EGG/COVID-19 and Emotionality

Emily Towner

2020-04-27

Contents

Chapter 1

Introduction

The EGG and Emotionality

Chapter 2

Study 1 - COVID - About

2.1 Summary

This study will explore the relationship between the global COVID-19 pandemic, somatic symptoms, and psychological stress.

This study will explore the relationship between emotions and somatic symptamology in the wake of the COVID-19 pandemic, while exploring individual differences in social, environmental, personality, and lifestyle factors which may mitigate or exacerbate the negative psychological impact of this stressor.

The specific aims of this study are to (1) establish a relationship between psychological stress and somatic symptoms as assessed by our newly developed Somatic Symptoms of Negative Affect (somna) questionnaire, (2) investigate the individual differences that might influence the somatic and psychological response to stress (such as early life stress, social support, media consumption, diet and exercise, lifestyle habits, trait variables, etc.), and (3) examine how specific somatic symptoms in the context of stress may relate to mental health.

We will recruit N = 200 (minimum 150) adult participants. Participants will be recruited online from the UCLA participant pool in the university term directly after the outbreak of COVID-19. Participants will complete a range of questionnaires assessing current levels of stress, social and emotional support and functioning, physical health symptoms, early life adversity, media exposure and consumption, and lifestyle factors.

2.2 Keywords

stress, emotions, mental health, somatic symptoms

2.3 Background

While we often describe our emotions as "gut feelings", surprisingly little research has examined how emotions and the gastrointestinal system interact. Given the onset of a global pandemic, the situation provides a unique opportunity to investigate how an emotion inducing real-world event, COVID-19, might influence somatic symptoms and the stress response.

Prior research during public health crises such as the SARS epidemic in 2006 reveal that the stress associated with quarantine during the epidemic was associated with higher symptoms of acute stress disorder and later post traumatic stress symptoms (Bai et al., 2004). However, research also reveals that in the wake of the SARS epidemic, individuals found their friends and family members more supportive (Lau et al., 2006). Similarly, research suggests that social support obtained through social interactions after the events of September 11th, 2001, reduced college students' symptoms of both depression and physical illness (MacGeorge et al., 2004).

Given that gastrointestinal and mental heath problems are highly comorbid, with anxiety five times higher in individuals with irritable bowel syndrome (IBS) than in those with no IBS symptoms (Lee et al., 2009), gastrointestinal and somatic symptoms may serve as a useful indicator of emotional functioning, particularly during this period of heightened awareness of physical health amid the COVID-19 pandemic. For example, stress in early life can affect both emotional and gastrointestinal symptoms and functioning. One study demonstrated that previous adverse care experiences were associated with both increased anxiety and incidence of gastrointestinal symptoms in youth (Callaghan et al., 2019). In addition, early adversity was associated with changes in gastrointestinal microbiome diversity that were correlated with neural activation to emotional faces (Callaghan et al., 2019).

Physiological methods such as heart rate and sweat response are common indicators of emotional arousal, but the electrograstrogram (EGG) is seldom used in psychological research. In one study, researchers found that movie clips capturing emotions of fear, disgust, and sadness, elicited a greater EGG response relative to a neutral condition (Vianna & Tranel, 2006).

Few studies have explored the way that individual differences including early stress, social support, media consumption, and lifestyle factors may mitigate or exacerbate the negative somatic psychological impact of a stressor as well as the way that these variables and emotional functioning may influence the EGG response to negatively emotionally arousing movie clips.

Using qustionnaires and electrogastrography, we seek to investigate the relationship between somatic symptoms (particularly gastrointestinal symptoms) gastric myoelectrical activity, and emotional functioning, in the context of a public health crisis as well as during emotionally arousing movie clips. We also hope to explore factors that might influence gastrointestinal responses to emo-

tional arousal, and whether and how physical sensations are associated with emotions and physiological responses. We also hope to evaluate how EGG sits with other physiological measures, such as heart rate and sweat response, in order to explore whether emotional patterning of physiological responses contribute to meaningful differences in emotion regulation, the stress response, and mental health.

2.4 Specific Aims

The study will test several hypotheses.

