Depression presentations, stigma, and mental health literacy: A critical review and YouTube content analysis

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Abstract

We review knowledge concerning public presentations for depression. These presentations impact illness beliefs and may influence public stigma, self-stigma, and depression literacy. We provide a critical review of messages, images, and information concerning depression's causes, continuum conceptualization, timeline, curability, coping/treatment regimen, and strengths. To provide data regarding the prevalence of particular presentations, we conducted a content analysis of 327 videos about depression representative of material on the YouTube social media platform. YouTube presentations of depression indicate that depression: 1) is caused by either biological (49.5%) or environmental (41.3%) factors; 2) is a categorical construct (71%); 3) is treatable, with 61% of relevant videos (*n*=249) presenting recovery as "likely"; 4) is chronic, found in 76% of videos mentioning timeline; 5) is recurrent (32.5%); 6) is mostly treated via medication (48.6%) or therapy (42.8%), although diet/exercise (29.4%) and alternative treatments (22.6%) are commonly endorsed; and 7) is rarely associated with strength (15.3%). Nearly one-third of videos were uploaded by non-professional vloggers, while just 9% were uploaded by mental health organizations. We discuss how these presentations may influence stigmatizing attitudes and depression literacy among people with and without depression and suggest future research directions to better understand how to optimize public presentations.

Keywords: Depression, public framing, YouTube, content analysis, stigma, illness beliefs

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The framing of health information is well known to impact health-related beliefs, attitudes, and behaviors (Gallagher & Updegraff, 2012). Importantly, people derive health information from a variety of sources like cultural knowledge and social communication (e.g., YouTube, healthcare websites, other media), the external social environment (e.g., healthcare professionals, family members, friends), and personal experiences of a health condition (Leventhal et al., 1984). In the realm of mental health conditions such as depression, specific messages may influence people's attitudes, beliefs, and behaviors (e.g., Lebowitz, Ahn, & Nolen-Hoeksema, 2013). Consider the following example to illustrate the power of health messages:

> *Jeff has been feeling down in the last month. He suspects he has depression after Googling through various sites. One day, while scrolling on his Facebook newsfeed, Jeff sees a posted video titled, "The Science of Depression," by ASAPscience (2014). Jeff watches the 3-minute video which has over 7 million views. The video focuses heavily on the neurobiological aspects of depression, depicting images of how serotonin and antidepressants work. The video concludes: "It's important to remember that depression is a disease with a biological basis along with psychological and social implications. It's not simply a weakness that somebody should get over or even something that we have a say in. And just like heart disease or cancer, shedding light onto the subject is of the utmost importance in order to bring funding and proper research."*

Jeff learns the following from the video: depression is (a) a disease with a biological basis, (b) not a personal weakness, (c) treated with antidepressants, (d) potentially

uncontrollable, and (e) potentially chronic or enduring ("like heart disease or cancer"). If Jeff adopts this information, these elements could shape Jeff's future behaviors including whether he seeks help for his suspected depression, where he will seek help for potential treatment (e.g., psychiatrist vs. psychologist), and how he copes with his mood.

Over the last two decades, research has attempted to target these messages and understand how they influence stigma, knowledge, and help-seeking behaviors for mental illness. The following movements provide evidence for the value of these efforts: *the National Alliance on Mental Illness* (United States; Corrigan et al., 2010), *Beyondblue: The National Depression Initiative* (Australia; Jorm et al., 2005), *Time to Change* (United Kingdom; Henderson, Evans-Lacko, & Thornicroft, 2013), *Opening Minds* (Canada; Stuart et al., 2014), and *Like Minds Like Mine* (New Zealand; Thornicroft, Wyllie, Thornicroft, & Mehta, 2013). These campaigns have demonstrated evidence for positive attitude change toward people with mental illness and mental illness treatment over time (Corrigan et al., 2012; Thornicroft et al., 2016; Angermeyer, van der Auwera, Carta, & Schomerus, 2017).

Unfortunately, most of the messages embedded within these anti-stigma campaigns have not been rigorously tested regarding their multitude of outcomes on people with *or* without mental illness (for reviews, see Borschmann, Greenberg, Jones, & Henderson, 2014; Thornicroft et al., 2016). Further, few studies have documented the existing public presentations about specific conditions, like depression, to assist in anti-stigma efforts, nor reviewed the benefits and consequences of particular messages. To facilitate such a program of research for depression, we perform a critical analysis of public presentations for depression, focusing on the popular social media channel, YouTube.

Public Presentations for Depression

We define public presentation as broad public content – messages, images, and information. Public presentations may speak to depression's *causes* (e.g. "is a brain disease"), *timeline* (e.g., "is chronic"), *consequences* (e.g., "increases the risk for suicide"), *curability* (e.g., "is treatable"), *continuum conceptualization* (e.g., "is different than sadness"), *coping/treatment regimen* (e.g., "medication," "therapy"), and *strengths* ("can be adaptive").

Public presentations on depression are important to investigate because they may influence people's beliefs, attitudes, and knowledge, and influence a variety of behaviors toward this condition, including how people identify, manage, and cope with depression (mental health literacy; Jorm, 2012). Print media, for instance, has historically implied that people with depression are personally responsible for their condition, or that depression results from a chemical imbalance (Scholz, Crabb, & Wittert, 2014; Zhang, Jin, Stewart, & Porter, 2016) – these messages may increase negative attitudes among the public toward mental illness (Kvaale, Gottdiener, & Haslam, 2013a; Kvaal, Haslam, & Gottdiener, 2013b). Documenting the prevalence of certain presentations, and considering their public health implications, can inform efforts to decrease stigma and help people with depression better manage their condition.

Aims of Current Review

The first part of our review draws upon three literatures: illness beliefs (Leventhal, Nerenz, & Steele, 1984), stigma (Corrigan, 2005), and mental health literacy, which we term depression literacy (Jorm, 2012). These literatures help provide a theoretical framework for considering public presentations. This framework focuses on dimensions that characterize depression – including *causes*, *timeline*, *consequences*, *curability*, *continuum conceptualization*, *coping/treatment regimen*, and *strengths* – and how variations on these dimensions might impact illness beliefs, attitudes, and knowledge about depression. Second, we utilize this framework in a

content analysis of public presentations on depression, focusing on the platform YouTube. YouTube content is particularly salient to analyze. YouTube is a growing hub for news and information about depression that is viewed, shared, and commented on by millions (Shearer & Gottfired, 2017). YouTube may even be more widely used than traditional healthcare websites (e.g., National Institute for Mental Health; Alexa Inc. 2019). Third, our YouTube analyses are a point of departure for a critical discussion of the relationship between public presentations, stigmatizing attitudes, and depression literacy (both for people with and without depression). Namely, we consider how public presentations for depression might be optimized to improve depression outcomes, including decreasing stigma (negative stereotypes, discrimination), increasing depression literacy (knowledge about how to identify, manage, and cope with depression), and improving social support and treatment seeking behaviors. Finally, we outline the key next steps to facilitate the study of public presentations for depression and other mental health disorders, as our framework could be useful to studying public presentations for other mental health problems.

Theoretical Framework

Our theoretical framework is inspired by the Common Sense Model of illness representations (CSM; Leventhal et al., 1984), with adaptions that incorporate stigma theories (Corrigan, 2005) and literatures on mental health literacy (Jorm, 2012). The CSM posits that individuals create mental representations, or beliefs, of an illness based on concrete and abstract sources of available information. These information sources may include (1) lay information via cultural knowledge and social communication (e.g., YouTube, healthcare websites, other media), (2) the external social environment including significant others and healthcare authorities

(physician, psychologist, parent), and (3) an individual's experience with the illness (e.g., an individual's experience with, or, knowing someone with depression).

These illness representations can be broken down into relevant dimensions such as *causes*, *consequences, timeline*, *curability*, *controllability*, *continuum beliefs*, *strengths*, *coping/treatment*, and *identity* (see Table 1). Researchers have applied the CSM framework to depression (Fortune, Barrowclough, & Lobban, 2004; Brown et al. 2001; for review see Prins, Verhaak, Bensing, & van der Meer, 2008; Baines & Wittkowski, 2012). While CSM research primarily explores patients' illness representations, the dimensions overlap with broader stigma and mental health literacy literature and may be useful for gaining a more comprehensive understanding of stigmatizing reactions (Mak, Chong, & Wong, 2014).

Conceptual Framework

Figure 1 outlines our adapted conceptual framework and the pathways whereby various illness dimensions may alter depression-related outcomes. For example, beliefs about depression's *causes*, *consequences, timeline*, *curability*, *controllability*, *continuum beliefs*, *strengths*, *coping/treatment*, and *identity* may influence public reactions to depression (such as public stigma) and self-reactions to having depression (e.g., self-stigma). As well, depression beliefs are inherently tied to depression literacy (e.g., knowledge about depression). Thus, stigma and depression literacy may contribute to how people manage depression – such as through seeking treatment or using coping strategies – as well as how others without depression behave toward people with depression, including providing social support.

