Relationship Between Personality Traits and Emotional Impacts of the COVID-19 Pandemic on Canadian Emerging Adults

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Abstract
We assessed whether traits from the four-factor vulnerability model for substance misuse are associated with the content of emotional descriptions given by Canadian university students of the impact of the COVID-19 pandemic on their lives. Personality traits were measured in 1185 first- and second-year undergraduates (mean age = 19.11 years; 79% female). Written responses to "Tell us about how the COVID-19 pandemic is impacting your life" were coded using Linguistic Inquiry and Word Count software. Negative binomial analyses were run to examine links between traits and emotion word types used in responses. Anxiety sensitivity was associated with increased use of anxiety words; hopelessness was associated with increased use of negative emotion and sadness words, and decreased use of positive emotion words; and impulsivity was associated with increased use of anger words. Findings have implications for personality-tailored interventions for students vulnerable to distress resulting from highly stressful situations such as pandemics.

Keywords
personality, pandemic, mental health, infectious disease

From the time the first cases emerged in Wuhan, China in December of 2019 (Patel & Jernigan, 2020), the COVID-19 pandemic took an enormous toll around the world (Taylor, 2020; Vidya & Prabheesh, 2020). By mid-March of 2020, many Canadian provinces had declared a state of emergency (Gollom, 2020) resulting in the closure of schools and businesses across the country to limit viral spread (Bronca, 2020).

One population that experienced significant disruptions in normal life due to the COVID-19 pandemic was university students (Sahu, 2020). In addition to moving classes to an online format, many universities around the world cancelled events such as conferences, sports games, and in-person services, all of which decreased face-to-face interactions between students and faculty (Sahu, 2020). Many students reported that the lack of human connection negatively impacted their university experience and the quality of their education (Laroque, 2020). Most Canadian undergraduates are in a phase of development referred to as *emerging adulthood* (Arnett, 2000). In emerging adulthood (age 18–25 years), social gatherings, relationships, and bonds are an important aspect of normal life (Arnett, 2000). Social gatherings make up a large part of the undergraduate student experience; however, most of these events were cancelled during the pandemic to limit viral spread (Bogart, 2020). With classes having moved online, and

the loss of many social events, the university experience of undergraduates in 2020 and 2021 was very different than that of students in pre-pandemic years.

Research on global pandemics prior to the COVID-19 pandemic has shown that there are multiple stressors associated with disease containment strategies that affect the public's mental health (Brooks et al., 2020). These stressors can result in numerous kinds of psychological distress, including psychological and emotional disturbance, depression, low mood and irritability,

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insomnia, PTSD, anger, and emotional exhaustion (Brooks et al., 2020). In his book on the psychology of pandemics, released just prior to the COVID-19 pandemic, Dr Steven Taylor suggested that future pandemics may cause more pronounced, widespread, and lasting psychological effects than the physical effects of the disease (Taylor, 2019). Research on the COVID-19 pandemic has shown that this pandemic has had the predicted deleterious effects on mental health (Grelle et al., 2023; Lambe et al., 2023; Yunus et al., 2022).

COVID-19 pandemic research also suggests that certain age groups may be more at risk for mental health concerns due to the pandemic (Grelle et al., 2023; Moore et al., 2020). Grelle et al. (2023) assessed mental health during the COVID-19 pandemic across four generations: Gen Z (aged 18–23 at the time of assessment), Millennial (aged 24–39 at the time of assessment), Gen X (aged 40–55 at the time of assessment), and Baby Boomer (aged 56–74 at the time of assessment). Of particular interest are those in the Gen Z and younger Millennial generations, as those individuals would have been of university age, and in the emerging adult stage of development, at testing (Arnett, 2000). The mental health of participants during the pandemic was assessed using measures of perceived stress, depression and anxiety symptoms, loneliness, and quality of life. They showed that members of the two younger generations (Gen Z and Millennial) showed worse mental health on all of the above measures compared to the older generations (Gen X and Baby Boomer). Moore et al. (2020) conducted preliminary research in March of 2020, into how early experiences with the COVID-19 pandemic had affected the mental health of the public. They distributed a survey including a free response question worded "Tell us about how the coronavirus crisis is impacting your life" and analyzed the responses using Linguistic Inquiry and Word Count analysis (LIWC; Pennebaker, Booth et al., 2015) to determine what types of words people used to describe their experiences. Such an analysis can tell us much about the different ways in which people are interpreting their experience with the pandemic. It was found that people in the youngest age group assessed (18–31 years) used the least emotionally positive terms and most anxiety-related terms, as well as the most self-centered terms. The results of both Moore et al. (2020) and Grelle et al. (2023) suggest that emerging adults are the most emotionally vulnerable with respect to pandemic distress. Further research should investigate the nature of the increased distress in this population.

It has been suggested that the psychological distress experienced due to pandemics differs from person to person based on individual differences in personality (Taylor, 2019). Therefore, personality variables may be an important predictor of vulnerability to pandemic distress (Besser et al., 2020; Gubler et al., 2021). One potentially useful model of personality, when it comes to pandemic-related distress, is the four-factor vulnerability model for substance misuse (Conrod, 2000). These four traits are measured by the Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009), a tool that taps two internalizing and two externalizing personality traits associated with different kinds of distress, psychopathology, and adverse coping behaviors in non-pandemic times (Woicik et al., 2009). The two internalizing traits are anxiety sensitivity (AS) – the fear that sensations associated with anxiety will result in catastrophic consequences (Conrod et al., 2000) – and hopelessness (HOP) – a trait characterized by expectations of aversive events and a lack of expectation of desirable events (Chinnek et al., 2018). The externalizing traits include impulsivity (IMP) – the tendency to fail to consider the consequences of actions when controlling behaviour (Dalley et al., 2011) – and sensation seeking (SS) – a drive for new and intense experiences (Woicik et al., 2009). In contrast to other widely used models which describe personality more generally, the four-factor vulnerability model includes traits that are associated with specific psychopathologies (Conrod et al., 2000). For example, the traits within this model predict negative outcomes such as alcohol abuse and dependence over and above other traits, such as those included in the Big Five model of personality (Woicik et al., 2009). While neuroticism within the Big Five predicts emotional disorders, the division of the SURPS into AS and HOP each predict more specific anxiety- and mood-related psychopathologies (Conrod et al., 2000). As this study aimed to examine potential negative emotional outcomes of the COVID-19 pandemic, using the SURPS to measure the four-factor vulnerability model could potentially provide more specific information than other widely used models of normal personality.