1. Establish a relationship between COVID-19 stress and somatic symptoms
    - Higher perceived stress during the outbreak of COVID-19 will be associated with greater somatic symptomology on the somna.
    - Increased interoceptive awareness since the onset of COVID-19 will be associated with greater somatic symptomology
    - Increased health anxiety since the onset of COVID-19 will be associated with greater somatic symtpomology
2. Examine how specific somatic symptoms in the context of COVID-19 stress may relate to mental health.
    - Somatic symptomology will mediate the relationship between perceived stress and anxiety, depression, and panic.
3. Investigate individual differences that might influence the emotional response to COVID-19 stress (such as early life stress, social support, media consumption, diet and exercise, lifestyle habits, trait variables, etc.).
    - Early life stress will be associated with an increased emotional response to COVID-19 stress.
    - Social support, lifestyle habits (such as sleep, diet, and exercise), personality traits, and media consumption will moderate the association between current stress and emotional response.

Chapter 3

Study 1 - COVID - Methods

3.1 Measures

3.1.1 Information

Title	Name	Description	Reference
info	Information questionnaire	Assesses demographics, health, and location information	Made by BABLab
covid_objective	Objective impact of COVID-19	Assesses the objective impact of COVID-19 including infection, quarantine, household, social distancing etc.	Made by BABLab

3.1.2 Somatic

Title	Name	Description	Reference
somna	Somatic markers of negative affect	Assesses physical sensations of anxiety and sadness, where they are located, and their intensity	Made by BABLab
maia	Multidimensional Assessment of Interoceptive Awareness	Multidimensional self-report measure of interoceptive body awareness	
hai	Health anxiety inventory	Assesses people's anxiety about health symptoms (hypochondriasis)	
ss	Somatic symptoms	Assesses a range of somatic symptoms in adult participants	
pill	Pennebaker inventory of limbid languidness	Measures people's tendency to notice and report a braod array of physical symptoms and sensations.	
pedsql_gi	Pediatric Quality of life – Gastrointestinal Symptoms Module	Assess incidence of Gastrointestinal Symptoms and fatigue in children	
med_check	Medication checklist	List of medications that participants are on – needed for physiology analyses as well as verification of physical health issues.	

Title	Name	Description	Reference
gastrointestinal_disorders	Gastrointetsinal disorders questionnaire	Assesses gastrointestinal issues, their frequency and intensity	
rome	Rome IV criteria questionnaire	Assesses the presence of symptoms which meet criteria for irritable bowel syndrome as stated by the Rome IV	
menstrual_cycle	Menstrual cycle questionnaire	Assesses menstrual phase, which affects gastrointestinal responding, as well as medications which may affect menstrual phase such as oral contraceptive use	
psst	Premenstrual symptoms screening tool	Assesses premenstrual syndromes and criteria for premenstrual dysphoric disorder (pmdd) as well as premenstrual syndrome (pms).	

3.1.3 Stress

Title	Name	Description	Reference
covid_subjective	Subjective impact of COVID-19	Assesses the subjective impact of COVID-19 on well-being.	

Title	Name	Description	Reference
pss	Perceived stress scale	The Perceived Stress Scale is a classic stress assesment instrument. This tool, while originally developed in 1983, remains a popular choice for helping us understand how different situations affect our feelings and our perceived stress. The questions in this scale as about your feelings and thoughts during the last month. In each case, you willl be asked ot indicate how often.	
sasrq	Stanford acute stress reaction questionnaire	Assesses the psychological symptoms experienced in the aftermath of a traumatic event.	

Title	Name	Description	Reference
cte	Childhood traumatic events questionnaire	The Childhood Traumautic Events Questionnaire is a brief survey of six early traumatic experiences (death, divorce, violence, sexual abuse, illnesss, and upheaval).	
ctq	Childhood trauma questionnaire	The Childhood Trauma Questionnaire (CTQ) is a self-report instrument covering 28 items, to rate the severity of emotional abuse and neglect, physical abuse and neglect and sexual abuse. It has been validated in terms of psychometric test properties in samples of psychiatric patients, i.e. drug and substance abusers. This data set includes five CTQ subscale scores.	