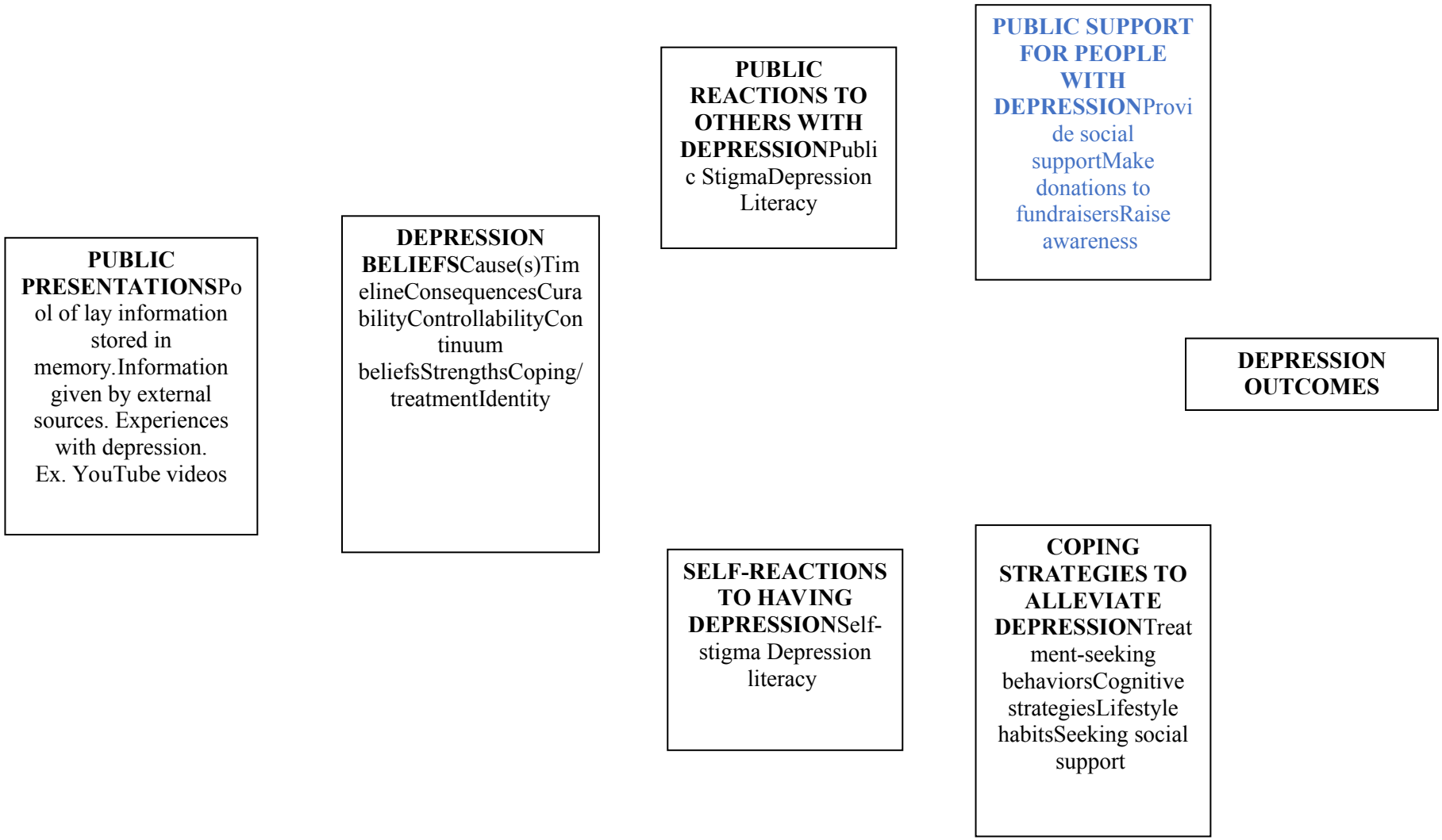


Figure 1. Conceptual Framework (adapted from Common Sense Model; Leventhal et al., 1984)

Table 1. Illness Dimensions and Public Presentations for Depression

Dimension	Definition	Example of Public Presentation
Causes	Refers to the etiological beliefs and contributing factors about depression.	Biological: "Depression is a brain disease." Environment: "Depression is caused by stressful life events like childhood trauma." Psychological: "Depression is driven by negative thinking styles." Other: "Depression is caused by a lack of Vitamin D."
Timeline	Refers to beliefs about the course and chronicity of depression.	"Depression is a chronic illness." "Depression is short-lived." "Depression may be gone now, but it will come back." "Once depression goes, it stays away."
Consequences	Refers to the perceived effects of depression on quality of life.	"Depression makes me late to work." "Depression can be lethal."
Curability	Refers to an individual's hope and expectations that recovery is possible from depression.	"Depression is treatable." "Depression never goes away completely, but you can cope with it." "Depression never improves."
Controllability	Refers to beliefs about control and sense of empowerment over depression.	"Depression is not a person's fault." "People with depression cannot control their moods." "People with depression can alter their thinking styles."
Continuum conceptualization	Refers to beliefs about perceived differentness and whether depression is viewed as a distinct entity or on a continuum.	Categorical: "People with depression are different," "depression is different than sadness." Continuum: "Depression is a spectrum of experiences," "No two depressions are alike."
Strengths	Pertains to beliefs about the benefits of having depression.	"Depression is a sign that something is wrong," "Having had depression, I feel I have more insight into myself."
Coping/treatment regime	Refer to beliefs about the perceived efficacy of coping behaviors and treatments.	Medication, therapy, diet/exercise, mindfulness practices, alternative (e.g., Lightbox therapy), Ketamine, ECT.
Identity	Refers to beliefs about the illness label.	"Depression is a big part of who I am," "Depression is one small part of my life."

Public reactions to people with depression: Public stigma. Public stigma regards prejudice that is expressed through forms of cognitive, affective, and behavioral reactions (Corrigan et al., 2005). Cognitive reactions may include stereotypical beliefs, such as people with depression are "lazy," "helpless," or "hard to talk to" (Wood, et al., 2014; Thornicroft et al., 2007). Affective reactions may include emotions like fear, irritation, and a lack of sympathy for people with depression. Behavioral reactions may include discrimination towards people with depression in employment, housing, or social interactions (Sickel, Seacat, & Nabors, 2014; Peluso & Blay, 2009). These stigmatizing reactions are linked with decreased support at the legislation level, including less allocation of funding and services toward people with mental illness (Henderson, Evans-Lacko, & Thornicroft, 2013). Combined, this decreased support at the individual and structural levels contribute to lower rates of treatment utilization, which lead to worse depression outcomes (Henderson et al., 2013; Clement et al., 2015).

Preliminary work suggests that illness dimensions can impact public stigma, with most research focusing on how *causal* presentations influence public stigma. Findings suggest that *causal* presentations may have positive and negative effects on stigma (Haslam & Kvaale, 2015). For instance, biological *causal* presentations for depression may increase perceptions of danger, unpredictability, and increase social distance (Dickerson, Sommerville, & Origoni, 2002; Wahl, 1999), while also decreasing blame toward the person with depression (Kvaale, Gottdiener, & Haslam, 2013a; Kvaal, Haslam, & Gottdiener, 2013b).

Self-reactions to having depression: Self-stigma. Self-stigma refers to what members of a stigmatized group (people with depression) may do to themselves – cognitively, affectively, and behaviorally – if they internalize public stigma (Corrigan, Druss, & Perlick, 2014; Corrigan, 2004). Cognitive reactions may include adopting negative stereotypes for depression, such as "I

am lazy," "I am helpless," and "I am different." Affective reactions may include emotions like guilt, fear (e.g., of self), and hopelessness. Behavioral reactions may include avoidance of treatment-oriented (e.g., taking medication) and help-seeking behaviors. Generally, higher levels of self-stigma increase negative attitudes about seeking treatment (Bathje & Pryor, 2011), increase behavioral avoidance for social and non-social situations (Manos, Rusch, Kanter, & Clifford, 2009), and lower self-esteem (Boyd, Adler, Otilngram, & Peters, 2013). Combined, these attitudes and behaviors lead to worse depression outcomes (Bathje & Pryor, 2011).

Like public stigma, most research has explored the effects of different *causal* presentations on depression self-stigma. Namely, biological presentations have been found to increase prognostic pessimism and decrease self-efficacy (Kemp, Lickel, & Deacon, 2014; Deacon & Baird, 2009; Lebowitz et al., 2013). Meanwhile, biopsychosocial *causal* presentations (depression is caused by the interplay of biological, psychological and social causes) may increase feelings of self-blame (Lee, Farrell, McKibbin, & Deacon, 2016).

Depression literacy. For all people, public presentations constitute a gateway for increasing depression literacy – a term adapted by Jorm's (2012) concept of mental health literacy. Depression literacy includes awareness and knowledge about depression as well as the possibility for action to benefit one's own or others' mental health (Jorm, 2012). The following components are important to depression literacy: (a) knowledge of how to prevent depression, (b) recognition of when depression is developing, (c) knowledge of help-seeking options and treatments available, (d) knowledge of effective self-help strategies for milder depression, and (e) first aid skills to support others who are developing depression or are in a depression crisis (adapted from Jorm, 2012, p. 231). Increased depression literacy may reduce depressive

symptoms (Brijnath, Protheroe, Mahtani, & Antoniades, 2016) and improve attitudes and help-seeking behaviors for depression (Hadlaczky, Hökby, Mkrtchian, Carli, & Wasserman, 2014).