The traits within the four-factor vulnerability model all have associations with different types of distress and psychopathology in non-pandemic times, suggesting it may be a useful model for assessing pandemic-related distress as well. With respect to the two internalizing traits, past research has shown those high in AS use ruminative or negative response styles, characterized by an attentional bias towards negative or threatening situations (Grafton et al., 2016; Tull & Gratz, 2008; Yang et al., 2023). These response styles may explain why AS has been shown to increase vulnerability for panic disorder, other anxiety-related disorders, and use of arousal-dampening substances (Naragon-Gainey, 2010; Tull & Gratz, 2008). Since a key characteristic of AS is increased fear of arousal-related bodily sensations such shortness of breath (Taylor et al., 2007) and given COVID-19's nature as a respiratory virus, individuals with high AS may have been particularly vulnerable to distress during the COVID-19 pandemic. HOP has been shown to be associated with depressive disorders and suicidality, possibly due to its characteristic negatively biased future thinking (Marchetti, 2019). This negatively biased thinking style diminishes the ability to envision positive future events (Marchetti, 2019). HOP is also a negative predictor of resilience in the face of stressful life events (Saricail et al., 2020) which may be particularly important during and after the pandemic.

With respect to the two externalizing traits in the four-factor model, IMP is thought to be due to cognitive deficits such as

disinhibition (Zeng et al., 2013). This trait is associated with substance use disorders and attention deficit hyperactivity disorder (Soares et al., 2019). IMP has also been found to be related to negative affect (Herman et al., 2018), particularly anger (Mahu et al., 2023). SS is frequently found to be related to extraversion, substance use, and risk-taking behaviours (Woicik et al., 2009). Interestingly, SS has also been found to be associated with moderate depressive symptoms (Mahu et al., 2023) which may arise from negative consequences resulting from their elevated risk-taking (Mahu et al., 2023). Additionally, those high in extraversion have been found to have negative perceptions of the pandemic due to the social limitations imposed by pandemic restrictions (Schmiedeberg & Thonnissen, 2020) and since SS is positively correlated with extraversion (Woicik et al., 2009), these negative perceptions of the pandemic may carry over to those high in SS.

The association between these traits and unique forms of psychopathology in pre-pandemic research suggests they may be important predictors of different types of distress during the pandemic. Prior research provides evidence for this, as studies have shown associations between AS and increased worry in response to the pandemic, and that AS significantly predicts COVID-19 specific distress even controlling for neuroticism (DeGrace et al., 2021; Yunus et al., 2022). Further research is warranted to assess the relationship between these personality variables and the specific perceived impact of the pandemic on the lives of emerging adults (ages 18–25; Arnett, 2000), given that prior studies have mainly focused on a broad age range of community recruited adults (e.g., DeGrace et al., 2020). Moore et al. (2020) showed that emerging adults were the most emotionally negative in their descriptions of the impact of the COVID-19 pandemic suggesting this developmental stage may be most vulnerable to COVD-19-related distress; however, they did not assess whether the particular language used to describe the personal impacts of the pandemic varied by individuals' personality traits. We aimed to fill these knowledge gaps surrounding the COVID-19 pandemic's adverse impact in the vulnerable population of emerging adult university students and applying the four-factor vulnerability model (Conrod et al., 2000) as a potentially useful personality framework for examining individual differences in these adverse impacts, when examining students' own language use.

The purpose of the current study was to investigate the association between personality traits and emerging adults' perceptions of the pandemic's impact on their lives, to better understand the relationship between the COVID-19 pandemic and emotional distress as well as to inform future targeted interventions for serious distress brought on by the pandemic. It was hypothesized that high levels of anxiety sensitivity (AS) would be associated with a greater use of negative emotion words (H1a) and anxiety words (H1b) in descriptions of COVID-19 pandemic experiences. This was hypothesized as AS has been shown to be associated with an attentional bias towards negative situations (H1a; Grafton et al., 2016) and has

been shown to be associated with increased anxiety in response to the pandemic (H1b; DeGrace et al., 2021). It was also hypothesized that high levels of hopelessness (HOP) would be associated with a lesser use of positive emotion words (H2a) a greater use of negative emotion words (H2b), and a greater use of sadness words (H2c) in descriptions of COVID-19 pandemic experiences. This was hypothesized as HOP is associated with decreased positive expectations (H2a; Marchetti, 2019), negatively biased thinking (H2b; Marchetti, 2019), and depressive symptoms (H2c; Lambe et al., 2023). It was hypothesized that high levels of impulsivity (IMP) would be associated with a greater use of anger words (H3) in descriptions of COVID-19 pandemic experiences, as those high in IMP have been shown to endorse anger and frustration themes in prior qualitative research (Mahu et al., 2023). Finally, it was hypothesized that high levels of sensation seeking (SS) would be associated with a greater use of negative emotion words (H4) in descriptions of COVID-19 experiences, given the association between SS and extraversion (Woicik et al., 2009) and the social restrictions imposed by pandemic containment strategies.

Method

Participants and Data Collection Procedure

A cross-sectional study was carried out as a part of the larger UniVenture study. Details of the study design and data collection procedures is published elsewhere (Lambe et al., 2023; Morris et al., 2023; Yunus et al., 2022). The survey was undertaken at five Canadian universities between January and April of 2021. At this time, a second wave of COVID-19 was spreading rapidly across Canada, and stay-at-home orders were issued across many provinces in an effort to control the spread of the virus. Many Canadian universities switched to an entirely online delivery of classes as additional viral containment precautions. Eligible participants were first- or second-year undergraduate students between the ages of 18–25 years.

The semi-structured questionnaire was employed using the web-based REDCap survey tool. At three sites, respective student affairs units sent mass emails to all first- and second-year undergraduate students informing them of the study. Other recruitment methods consisted of social media advertisements, assistance in circulating the study posters and brochures from student-led groups within the respective universities, and posting the study to SONA systems (a platform that enables students to participate in research hosted within the university). One site was primarily French speaking; therefore, a French version of the questionnaire was administered at this site. Due to potential inconsistencies between the English and French LIWC dictionaries (Dudău & Sava, 2021), and the discrepancies between the European French of the French LIWC and the French-Canadian language spoken at this site (Eriksen Translations Inc. & Murphy,

2023), our final analyses contain results from only the English-speaking sites. To verify participants' enrollment, they were asked to provide their institutional email, which was verified to allow them to receive compensation in the form of a $15 Amazon gift card or 0.5 SONA Credit. Each eligible student was restricted to completing the survey only once. Additionally, two quality control questions were included in the questionnaire to ensure data quality.

