



Gratitude for Categories of Needs Before and During the COVID-19 Pandemic

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Abstract

This naturalistic observation study investigated the influence of broad societal events such as the COVID-19 pandemic on public expressions of gratitude. Spontaneously produced gratitude expressions posted by individuals ($N=159$) in an online discussion forum were extracted at three time periods (during the pandemic, one year pre-pandemic, and 2 years pre-pandemic). The gratitude expressions were coded for the categories of deficiency and growth needs based on Maslow's Theory of Motivation. The results demonstrate a higher frequency of gratitude expressions for growth opportunities during the COVID-19 pandemic compared to 2 years prior. The results also demonstrate a higher frequency of gratitude for the fulfillment of deficiency needs compared to growth needs within each of the years, highlighting the overall salience of this category. These findings reveal the capacity of broad societal events to impact public gratitude expressions for needs fulfilment, which has implications for policies and programs intended to meet needs during a global crisis.

Keywords Gratitude · COVID-19 pandemic · Maslow's theory of motivation · Categories of needs

The science of gratitude has become a blossoming area of research within the field of positive psychology. Researchers have conceptualized and studied gratitude in many ways, highlighting the multifaceted nature of this concept (e.g., see Emmons, 2020; Navarro & Tudge, 2020 for a review). For example, gratitude has been described at both the interpersonal and intrapersonal levels. Interpersonally, gratitude is an individual's recognition and appreciative response to another person who has bestowed upon them an altruistic gift or favor (e.g., Emmons, 2004, 2007; Emmons & Shelton, 2002; Emmons et al., 2003;

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McCullough et al., 2002). Intrapersonally, gratitude is an individual's inner appreciation for the positives in the world more generally, not solely in reciprocation of another person's benevolence (e.g., Seligman et al., 2005; Wood et al., 2010). Additionally, gratitude has been described as both an emotional state and dispositional trait; the former is a momentary, situation-specific manifestation of gratitude, whereas the latter is an overall propensity towards experiencing gratitude (e.g., McCullough et al., 2002; Wood et al., 2008). Empirical evidence shows that gratitude is associated with a wide variety of benefits including enhanced psychological well-being, increased engagement in prosocial behaviors, and decreases in materialistic attitudes (see McCullough, et al., 2002; Watkins, 2014; Wood et al., 2010). Such results have inspired the design and implementation of a variety of gratitude interventions aimed at attenuating psychological symptoms and ameliorating physical and mental well-being (e.g., Emmons & Mishra, 2011; Jans-Beken et al., 2020).

However, less is understood about how gratitude is impacted by broad societal events. In the current study, we investigate gratitude within the context of the unfolding global crisis and tragedy of the COVID-19 pandemic. The World Health Organization declared the novel coronavirus (COVID-19) outbreak a global pandemic on March 11, 2020 as it had spread to over 100 countries. One year later, COVID-19 had been confirmed in almost every country and territory worldwide (WHO, 2020, 2021). The COVID-19 pandemic has been devastating, leading to loss of human life and presenting unprecedented challenges to public health, food security, and employment. The COVID-19 pandemic has upended most aspects of everyday life and has introduced new precautionary measures such as social distancing, physical distancing, sheltering in place, wearing masks, and quarantining (WHO, 2020, 2021). The magnitude of uncertainty, disruption, and loss has been collectively experienced worldwide during the COVID-19 pandemic, and has led to soaring rates of psychological distress (see Okabe-Miyamoto & Lyubomirsky, 2021).

Recently, there has been growing discussion about how findings from the field of positive psychology, including research on gratitude, can be applied to helping people cope (e.g., buffering distress and bolstering mental health) and grow (e.g., building psychological resources and capacities) through the COVID-19 pandemic (Waters et al., 2021). The present investigation aligns with this urgent, real-time necessity to understand gratitude during an unprecedented global pandemic. During the COVID-19 pandemic, due to stay at home orders and restrictions on in-person interactions and gatherings, online communication has become increasingly more salient (Nguyen et al., 2020) as well as the use of interactive technologies to promote well-being (Riva et al., 2020; see also Riva et al., 2012). This afforded the opportunity to conduct a naturalistic investigation of how broad societal events such as the COVID-19 pandemic impact online expressions of gratitude. In the current study, we sought to understand how the COVID-19 pandemic has affected public expressions of gratitude within an online asynchronous forum discussion. As much of the existing research on gratitude has been experimentally based (see Jans-Beken et al., 2020, for a review), we view the current study as offering a complementary naturalistic approach to gratitude science.

We also view the monumental challenges that the onset of the COVID-19 pandemic posed to society as an important context to help us clarify ways that broad societal events may influence gratitude. That is, the current study seeks to understand the way changes in society may precipitate changes in gratitude. In particular, the extant literature on gratitude has identified that it can operate as both a malleable psychological state and a more stable dispositional trait. The extent to which major societal changes are met with stability or change in gratitude expressions, however, remains unclear. To date, we are aware of only a handful of studies that have examined gratitude in the context of major societal change

(see also Jans-Beken, 2021). For example, an online survey of adults suggests gratitude's bolstering effect during the pandemic (Watkins et al., 2021). This study showed that during the first two months of the pandemic, from March to May 2020, over half of the sample reported being very grateful and anticipated being more grateful in the future. In this study, gratitude was a predictor of happiness as well as variables pertinent to well-being (such as 'I am more likely to help others') after the researchers controlled for positive states (Watkins et al., 2021). Similarly, another online survey of adults (gratitude, nature connection, physical activity, social support, and tragic optimism) found that gratitude and tragic optimism contributed significantly to well-being two weeks after lockdown (April–May 2020) (Mead et al., 2021). Also, a short-term longitudinal online survey of college students found that grit and gratitude prior to campus closure (January–March 2020) predicted better subjective well-being during the onset of the pandemic (April–May 2020) (Bono et al., 2020).

