personal vlog (Figure 6b). The video engagement has a statistically significant association to popularity (Table 1). Engaging videos were 4.86 times more popular than disengaging videos (OR= 4.86 95% CI 1.50-15.60) based on logistic regression test.

DISCUSSION

Since its development in 2004, YouTube has transformed not only as a post-and-sharing video platform but also as a social networking site providing a challenge for misleading information and affects users' decision making on vape consumption (13, 27). We aim to identify characteristics of popular vape videos on YouTube both that promoting and discouraging its use, to provide evidence on how to develop an attractive video that discouraging vape use. Important aspects of popular vape videos are valence of video and engagement of videos that significantly associated with videos' popularity. We discuss our results on each aspect that may contribute to the popularity of the vapes videos, and the implication to develop a pro-to-health video.

1. Primary persuasive appeal

Our finding showed that the use of primary persuasive appeal didn't associate significantly with the popularity of vapes videos. Similar to a study conducted by Sohal and Kaur (2019) studied the relationship between the number of viewers and the type of appeal used in political campaigns and found no significant association (28). Another research by Yang and colleagues (2018) about marijuana vapes videos on YouTube also found that the use of appeal not significantly associated with video views but associated with sharing, comment, and dislikes (29).

Previous study found that using primary persuasive appeals in the media would encourage viewers to consider or perform the suggested behaviour (22). In the advertisement industry, they used rational appeal to encourage audience engagement in the communication process, however it doesn't ensure the effectiveness of the communication compared to emotional appeal (22). Public health campaign usually use fear/emotional appeal to influence behavior in some circumstances (23), and in many topics, such as food advertisement, anti-smoking campaign (30) and safety driving (31). Although important, appeal is unnecessary as the strategy to create a popular content on YouTube.

2. Dynamic audio-visual component

Our findings show that most of the popular vape videos were using dynamic audio-visual components, and almost statistically significant association. Video with dynamic audio-visual were those that used expressive and dynamic audio and visual other than static or text based visual. Research on video popularity on YouTube found that fast pace videos, videos that communicate

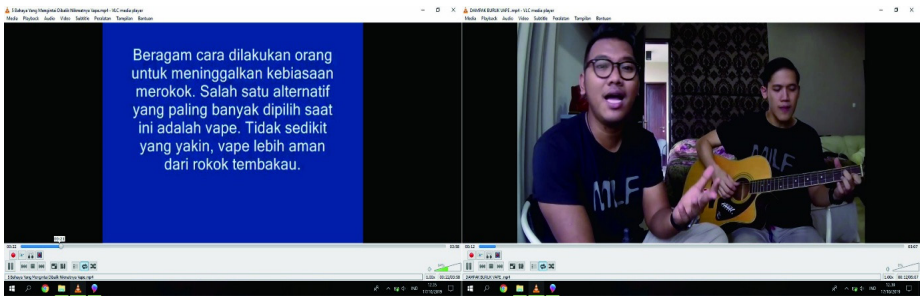


Figure 6: Examples of video engagement. (a) A disengaged pro-to-health video clip. Source: https://www.youtube.com/watch?v=CVjZMotiM48 (b) An engaged anti-pro-to-health video in a vlog. Source: https://www.youtube.com/watch?v=8eAci54ZQMg

rapidly, attract more viewers than those with slow paced. Audio-visual is one of the prominent features of YouTube content and known to be effective in knowledge translation (32, 33). However, fast pace video may also affect how viewers comprehend the message (34). Vapes video creators should consider the application of dynamic audio-visual without negating the other factors such as channel type (user generated or professional generated), the use of special figure as the communicators (34) and also the video appeal (33). Although almost significantly related to the popularity of a video, further study is in demand to achieve stronger evidence.

3. Use of familiar figures and characters

This study found that most of the popular vapes videos were use no figure to deliver their messages and no significant association between the use of familiar figures and popularity of vapes videos. However, in our qualitative analysis found that the most popular videos (Rank 1st with 9 million viewers) featured celebrity figures. Previous study found celebrity figures known to have a powerful influence on the viewers, especially those who already have millions of subscribers on their YouTube account. Viewers are more receptive to the information if they recognize their favourite figures delivering the information (35). Besides celebrity, characters of doctors and vapers frequently appear in vapes videos. Use vaper's figure possibly caused by many similarities experienced between viewers and the vaper or known as parasocial interaction (36). Parasocial interaction boost viewers' loyalty, driving by the feeling of similarity with the figures. These findings suggest that the development of vapes videos, especially pro-to-health videos, might consider the use of special figures. The figures of celebrities or ex-vapers, especially those who can generate the sense of familiarity, a sense that the viewer can easily recognize the figure, and similarity, a sense of similar experiences shared between the figure and the viewers. However, further study is in demand to identify the character of the figure that can raise the sense of familiarity for the YouTube users.