Measures

Demographics Questionnaire. Participants' age, year of study (first or second year) and biological sex assigned at birth (male or female) were captured through an author-compiled demographics questionnaire.

Substance Use Risk Profile Scale. The Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009) consists of 23-items to assess the four-factor model of personality vulnerability to substance misuse. The SURPS measures the externalizing traits of impulsivity (IMP; 4 items; current study α = .64) and sensation seeking (SS; 6 items; current study α = .70), and the internalizing traits of hopelessness (HOP; 7 items; current study α = .86) and anxiety sensitivity (AS; 5 items; current study α = .61). Considering the short length of the subscales, each subscale showed acceptable to good internal consistency in the present study (α > .60; Loewenthal & Lewis, 2001). The SURPS also shows good validity with respect to emotional problems in both non-pandemic (Castellanos-Ryan et al., 2013) and pandemic (e.g., Lambe et al., 2023) times.

Free-Response Question Related to COVID-19 Pandemic Impact. A free response question assessed perceived effects of the COVID-19 pandemic on respondents' own lives. The question was phrased as: "Tell us about how the *COVID-19 pandemic* is impacting your life". This question was adapted from Moore et al. (2020) who asked their participants "Tell us about how the *coronavirus crisis* is impacting your life". The material in italics was altered from the wording used by Moore et al. (2020) to better represent the state of the pandemic situation at the time of our data collection (i.e., winter term 2021). Free response textual responses to this question were used as the basis of the word count analysis for emotional word usage.

Data Analyses

Linguistic Inquiry and Word Count Analysis (LIWC version 15; Pennebaker, Boyd et al., 2015) was used to analyze the responses to the above free-response question. LIWC is a widely accepted computational natural language processing application that analyzed the texts by assessing the proportion of each response that contains words from multiple pre-set dictionaries. Given our interest in personality and emotional distress, the pre-set dictionaries used for the LIWC analyses were those pertaining to five specific types of emotional words: positive emotion words (e.g., *love, nice;* α = 0.64), negative emotion words (e.g., *worried, hate;* α = 0.55), anxiety words (e.g., *worried, fearful;* α = 0.73), sadness words (e.g., *crying, grief;* α = 0.70), and anger words (e.g., *hate, annoyed;* α = 0.53). The negative emotion category was a superordinate category that comprised the anxiety, sadness, and anger words categories, as well as other negative emotion words; the positive emotion category is not further subdivided in the LIWC-15 dictionary. Internal consistency of the LIWC-15 system is reported as corrected alphas, using the Spearman-Brown prediction formula, which more accurately reflects the internal consistency of natural language systems than Cronbach's alpha (Pennebaker, Booth et al., 2015).

We used SPSS 28.0 version (IBM Corp, 2021) for descriptive and inferential statistics. Pearson's partial correlations were assessed among the variables of interest (four personality traits and five word count categories) controlling for age, LIWC-15 total word count, study site, and biological sex (M/F). We observed over-dispersions across all five LIWC count outcome variables due to zero-inflation. Furthermore, a significant 1-sample Kolmogorov-Smirnov (K-S) test indicated that the data did not have a Poisson distribution, suggesting negative binomial regression analysis as the best analytic strategy (Robertson et al., 2005). We ran five separate covariate-adjusted multivariate zero-inflated negative binomial regression (ZINB) models to avoid multicollinearity controlling for age, LIWC-15 total word count, study site, and biological sex (M/F) to estimate the effect of each personality trait on the usage of positive emotion, negative emotion, anxiety, sadness, and anger words in students' written descriptions of the pandemic's impact. To facilitate interpretation, the beta-coefficients from the ZINB regressions were converted into their exponentiated form: Incidence Rate Ratios (IRRs). IRRs surround the number one and represent a percentage higher or lower in the outcome as a function of a one unit increase in the predictor, holding all the other predictors and covariates constant (Rodriguez et al., 2021). For example, an IRR of 1.05 for the effect of a given trait on a given emotional word count outcome means that every one unit more in the personality trait corresponds to a 5% increase in the use of that category of emotional word in the textual response. Similarly, an IRR of 0.95 means that every one unit more in the personality trait corresponds to a 5% decrease in the use of that category of emotional word in the textual response. The likelihood ratio Chi-square tests were significant for the overall model for each of the five ZINB models. Statistical tests were 2-tailed, and significance was set at p < .01.

Results

A total of N = 2231 students started the online survey with N = 1898 students completing survey across the four study sites

(drop-out rate of 15.9%). Of the free response measures, 4 participants were excluded due to the open-ended response not containing any words, 5 were excluded for providing a free-response of "I prefer not to say", and 2 were excluded for providing duplicate free-responses (free responses that were word-for-word identical to those provided on another survey, indicating that they had completed the survey twice). In the case of the last 2 participants with duplicate surveys, the first survey completed was retained for analysis. After the removal of these 11 participants, and cleaning of the dataset [further removal of another $N = 703$ participants for falling outside the study eligibility criteria (i.e., age <=18 and >=25 ($N = 168$), year of study outside of 1st or 2nd year ($N = 396$), or for selecting 'I prefer not to answer' to the aforementioned eligibility items ($N = 139$)], a final sample of $N = 1185$ remained.

Participants' mean age (±SD) was 19.1 (±1.2) years, and 78.6% of the total sample was female. Table 1 presents the distribution of key study variables such as age, personality traits, and emotion words across study sites. The distribution of female participants was consistently higher across study sites than their counterpart males. Table 2 presents the partial correlations across study variables adjusted for participants'

age, study site, LIWC total word count, and sex. With regards to the internalizing traits, hopelessness (HOP) was positively and significantly correlated with participants' use of negative emotion words to describe the personal impact of the COVID-19 pandemic. Similarly, anxiety sensitivity (AS) correlated positively and significantly with participants' use of anxiety words. Impulsivity (IMP), one of the externalizing traits, was positively and significantly correlated with participants' use of negative emotion and anger words in their written response whereas sensation seeking (SS), the other externalizing trait, only showed a significant positive relationship with the use of anger words.