Despite the CSM and mental health literacy literatures being separate, they are ostensibly linked. Knowledge about how to manage depression, for instance, depends on the public presentations related to depression. Meta-analyses and systematic reviews have demonstrated that CSM illness dimensions are associated with coping behaviors and outcomes (Hagger & Orbell, 2003; Leventhal et al., 2012; Prins et al., 2008; Baines & Wittkowski, 2013). In one such meta-analysis, perceived *controllability* and *curability* were associated with adaptive coping strategies like cognitive reappraisal, expressing emotions, and problem-focused coping (Hagger & Orbell, 2003). Additionally, perceptions of illness *controllability* were associated with better psychological well-being, social functioning, and vitality, compared to viewing one's illness as uncontrollable. In the realm of depression, a systematic review found that patients with biological *causal* beliefs may be more accepting of antidepressant treatments compared to non-patients (Prins et al., 2008). Another review found that perceptions of chronicity (*timeline*) were associated with increased treatment seeking behaviors (Baines & Wittkowski, 2013).

Framework Summary. It is vital to examine how depression is publicly presented in terms of its *causes*, *consequences, timeline*, *curability*, *controllability*, *continuum beliefs*, *strengths*, *coping/treatment*, and *identity.* These public presentations may impact beliefs about depression, and in turn how people identify, respond to, manage, and support depression. Given this framework, it is important to consider the prevalence of particular messages within these public presentations to inform efforts that decrease stigma and improve depression outcomes.

Existing Public Presentations for Depression

No study has systematically documented the aforementioned public presentations for depression. We do have survey data regarding community beliefs (Schomerus et al., 2012; Read, Cartwright, Gibson, Shiels, & Haslam, 2014; see for reviews Prins, Verhaak, Bensing, & van der Meer, 2008; Baines & Wittkowski, 2013) and mental health literacy about depression (Reavley & Jorm, 2011a; Jorm, 2012). For instance, meta-analyses suggest that acceptance of biological causal factors have increased substantially between 1990 and 2006 (Schomerus et al., 2012), although endorsement of psychosocial causes remain strong. Unfortunately, the role of public presentations in informing these beliefs remains unclear. Without systematic and quantitative data, we can only guess about the prevalence of certain presentations, and we are in a weak position to consider how public messages might be better targeted or framed to decrease stigma. Below, we consider how depression has been presented via anti-stigma campaigns, popular media (including print media, commercials, television, and film), and informational websites from healthcare authorities. This history informs our initial hypotheses regarding the prevalence of particular public presentations for depression.

In the 1990s, anti-stigma campaigns in the United States, propelled by groups like the National Alliance for Mental Illness (see for examples Albee & Joffe, 2004), disseminated a biomedical model for depression and other mental illness (Clarke & Gawley, 2009). The biomedical model packages depression as a medical condition that is primarily driven by biological forces, such as brain abnormalities, neurotransmitter imbalances, and genetics. Advocates publicly presented depression as a "disease like any other" (*causes*) that was "a treatable medical illness involving an imbalance of brain chemicals" (*treatable, causes*). The hope was that by featuring biological causes and treatments, people with depression would no longer blame themselves ("depression is not a weakness of character;" Depression and Bipolar

Support Alliance website, March 2019), and that in turn public stigma toward depression would decrease. As we will discuss later, biological casual presentations may inadvertently increase certain forms of stigma (Haslam & Kvaale, 2015).

Over the years, biomedical presentations have been promulgated by popular press outlets (e.g., *New York Times, LA Times*; Leo & Larcasse, 2008), the U.S. president (Albee & Joffe, 2004), and other prominent sources (see for examples Deacon, 2013). Additionally, pharmaceutical companies have disseminated biomedical messages through direct to consumer (DCT) advertising. Each year, billions of dollars ($4.07 billion in 2010) are spent to educate consumers about medication treatments for mental illnesses like depression (IMS, n.d.) using commercials and print advertisements (Greenslit & Kaptcuk, 2012; Grow, Park, & Han, 2006).

Advertisements may be powerful means to convey implicit and explicit messages about depression. Many commercials for medication treatments depict the following sequence: a person feels sad, helpless, and as if they have lost their identity; then, they take an antidepressant and their symptoms vanish; their energy is restored; and they regain their premorbid lives (e.g., 2017 Rexulti Commercial). Such presentations suggest that depression: is biological (*causes*); impacts a person's identity (*identity*); is treatable (*curability*) with medication (*coping/treatment regimen*). Indeed, a content analysis of DTC advertisements between 1997 and 2003 concluded that depression was presented as biological (*causes*), treatable (*curability*), and most likely to be helped by antidepressants (*coping/treatment regimen*; Grow et al., 2006).

We can also gain some insight into public presentations through considering how healthcare authorities represent depression. Websites from healthcare authorities like the American Psychological Association (APA), National Institute for Mental Health (NIMH), and the American Psychiatry Association (APA) endorse many causal presentations for depression

(*causes*). As seen in Table 2, the American Psychological Association and American Psychiatric Association endorse biological and environmental causal models. The NIMH endorses a biopsychosocial model, which states that a combination of biological, psychological, and environmental factors cause depression. Interestingly, the current and previous directors of the NIMH have tended towards portraying mental health problems as primarily brain disorders (Insel & Cuthbert, 2015; Gordon, 2019). All three websites also present depression as treatable (*curability*) and helped primarily by medication, therapy, and/or brain stimulation treatments like electroconvulsive shock therapy (*coping/treatment regimen*). As well, these websites convey categorical *continuum conceptualizations* of depression; categorical depictions infer that depression is represented as a distinct, different, and "natural kind" construct (Haslam & Ernst, 2002). An example of a categorical presentation, taken from the American Psychiatry Association website, is "Depression Is Different From Sadness or Grief/Bereavement." As will be discussed later, categorical presentations may result in an "us" and "them" mentality that increases social distance (Link and Phelan, 2001).

Table 2. Public Presentations for Depression from Healthcare Authorities Websites

Organization	Public Presentation	Selected Quotes
American Psychological Association	▪*Causes:* Biological/Environmental	▪"Some depression is caused by changes in the body's chemistry that influence mood and thought processes. Biological factors can also cause depression. In other cases, depression is a sign that certain mental and emotional aspects of a person's life are out of balance. For example, significant life transitions and life stresses, such as the death of a loved one, can bring about a depressive episode."
	▪*Continuum conceptualization*: Categorical	▪"Depression is more than just sadness."
	▪*Curability*: Treatable	▪"Depression is treatable."
	▪*Coping/treatment*: Therapy and medication	▪"A combination of therapy and antidepressant medication can help ensure recovery."

American Psychiatric Association	▪*Causes*: Biological/Environmental	▪Risk Factors for Depression: Biochemistry, Genetics, Personality, Environmental factors
	▪*Continuum* conceptualization: Categorical	▪"Depression is a…serious medical illness…" AND "Depression Is Different From Sadness or Grief/Bereavement"
	▪*Curability*: Treatable	▪"Depression is among the most treatable of mental disorders. Between 80 percent and 90 percent of people with depression eventually respond well to treatment."
	▪*Coping/treatment:* Medication/psychotherapy/ ECT/ regular exercise/sleep/health diet	▪ "How is Depression Treated:" lists Medication, psychotherapy, electroncovlusive shock therapy (ECT)
National Institute for Mental Health	▪*Causes*: Biopsychosocial	▪"Research suggests that a combination of genetic, biological, environmental, and psychological factors play a role in depression."
	▪*Continuum* conceptualization: Moderately continuum	▪Mentions major depression, persistent depressive disorder, prenatal depression, seasonal affective disorder, and psychotic depression. Also states, "Depression affects different people in different ways."
	▪*Curability*: Treatable	▪"If you have felt this way for at least 2 weeks, you may have depression, a serious but treatable mood disorder."
	▪*Coping/treatment:* Medication/psychotherapy/ ECT/ exercise/cognitive strategies/social support	▪"How is Depression Treated:" Medication, psychotherapy, electroncovlusive shock therapy (ECT)." "Other things that help may include…" "be active and exercise," "breaking up large tasks," "spending time with other people," etc.

All websites were accessed on May 14, 2019.

Public Presentation Summary. Circumstantial evidence suggests that many public presentations of depression feature it as either as a biological or biopsychosocial condition (*causes*) with a categorical *continuum conceptualization*. Additionally, depression is commonly presented as treatable (*curability*) via many types of treatments (*coping/treatment regimen*). Our goal was to move beyond this circumstantial evidence to a more systematic analysis of (a) the extent, or proportion, to which certain public presentations prevail and (b) how often these public

presentations are viewed. With this in mind, we conducted a content analysis of YouTube videos about depression.