1 Present Study

The overall aim of the present study was to understand the influence of broad societal events on stability and/or change in public expressions of gratitude, using the COVID-19 pandemic as an example. To this aim, we provide a fine-grained analysis of what individuals are grateful for by coding public expressions of gratitude posted before and during the COVID-19 pandemic in an asynchronous online discussion forum. We developed and used a coding scheme derived from Maslow's Theory of Motivation (Maslow, 1943, 1962/1998, 1969, 1970, 1971). Maslow's Theory of Motivation proposes that individuals are motivated by two hierarchically related, broad categories of needs, deficiency and growth, each subsuming more specific subcategories. Maslow posited that deficiency needs (i.e., physiological, safety, love and belongingness, and esteem needs) form the foundation of a hierarchy. Further, Maslow postulated that growth needs (i.e., cognitive, aesthetic, self-actualization, and transcendence needs) are built upon this foundation and represent aspirational motivations. Unlike deficiency needs largely aimed at addressing survival challenges, growth needs stem from love for humankind and the desire to grow as a human being (Maslow, 1962/1998). According to Maslow's Theory of Motivation, as deficiency needs are more or less satisfied, growth needs that have yet to be satisfied increase in their salience. In other words, individuals become freed up to focus on personal growth and humanity when they are no longer driven by the necessity of fulfilling basic needs. Once growth needs are engaged, they may become stronger (not weaker like deficiency needs) as humans aspire towards self-actualization and transcendence (Maslow, 1962/1998).

Maslow's Theory of Motivation is highly relevant to gratitude science. Towards the end of his career, in an unpublished article, Maslow acknowledged the significance of feeling and expressing gratitude. He stated, "To help regain our sense of gratitude towards others, it is important that we acquire the ability to 'count our blessings': that we appreciate what we possess without necessarily having to undergo its actual loss..." (Maslow, 1991, p. 121). He then proposed two exercises (imagining the loss of someone you care for, imagining the loss of your own life) to "help us to feel and express gratitude more easily, as well as to re-trigger our peak experiences where "we will be better able to perceive our life from a higher, more satisfying perspective" (Maslow, 1991, p. 122). In our present study, we focused on expressions of gratitude pertaining to both deficiency needs (physiological, safety, love and belongingness, and esteem) and growth needs (cognitive, aesthetic,

self-actualization, and transcendence). We coded public expressions of gratitude within an online discussion forum that prompted individuals to post three things they are grateful for, similar to Maslow's encouragement to count blessings.

Although Maslow's Theory of Motivation was proposed during the early twentieth century, researchers within the field of positive psychology have demonstrated how this theory can be integrated into contemporary empirical investigations and have found support for the association between subjective well-being and the satisfaction of needs and the characteristics of self-actualization (e.g., Kaufman, 2018, 2021; Tay & Diener, 2011; see also Diener et al., 1985). Maslow's Theory of Motivation is especially pertinent at this time when the COVID-19 pandemic has complicated the ability for needs fulfilment, posing extraordinary challenges (e.g., health risk, economic turmoil, and psycho-social strain) and opportunities (e.g., healthcare innovation, time affordances, communication technology advancements) (see Duygun & Şen, 2020; Suh et al., 2021). Thus, we were particularly interested in the impact of the COVID-19 pandemic on expressions of gratitude for the fulfilment of both deficiency needs and growth needs, which may have important implications for associated public policies and programs. Public expressions of gratitude regarding deficiency and growth needs satisfaction may signal people's current and shifting needs amidst the pandemic, and can potentially inform policies and program in meeting these critical needs.

To study the impact of the COVID-19 pandemic, we compared three time periods of intrapersonal gratitude expressions extracted from an asynchronous online discussion forum available to Australian residents, each corresponding to an important inflection point: 2 years pre-pandemic, one year pre-pandemic, and the year of the pandemic. One year pre-pandemic was of particular interest because it corresponded to another societal event, a national natural disaster in Australia, the Black Summer Bushfires. The scale and harm of the bushfires were staggering and unprecedented, burning approximately 19 million hectares and impacting nearly 80% of the country's population. The catastrophic loss of property and life as well as the economic devastation, and environmental destruction of the bushfires were among the worst on record (Climate Council, 2020; Filkov et al., 2020). The comparison between the pandemic year and one year pre-pandemic was critical because it could help shed light on whether any effects found in this study are unique to the COVID-19 pandemic or generalizable to societal events more widely. Although the COVID-19 pandemic and the Black Summer Bushfires share many similarities (e.g., they are both major disasters that directly threatened the physical safety and economic stability of a large proportion of Australians), an important difference also exists (i.e., the pandemic demanded social distancing that left many feeling isolated). This difference is notable given that social connectedness is pertinent to conceptualizations of gratitude at the interpersonal/intrapersonal level and as an emotional state/dispositional trait. It was also important to compare these time periods against an earlier time period in the absence of both the COVID-19 pandemic and Black Summer Bushfires. Two years pre-pandemic was chosen as a comparison baseline due to its temporal proximity to these societal events. Thus, a comparison between these three time periods enables one to examine whether gratitude expressions change in response to the unique features of a given context, or remain relatively stable across contexts. In other words, this comparison will help clarify the extent to which gratitude "behaves" more like a state or a trait in the face of drastic social changes by revealing relative stability or change in the fulfillment of deprivation and growth needs, respectively.

We regard this study as descriptive and exploratory given the unprecedented times, and thus propose research questions as opposed to concrete hypotheses. It is important to note

that our data comprise observations of intrapersonal gratitude (i.e., gratitude generated from internal reflection about things one appreciates), which is distinct from interpersonal expressions of gratitude toward a generous benefactor for a gift or favor that has been intentionally bestowed. First, how do frequencies of intrapersonal gratitude expressions for the fulfilment of deficiency and growth needs compare between the three time periods (during the pandemic, 1 year pre-pandemic, 2 years pre-pandemic)? If the COVID-19 pandemic has a unique impact on public expressions of gratitude, then we would expect a difference between this time period and 1 year and 2 years pre-pandemic. However, if the COVID-19 pandemic has a similar impact as a natural disaster on public expressions of gratitude, then we would expect similarities between this time period and 1 year pre-pandemic relative to 2 years pre-pandemic. Of course, it is also possible that public gratitude expressions for the satisfaction of deficiency and growth needs are impervious to adverse societal events. If this is the case, then we would expect no differences between the three time periods. The relative paucity of literature examining gratitude in the midst of major societal change leaves little foundation for specific hypotheses, but this naturalistic observation approach will enable a picture to emerge regarding the trait-like and/or state-like features of gratitude's stability and change, respectively.