Table 3 presents five independent adjusted negative binomial models predicting each of the five categories of emotion words (positive emotion, negative emotion, anxiety, sadness, and anger) that students used to describe the impact of the COVID-19 pandemic on their lives, using four-factor traits (Conrod et al., 2000) as simultaneous predictors controlling for age, LIWC-15 word count, study site, and sex. Consistent with H2a, the exponentiated conversion of the beta-coefficient suggested that a one-unit increase in HOP was associated with a 4.1% (IRR 0.959; 95% CI 0.93, 0.98) decrease in the

Table 1. Distribution of Study Variables (Demographics, Personality, Word Usage) Across Study Sites.

Variables	Study Site 1 (N = 320)	Study Site 2 (N = 393)	Study Site 3 (N = 227)	Study Site 4 (N = 245)
	Number (%)			
Demographics				
Biological sex				
Male	56 (4.7)	90 (7.6)	61 (5.2)	45 (3.8)
Female	263 (22.2)	303 (25.6)	165 (13.9)	200 (16.9)
Year of study				
First year	177 (14.9)	210 (17.7)	107 (9.0)	136 (11.5)
Second year	143 (12.1)	183 (15.4)	120 (10.1)	109 (9.2)
	Mean+/−SEM			
Age	19.03+/−0.07	18.87+/−0.04	19.66+/−0.11	19.12+/−0.07
Personality				
Hopelessness (HOP)	14.03+/−0.23	13.25+/−0.18	14.21+/−0.26	13.68+/−0.25
Anxiety sensitivity (AS)	13.44+/−0.15	13.50+/−0.14	13.92+/−0.19	13.37+/−0.18
Impulsivity (IMP)	10.96+/−0.15	11.00+/−0.13	11.33+/−0.19	11.01+/−0.18
Sensation seeking (SS)	16.20+/−0.21	16.81+/−0.17	16.13+/−0.23	16.34+/−0.23
	Mean+/−SEM [median]			
Word usage				
Word count (WC)	35.04+/−1.66 [26.0]	28.34+/−1.27 [23.0]	38.22+/−3.88 [24.0]	32.00+/−1.68 [26.0]
Positive emotions	1.03+/−0.26 [0.0]	3.51+/−1.02 [0.0]	2.51+/−0.74 [0.0]	2.02+/−0.71 [0.0]
Negative emotions	38.98+/−2.94 [22.0]	48.76+/−5.60 [0.0]	62.23+/−7.76 [27.0]	44.80+/−3.72 [32.0]
Anxiety	9.64+/−1.27 [0.0]	15.41+/−2.41 [0.0]	19.19+/−3.68 [0.0]	11.65+/−1.63 [0.0]
Sadness	17.46+/−2.07 [0.0]	16.20+/−2.56 [0.0]	25.45+/−6.66 [0.0]	19.73+/−2.61 [0.0]
Anger	3.33+/−1.34 [0.0]	7.91+/−3.37 [0.0]	4.15+/−1.25 [0.0]	3.33+/−0.93 [0.0]

Note. Hopelessness, Anxiety Sensitivity, Impulsivity, and Sensation Seeking = personality trait subscales from the Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009). Positive emotions, negative emotions, anxiety, sadness, and anger = categories of emotional word counts from the LIWC-15 (Linguistic Inquiry and Word Count; Pennebaker, Booth et al., 2015). Negative emotions is a superordinate category that comprises the anxiety, sadness, and anger words categories, and other negative emotion words.

Table 2. Partial Correlations Among SURPS Personality Traits and Proportion of Emotion Word Use in Describing Pandemic Experiences.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Hopelessness (HOP)	—								
(2) Anxiety sensitivity (AS)	0.127***	—							
(3) Impulsivity (IMP)	0.289***	0.123***	—						
(4) Sensation seeking (SS)	−0.008	−0.161***	0.241***	—					
(5) Positive emotions	−0.029	0.004	0.038	0.029	—				
(6) Negative emotions	**0.111***	−0.001	**0.063***	0.051	0.039	—			
(7) Anxiety	0.033	**0.077***	0.003	0.005	−0.021	0.399***	—		
(8) Sadness	**0.107***	−0.047	0.045	0.004	−0.038	0.619***	−0.050	—	
(9) Anger	0.001	−0.016	**0.070***	**0.062***	0.149***	0.459***	−0.006	0.001	—
Mean (SD)	13.7 (3.7)	13.5 (2.7)	11.1 (2.6)	16.4 (3.4)	2.3 (13.8)	47.9 (90.6)	13.8 (40.3)	5.0 (41.8)	19.0 (59.1)
Variance	13.7	7.4	7.0	12.0	192.0	8203.0	1628.0	1747.0	3498.0
VIF	1.1	1.1	1.2	1.1	1.0	7.8	3.6	1.8	4.5

Note. Partial correlations controlling for age, LIWC-15 total word count, Study Site (coded 1–4), and Biological Sex (male or female). VIF = variance inflation factor, the extent to which variance is increased as a result of multicollinearity between predictor variables. Bolded values indicate a significant correlation between a personality trait and category of emotion word use.
Controlling for 'age', 'word count', 'study site', and 'biological sex'.
*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed tests).

likelihood of using positive emotion words when describing the impact of the pandemic on one's life, controlling for other predictors and covariates. Unexpectedly, IMP and SS increased the likelihood of using positive emotion words: a one-unit increase in IMP and SS were related to a 5.0% (IRR 1.050; 95% CI 1.01, 1.08) and 4.9% (IRR 1.049; 95% CI 1.02, 1.07) increase in the likelihood of using positive emotion words when describing the pandemic impact, respectively. Consistent with H2b, a one-unit increase in HOP was associated with a 4.1% (IRR 1.041; 95% CI 1.02, 1.06) increase in the likelihood of using negative emotion words when describing the impact of the pandemic. Contrary to H1a and H4, neither AS nor SS were significantly associated with use of negative emotion words generally, when describing the pandemic's personal impact.