YouTube Content Analysis

YouTube as a Hub for Cultural Messages

There are many platforms (e.g., TV, magazines) that could be analyzed to facilitate the study of pubic presentations for depression. For several reasons, we decided to focus on the social media platform, YouTube. YouTube is the dominant public platform for people to find, view, share, and post videos on the internet. In fact, YouTube is the 2nd most popular website globally (Alexa Inc., 2019) and is commonly used by other media and social media outlets to host content. Analyzing the content of YouTube videos is a sensible first step to this research because video content is more likely to elicit attentional and emotional engagement (Rottenberg, Ray, & Gross, 2007). That YouTube is a free website makes it open and accessible to a diversity of perspectives. Whereas content on healthcare and advocacy websites are motivated to endorse depression from a particular view, those who run the YouTube platform are not so beholden. Hence, YouTube hosts an array of information for didactic, entertainment, and self-disclosure purposes. These qualities make YouTube a compelling first avenue to explore public presentations for depression.

Content Analysis Aims

For this review, our goal was to provide estimates about the prevailing public presentations about depression. Specifically, we coded for the aforementioned illness dimensions regarding how these videos presented depression's *causes*, *continuum presentation*, *timeline*, *curability*, *strengths*, and *coping/treatment*. Due to the complexities of the constructs

consequences, controllability, and *identity,* we did not include these dimensions in our coding scheme.

Thus, we had the following research goals and hypotheses:

1. *Causes:* What are the most commonly mentioned and endorsed causal models for depression?
2. *Continuum conceptualization:* To what extent is depression portrayed as a categorical, distinct entity versus a spectrum, continuum-based condition?
3. *Timeline:* Is depression presented as a chronic or a short-lived condition? Is depression presented as a recurrent condition?
4. *Coping/treatment regimen:* What treatments and coping strategies are presented and recommended for depression?
5. *Curability:* To what extent is depression presented as a condition from which people can achieve recovery from?
6. *Strengths:* How often are benefits mentioned to having depression?

These aims and hypotheses were preregistered at https://osf.io/658az/register/565fb3678c5e4a66b5582f67#q16. Please see this link for more information on our hypotheses. Given our reviews from the CSM, mental health literacy, and stigma literature, we expected that depression will be publicly presented as: (1) a biological or biopsychosocial condition (*causes*), (2) a categorical rather than continuum condition (*continuum conceptualization*), (3) a chronic and recurrent condition (*timeline*), (4) a condition treated primarily with medication or therapy (*coping/treatment regimen*), (5) a condition that is treatable but not fully recoverable (*curability*), and (6) a condition with few strengths (*strengths*).

Method

Sample

Following PRISMA guidelines (2009), we searched YouTube.com on June 1, 2018 using nine search terms representing common searches for depression-related content. We cleared our internet browser history and cache, logged off all accounts, and used the Chrome Browser's Incognito mode to diminish bias from our own computer. To generate common search terms, we first used YouTube's auto-fill feature in the search bar (which uses an algorithm influenced by popular user searches to auto-fill searches from stem words). The videos were searched by the "Relevance" filter (the default YouTube setting at the time). Auto-fills suggested the following searches: "depression," "what is depression," "what causes depression," "depression test," "am I depressed?", and "depression and anxiety." These search terms were supplemented by a consensus discussion of other popular searches amongst the research team, which generated "how to treat depression," "coping with depression," and "science of depression." For each search term, we included the first 50 videos that arose in search. This cutoff was used to capture common sense internet scrolling behavior, while including videos that were most likely to be viewed.

Video inclusion criteria for the content analyses were: (1) had to reference depression as a mental health problem (e.g., exclude the Great Depression), (2) had to be less than 25 minutes long; videos over 25 minutes were included only if they had 500,000 views, (3) had to be in English. All videos were screened by the lead author, and videos were transcribed verbatim and verified for accuracy. Our initial search resulted in 292 unique videos. To increase our sample size and ensure saturation of content, we conducted a second search on October 28, 2018 using both the nine original search terms and three additional search terms: "do I have depression" and

"what does depression look like" from the YouTube autofill feature, and "signs of depression" from consensus discussion. After this updated search, our pool of videos included 327 unique videos. Given that 45.5% of our 600 videos were either duplicates, irrelevant, or did not meet our criteria, we have confidence that our content analysis includes representative YouTube content about depression. Figure 2 presents our PRISMA flow chart. Our sample size of 327 videos and use of 12 search terms are both more than double the size of the typical YouTube content analysis. A review of 18 YouTube content analyses regarding healthcare information reported that the average study used a sample size of 120 videos and 3.55 search terms (Madathil, Rivera-Rodriguez, Greenstein, & Gramopadhye, 2015).

Procedure

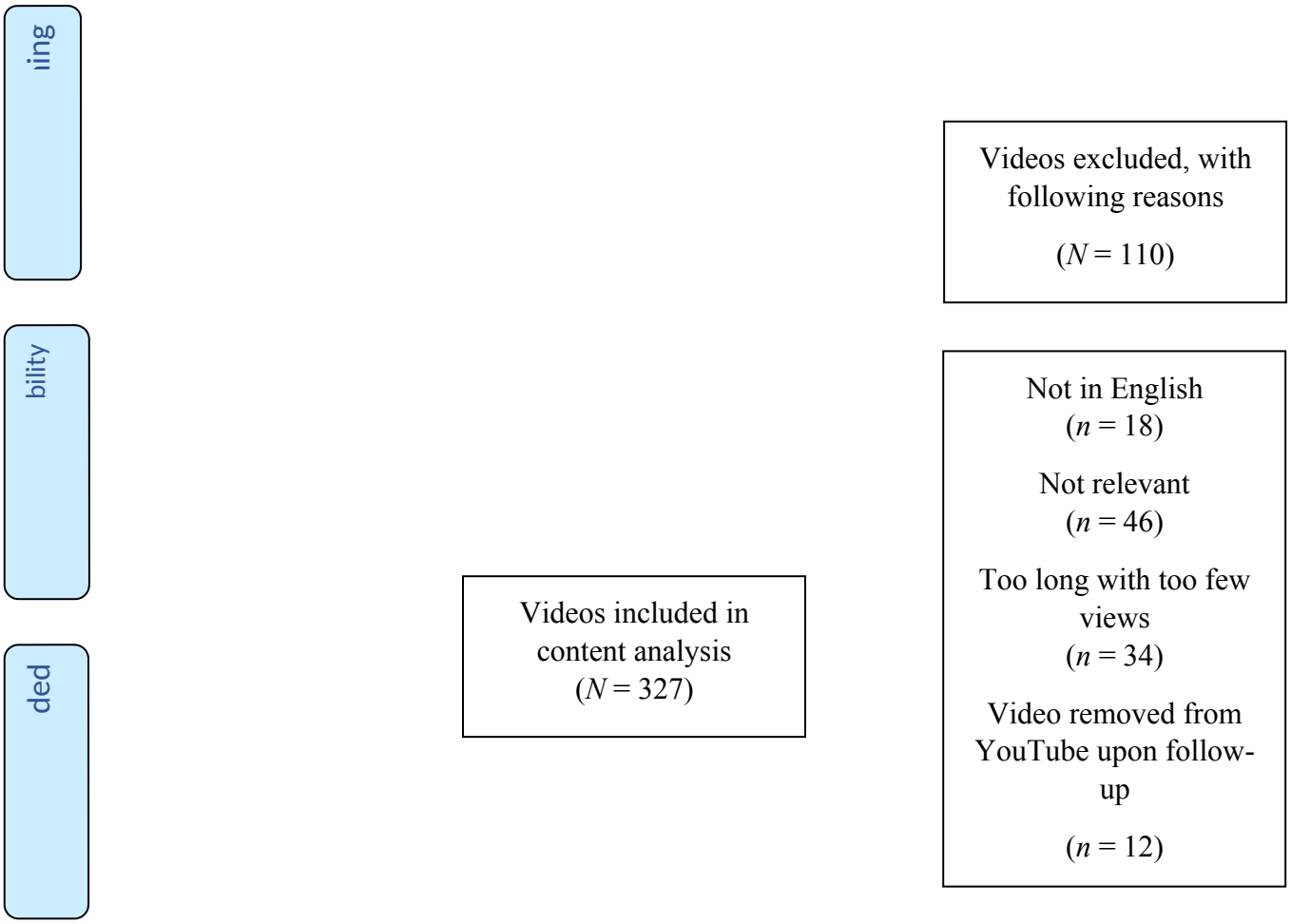
The unit of analysis for media content was each whole video including all the video's visual, audio, and text presentation (Krippendorff, 2012). We developed a theoretically derived codebook to capture concepts related to illness beliefs, mental health literacy, and stigma. Our codes included: causal presentation (*causes*), continuum presentation (*continuum conceptualization*), mention and presentation of recovery (*curability*), mention of chronicity and recurrence (*timeline*), mention of treatment (*coping/treatment regimen*), and mention of strengths (*strengths*).

Figure 2. PRISMA 2009 Flow Diagram

ion

Videos identified through search terms
(*N* = 600)

Videos after duplicates removed
(*N* = 447)



The first and second authors (doctoral students in clinical psychology who study depression and suicide) developed and applied the codebook to the videos, with input from the third author (a depression expert). After a final codebook was developed with definitions and examples, the first and second authors collaboratively coded a sample of 20 videos (data not included in the final analysis) to clarify coding procedures. Next, coders established reliability on 25% (*N*=83) of a representative, random sample of videos (see Neuendorf, 2002). Coders maintained a journal to record lingering questions, confusion, or thoughts for discussion. Coders frequently met to address these questions and updated coding accordingly.