Second, how do the relative frequencies of intrapersonal gratitude expressions for the fulfilment of deficiency and growth needs compare against each other within each time period considered separately? Although difficult to forecast specific predictions, Maslow's Theory of Motivation provides a basis for general predictions (Maslow, 1943, 1962/1998, 1969, 1970, 1971). For example, it is possible that there would be a greater frequency of gratitude for the satisfaction of deficiency needs (versus growth needs) if individuals' basic needs have yet to be sufficiently met within each of the time periods. Of particular interest is whether the category of deficiency needs is notably salient during the pandemic year in the face of challenges that threaten the ability to meet basic needs. However, the opposite pattern of results is also possible. For example, if deficiency needs have been met to a sufficient degree within each of the three time periods, it is possible that there would be a greater frequency of gratitude for the fulfilment of growth needs (versus deficiency needs). Again, of particular interest is whether the category of needs is notably salient during the pandemic year when there may be, optimistically, opportunities for pursuit of personal development and higher-level aspirations. Of course, the pandemic has affected different people in different ways and with a naturalistic observation methodology, we do not have the ability to clearly identify or sample from different geographic and socioeconomic backgrounds among our participants. Thus, we do not seek to determine whether the pandemic consistently impacted gratitude the same way for people with vastly different pandemic experiences, rather we aim to determine whether broad societal events such as the COVID-19 pandemic possess the capacity to shift trends in naturally occurring gratitude expressions observed online.

2 Method

2.1 Forum Selection

Over the years, there has been a proliferation of online asynchronous discussion forums, and researchers in psychological science and related fields are increasingly recognizing the richness of these forums as a basis for naturalistic research (Ferrante et al., 2016). For

the present study, we gathered publicly available data from Beyond Blue, a mental health organization that has a website with a link to their online forum community. Forum community membership is available to only Australian residents as the organization is funded by the national and state/territory governments of Australia and the Australian public. The forum community is a popular venue for dialogue among Australian citizens and attracts a wide membership (Beyond Blue, 2021). The forum community also has a policy of one account per person so that individuals are not posting under multiple identities. The forum community hosts a number of online asynchronous discussion forums. For the purposes of this study, we focused on the online asynchronous discussion forum titled, “Three things to be thankful for today”. This discussion forum began on August 2014, and remains open to present day under the moderation of a member of the online forum community. The instructions for the forum are “Some days it is really hard to find anything to be thankful for when we feel overcome by the darkness and fog of depression. If I look hard enough, I can find something to be thankful for. I would like to encourage others to write down three things they are thankful for, and to realise there is a sense of hope available to us all. Sometimes it is just a little hard to find!”.

This forum community and specifically the “Three things to be thankful for today” discussion forum were identified by searching Google for public expressions of gratitude (e.g., ‘public gratitude,’ ‘gratitude online,’ ‘gratitude online forum posts’). This discussion forum was specifically selected for this research based on several criteria: forum readership is accessible to everyone and does not require a password to view posts, regardless of residency (although Australian residency is required to post); the topic and title of the forum was about gratitude; there were clear instructions for individuals on how to structure their gratitude posts; usernames and dates were available for the posts; and, the forum began before and continued through the pandemic.

This research was reviewed by Institutional Review Board staff at (redact for review), and determined to not require IRB approval as it does not constitute human subjects research, per federal regulations [45 CFR 46.102 (d or f)]. The research did not involve interactions with human subjects, but rather, the data were obtained from a public source where individuals were already voluntarily posting their expressions of gratitude online with no reasonable expectation of maintaining privacy.

2.2 Data Collection

Posts were extracted from the online asynchronous discussion forum titled, “Three things to be thankful for today”. The forum allows users to respond to posts by adding comments; however, we only gathered posts for this study. One research assistant manually transcribed all of the posts (no comments) and corresponding information (dates and screen names) from the discussion forum site into IBM® SPSS® Statistics. The rows of the SPSS file were designated for the screen names, thus one row per individual, and the columns were designated for the posts and dates. A second research assistant checked the accuracy of the transcription in SPSS directly against the online asynchronous discussion forum and made corrections as needed. Finally, the first research assistant reviewed and approved the corrections.

For the purposes of this study, we focus on a subset of posts by individuals who posted for the first time (no subsequent posts) either during the COVID-19 pandemic, 1 year before the pandemic, or 2 years before the pandemic. There were a total of 159 individuals who met this criterion and four individuals who did not because they

had initially posted prior to this window of time, and then again for a second time during one of these time periods. Specifically, of the 159 individuals, 59 individuals posted for the first time during the COVID-19 pandemic (between March 2020–March 2021), 46 individuals posted for the first time 1 year before the pandemic (between March 2019–February 2020), and 54 individuals posted for the first time 2 years before the pandemic (between January 2018–February 2019). These individuals were distinguished by their screennames to ensure that only their first post was included in the study. Collectively, these 159 individuals' first posts yielded 473 expressions of gratitude. All 159 individuals provided three expressions of gratitude within their first posts except for three individuals who posted one year before the pandemic (two individuals provided two expressions of gratitude and one individual provided one expression of gratitude).

2.3 Coding

The first and second authors used a deductive theory-driven, top-down approach to the development of a coding scheme (see Chi, 1997) based on Maslow's Theory of Motivation (Maslow, 1943, 1962/1998, 1969, 1970, 1971). We deconstructed the eight stage version of Maslow's hierarchy of needs into eight codes that could be applied to the data: 1. physiological; 2. safety; 3. love and belongingness; 4. esteem; 5. cognitive; 6. aesthetic; 7. self-actualization; and, 8. transcendence. The first four are deficiency needs and the second four are growth needs. We also created a ninth code, other, for miscellaneous and uninterpretable expressions of gratitude. The unit of analysis for the coding scheme was each mention of gratitude. Most posts contained three expressions of gratitude, each of which were coded separately. Our coding guide included a description of the codes, inclusion and exclusion criteria for the codes, and examples of gratitude captured and not captured by the codes. Please see Table 1 for a description of the codes and examples.