Several significant findings were obtained when examining personality traits' prediction of the use of specific categories of negative emotion words. Consistent with H1b, a one-unit increase in AS predicted an 8.7% (IRR 1.087; 95% CI 1.06; 1.11) increase in the likelihood of using anxiety words. Unexpectedly, like with AS, a one-unit increase in HOP predicted a 3.5% (IRR 1.035; 95% CI 1.02; 1.05) increase in the likelihood of using anxiety words (but not as strong as the relationship with anxiety words shown for AS). Consistent with H2c, a one-unit increase in HOP predicted a 7.0% (IRR 1.070; 95% CI 1.05, 1.09) increase in the likelihood of using sadness words to describe the impact of their pandemic experience. Unexpectedly, like with HOP, a one unit increase in IMP predicted a 4.9% (IRR 1.049; 95% CI 1.02, 1.09) increase in the likelihood of using sadness words to describe the impact of their pandemic experience (but not as strong as the relationship with sadness words shown for HOP). Unexpectedly, AS showed an inverse relationship with students' use of sadness words to describe their COVID-19 pandemic experience: a one-unit increase in AS was associated with a 6.3% (IRR 0.937; 95%

CI 0.91; 0.96) decrease in the likelihood of using sadness words. Consistent with H3, a one unit increase in IMP was associated with a 14.6% (IRR 1.146; 95% CI 1.11, 1.19) increase in the likelihood of using anger words. Unexpectedly, like with IMP, a one-unit increase in SS was associated with a 14.2% (IRR 1.142; 95% CI 1.11, 1.17) increase in the likelihood of using anger words in describing the pandemic's impact.

Discussion

The purpose of the current study was to assess the relationship between personality traits and how Canadian undergraduate students interpreted the impact of the COVID-19 pandemic on their lives. We accomplished this goal by examining relations of personality traits in the four-factor vulnerability model for substance misuse (Conrod et al., 2000) to the relative frequency of use of various types of emotional words when students were asked to describe the personal impact of the pandemic on their lives. The results using the validated LIWC word count software (Pennebaker, Boyd et al., 2015) provided support for five of the seven proposed hypotheses regarding associations of personality to emotional word usage (i.e., H1b, H2a, H2b, H2c, and H3), as well as an additional five unexpected results regarding personality-emotional word count usage. Each of the five types of emotional words was predicted by at least one of the personality traits in the four-factor vulnerability model. Moreover, each trait was characterized by a different pattern of use of emotional words in the description of the pandemic's impact on their lives. These results suggest that students' particular emotional experience of the pandemic varies according to their personality and that these differences are evident in the choice of language

Table 3. Estimated Contributions of Each SURPS Personality Trait, Controlling for Demographic Covariates, to the Proportion of Words Used to Describe Pandemic Experiences From Various Categories of Emotion Words.

Outcome Variables	Predictors	Beta (SE)	p Value	IRR (95% CI)
Positive emotions	Age	−0.187 (0.036)	<.001**	0.829 (0.77; 0.89)
	Word counts	0.016 (0.001)	<.001**	1.017 (1.01; 1.02)
	Biological sex			
	Male	0.592 (0.09)	<.001**	1.807 (1.49; 2.18)
	Female	Ref.		
	Study site			
	Site-1	−0.662 (0.13)	<.001**	0.516 (0.40; 0.66)
	Site-2	0.692 (0.11)	<.001**	1.998 (1.59; 2.51)
	Site-3	0.833 (0.13)	<.001**	2.299 (1.75; 3.00)
	Site-4	Ref.		
	Externalizing traits			
	Hopelessness (HOP)	**−0.041** (0.01)	.001*	0.959 (0.93; 0.98)
	Anxiety sensitivity (AS)	0.004 (0.01)	.826	1.004 (0.97; 1.03)
	Internalizing traits			
	Impulsivity (IMP)	**0.049** (0.01)	.004*	1.050 (1.01; 1.08)
	Sensation seeking (SS)	**0.048** (0.01)	<.001**	1.049 (1.02; 1.07)
Negative emotions	Age	0.062 (0.03)	.026*	1.064 (1.01; 1.12)
	Word counts	−0.005 (0.001)	<.001**	0.995 (0.993; 0.997)
	Biological sex			
	Male	−0.27 (0.08)	.001*	0.764 (0.65; 0.90)
	Female	Ref.		
	Study site			
	Site-1	−0.176 (0.09)	.057	0.839 (0.70; 1.01)
	Site-2	−0.092 (0.09)	.303	0.912 (0.77; 1.09)
	Site-3	0.243 (0.10)	.017	1.275 (1.04; 1.56)
	Site-4	Ref.		
	Externalizing traits			
	HOP	**0.040** (0.01)	<.001**	1.041 (1.02; 1.06)
	AS	−0.003 (0.01)	.835	0.997 (0.97; 1.02)
	Internalizing traits			
	IMP	0.023 (0.01)	.074	1.024 (0.998; 1.05)
	SS	0.017 (0.01)	.088	1.017 (0.997; 1.04)
Anxiety	Age	0.213 (0.03)	<.001**	1.237 (1.16; 1.32)
	Word counts	0.002 (0.001)	.106	1.002 (1.00; 1.004)
	Biological sex			
	Male	−0.628 (0.09)	<.001**	0.533 (0.45; 0.63)
	Female	Ref.		
	Study site			
	Site-1	−0.297 (0.10)	.003*	0.743 (0.61; 0.90)
	Site-2	0.270 (0.09)	.004*	1.310 (1.09; 1.58)
	Site-3	0.363 (0.11)	<.001**	1.43 (1.17; 1.77)
	Site-4	Ref.		
	Externalizing traits			
	HOP	**0.034** (0.01)	<.001**	1.035 (1.02; 1.05)
	AS	**0.083** (0.01)	<.001**	1.087 (1.06; 1.11)
	Internalizing traits			
	IMP	−0.002 (0.01)	.893	0.998 (0.97; 1.03)
	SS	0.016 (0.01)	.141	1.017 (0.995; 1.04)

(continued)

Table 3. (continued)