We sought to establish at least moderate agreement on all codes indicated by Cohen's Kappa (*K* values of .41 to .60 indicates moderate agreement; Stemler, 2001; Burla, Knierim, Barth, Liewald, Duetz, & Abel, 2008; Neuendorf, 2002) or by assessing the intraclass correlation coefficient (ICC) for continuous measures (values between 0.5 and 0.75 indicate moderate reliability; Koo & Li, 2016). We calculated reliability using Statistical Package for the Social Sciences Version 25 (SPSS, SPSS Inc, Chicago, IL). ICC estimates and their 95% confident intervals were calculated based on a mean-rating (raters = 2), absolute-agreement, 2-way mixed-effects model (Koo & Li, 2016). Table 3 provides a table of our 95% confidence intervals for ICC. Interrater reliability for all codes met at least moderate reliability. We also gleaned count data regarding each video's views, likes, dislikes, and comments, as well as the video publisher's subscription base. We updated our database with this information on May 19, 2019.

Table 3. Intraclass Correlation Coefficients for Interrater Reliability

Measure	Intraclass Correlation	95% Confidence Interval		Value	df1	df2	*p*
Etiology (support)							
Biological	.87	.76	.93	7.70	43	43	< .001
Environmental	.93	.87	.96	14.01	37	37	< .001
Biopsychosocial	.78	.21	.94	5.00	9	9	< .001
Cognitive	.90	.78	.96	10.11	21	21	< .001
Diet/exercise	.95	.80	.99	18.10	9	9	< .001
Personal weakness	.99	.98	.99	108.50	16	16	< .001
Continuum	.85	.76	.90	6.50	79	79	< .001
Presentation							
Timeline	.94	.88	.97	16.02	40	40	< .001
Curability	.66	.43	.80	2.94	60	60	< .001
Coping/treatment efficacy							
Medication	.70	.41	.85	3.30	35	35	< .001
Therapy	.59	.11	.81	2.39	28	28	< .01
Diet/exercise	.79	.51	.91	4.66	23	23	< .001
Mindful practices	.98	.94	.99	50.85	13	13	< .001
Alternative	.72	.12	.92	3.82	11	11	< .001

Note: All estimates are from Average Measures. Some reliabilities for codes are not provided due to their low frequencies. Wider 95% confidence intervals may reflect a lack of variability among the sampled videos, the small number of codes, and the small number of raters being tested (Koo & Li, 2016)

Codebook Variables

Causal Presentation

We coded the mention of *causes* (1=mention, 0=no mention) for the following: biopsychosocial (the combination of biological, psychological, and social factors causes depression), biological (e.g., brain disease, chemical imbalance), environmental (e.g., stress, life events), cognitive (e.g., negative thinking), other (e.g., Vitamin D deficiency), personal weakness (e.g., depression is due to being weak), and lifestyle (e.g., not exercising causes depression). If videos mentioned more than one cause, all causes were coded. Reliability was substantial to excellent (Cohen's *K* ranged .69 to .88). If a video mentioned a cause, we used a 5-point scale (1=extremely unsupportive, 3=indeterminate, 5=extremely supportive) for determining the degree of support stated for the cause – an unsupportive video may have stated a cause but disagreed with its veracity. Based on the ICCs, reliability for these continuous measures were good to excellent (range .78 to .99). We collapsed this continuous measure into three groups for ease of interpretation: supportive, indeterminant, and unsupportive.

Continuum Presentation

We used a 5-point scale to code for *continuum presentation* with higher scores reflecting stronger categorical presentations (1=continuum presentation; 3=mid-spectrum; 5=categorical presentation). Continuum presentations (scores of 1 or 2) exhibited depression on a spectrum, perhaps stating that depression looks different in everyone, and perhaps endorsing a dimensional view of mood. A mid-spectrum presentation (scores of 3) presented some subtypes of depression (e.g., chronic depression, dysthymia, major depressive episode) to illustrate that depression is more heterogenous. A categorical presentation (scores of 4 and 5) depicted depression as a

distinct, well-defined construct (e.g., "different than sadness"). Reliability for continuum presentations was good (ICC, 95% CI, .76 - .90). Please see Appendix A (Table A.1) for definitions and representative examples of codes for *continuum presentation.*

Timeline and Recurrence

We coded for the mention of a *timeline* for depression. If a video indicated the duration of depression, we used a 5-point scale with higher scores indicating a longer timeline. Table 8 provides details about our coding definitions. Reliability was good to excellent for the *timeline* measure (ICC, 95% CI, .88 - .97). Additionally, we coded for the mention of depression as a recurrent condition (1=mention, 0=no mention). Examples include if a video states, "depression comes and goes," "depression may go away, but come back later," or "I have had depression many times." Reliability was excellent (Cohen's K = .84). Please see Appendix A (Table A.2) for definitions and representative examples of codes for *timeline.*

Curability

We coded for the mention of *curability*. If a video indicated the treatability of depression, we used a 5-point scale for the likelihood of recovery, with higher scores indicating a higher chance of recovery (1=extremely unlikely, 3=somewhat likely/improvement, 5=extremely likely). Reliability ranged from poor to good for this measure (ICC, 95% CI, .43 - .80). Please see Appendix A (Table A.3) for definitions and representative examples of codes for *curability.*

Coping/treatment regimen

We coded the mention (1=mention, 0=no mention) of the following treatments/coping and established moderate to substantial reliability: medication (K = .60), therapy (K = .66), mindfulness practices (K = .77), diet/exercise (K = .68), alternative (e.g., vitamin D, essential

oils, *K* = .66), electroconvulsive shock therapy (ECT), and ketamine. Kappa values were not calculated for ECT or ketamine due to low frequencies; due to the potential unreliability of these data, we consolidated these codes and refer to them as "Other Treatments. If a video mentioned a treatment, we used a 5-point scale for coding the implied effectiveness of a treatment (1=extremely ineffective, 5=extremely effective). Based on the ICCs, reliability for these continuous measures were moderate to excellent (range .59 to .98). Additionally, we coded for if a video appeared to recommend a treatment. For example, a video may have presented medication as effective but cautioned its use due to side effects. Moderate to substantial reliability was established on these endorsement measures: moderate to substantial reliability: medication (*K* = .44), therapy (*K* = .65), mindfulness practices (*K* = .77), diet/exercise (*K* = .77), alternative (e.g., vitamin D, essential oils, *K* = .61).

Strengths

We coded for the mention (1=mention, 0=no mention) of strengths, which pertain to the perceived benefits of having depression (e.g., "depression makes me more insightful."). Moderate reliability was established (*K* = .60). Please see Appendix A (Table A.4) for representative examples of codes for *strengths.*

Video Publisher and Country

We categorically coded the video Publisher (YouTube channel) using the following codes: non-mental health professional (MHP) vlogger, educational organization, entertainment channel, health organization, medical center/hospital, non-MHP professional (e.g., physician), lifestyle organization, news organization, mental health organization, MHP, miscellaneous, business channel, magazine, spiritual leader, not available, TV show, and TV channel. We

collapsed across these categories to help with interpretability. Perfect agreement was achieved. Lastly, we obtained the Video Publisher's country from the "About" section on the publisher channel after reviewer feedback. Please see Appendix C for our video database and codes.

Data Analytic Plan

To test our hypotheses and examine whether specific public presentations were more prevalent than others, we calculated the 95% confidence interval (CI) for the difference score amongst proportions (see Franklin, 2007). We denoted a significant difference if the 95% confidence interval did not include zero (Cumming & Finch, 2005). We report our general results below and provide our CI estimates in Appendix B. Additionally, we explored whether certain causal presentations predicted view counts. We used negative binomial regression, which accounts for overdispersion (Coxe, West, & Aiken, 2009), to predict view count from number of subscribers and mention of an etiology (biopsychosocial, biological, cognitive, environmental, lifestyle, "other," and personal weakness). We included number of subscribers as a control variable to examine if *causes* content predicts view count independent of Publisher popularity.

We also explored whether the presentation of treatment effectiveness would vary by treatment type. We conducted a one-way ANOVA with treatment type entered as the independent variable and treatment effectiveness entered as the criterion. Treatment type consisted of seven levels (1 = medication, 2 = therapy, 3 = mindfulness, 4 = diet/exercise, 5 = alternative, 6 = electroconvulsive therapy, 7 = ketamine). Significant mean differences in effectiveness between individual treatment types were identified using Fisher's Least Significant Difference (LSD) post hoc tests.

Results

Video Demographics

Of the 327 videos, the mean and median view counts were 551,679 and 54,298, respectively. Videos ranged in length from 24 seconds to 110 minutes, with a mean of 7.63 minutes and median of 5.68 minutes. Fifty-four videos had over one million views, 75 videos had over 500,000 views, and 142 videos had over 100,000 videos, indicating that many of these YouTube videos are highly viewed. See Table 4 for specifics.