Note. Descriptions of the needs and examples of how the needs are met were based on Maslow's Theory of Motivation (Maslow, 1943, 1962/1998, 1969, 1970, 1971; see also Kelly, 2014; Mcleod, 2020). Two research assistants were trained by the first author on the coding scheme using the following three step procedure (see Syed & Nelson, 2015): 1. reviewed Maslow's Theory of Motivation and discussed the coding scheme to establish a common understanding; 2. practiced coding on 30 sample expressions of gratitude drawn from year 2014 of the online discussion forum, and thus not a part of the present study; and, 3. initial codes were discussed and decisions about inclusion/exclusion criteria were documented. Once the research assistants were trained, they independently coded three waves of gratitude expressions that corresponded to the three time periods when contributors made their posts (in the following order: March 2019–February 2020; March 2020–March 2021; January 2018–February 2019). Thus, both research assistants independently coded all 473 expressions of gratitude retrieved for this study, recording their codes in two separate SPSS files. Periodic meetings transpired after each wave of coding to compare files and prevent coder drift. If there was a discrepancy between the two research assistants' coding, they discussed the expression of gratitude until there was agreement. The research assistants also sought input from the first and second author as needed to reconcile differences via research team consensus. Final codes were recorded in a third separate file.

Table 1 Summary of coding scheme

Description of coded needs	Examples of how needs are met	Examples from the Corpus(pandemic, 1 year pre-pandemic, 2 years pre-pandemic, in order)
Deficiency needs		
Physiological -These needs are vital biological requirements that are essential for optimal human life and survival	Breathable air, drink, food, homeostasis, sleep, sex, and warmth	<p>"Having basic necessities." "Having food to eat." "Fresh air."</p>
Safety -These needs are fundamental for one to feel safe from harm, secure, and in control of their life	Employment, familiarity, freedom from fear/anxiety, law, health, order, protection from elements, security, shelter, and stability	<p>"I am safe and sound from COVID-19." "Having a full time job." "Feeling safe in my home."</p>
Love and belongingness -These needs are social-emotional, and focus on connectedness, companionship, and interpersonal relationships	Acceptance, affiliation, being a part of a group (family, work), friendship, intimacy, receiving and reciprocating love and affection, and trust	<p>"Finding this little community, and the support I have found here already." "Having a close and supportive friend." "My family."</p>
Esteem -These needs are about regard for oneself, self-esteem and self-respect as well as the desire to be recognized and valued by others	Esteem and respect for oneself (achievement, dignity, mastery) and recognition and value from others (e.g., dominance, prestige, status)	<p>"Thankful for learning to love myself even on tough days." "My life being worth it." "A sense of achievement."</p>
Growth Needs		
Cognitive -These needs are about pursuing knowledge and welcoming experiences that foster a better understanding of the world	Curiosity, discovery, exploration, learning, gaining knowledge and developing meaningful understanding	<p>"Thankful for the lessons I've learnt so far." "The education I have the opportunity of receiving on a weekly basis." "New book announced from one of my favorite authors."</p>
Aesthetic -These needs are in regards to exploring and refreshing oneself in the beauty of nature or in the environment, and expressing oneself in aesthetically pleasing ways	Search and appreciation for beauty in nature and the environment, observation of beautiful imagery, balance, and form, and self-expressions of beauty	<p>"Beautiful morning rain when I woke up. Very relaxing sounds." "Being able to admire the wind." "Birds singing outside in our trees."</p>
Self-actualization -These needs refer to achieving one's unique potentiality, becoming all that one can possibly become, a self-realization on the path to self-transcendence	Seeking self-actualization, the realization and fulfillment of one's highest potential (e.g., artist, musician, or poet, who has achieved their potential in creating art, music, or poetry)	<p>"Time to (self) reflect." "My desire to want to live as the most truest version of myself."</p>

Table 1 (continued)

Description of coded needs	Examples of how needs are met	Examples from the Corpus(pandemic, 1 year pre-pandemic, 2 years pre-pandemic, in order)
<p>Transcendence-These highest, most holistic needs transcend beyond one's personal needs and focus on supporting the self-actualization of others and unity of all things</p>	<p>Shifting in focus from the self to other humans, living beings, nature, and the cosmos (e.g., altruism, liberation from egocentricity, mystical experiences)</p>	
<p>Other-This code is for expressions of gratitude that are not within the scope of the previous codes</p>	<p>Expressions of gratitude that are miscellaneous, nonspecific, or uninterpretable</p>	<p>"Life unfolding like a dream." "That the council elected to... cause a hell of a noise."</p>

Overall percent agreement and Cohen's kappa (to account for chance) were calculated based on the two research assistants' original coding (prior to the resolution of discrepancies) to determine inter-rater reliability between their coding of the entire data set, and was found to be 94.50%, $\kappa=0.924$ (95% CI, 0.90 to 0.95), $p < 0.001$.

2.4 Data Analysis

The 473 expressions of gratitude were analyzed as a corpus. We did not parse individuals' enumerated expressions of gratitude because the instructions for the discussion forum merely asked individuals to "write down three things they are thankful for" and did not explicitly ask individuals to prioritize these things in rank order. Therefore, we could not assume that the expressions of gratitude were enumerated in relative prioritization as individuals may or may not have written their expressions of gratitude in any rank order (e.g., "Best is first," "The best is saved for the last").

We calculated frequencies (and percentages) for each of the nine codes: 1. physiological; 2. safety; 3. love and belongingness; 4. esteem; 5. cognitive; 6. aesthetic; 7. self-actualization; and, 8. transcendence; and, 9. other. We then aggregated across codes 1 through 4 to create a deficiency needs variable (physiological, safety, love and belongingness, esteem) and across codes 5 through 8 to create a growth needs variable (cognitive, aesthetic, self-actualization, and transcendence). We then used Chi-square tests of independence to examine whether frequencies of gratitude expressions for deficiency and growth needs fulfilment were associated with year. We also applied McNemar's tests to compare the frequency of deficiency and growth needs within each year.