Outcome Variables	Predictors	Beta (SE)	*p* Value	IRR (95% CI)
Sadness	Age	0.025 (0.03)	.369	1.025 (0.97; 1.08)
	Word counts	−0.01 (0.001)	<.001**	0.990 (0.988; 0.992)
	Biological sex			
	Male	−0.296 (0.09)	<.001**	0.744 (0.63; 0.88)
	Female	Ref.		
	Study site			
	Site-1	−0.132 (0.09)	.159	0.876 (0.73; 1.05)
	Site-2	−0.409 (0.09)	<.001**	0.665 (0.56; 0.80)
	Site-3	0.089 (0.11)	.412	1.093 (0.88; 1.35)
	Site-4	Ref.		
	Externalizing traits			
	HOP	**0.070** (0.01)	<.001**	1.07 (1.05; 1.09)
	AS	**−0.065** (0.01)	<.001**	0.937 (0.91; 0.96)
	Internalizing traits			
	IMP	**0.048** (0.01)	.001**	1.049 (1.02; 1.08)
	SS	−0.003 (0.01)	.761	0.997 (0.98; 1.02)
Anger	Age	−0.005 (0.03)	.862	0.995 (0.94; 1.06)
	Word counts	−0.007 (0.001)	<.001**	0.993 (0.99; 0.996)
	Biological sex			
	Male	0.175 (0.09)	.054	1.192 (0.997; 1.42)
	Female	Ref.		
	Study site			
	Site-1	0.108 (0.11)	.346	1.114 (0.89; 1.39)
	Site-2	0.894 (0.11)	<.001**	2.44 (1.99; 3.00)
	Site-3	0.372 (0.12)	.002*	1.451 (1.14; 1.84)
	Site-4	Ref.		
	Externalizing traits			
	HOP	0.005 (0.01)	.618	1.005 (0.99; 1.02)
	AS	−0.016 (0.02)	.300	0.985 (0.96; 1.01)
	Internalizing traits			
	IMP	**0.137** (0.02)	<.001**	1.146 (1.11; 1.19)
	SS	**0.133** (0.01)	<.001**	1.142 (1.11; 1.17)

Note. Bolded values indicate a significant association between a personality trait and category of emotion word use.
Negative binomial regression significant at *p= <.05 and **p= <.001.
IRR represents Incident Risk Ratio.

used to describe the impacts of this experience on their lives.

Consistent with hypothesis 1b, anxiety sensitivity (AS) was found to be related to a greater use of anxiety words when students described the impact of the pandemic on their levels. This was expected given the multitude of research documenting the relationship between anxiety sensitivity and anxiety disorders (Naragon-Gainey, 2010; Tull & Gratz, 2008; Yang et al., 2021). Those high in AS tend to show a ruminative response style (Tull & Gratz, 2008), characterized by an attentional bias towards focusing on distressing events in the individual's life (Grafton et al., 2016). In thematic analysis of first-person accounts given by those high in AS of their life experience with respect to the trait, individuals high in AS have been found to give descriptions that are categorized as involving themes of anxiety, fear, and stress more than other traits (Mahu et al., 2023). With regard to the pandemic situation in particular, this result falls in line with the findings of DeGrace et al. (2020) showing AS is linked with increased anxiety and worry about the COVID-19 pandemic. This result also reflects previously published research from the Uni-Venture project, showing AS to be significantly related to increased anxiety symptoms during the COVID-19 pandemic (Yunus et al., 2022). The present findings extend these prior results in showing that the link of AS to anxiety during the pandemic is evident in the choice of words students use to write about the personal impact of the pandemic on their lives.

However, there was not support for hypothesis 1a, as there was not a significant relationship between AS and a greater use of negative emotion words as a whole in the pandemic impact descriptions. This was surprising given the documented link between AS and negative emotionality (Tull & Gratz, 2008). Additionally, AS was unexpectedly found to be related to a lesser use of sadness words. The greater use of anxiety words in combination with the lesser use of sadness words might explain the lack of relation of AS with overall use of negative emotion words. These findings indicate that AS is specifically linked to the use of anxiety words in describing the pandemic's

impact. While the positive effect of AS on use of anxiety words was expected, the significant negative association with sadness words was unexpected. A closer look at the results reveals that this unexpected finding may represent a suppression effect; specifically, in the bivariate correlations (see Table 2), AS was unrelated to the use of sadness words, and it was only in the context of the negative binomial regression, when the effects of hopelessness (HOP) were controlled, that we saw AS negatively predicting use of sadness words. This suggests that what is unique about AS, independent of its overlap with HOP, is associated with a lower use of sadness words. Alternatively, individuals high in AS may have focused excessively on anxious emotions during the pandemic, potentially leading to a reduced emphasis on other negative emotions, such as sadness. It is also possible that the negative relationship between AS and sadness words and positive relationship between AS and anxiety words was due to the time of data collection being in the midst of the second wave of the COVID-19 pandemic. Prior research suggests that while anxiety and depression are related, anxiety tends to precede depression (Stein et al., 2001), so it is possible that when the data for the current study was collected, high AS students were still in the initial stage of experiencing anxiety. If they were to be evaluated again at a later time, there may be a positive association of AS with use of sadness words as well. Overall, these results reflect a specificity of higher AS students to perceive and describe the impacts of the COVID-19 pandemic in terms of anxiety-related emotions.

Consistent with hypotheses 2a, b, and c, HOP was related to a greater use of negative emotion words generally and sadness words specifically, and a lesser use of positive emotion words, when writing about the personal impact of the pandemic. These relationships may be explained by the link between HOP and both depression and suicidality (Mahu et al., 2023; Marchetti, 2019). Additionally, in thematic analysis of first-person accounts given by those high in HOP of their life experience with respect to the trait, those high in HOP have been found to give descriptions that are categorized as involving themes of sadness or depression more so than other traits (Mahu et al., 2023). The inverse relationship expected between HOP and use of positive emotion words reflects past literature suggesting that HOP includes a biased outlook about the future, including a decreased expectation of positive future events (Marchetti, 2019). HOP was also found to be related to a greater use of anxiety related words, which, although not hypothesized, is consistent with some prior findings. A multitude of studies has shown a relationship between HOP and anxiety symptoms both before and during the COVID-19 pandemic (Carretta et al., 2014; Lambe et al., 2023; O'Connor et al., 2000; Padmanabhanunni, 2022). It is important to note, however, that the link with the use of anxiety related words was stronger for AS than for HOP, and that HOP was more strongly related to use of sadness words than to the use of anxiety words, in students' written descriptions of the pandemic's impacts.