Almost half of videos (46.2%) were from the United States, followed by "country not provided" (29.1%), Canada (7.9%), United Kingdom (4.3%), Pakistan (.6%), South Africa (.3%), and Romania (.3%). Additionally, 2.4% of videos had been removed since the initial coding and the country of origin could not be identified. Regarding video Publisher, over one third of videos were from a non-MHP vlogger (36.1%), while just 9.2% of videos were uploaded by a mental health organization or MHP (see Table 5).

Table 4. Video descriptives (N=327)

	Min	Max	Median	Mean	Standard Deviation
*Views	9	10,077,067	54,298	551,679	1,250,160
Minutes	.40	110	5.68	7.63	8.02
Months posted	7	146	28	37	26
Likes	0	377,904	997	15,968	42,956
Dislikes	0	41,353	33	437	2,390
Subscribers	0	26,611,224	179,135	1,738,984	4,134,967
Comments	0	42,338	226	1901	4,937

*54 videos had over 1 million views; 75 videos had over 500,000 views; 142 videos had over 100,000 views

Table 5. Video Publisher Frequencies (N=327)

Video Publisher	Frequency	Percentage	Views

Non-MHP Vlogger	118	36.09	427,851
Educational Organization	51	15.60	914,299
Entertainment Channel	30	9.17	812,531
Health Organization/Medical Center/Non-MHP Professional	32	9.79	404,667
Lifestyle Organization	20	6.12	853,444
News Organization	20	6.12	251,580
Mental Health Organization/MHP	30	9.17	370,082
Miscellaneous/Business/Magazine	8	2.45	92,369
Spiritual Leader	7	2.14	672,901
Not Available	6	1.83	527,583
TV Show/TV Channel	5	1.53	828,096

Causal Presentations

Table 7 provides our *causes* results and statistical comparisons. Most (76.2%) videos presented a cause. Of all videos, biological (49.5%) and environmental presentations (41.3%) were significantly more common than the cognitive (22.9%), personal weakness (20%), lifestyle (10.4%), and biopsychosocial etiologies (8%), but biological and environmental presentations were not significantly different from each other (95% CI for difference score: -2.03, 18.55).

Contrary to our hypothesis that biopsychosocial causal presentations would be prevalent, only 7.8% of videos presented biopsychosocial causes. It should be noted that "biopsychosocial" was coded only when videos explicitly stated that there was "combination" or "interplay" of biological, psychological, and social factors causing depression. While many (49%) videos mentioned multiple causal perspectives, these perspectives were usually presented as distinct (e.g., "Depression is biological for some people. For others, depression is more environmental."). Nearly all videos that mentioned a cause included information that supported or endorsed the etiology; the most notable counterexamples were that 13.8% of environmental mention videos

were unsupportive, and 80% of videos that mentioned personal weaknesses did *not* support a personal weakness etiology (e.g., "depression is not a personal weakness").

A negative binomial regression predicted view count from subscribers and *causes* mention (biopsychosocial, biological, cognitive, environmental, lifestyle, "other," and personal weakness). Diagnostics for variance inflation factors (VIF) >= 2.5 and tolerance values (of less than 0.1) suggested that collinearity among predictor variables was minimal (Midi, Sakar, & Rana, 2010). Table 6 reports the unstandardized and standardized beta coefficients. Controlling for the number of subscribers and other causal presentations, the following presentations predicted higher view counts: biopsychosocial mention, Exp(*B*) = 1.69, 95% CI =1.04, 2.73, $p \leq .033$, and personal weakness mention, Exp(*B*) = 1.56, 95% CI =1.15, 2.12, $p \leq .005$. The following presentations predicted fewer view counts: biological mention, Exp(*B*) = .51, 95% CI =.39, .66, $p < .001$ and cognitive mention Exp(*B*) = .67, 95% CI =.50, .91, $p \leq .011$.

Table 6. Predicting View Count by Mention of Causal Presentation Using Negative Binomial Regression

	B	*SE*	Exp(*B*)	L95% *CI*	U95% CI	*p*
Intercept	13.132	.0916	504672.445	421746.068	603904.330	< .001
Subscribers	1.484E-7	2.3642E-8	1.000	1.000	1.000	< .001
Biopsychosocial mention	.524	.2461	1.688	1.042	2.734	.033
Biological mention	-.684	.1347	.505	.387	.657	< .001
Cognitive mention	-.394	.1546	.674	.498	.913	.011
Environmental mention	.011	.1260	1.011	.790	1.294	.932
Lifestyle mention	.013	.2009	1.013	.684	1.502	.948
Other mention	-.255	.2497	.775	.475	1.264	.307
Weakness mention	.442	.1567	1.556	1.145	2.116	.005

Continuum Presentation

Supporting hypotheses, categorical presentations of depression (71%) were more prevalent than videos coded as mid-spectrum presentations (14%) and continuum presentations (14%), with the 95% confidence interval for the difference score (57%) being 49.01% and 64.75%, respectively.

Timeline and Recurrence Presentation

Nearly half (48%) of the 327 videos indicated a timeline for depression. Of these videos, 76% presented depression as a chronic, enduring condition that lasts between 1-year to a lifetime. Chronic presentations were significantly more common than presentations that portrayed depression as temporary or acute and lasting less than one year (see Table 8); 32.5% of all videos presented depression as recurring. These findings support hypotheses of depression presented as a chronic and recurrent condition (Rottenberg, Devendorf, Kashdan, & Disabato, 2018).

Curability

Most (73%) videos mentioned a course. Of these, "likely" recovery presentations (61%) were significantly more common than "somewhat likely" (30%) and "unlikely" (9%) presentations (see Table 8). Recovery is "somewhat likely" was significantly more common than "unlikely." Thus, the hypothesis regarding the *curability* presentation was partially supported. While 61% of relevant videos endorsed a full recovery picture, a significant proportion (31%) of videos presented depression as something that is treatable but still unmoving.

Coping/treatment regimen

Table 9 provides results on treatment and significant differences. Consistent with hypotheses, videos mentioned medication (48.6%) and therapy (42.8%) significantly more than

diet/exercise (29.4%), alternative treatments (22.6%), mindfulness practices (15%), or other treatments (7.9%). Medication did not significantly differ from therapy, and diet not significantly differ from alternative treatments. All other differences were significant.

The presentation of treatment effectiveness varied significantly by treatment type $F(5, 534) = 27.41$, $p < .001$. Post-hoc tests revealed that medication ($M = 3.40$, $SD = 0.88$) was rated as less effective than therapy ($M = 3.79$, $SD = 0.69$, $d = 0.39$, $p < .001$), mindfulness ($M = 4.35$, $SD = 0.80$, $d = 0.95$, $p < .001$), diet/exercise ($M = 4.33$, $SD = 0.61$, $d = 0.93$, $p < .001$), and alternative treatments ($M = 4.21$, $SD = 0.71$, $d = 0.81$, $p < .001$). It was not rated as significantly less effective than other treatments ($M = 3.88$, $SD = 0.61$, $p = .06$). Therapy was likewise rated as less effective than mindfulness ($d = 0.56$, $p < .001$), diet/exercise ($d = 0.54$, $p < .001$), and alternative treatments ($d = 0.42$, $p < .001$). There were no other significant differences.

Strengths

Only 15.3% (50) of all videos mentioned a depression-associated strength.

Table 7. Causal Presentations for Depression on YouTube videos (*N*=327)

	Biological	Environmental	Cognitive	Weakness	Lifestyle	Biopsychosocial	Other
*Mention (%, N)	49.5% (162)[a]	41.3% (135)[a]	22.9% (75)[b]	20.2% (66)[b]	10.4% (34)[c]	8.0% (26)[c]	6.1% (20)[c]
Of the mentions							
Supportive	87.2%	81.2%	93.3%	18.2%	88.2%	96.2%	90%
Indeterminate	7.3%	5.1%	4.0%	.3%	0	3.8%	5%
Unsupportive	5.5%	13.8%	2.7%	80.3%	11.8%	0	5%

*Mention: a video mentioned an etiology; [abcd]Similar letters denote non-significant difference; "Other" includes causes like Vitamin D deficiency.

Table 8. Timeline and Curability Presentations of Depression

Timeline Code (*N* = 158)	% (*N*)	Curability Code (*N* = 237)	% (*N*)
1: acute, short lived, under 1 month	2.5% (4)		
2: temporary, under 6 months	9.5% (15)[b]	1. Unlikely to recover	8.9% (21)
3: moderate in duration, 6-12 months	12% (19)[b]	2. Somewhat likely to recover	30.4% (72)
4: chronic, enduring condition, 1-3 years	33.5% (53)[a]	3. Likely to recover	60.8% (144)
5: chronic and potentially lifelong, 3+ years	42.4% (67)[a]		
Mean (*SD*)	4.04 (1.08)		

*32.5% (108) presented depression as a recurring condition. [ab]Similar letters denote non-significant difference.