3 Results

The results are presented according to the research questions described in the Introduction. The primary research question was in regards to the relative frequencies of gratitude expressions pertaining to the broad categories of deficiency and growth needs posted during the pandemic year, 1 year pre-pandemic, and 2 years pre-pandemic. Table 2 summarizes by year, the frequencies and percentages of gratitude expressions for the satisfaction of these broad categories.

Note: Data represent frequencies with percentages in parentheses. Percentages were calculated based on the total number of coded expressions of gratitude for each year. A chi-square test of independence was calculated to determine if there was an association between the year and the frequency of gratitude for growth and deficiency needs fulfilment. Results indicated that there was a significant association between the year and the frequency of gratitude expressions for deficiency and growth needs fulfilment, (χ^2

Table 2 Frequency of gratitude for deficiency and growth needs fulfilment

	Pandemic (<i>n</i> = 176)	1 Year pre-pandemic (<i>n</i> = 133)	2 Years pre-pandemic (<i>n</i> = 162)
<i>Deficiency needs</i>	129 (73.29%)	110 (82.70%)	142 (87.65%)
<i>Growth needs</i>	47 (26.70%)	23 (17.29%)	20 (12.34%)

(2) = 11.64, $p = 0.003$). Post hoc comparisons revealed significant differences between the pandemic year and 2 years pre-pandemic, but not between the other years. Specifically, there were significantly less expressions of gratitude for deficiency needs satisfaction during the pandemic (73.29%) than 2 years pre-pandemic (87.65%), $p < 0.05$. Conversely, there were significantly more gratitude expressions for growth needs fulfilment during the pandemic (26.70%) than 2 years pre-pandemic (12.34%), $p < 0.05$.

We also explored the specific subcategories of needs to glean how they may have contributed to these differences between the pandemic year and 2 years pre-pandemic. Table 3 summarizes the frequencies and percentages of gratitude expressions for the satisfaction of specific subcategories of needs by year. Although we could not formally analyze the specific subcategories because the data did not adhere to the assumptions of the Chi-square test of Independence (i.e., at least 80% of the cells have an expected frequency of 5 or more) and Fisher's Exact test (i.e., fixed marginal [row/column] totals), we were able to visually inspect the data in Table 3 for apparent differences. It appears that there were somewhat fewer expressions of gratitude for the subcategories of safety (12.99% vs. 19.1%), love and belongingness (40.67% vs. 48.76%), and esteem (5.6% vs. 8.6%) during the pandemic year relative to 2 years prior, respectively. Considering growth needs, it can also be seen in Table 3 that there were approximately twice as many gratitude expressions for the subcategories of cognitive (3.9% vs. 1.8%) and aesthetic (22% vs. 8%) needs fulfilment during the pandemic relative to two years prior, respectively.

Note. Data represent frequencies with percentages in parentheses. Percentages were calculated based on the total number of coded expressions of gratitude for each year. The secondary research question was in regards to within-year comparisons. To examine this question, we compared the frequency of gratitude for fulfilment of deficiency and growth needs displayed in Table 2 within each of the years separately. McNemar's tests determined that there were significantly more gratitude expressions for the satisfaction of deficiency needs than growth needs within the pandemic year (73.29% vs. 26.70%), 1 year pre-pandemic (82.70% vs. 17.29%), and 2 years pre-pandemic (87.65% vs. 12.34%), p 's < 0.001 . We also looked at the specific subcategories of needs in Table 3 to see if any of the subcategories were driving this difference. It appears that within each of the time periods, pandemic year, 1 year pre-pandemic, and 2 years pre-pandemic, the

Table 3 Frequency of gratitude for subcategories of needs fulfilment

Code	Pandemic ($n = 177$)	1 Year pre-pandemic ($n = 134$)	2 Years pre-pandemic ($n = 162$)
Physiological	24 (13.55%)	21 (15.67%)	18 (11.1%)
Safety	23 (12.99%)	16 (11.94%)	31 (19.1%)
Love and belongingness	72 (40.67%)	62 (46.26%)	79 (48.76%)
Esteem	10 (5.6%)	11 (8.2%)	14 (8.6%)
Cognitive	7 (3.9%)	1 (0.74%)	3 (1.8%)
Aesthetic	39 (22%)	22 (16.41%)	13 (8%)
Self-actualization	1 (0.56%)	0 (0%)	4 (2.4%)
Transcendence	0 (0%)	0 (0%)	0 (0%)
Other	1 (0.56%)	1 (0.74%)	0 (0%)

largest percentage, almost half of the expressions of gratitude were for love and belongingness needs fulfilment (40.67%, 46.26%, 48.76%, respectively).

4 Discussion

In the present study, we sought to determine whether broad societal events, such as the COVID-19 pandemic, may have the capacity to influence public expressions of gratitude by conducting a fine-grained analysis of gratitude posts in an asynchronous online discussion forum. We coded expressions of gratitude based on Maslow's hierarchy of needs, including both deficiency needs and growth needs, as well as the subcategories that comprise each. According to Maslow's Theory of Motivation, growth needs emerge from higher-level aspirations towards individual and collective development as humans, whereas deficiency needs arise from a lack of satisfaction of necessities of human life (Maslow, 1962/1998). We uncovered two key findings in respect to our research questions involving between-year and within-year comparisons. First, there were only differences between expressions of gratitude posted during the pandemic and 2 years pre-pandemic. We found that there were relatively more expressions of gratitude for fulfilment of growth needs during the pandemic than 2 years pre-pandemic, and relatively fewer expressions of gratitude for deficiency needs satisfaction during the pandemic than 2 years pre-pandemic.