Consistent with hypothesis 3, impulsivity (IMP) was related to a greater use of anger words. This relationship is in line with past research using thematic analysis of those high in IMP describing their life experiences with respect to the trait, showing those high in IMP were more likely to show evidence of themes of anger than other traits (Mahu et al., 2023). Past research has also shown a positive relationship between IMP and a tendency to experience negative affect and both state and trait anger (Bettencourt et al., 2006; Devilly et al., 2023; Fassino et al., 2001; Lievart et al., 2016). This relationship may be explained by the tendency of those high in IMP to act without considering the potential adverse consequences of their actions (Dalley et al., 2011; Mahu et al., 2023). In their qualitative thematic study, Mahu et al. (2023) found those high in IMP reported feeling they do not have control over their actions, which could potentially lead to anger and frustration. With respect to the pandemic situation in particular, the restrictions put in place such as stay at home orders and social distancing severely impeded peoples' ability to act without prior planning. This could lead to increased frustration and anger in those high in IMP, as they may use impulsive behaviour to deal with negative emotions and enhance positive emotions, and they were no longer able to do so (Killgore et al., 2021; Woicik et al., 2009).

IMP was also unexpectedly found to be related to a greater use of sadness words. This result is in line with previous research on IMP during the pandemic showing increased depression compared to pre-pandemic (Johnson et al., 2022). In the context of the COVID-19 pandemic, the increased use of anger and sadness words in those high in IMP may be due to viral containment strategies limiting their ability to act on their impulsive tendencies and leading to feelings of frustration and sadness (e.g., disappointment in their own ability to control their behavior). Indeed, those high in IMP have been shown to be less adherent to public health viral containment strategies, such as staying six feet apart, than those with other externalizing traits (DeGrace et al., 2021). It is important to note, however, that the relation of IMP to use of specific negative emotion words was much stronger for the use of anger words than for the use of sadness words, suggesting the primary emotion experienced by those students higher in IMP during the pandemic restrictions was one of anger. Moreover, the relation of personality to the increased use of sadness words was stronger for HOP than IMP suggesting a more primary role of depressed affect in the experience of the pandemic among high HOP than among high IMP students.

There was not support for hypothesis 4, as no relationship was found between sensation seeking (SS) and overall use of negative emotion words in the textual descriptions of the pandemic's impact. However, SS was unexpectedly specifically related to a greater use of anger words, and to a similar level as the relation of IMP with increased use of anger words. Past research has shown links between SS and anger and aggression (Joireman et al., 2003). This relationship may be explained by the propensity for those high in SS to experience

proneness to boredom, and that boredom proneness has been related to frustration and anger (Dahlen et al., 2004). This relationship may be exacerbated by the pandemic situation, since viral containment strategies such as lockdown may have led to increased boredom (Liang et al., 2020). Thus, while both IMP and SS were related to an increased use of anger words in description of the pandemic's impacts (and with similar magnitude effects), we suggest that there may be slightly different reasons for the anger content in their written descriptions (e.g., boredom proneness and thwarting of social activities for those high in SS; frustration with difficulties controlling their impulses during lockdown for those high in IMP). These potentially differing reasons for the increased anger content for these two externalizing traits could be tested in future research.

Additionally, both externalizing traits (IMP and SS) were unexpectedly found to be related to a greater use of positive emotion words in their textual description of the impact of the pandemic on their lives. In the case of SS, this relation may be explained by the nature of SS as involving a preference for new and intense experiences (Woicik et al., 2009) and a tendency towards risk-taking and rule breaking behaviour (Mahu et al., 2023). When the COVID-19 pandemic first started and viral containment strategies such as lockdowns were introduced, a very novel and intense atmosphere was created around the world, as everyday activities now presented risk for infection. For those high in SS, daily activities which used to seem boring may have become exciting opportunities for risk-taking, and therefore the pandemic situation elicited positive emotions like excitement and stimulation rather than negative emotions like anxiety and sadness elicited for those with elevations in other traits. This idea is supported by research showing that students high in SS showed poorer compliance with strategies put in place to limit the spread of the COVID-19 virus (Morris et al., 2023). These findings are also somewhat in line with prior research showing that trait openness to experience was related to positive perceptions of the pandemic (Schmiedeberg & Thonnissen, 2020). As openness to experience and SS have been shown to be related (De Vries et al., 2009), it is possible that individuals who are open to and driven by new and exciting experiences may be more likely to describe the pandemic positively. In the case of students with high levels of IMP, they are prone to experiencing a variety of emotions more strongly than others including not only sadness and anger, but also positive emotions, as is evident in their propensity towards enhancing positive emotions through alcohol use (Woicik et al., 2009). It appears this tendency extends to the stressful context of the pandemic as well, at least in terms of the emotions evident in their writing about the personal impact of the pandemic. Thus, while both IMP and SS were related to an increased use of positive emotional words in their description of the pandemic's personal impact (and with similar magnitude effects), there may be slightly different reasons for the positive emotional content in their written descriptions (e.g., SS

individuals finding the novelty of the pandemic context exciting; the tendency to experience strong emotions whether negative or positive among those high in IMP). These potentially differing reasons for the increased positive emotional content for these two externalizing traits could be tested in future research. It is also important to emphasize that for both SS and IMP, the links of personality to emotional content in the textual descriptions of the pandemic impact was much stronger in the case of anger content than in the case of positive emotional content, suggesting that for both SS and IMP, the primary emotional experience during the pandemic was one involving frustration and anger rather than positive emotions. And while the emotional experiences during the pandemic described by those students with SS and IMP at first glance appear highly similar, only IMP (but not SS) was related to increased use of sadness words in the written descriptions.

While the primary goal of the current study was to evaluate the emotional impacts of the COVID-19 pandemic, it is possible that the results may also provide insights into how students are coping with stress associated with the pandemic. Lazarus and Folkman's (1984) classic transactional model of stress and coping suggests that when individuals are faced with stress, they engage in either problem-focused (i.e., trying to change their situation) or emotion-focused coping (i.e., trying to change their negative emotions). Some of the unexpected findings in the current study may represent emotion-focused coping strategies. For example, SS and IMP being associated with use of positive emotion words may represent active attempts to emphasize the positive. Indeed, SS has been shown to be related to active or positive emotion focused coping in prior research (Nowakowska, 2023). Another unexpected finding which may be explained by emotion-focused coping is the negative association between AS and use of sadness words, which may represent a form of experiential avoidance (Tull & Gratz, 2008). By not acknowledging their sadness, those high in AS may be attempting to decrease their overall negative emotions.