4. Evidence of health claims

Our findings showed that the use of evidence of health claims didn't associate significantly with the popularity of vapes videos. Evidences supported the claims in the vapes video in the form of testimonials from medical experts, recording of an event or experiment. However, our findings showed that most popular vapes videos had no scientific evidence. Our findings in line with previous study that found the lack of evidence-based health information in social media, especially those that gain popularity most are misleading and dangerous content (37). Li and Suh found that viewers of a social media consider more on how the content creator explains the evidence logically and easily to understand rather than the credibility of the evidence (38). We found that many anti pro-to-health videos were mimicking the "looks sound evidence" by showing a doctor figure or "looks like legitimate" institution such as YPKP or the Indonesia Public Health Observer and the National Institute for Health and Care Excellence. Although there was no significant association between evidence of health claims and video popularity, as a professional responsibility, it is still important for a pro-to-health content creators to develop content based on evidence in an easy-to-understand format.

5. Valence of Video

Qualitative data in this research found that there were more anti-pro-to-health than pro-to-health vapes videos on YouTube (See Table I). We found that there are two dominant conflicting arguments regarding vape: vape was a potential gateway from the nicotine addiction trap vs. vape might lead to a new nicotine-dependent trap. Our findings supported the result of the study by Luo et al. (2014) which showed that most e-cigarette videos on YouTube use claims that e-cigarette were healthier than conventional cigarettes (15). Another study also found that media promoting the use of e-cigarette claim that e-cigarette were cleaner, cheaper, more convenient than traditional cigarettes and can be 'a smoking cessation aid' (16). Studies have shown that misleading, even dangerous health information, is more commonly found in social media including YouTube (37, 39). A study in the US found young adults showed a positive attitude toward e-cigarettes after viewing videos on YouTube containing misleading health information (40). Evidence from a National Longitudinal Survey also showed that e-cigarette information sought by youth and young adults were majority related to anti-pro-to-health messages (41).

Our quantitative data analysis also showed that the valence of video has a significant association with the popularity of vapes videos. Kim et al. (2020) found that the provision of anti-pro-to-health video messages was more prominent in social media rather than traditional media. Therefore, people who actively use social media may have more positive beliefs regarding vapes, which may increase the popularity of anti-pro-to-health videos (24). Study by Vosoughi et al. (2018) also showed that false information shared faster than correct information. This may because the false informations are more novel and can attract more emotional reaction than correct information (42). Social media users also tend to share false information due to social media fatigue, which makes them share false information without authentication (43), especially during COVID-19 pandemic (44). This finding calls for action from public health authority to produce more pro-to-health related content.

6. Video Engagement

Our quantitative data analysis showed that the video engagement has a significant association with the popularity of vapes videos. Vape videos examined in

this research were dominated by video clips, personal and experimental vlogs. Based on the qualitative data, most pro-to-health videos delivered their messages in disengaging format. Our study also found that engaging vapes videos were 4.86 times more popular than disengaging videos. This is because of direct personal communications between the vloggers and viewers are more emotionally arising and engaging compared to video clips. Beaunoyer et al. (2017) state that attractive information media needs to pay attention to emotional tones, upload viewer emotions, arouse curiosity, and easy-to-understand (45). Heldman et al. in 2013 stated that the design of social media was to engage target audiences. In conventional public health promotions, they usually developed media for the dissemination of mass information rather than interactive and multi-directional audience involvement (46).

Policy implication

The findings of this study showed that most popular vape videos are anti-pro-to-health, thus more misleading information. People move to more active roles in communication in the new "social media" era brought by industrial revolution 4.0. During the COVID-19 pandemic, the "infodemic", and overburdened of mainly wrong information disseminated both online and offline, endangered disease control run by the government also supporting this sign (44). This has a serious implication for the policy maker to encourage the health promotion strategy to utilise social media such as YouTube as a strategic way to access audiences. Health promotion professions need necessary training to improve their "digital" capacity. The government organizations and professional associations as the credible entity should produce more videos in a "YouTube style" (13). The delivery should consider the use of engaging interactive videos, accomplished with the dynamic audio-visual components, provision of special figures that are familiar or had similar experience, provision of evidence and delivered in logic, and packaged in an easy to understand messages. There is a demand to strengthen the regulation to control misleading information delivered on YouTube (47).

Responding to the fake news, the government is expected to implement a top-down and bottom-up social media control policy. The top-down strategy, the government needs to make a regulation that oblige social media providers to withdraw fake contents (42, 48). It is also necessary to establish a social media monitoring board in all government institutions to monitor fake issues circulating on social media (49).

On the bottom-up strategy, it is necessary to implement social media policies for the public to provide content responsibly. As a modification, they can mobilize government officers to take part in clarifying fake contents in social media (50). It is also necessary to clarify fake content by providing contextual information so that users can conclude themselves that the news is fake. For example, Facebook provides access to "Related Articles" close to the fake news (48).

This study limitation is on the number of experts who judge the video, there is a possibility of bias in categorizing the characteristics of videos. Further research with stronger judgement from more experts from related disciplines and from lay people viewers is in demand.

CONCLUSION

The characteristics of popular vapes videos with health aspects in YouTube in Indonesia were anti-pro-to-health but delivered in an interactive and engaging manner. There is a need in pro-to-health video development regarding vapes that attract viewers by using more engaging methods of delivery.

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