Following up on this finding, we looked for apparent differences in the subcategories and found a preponderance of gratitude for the fulfilment of two growth subcategories, cognitive and aesthetic needs, during the pandemic as seen in Table 3. Underlying cognitive and aesthetic needs is the motivation for pursuit of knowledge and understanding of the world, and the motivation to immerse and replenish oneself in beauty that is present in nature or in one's environment. These patterns of results are perhaps indicative of the adverse conditions wrought by the pandemic heightening individuals' ambition to grow as humans amidst a global health crisis and the resulting lockdown and social restrictions that left many with empty space in their daily routine. Recently, evidence suggests that while grappling with the vicissitudes of the pandemic, individuals have developed in a multitude of ways such as learning content knowledge and skills through online classes (Srinivasan, 2020), engaging in leisure activities and practices (Lashua et al., 2021), and spending time immersed in nature (Robinson et al., 2021). Indeed, Maslow proposed that "human life will never be understood unless its highest aspirations are taken into account. Growth, self-actualization, the striving towards health, the question for identity and autonomy, the yearning for excellence (and other ways of phrasing the striving 'upward') must by now be accepted beyond question as a widespread and perhaps universal tendency... growth is often a painful process" (Maslow, 1970, pp. xii-xiii). The influence of the COVID-19 pandemic must be interpreted cautiously, however, given that there were no differences between the pandemic year and the one year pre-pandemic as well as between the one year pre-pandemic and 2 years pre-pandemic time periods. This has the potential to reflect a correlation between gratitude expressions and the progressively impactful events of the Black Summer Bushfires and the COVID-19 pandemic, respectively, or it could reflect a broader trajectory occurring in society independent of these events. We argue, however, that the observed shift in types of gratitude expression is sizeable and occurred in a relatively short time-frame, seemingly consistent with the presence of a precipitating event. Future studies will be needed to clarify this shift.

Future studies will also need to clarify how satisfaction of deficiency and growth needs are related to each other across time. Although the comparisons between the pandemic year and 2 years pre-pandemic indicated relatively more gratitude expressions for fulfilment of growth needs during the pandemic year, we cannot ascertain whether this pattern is caused by an actual increase in satisfaction of growth needs or due to a decrease in satisfaction of deficiency needs. A possibility is that individuals remained dispositionally grateful over the years, but if they were experiencing deprivation of basic necessities during the pandemic, individuals may have simply posted about whatever was available to them or seemed appropriate at the time. In other words, individuals may not have been increasingly focused on growth needs and intentionally expressing gratitude for the fulfilment of these needs during the pandemic, but only did so because there was not much else to post about in the other domain.

Alternatively, and in accordance with Maslow's conceptualization, it may be the case that growth needs were increasingly mentioned because lower deficiency needs were already satisfied. In the context of the present data, we do not mean to suggest that the pandemic increased deficiency need fulfillment, but perhaps it did increase forum users' *attention* to the fact that their basic needs were fulfilled. In other words, it may be the case that forum members took for granted that their basic needs were met prior to the pandemic, but continued to orient themselves toward these needs anyway as a default focus for their gratitude until the pandemic threatened the assumption that these needs would continue to be stably fulfilled. If this were the case, forum users may have begun to attend to the stability of their deficiency needs more actively as the threats associated with the pandemic became more salient, and once satisfied that their basic needs were stable, may then naturally turn to growth needs (as Maslow predicted) rather than remaining in an "autopilot" mode of focusing on deficiency needs by default.

To summarize, a proportional shift toward higher level growth needs was evident across the three time periods comprising the data. This could be because basic needs *were not* met during the crises occurring in the second and third years (thus forum users *had to* look toward growth needs), or because basic needs *were* met (thus, forum users *were able to* look toward growth needs). Again, the present naturalistic observation study was designed to establish whether and what type of changes may have occurred during these tumultuous social times, whereas follow-up studies utilizing an experimental design are needed to establish the underlying mechanisms explored above.

The second key finding of this investigation pertains to the within-year comparisons, which revealed a higher frequency of expressions of gratitude for the fulfilment of deficiency needs than growth needs during the pandemic year as well as the time periods of one year pre-pandemic and 2 year-pre-pandemic. The consistent and stable prevalence of gratitude for deficiency needs satisfaction within each of these time periods perhaps underscores the fundamental nature of this broad category, that is, the motivation to fulfill basic needs. Recall this broad category is comprised of four hierarchically-related subcategories of needs: physiological, safety, love and belongingness, and esteem. When we took a closer look at these subcategories, we found that love and belongingness needs contributed to nearly half of all of the expressions of gratitude within each of the time periods, as seen in Table 3. Moreover, taking into consideration gratitude expressions for the fulfilment of deficiency needs only, love and belongingness needs accounted for a remarkably consistent and predominant proportion of these expressions during the pandemic (55.81%), 1 year pre-pandemic (56.36%), and 2 years pre-pandemic (55.53%) time periods. This pattern of findings is suggestive of the enduring importance of interpersonal connectedness, companionship, and relationships, that is,

the desire to experience love and belongingness. In other words, whereas significant shifts in types of gratitude expressions appear to correspond with the shifting landscape of social challenges accompanying the onset of the pandemic, our data suggest that the importance of love and belongingness to the human experience remained stable and enduring in the face of major global change.

An alternative explanation, however, is that this pattern of findings is due to the interpersonal aspect of gratitude. Although our data represent intrapersonal reflections on internal gratitude and not expressions of interpersonal exchanges between people, gratitude nonetheless carries with it a strong element of attending to interpersonal forms of appreciation. Because social connectedness is central to gratitude, love and belongingness may have been somewhat over-represented or highlighted in these data because they were drawn from a forum about gratitude. Thus, love and belongingness may be of less importance across different forums with topics unrelated to gratitude. We should emphasize too that the findings may be sample-specific, characterizing gratitude expressions for the satisfaction of needs experienced by individuals participating in an online discussion forum. In other words, the findings may be representative of individuals who are particularly motivated by love and belongingness needs and generally seek social connection from others online. However, these interpretations do not diminish the results of the current study. Under the threat of a global pandemic it is noteworthy that the focus on love and belongingness is withstanding, and highly salient within three time periods of the online discussion forum. In the face of extraordinary challenges to health and economic stability, it is striking that gratitude for physiological needs and safety needs did not predominate. It is possible that these findings may inform policies and programs aimed at addressing social needs during times of social upheaval.