The results of the current study may have both theoretical and clinical implications. For example, our results provide more insight into how undergraduate students in the emerging adulthood phase experience significant, life altering events such as pandemic situations. In particular, the results show that the emotions experienced in response to the situation may differ from one student to another based on individual differences in their personality. Overall, we gained evidence that many students, regardless of personality, were reporting negative emotions in relation to the impact of the pandemic on their lives. This research gives us an idea as to how students are responding to not only the viral nature of the pandemic itself, but also to the public health strategies put in place to prevent the spread of the virus. Clinically, the results can be used to aid in the development or refinement of therapeutic interventions for those experiencing significant negative emotions and/or distress due to pandemic situations, by tailoring them to individual differences in personality.

Universities can use these findings to provide intervention efforts for students who may be struggling to deal with crisis situations such as pandemics.

Due to the degree of overlap between conditions such as anxiety and depression, some argue that these should be targeted together. For example, the unified protocol for transdiagnostic treatment of emotional disorders (UP; Barlow et al., 2020) targets neuroticism as an underlying mechanism leading to emotional disorders such as anxiety and depression. While AS and HOP are both related to neuroticism (Woicik et al., 2009), our results suggest that students high in either AS or HOP may benefit from specific targeted interventions that are unique from one another. Specifically, our results suggest that interventions for high AS students should very specifically focus on their tendency to experience the pandemic with anxious emotions by providing them with effective anxiety management strategies. In contrast, interventions for high HOP students should focus more broadly on helping them manage negative emotions (primarily sadness but also anxiety) and to find ways to effectively increase their optimism and positive emotions during pandemic restrictions, through cognitive behavioral strategies. Similarly, although SS and IMP both represent externalizing personality factors, our results suggests that students high in either SS or IMP may benefit from targeted interventions that have some commonalities but are otherwise unique from one another. Both high IMP and high SS students would benefit from cognitive behavioral strategies for managing frustration and anger to help prevent aggressive behavior and risk taking during the pandemic. High IMP students would also additionally benefit from training in skills for management of depressed affect. While both IMP and SS students may experience more positive emotions during the pandemic (a potential protective reaction), interventions should help them manage those positive emotions to ensure they do not prompt risk taking and rule breaking around pandemic containment measures (DeGrace et al., 2021; Morris et al., 2023).

An additional benefit of using the SURPS and the four-factor vulnerability model to examine individual differences in the experiences of pandemic distress is the use of this model in pre-existing, well-validated intervention programs. For instance, personality-tailored interventions such as the PreVenture program include programming specific to the traits within the four-factor vulnerability model and have been shown to lead to reductions in negative outcomes associated with AS, HOP, IMP, and SS (Castellanos & Conrod, 2006; Conrod, 2016; Conrod et al., 2006). Pilot research for the efficacy of the personality-based UniVenture program (recently adapted from PreVenture for use with university students) during the early months of the pandemic also showed promising results for reducing emotional distress (Stewart et al., 2022). Universities could benefit from working to implement interventions such as UniVenture into existing student support services in order to help students at risk for specific forms of emotional distress resulting from pandemic situations. Additionally, existing personality-based interventions could be further tailored to target emotional experiences associated with crisis situations such as the COVID-19 pandemic, by including further

content on anxiety-reduction, fostering optimism, anger and frustration management, and resilience building.

There are several limitations of the current study that should be acknowledged. First, there is a limitation associated with the cross-sectional design. Since the measures were collected at only one-time point, one cannot determine if there is a causal or even temporal relationship between the variables (e.g., does personality precede and cause specific emotional experiences of the pandemic?) (Carlson & Morrison, 2009). There are also limitations of the LIWC analysis, one being that contextual cues are not included in the coding. For example, the greater use of positive emotion words by those students higher in IMP and SS may not indicate the presence of positive emotions but may be describing the absence of those positive emotions. For this reason, we cannot definitively conclude that relationships such as these represent what we expected. This possibility could be explored in future research using other methodologies (e.g., thematic analyses). Another potential limitation of the LIWC analysis is the use of pre-defined dictionaries, which may not contain the necessary words to adequately capture all nuance associated with participants' descriptions of their emotional experiences. There is also a limitation in the assumption that language use in descriptions of the pandemic's impact on respondents' lives provides an accurate representation of their interpretation of the pandemic. As the data is collected by self-report, it is possible that not only may this assumption be flawed, but responses may not be honest reflections of respondents' thoughts about the pandemic due to self-report biases such as social desirability. Steps were taken in order to minimize the likelihood of such biases of self-reporting, including the assurance of anonymity and confidentiality of participants' data, and the use of validated measures with clearly explained instructions. There may be additional concerns surrounding biases in self-report data collected in an online format; however, meta-analyses have suggested that there is not a large discrepancy between socially desirable responding in online versus pencil-and-paper surveys (e.g., Gnams & Kaspar, 2017). There may also be individual differences in the ability to use written language to describe one's internal emotional experience (Gross & John, 1995) and this may be particularly relevant for international students, who may vary in their ability to express these experiences in their second language (Pavlenko, 2002). In Canada, international students are required to demonstrate a minimum level of English language proficiency prior to admission to university programs; however, this does not guarantee their ability to articulate potential nuances associated with internal emotional experiences. Finally, while our sample was large and drawn from four representatively diverse Canadian postsecondary institutions (which should help to increase generalizability of the findings), certain groups were under-represented (e.g., international students, male students) or not included (e.g., mature students, students in upper years of their undergraduate training), placing limitations on generalizability of the results. As mentioned earlier, although data

was collected from a French-speaking university, those responses were omitted from the final analyses due to potential inconsistencies between the English and French LIWC dictionaries, and the possibility that the French dictionary may not capture linguistic nuances particular to Canadian French. Future research may benefit from further evaluation of the cross-language comparison of the LIWC dictionaries to improve generalizability of results.

Conclusion

The current study provides support for the idea that how emerging adults perceived the effects of the COVID-19 pandemic on their lives differs based on personality traits. Moreover, findings suggest that these differences are captured in the emotional language used to describe the personal impact of the pandemic. Results have important implications for designing or refining targeted interventions for helping those emerging adults at greatest risk of experiencing severe negative consequences on their emotional health in relation to future pandemic restrictions or other future public health crises.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

Transparency and openness statement

The raw data contained in the manuscript are not openly available but may be made available upon reasonable request to the corresponding author after considering all ethical aspects and in consideration of the existing rules imposed by the REBs in question. One exception is participants' free response data, as they may contain identifying information, and participant consent for the release of these responses beyond the research team was not obtained. This particular sub-study of the larger UniVenture study was not pre-registered.

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Supplemental Material

Supplemental material for this article is available online.

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