Table 9. Treatment/Coping Recommendations for Depression on YouTube videos (*N*=327)

	Medication	Therapy	Diet/exercise	Alternative	Mindfulness Practices	Other Treatments
Mentions (%, N)	48.6% (159)[a]	42.8% (140)[a]	20.4% (96)[b]	22.6% (74)[b]	15% (49)	7.9% (26)
Effectiveness (M, SD)	3.40 (.88)	3.79 (.69)[a]	4.33 (.61)[b]	4.21 (.71)[b]	4.35 (.80)[b]	3.88 (.61)[ac]
Recommends	43.2% (67)	70.1% (96)	89.6% (86)	92.1% (70)	89.8% (44)	27% (7)
Neutral	40% (62)	26.3% (36)	8.3% (8)	2.6% (2)	8.2% (4)	65% (17)
Doesn't Recommend	16.8% (26)	3.6% (5)	2.1% (2)	5.3% (4)	2.0% (1)	8% (2)

[abc]Similar letters denote non-significant difference.

Critical Discussion

Previous research suggests that public presentations – in terms of depression's *causes*, *timeline*, *curability*, *controllability*, *continuum beliefs*, *strengths*, and *coping/treatment* – impact beliefs about depression, which impact how people identify, respond to, manage, and support depression. Until now, no study has systematically examined the prevalence of these public presentations. Quantitative estimates of specific presentations are a key first step to inform anti-stigma efforts and healthcare authorities: problematic messages that are commonly presented can be targeted for reduction; helpful messages that are uncommonly presented can be propagated more widely.

Analysis of YouTube videos revealed the following regarding public presentations of depression: 1) presentations commonly portray depression is driven by either biological or environmental factors; 2) people with depression are often portrayed as categorically different; 3) depression is often seen as chronic, and 4) people with depression are likely to have many episodes but also that 5) recovery, and certainly improvement, from depression are likely; 6) depression is mostly treated via medication or therapy, but diet/exercise is also commonly endorsed; and 7) strength presentations are rare. Millions of people view and share these public presentations. Additionally, over one-third of videos were uploaded by non-mental-health professional vloggers, while just 9% were uploaded by a mental health organization or mental health professional. Interestingly, biopsychosocial and personal weakness *causal* models predicted higher view counts.

What we observed in this content analysis aligns with other knowledge regarding public beliefs about depression (Schomerus et al., 2012; Prins et al., 2008; Jorm, 2012). For example, many causes were commonly mentioned in YouTube content; this finding aligns with surveys

that people view the causes of depression to be multi-faceted (Schomerus et al., 2012). The finding that depression was often presented from either a biological or environmental model, and less often from a biopsychosocial model, is consistent with a German study. In this study, respondents were asked to indicate the most and second most cause for depression. Most respondents supported either two biological causes or two psychosocial causes, which suggests that people prefer either biological or psychosocial explanations but not usually a combination of both (Schomerus, Matschinger, & Angermeyer, 2006). Additionally, our findings that informal treatments (diet/exercise, alternative, and mindfulness practices) in YouTube content were relatively common and more endorsed than traditional treatments (medication, therapy) aligns with community surveys from Australia and Canada (Jorm et al., 2005; Wang, Adair, et al., 2007). Finally, similar to what we observed with YouTube content, there is also evidence that laypeople and patients view depression as categorical (Wood, Birtel, Alsawy, & Morrison, 2014), chronic (Rottenberg et al., 2018; Baines & Wittkowski, 2013) but treatable (Baines & Wittkowski, 2013), and recurrent (Kirk, Haaga, Solomon, & Brody, 2000).

Our study is the first systematic analysis of public presentations of depression with a large sample of popular YouTube videos. Through recognizing the existing public content, we can work toward improving how we present depression publicly. In the following sections, we consult existing theory and literature to consider how public presentations might be optimized to lessen public stigma, self-stigma, and increase depression literacy.

Before considering these broad implications, it is important to be clear on what our analysis cannot establish. Our study can provide insight into the content of YouTube videos; it does not assess the effects that the videos have on viewers. It remains an empirical question how our systematic coding compares to the average viewer's experience of these YouTube videos.

Given that we watched videos multiple times and consulted their transcripts, our coding system may have documented messages that typical viewers may miss. Additionally, we coded for messages but did not code for the amount of material in a message. In other words, a 3-minute video that devoted most of its time to discussing biological causes for depression, but mentioned an environmental cause in one sentence, would have been coded as both biological and environmental. Our measure of "support for a cause" had limited variability, as mentions were almost always supportive.

The Risks of Presenting Depression as either Biological or Environmental

In YouTube content, depression was primarily presented with either a biological or environmental causal model. Framing these causal factors as distinct may be problematic, as they may promote reductionistic thinking (e.g., genetic essentialism) among laypeople which has consequences for stigma and treatment preferences (Phelan, Cruz-Rojas, & Reiff, 2002; Phelan, 2005; Read, Haslam, Sayce, & Davies, 2006). Meta-analyses infer that the cons of biological (often termed 'biogenetic' or 'biomedical') presentations may outweigh the pros for laypeople, patients, and clinicians (Haslam & Kvaale, 2015). Among laypeople, biological presentations may reduce blame toward people with depression but they also increase perceptions that they are dangerous, unpredictable, and less likely to recover (Kvaale et al., 2013a; Kvaal et al., 2013b). In correlational studies (Kvaale et al., 2013a), but not experimental studies (Kvaale et al., 2013b), biological presentations are associated with increased social distance toward mental illness among laypeople.

For people with depression, biological presentations may increase prognostic pessimism, lower negative mood regulation expectancies, and increase views that pharmacotherapy is more credible and effective than psychotherapy (Lam & Salkovskis, 2007; Lebowitz, Ahn, & Nolen-

Hoeksema, 2013; Kemp, Lickel, & Deacon, 2014; Khalsa, McCarthy, Sharpless, Barrett, & Barber, 2011). Additionally, biological beliefs may be associated with worse treatment outcomes. Bann et al. (2005) found biological beliefs about depression were associated with less improvement and greater depression severity over an 8-week clinical trial. In a treatment trial prescribing either paroxetine or placebo, participants with dysthymia or minor depression were more likely to experience remission among those who did not endorse a biological causal explanation of their depression (Sullivan et al. 2003). Sullivan et al. (2003)'s finding is especially interesting because it suggests that depressed individuals do not need to endorse the biological beliefs to reap the benefits of antidepressants. Lastly, biological presentations and beliefs may impact clinicians' attitudes toward their clients. In three studies (Lebowitz & Ahn, 2014), biological presentations for patients' mental health problem, relative to psychosocial presentations, decreased clinicians' empathy toward the patient and increased the perceived efficacy of medication. Although some studies show null effects of stigma from biological causal presentations (Goldstein & Rosselli, 2003; Jorm & Griffiths, 2008), there appears some risk to focusing on the biology of depression.

Relative to biological models, some studies find environmental and psychosocial models decrease stigmatizing behaviors (Mehta & Farina, 1997), while others find no or worse effects (Goldstein & Rosselli, 2003; Jorm & Griffiths, 2008). Findings are also mixed on whether a biopsychosocial presentation always improves stigma. Some studies show that biopsychosocial presentations, compared to biological explanations, improve perceptions that people with depression can recover (Deacon & Baird, 2009). Other work found that combined biological and cognitive-behavioral presentations increase prognostic pessimism (Lee, Farrel, Mckibbin, & Deacon, 2016). These mixed findings have resulted in concern for the problematic nature of

causal presentations. In a panel of 32 experts on mental health stigma, panelists expressed concern over the complexity of different types of biological and psychosocial messages (Clement, Jarrett, Henderson, & Thornicraft, 2010).

Perhaps, the varying effects of causal presentations suggest that the delivery of causal presentations may be more important to consider than the cause itself. For instance, Lebowitz et al. (2013) demonstrated that emphasizing the malleability of gene expression and brain chemistry associated with depression can reduce prognostic pessimism among individuals with low to moderate depressive symptoms. Ultimately, public presentations should be mindful about the potential effects of causal framing (Clement et al., 2010). If public presentations speak to depression's causes, they may benefit from including messages that emphasize the treatability and malleability of depression, while emphasizing depression is not a personal weakness (Jorm & Griffiths, 2008). Within our content analysis, just 15% of YouTube videos explicitly advocated against the notion that depression is a personal weakness.

Moving from Categorical to Continuum Presentations

Seventy percent of YouTube videos presented a categorical depiction of depression. Not only are categorical presentations recommended against by stigma experts (Clement et al., 2010), they are also inconsistent with considerable taxonometric data on depression (Fried & Nesse, 2015). Categorical presentations place individuals with depression into a distinct category, potentially creating an "us" and "them" mindset among patients and laypeople (Phelan, 2005; Ben-Zeev, Young, & Corrigan, 2010). Preliminary research shows that continuum presentations, relative to categorical presentations, are more likely to decrease public stigma. Continuum presentations may decrease public perceptions of differentness, decrease social distance, and improve recovery perceptions of depression and schizophrenia (Corrigan et al., 2017;

Angermeyer et al., 2013; Subramaniam et al., 2017; Makowsk, Mnich, Angermeyer, von dem Knesebeck, 2016).