Taken together, the present data support the notion that gratitude is, at once, a malleable psychological state which is influenced by context and an enduringly stable psychological trait. Specifically, this study shows that the type of intrapersonal gratitude expressions (as coded to coincide with Maslow's Theory of Motivation) naturally conveyed during major social crises shifted substantially toward greater emphasis on growth needs and less emphasis on the more basic deficiency needs. Hence, gratitude demonstrated significant shifts in the face of changing societal challenges, consistent with theoretical conceptualizations of gratitude as a psychological state. At the same time, evidence also emerged that throughout the three-year span of the study, most of the gratitude expressions remained focused upon deficiency needs, and the proportion of those deficiency needs-related expressions remained remarkably stable in their focus on love and belongingness, despite the fact that the two social crises examined (i.e., the Black Summer Bushfires and the COVID-19 pandemic) carried with them very different degrees of constraint pertaining to social gathering. Thus gratitude demonstrated significant stability in the face of changing societal challenges, consistent with theoretical conceptualizations of gratitude as a psychological trait.

This study makes several additional contributions to gratitude science as well. To begin, the current study demonstrates how gratitude is expressed organically and spontaneously in online discussion forums. These naturalistic data complement existing experimental data (see Jans-Beken et al., 2020, for a review) and bring the study of gratitude outside of the lab into everyday online contexts. Notably, the current study characterizes public expressions of gratitude during the pandemic compared to two time periods before the pandemic using Maslow's Theory of Motivation. While there is research in the field of human-computer interaction and information science on gratitude in computer-mediated communication (e.g., Glasgow et al., 2016; Köylü, 2015; Makri & Turner, 2020), we are unaware of

other studies that provide naturalistic data supporting the idea that broad societal events have the capacity to influence the ways that people talk about gratitude.

At this time, we know of only a few studies that have examined gratitude and the COVID-19 pandemic within the field of positive psychology. These studies have led the way for investigations of gratitude during the pandemic by providing valuable findings related to its onset between the weeks or months of March 2020 to May 2020 (Bono et al., 2020; Mead et al., 2021; Watkins et al., 2021). Therefore, the current study substantially contributes to this small but crucial body of research on gratitude and the COVID-19 pandemic by offering integral findings that extend into a full year of the pandemic from March 2020 to March 2021.

As research on this topic continues, a next potential step could be to explore whether conveying gratitude for the fulfilment of deficiency and growth needs in an online discussion promotes positive psychological outcomes in individuals. Although analyzing data drawn from a public online forum precluded us from asking questions that probe for its potential benefits, we took the opportunity to revisit the corpus to see how often individuals expressed gratitude for the forum itself. We discovered that a total of 28 (out of 159) individuals were grateful for the forum, many of whom described specific benefits: 7 (e.g., out of 59 during the pandemic, e.g., “I am grateful for this thread, reminding me that things are good...”); 7 (out of 46, one year pre-pandemic, e.g., “Thanks for those who have written and continue to write. Reading these posts is lifting my spirits.”); 14 (out of 54, 2 years pre-pandemic, e.g., “The beautiful members who have supported me on my thread since I joined, and other members whose threads I have read and gained inspiration from.”). This informal count reveals how some of the individuals viewed the forum as a beneficial experience and encourages more systematic investigations in the future.

Given the association between gratitude and myriad benefits such as increased happiness and life satisfaction as well as decreased loneliness and depression (for reviews see Nelson & Lyubomirsky, 2016; Wood et al., 2010), it would be of great interest to employ a mixed method approach to curate an online discussion forum, recruit diverse samples, and collect data on more variables (e.g., demographics, positive psychology measures). Such work would further align with the call to apply positive psychology research to facilitate coping and growth during the pandemic (Waters et al., 2021), along with recent work suggesting the relevance of examining different means of communicating gratitude and how gratitude remains beneficial for well-being regardless of whether it is conveyed in person (e.g., texting, Sheldon & Yu, 2021).

5 Limitations and Future Directions

We acknowledge that this study is not without limitations. First, we recognize that coding individuals' public expressions of gratitude for categories from Maslow's Hierarchy of Needs is just one of many possible ways of analyzing these rich data. We originally chose Maslow's Theory of Motivation and not other frameworks because it offered us the opportunity to examine a variety of needs, including the broad categories of deficiency and growth needs as well as their specific subcategories of needs. Had we selected a framework that is centered on one kind of need (e.g., psychological), we would not have been able to capture a breadth of needs fulfilment (e.g., psychological and physical), which was critical given the aims of this investigation. A drawback of our approach, however, is that we were unable to provide an in depth analysis of any one kind of need. In future research, it

would be extremely interesting to develop different theoretically-driven coding schemes to examine gratitude from various perspectives on needs and to hone in on certain kinds of needs (e.g., Self-Determination Theory's psychological needs of autonomy, competency, and relatedness, see Deci & Ryan, 2000, Vansteenkiste & Soenens, 2020; Vermote et al., 2022; see also Cantarero et al., 2021). The application of gratitude-specific theories (see Watkins & Bell, 2017; Wood et al., 2010) would also be useful in examining particular aspects of gratitude (e.g., interpersonal/intrapersonal; state/trait). Moreover, it would be extremely interesting to use text mining methods to identify trends in the data such as sentiment analysis to derive the positive and negative emotional state of the individuals who posted the gratitude expressions (see Pang & Lee, 2008).