While more research is needed, depression campaigns, clinicians, and healthcare authorities might benefit in experimenting with continuum presentations. Mentioning subtypes of depression ("major depression," "postpartum depression," "chronic depression") is a step in the right direction, as it suggests that depression experience and treatment is more nuanced. However, naming depression subtypes remain inherently "clinical" and may not connect with a wider audience who may assume seeking help for depression symptoms requires a diagnosis (Ben-Zeev et al., 2010). As an illustration of how to frame depression on a continuum, the website *Lighter Blue* has visitors take a quiz about depression symptoms. *Everyone* is then classified into: Light Blue, True Blue, and Deep Blue. This process facilitates depression screening while countering the "otherness" perceptions of depression (Clement et al., 2010). Another useful example is the website for *BeyondBlue: The National Depression Initiative*. *Beyondblue* includes a "Types of Depression" page which states, "There are different types of depressive disorders. Symptoms can range from relatively minor (but still disabling) through to very severe, so it's helpful to be aware of the range of conditions and their specific symptoms." Further, the page includes descriptions about bipolar disorders, indicating to viewers the overlap of mental health problems (BeyondBlue, 2020).

Presenting a More Nuanced View of Depression – Questioning Chronic "Disease" Presentations

Three-fourths of relevant YouTube videos presented depression as a chronic condition, and one third of all videos presented depression as recurrent. Just 15% mentioned a depression-associated strength. More research is needed to determine the benefits and consequences of these

messages for treatment, self-stigma, and public stigma. Some perspectives suggest chronic disease presentations can increase treatment initiation, compliance, and decrease overall stigma (Andrews, 2001; Moussavi et al., 2007). Some evidence shows that patients who perceive symptoms as long-lasting are more likely to seek depression treatment, controlling for depression severity (O'Mahen, Flynn, Chermack, & Marcus, 2009). Other perspectives argue that chronic presentations may decrease self-efficacy (Corrigan & Rao, 2012), increase public and self-perceptions of differentness (Corrigan & Fong, 2014), and sensitize individuals to become more susceptible to future depression (e.g., fears of being depressed again may prompt catastrophic interpretation of certain symptoms) (Coyne & Calarco, 1995). Indeed, evidence suggests that adolescents and adults who endorse chronic presentations are less likely to believe in personal control over symptoms and that treatment could help (Baines & Wittkowski, 2013), and there is evidence that chronic perceptions increase social distance (Mak et al., 2014). Ultimately, this evidence suggests the importance to consider chronicity presentations with caution and nuance.

Moving forward, depression presentations may benefit from focusing on recovery-oriented messages – that recovery from depression is possible and achievable (Clement et al., 2010). Fortunately, our study suggests that recovery presentations are common among videos that imply a course. Not only are these messages consistent with community-based epidemiological studies (Eaton et al., 2008; Mattisson, Bogren, Horstmann, Munk-Jörgensen, & Nettelbladt, 2007; Moffit et al., 2010; Rottenberg, Devendorf, Panaite, Disabato, & Kashdan, 2019), but burgeoning research shows recovery messages decrease public and self- stigma (Yanos, Lucksted, Drapalski, Roe, & Lysaker, 2015).

Future Research Directions

Now that we have addressed *why* we need to research public presentations with more nuance, the next steps are to suggest future directions to learn how we can optimize depression presentations. Such investigations may spawn innovative solutions to address depression stigma and literacy amongst the public. Below we outline seven key directions intended to help facilitate the study of public presentations for depression, stigma, and depression literacy.

(1) Finding the "key ingredients" in public presentations. What dimensions of depression presentations – and what combinations of messages – produce the most salient effects on illness beliefs? The framing of illness dimensions clearly matters, but the heterogeneity of public presentations makes it difficult to interpret their effects. Most YouTube videos presented different combinations of messages related to *causes*, *timeline,* and *curability.* Even within dimensions like *causal presentations,* conflicting messages within the same video were common (e.g., "depression is biological," "depression is environmental"). It will be important for researchers to move beyond examining *causal presentations* in isolation and consider how multiple illness dimensions interact (Mak et al., 2014).

(2) Finding public presentations that are empirically-based and useful. Ideally, it would be beneficial for public presentations to be accurate (supported empirically) and useful (effects are more "positive" than "negative"). Fortunately, previous work has found that depression information presented online (e.g., Wikipedia) is of relatively high quality (Reavley et al., 2012; Reavley & Jorm, 2011b). In our study, a considerable number of videos (32.5%) presented depression as recurrent – which may have negative consequences like stigma (Corrigan & Rao, 2012; Coyne & Calarco, 1995). While a depression recurrence occurs in approximately half of the people who suffer from an initial depressive episode (Monroe, Anderson, & Harkness, in press), this also means that half of people with an initial episode do

not experience a recurrence (Monroe, Anderson, & Harkness, in press). This example raises the issue of whether disseminating chronic presentations for depression are beneficial and empirically warranted in the first place.

(3) Understanding the long-term effects of depression presentations, stigma, and clinical outcomes. Stigma and literacy research have been limited by cross-sectional assessments and a reliance on survey data (Thornicroft et al., 2016), which limits knowledge on how these variables manifest behaviorally and in daily life. While such methodologies provide foundational insight into static effects and relationships of stigma, it is important to consider the dynamic, emergent processes of stigma, particularly as they relate to changes in more informative outcomes (e.g. behavior). This is particularly feasible in the study of how public messaging may influence stigma. That is, the increased use of smart phones allows for both increased access to public presentations of depression (e.g. through videos, "GIFs," pictures, textual posts, "memes," and other content shared on social media) and for in-vivo research methods (e.g. ecological momentary assessment).

There is thus ample opportunity for creative approaches to studying the real-time effects of such messages. These methodologies may also allow for exploration of dose-response relationships – is one exposure to such media enough to effect changes in attitudes, beliefs, knowledge, expectancies, intentions, subjective norms, or even behaviors? A week of exposure? A month? Are some constructs more immutable (e.g. behaviors) than others (e.g. knowledge)? These and other more complex methodologies (e.g. longitudinal, behavioral) are severely underemployed in the broad study of stigma, and presentations of depression specifically.

Finally, this research needs to remain focused on the ultimate goal – improving depression outcomes. More experimental and longitudinal work should examine how public

presentations behaviorally influence people's coping (e.g., emotion regulation strategies) and treatment-seeking behaviors (e.g., treatment initiation; help-seeking sources).

(4) Focusing on how group-status impacts receipt of messages. Message impact may systematically differ by who receives it. It will be important to investigate how message effects may differ for people with depression, people with other mental illnesses, family members of those with depression, treatment providers, people or other identities such as culture, gender, or age.

(5) **Expanding the study of public presentations of depression to other media.** While the present review documented public presentations of depression on YouTube, we recognize YouTube is just one platform, and we encourage others to use our framework as a starting point to expand the study of public presentations. Obviously, there many rich platforms remain to be examined (e.g., Facebook, Twitter, Instagram, Imgur, Reddit, television, film). Moreover, there is a wealth of media available to analyze within these platforms (e.g. captions, comments, page names, usernames, hashtags, videos, images, "stories," "GIFs," "memes," etc.).

(6) Extending the framework to other mental disorders. Our framework should be expanded to other mental health conditions. Notably, there has been debate on how to optimize public presentations for addiction. For instance, should addiction be presented as a brain disease or a consequence of a bad environment? Like depression, preliminary research suggests that growth-based presentations of addiction, compared to disease-fixed presentations, increase treatment-seeking intentions and self-efficacy of probable substance users without impacting self-blame (Burnette, Forsyth, Desmarais, & Hoyt, 2019)? Going beyond depression, one important question is to what extent each mental health condition would benefit from a uniquely tailored set of public messages versus more universal ones.

(7) **Working with YouTube "influencers" and other media icons.** One startling finding was that just 9% of all videos were uploaded by mental health professionals or organizations, while 36% were uploaded by non-mental health professional vloggers. Although this finding cannot attest to the quality of information provided in these videos, it is concerning that two of the dominant mental health organizations – NAMI and the NIMH – had only one video, each, in our broad YouTube search. Given each organization's resources, along with the general success of their posted videos (view counts; NIMH video = 337,014; NAMI = 89,475), it is surprising that these organizations do not post more YouTube content. Concurrently, that most videos were uploaded by vloggers – who have thousands, sometimes millions of subscribers – suggests that mental health organizations might consider reaching out to YouTube vloggers with a wide reach, although it is possible that such partnerships already exist.

Conclusion

In this paper, we have argued that public presentations for depression are an important but neglected research area, one that has the potential to decrease stigma, increase depression literacy, and ultimately improve help-seeking behaviors. A comprehensive YouTube content analysis demonstrated that depression is commonly presented as a biological or environmental condition, and one that is chronic, treatable (often with medication, therapy, or diet/exercise behaviors), recurrent, and has few benefits associated with experiencing it. We have critically discussed the implications of these presentations and argued that more research is needed to optimize their desired effects (e.g., decreasing stigma; increasing help-seeking behaviors). We have also outlined key directions to facilitate future work public presentations for depression and other mental health problems. We hope this paper is a first step in drawing attention to public presentations for depression that will ultimately lead to improvements in message framing akin

to those witnessed in other areas of the public health such as smoking cessation, HIV/AIDS, or vaccination.

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