Second, we recognize that our findings for public expressions of gratitude may not generalize to private expressions of gratitude (e.g., journal entries), and indeed, that people choosing to post expressions of gratitude on a forum are a self-selected sample that may not represent broader gratitude trends in the population. How gratitude is socialized within the context of online discussion forums is an intriguing empirical question that requires further detailed investigation. For example, we do not know whether the communication/sharing of gratitude, reading others' gratitude posts and comments on these posts, influence the content of an individual's posts. Additionally, we do not know the extent to which awareness that others will be reading and possibly commenting on posts may have affected how individuals choose to construct their posts. However, to help mitigate this concern, it should be highlighted that the individuals who posted in the present online discussion forum were anonymous, and the forum community requires using a username that does not reveal any identifying information. Nevertheless, forum users may represent various forms of bias when compared to the broader population (e.g., those posting gratitude expressions, by definition, have things to be grateful for during these social crises, and thus may represent a survivorship bias that differentiates them from their peers). Future research should augment the present naturalistic observation data by actively recruiting samples that can represent the broader population and examine public versus private expressions of gratitude to clarify potential similarities and differences.

A third limitation of this study is that the data were cross-sectional and not longitudinal. While this corpus afforded us the opportunity to compare expressions of gratitude between three distinct groups of individuals whose first post was either during the pandemic, 1 year pre-pandemic, or 2 years pre-pandemic, we did not have the ability to analyze a single large group of individuals' expressions of gratitude longitudinally across these time periods. Although, please see the Appendix for an exploratory follow-up to 17 individuals who originally posted 1 year or 2 years pre-pandemic and then posted again during the pandemic. While we wish we had longitudinal data for every individual within the 1 year- and two-year pre-pandemic group, given that this was a naturalistic study, we were limited in our ability to gather such data. We would like to share what we have though in hopes that it offers some insights into the pandemic's influence on public expressions of gratitude across time. A longitudinal investigation that explores the trajectory of individuals' expressions of gratitude from before the pandemic, to the start and end of the pandemic, and beyond would be a very welcomed line of future research.

Finally, although it affords unique and important advantages to other methodologies by capturing psychological processes in real-world settings, it must also be acknowledged that naturalistic observation limits clarity about sample characteristics, making it difficult to know how generalizable the present findings may be in terms of demographics.

6 Conclusions

To conclude, 3 years of data from an online discussion forum were analyzed to determine the COVID-19 pandemic's influence on individuals' expressions of gratitude for the fulfilment of deficiency and growth needs. Though we cannot necessarily state definitive conclusions based on this single corpus of gratitude expressions, it is possible to draw some inferences. The results of the between-year comparisons point to how the pandemic may have increased the salience of growth needs (namely cognitive and aesthetic needs) during the pandemic compared to 2 years before the pandemic. The results of the within-year comparisons also point to how deficiency needs (especially love and belongingness needs) are more salient than growth needs not only during the pandemic, but 1 year and 2 years prior. These results are an important step towards understanding the impact of the COVID-19 pandemic and indeed the capacity that broad societal events have to shift experiences of gratitude in general and on public expressions of gratitude for the fulfilment of deficiency and growth needs. We look forward to future research that continues to examine individuals' public expressions of gratitude for the pursuit and attainment of needs before, during, and after this global crisis, and to the eventual applications such a body of work may have for public policies and programs.

Appendix: Exploratory Follow-up

As an exploratory follow-up, we re-examined the corpus to see if any of the individuals who posted 1 year or 2 years pre-pandemic also posted again during the pandemic. We discovered 17 individuals who posted again during the pandemic. To clarify, these 17 individuals were not among the original 59 individuals who posted during the pandemic, but had either posted 1 year or 2 years pre-pandemic. In particular, nine of the 17 individuals initially posted 1 year pre-pandemic and eight of the 17 individuals initially posted 2 years pre-pandemic.

Table 4 Frequency of gratitude for deficiency and growth needs fulfilment for nine individuals (left columns) and eight individuals (right columns) who posted during the pandemic and either during the 1 or 2 years pre-pandemic time periods

	9 Individuals		8 Individuals	
	Pandemic (<i>n</i> = 23)	1 Year Pre-Pandemic (<i>n</i> = 26)	Pandemic (<i>n</i> = 24)	2 Years Pre-Pandemic (<i>n</i> = 24)
<i>Deficiency Needs</i>	17 (73.9%)	19 (73.1%)	18 (75%)	21 (87.5%)
<i>Growth Needs</i>	6 (26.1%)	7 (26.9%)	6 (25%)	3 (12.5%)

Note. Data represent frequency of deficiency and growth needs with percentages in parentheses. Percentages were calculated based on the total number of coded expressions of gratitude for each year.

Together, these 17 individuals' posts during the pandemic yielded 47 expressions of gratitude. The same coding procedure described in the present article was applied to these expressions of gratitude. Percent agreement and Cohen's kappa were calculated to determine inter-rater-reliability between the two research assistants' coding, and was found to be 87.20%, $\kappa=0.831$ (95% CI, 0.71 to 0.95), $p < 0.001$.

The frequencies are presented in Table 4. Upon visual inspection, the frequencies for the nine individuals' expressions of gratitude for deficiency and growth needs satisfaction appear virtually identical during the pandemic and 1 year pre-pandemic. Also upon visual inspection, the frequencies for the eight individuals' expressions of gratitude for deficiency and growth needs satisfaction appear to have different trends during the pandemic (< deficiency, but > growth needs) compared to 2 years pre-pandemic. The frequencies in Table 4 also suggest that a trend towards more expressions of gratitude for the fulfilment of deficiency needs than growth needs within each year for the nine and eight individuals.

These frequencies should be interpreted with caution, of course, given that they were obtained from only nine (19.56%) out of 46 individuals whose first post was one year pre-pandemic and only eight (14.81%) out of 54 individuals whose first post was 2 years pre-pandemic. We do not know how representative the trends are for the nine and eight individuals' expressions of gratitude. Additionally, we do not know how these individuals' subsequent posts may have been influenced by their first posts and any comments made by others on their first posts. For example, these 17 individuals may have reviewed their first posts, and intentionally posted a similar or different expression of gratitude to highlight continuity or discontinuity over time, perhaps depending upon the comments they had previously received on their first posts.

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Declarations

Conflict of interest There authors have no conflict of interest to declare that are relevant to the content of this article.

Informed consent The study does not involve interactions with human subjects and informed consent.

Ethical Approval.

This research was reviewed by Institutional Review Board staff at UNCW, and determined to not constitute human subjects research, per federal regulations [45 CFR 46.102 (d or f)].

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