Title	Name	Description	Reference
ccfq	Cognitive control and flexibility questionnaire	Measures an individual's percevied ability to exert control over intrusive, unwanted (negative) thoughts and emotions, and their ability to flexibly cope with a stressful situation.	
ptgi	Post-traumatic growth inventory	An instrument for assessing positive outcomes reported by persons who have experienced traumatic events.	
usq	Undergraduate stress questionnaire	The undergraduate stress inventory presents students with various stressors and asks them to indicate if any of the events have happened to them. They are also asked how stressed they are by this event.	

Title	Name	Description	Reference
brcs	Brief resilient coping scale	The Brief Resilient Coping Scale (BRCS) is a 4-item measure designed to capture tendencies to cope with stress in a highly adaptive manner	

3.1.4 Mental health

- State and trait anxiety inventory (stai)
- Depression (bdi_ii)
- Mental health history

3.1.5 Social

- UCLA loneliness scale
- Social craving (may need to adapt substance craving scale)(adapt from food cravings questionnaire - trait and state - may need to also adapt dimensions of social craving)
- Adolescent Social Connection & coping during COVID-19 (ASC3Q)
- mspss
- scs

3.1.6 Personality

- Introversion and extroversion scale
- Tolerance for uncertainty/ambiguity/change (tolerance of ambiguity scale)(intolerance for uncertainty scale)

3.1.7 Lifestyle

- Sleep
- Timeline
- Diet (brief food questionnaire)
- Exercise (adapt the international physical activity questionnaire - pre and during)
- Productivity

3.1.8 Media

- Social media use
- Traditional media consumption
- Public health information consumption
- Use of technology/new media to socialize
- Screen time usage
- smcs

3.1.9 Well-being

- shs

3.1.10 Qualitative

- Long form qualitative written response (adapted from Pennebaker, 1997)(5-10 minutes timed)

I would like for you to write about your very deepest thoughts and feelings about the way COVID-19 has affected you and your life. I'd like you to really let go and explore your very deepest emotions and thoughts. You might tie your topic to your relationships with others including parents, lovers, friends, or relatives, to your past, your present, of your future, or to who you have been, who you would like to be, or who you are now. All of your writing will be completely confidential. Don't worry about spelling, sentence structure or grammar. The only rule is that you begin writing and keep writing until 5 minutes have passed.

3.2 Procedure

3.2.1 Timing

Pilot time:

- Nicole - 1 hour and 50 minutes
- Danielle - 1 hour and 15 minutes
- Chloe - 1 hour and 5 minutes

3.2.2 Questionnaire Order

1. panas (assessed 3 times - once at beginning, once before writing, once after writing)
2. information
3. somna
4. covid_objective
5. somatic_symptoms (assessed currently and retrospectively before COVID-19)
6. pss

7. hai (assessed currently and retrospectively before COVID-19)
8. bdi_ii (assessed currently and retrospectively before COVID-19)
9. pill
10. covid_subjective
11. pedsql_gi (assessed currently and retrospectively before COVID-19)
12. media_consumption
13. ctq
14. sci
15. psqi
16. cte
17. timeline
18. uclals
19. sasrq
20. ccfq
21. maia (assessed currently and retrospectively before COVID-19)
22. stai
23. usq
24. bfq (assessed currently and retrospectively before COVID-19)
25. asc
26. demographics
27. shs
28. mspss
29. ipaq (assessed currently and retrospectively before COVID-19)
30. ius
31. smcs
32. bfi
33. ptgi_brcs
34. mental_health_history
35. med_check
36. gastro
37. rome
38. menstrual
39. panas
40. written_response
41. panas

3.2.3 Attention Checks

1. covid_objective
2. covid_subjective
3. media_consumption
4. scq
5. sasrq
6. bfq
7. ipaq
8. ptgi

Chapter 4

Study 2 - EGG - About

4.1 Summary

This study will explore the relationship between gastrointestinal activity and emotions utilizing electrogastrography. The specific aims of this study are to (1) establish a relationship between emotionally arousing stimuli and the EGG response, (2) investigate the individual differences that might influence the EGG response to stress (such as early life stress, current stress, trait variables, etc.), (3) examine how the EGG response sits with other physiological indices (such as heart rate and sweat response), and (4) explore the ways in which physical sensations are associated with emotions and physiological responses.

We will recruit N = 200 (minimum 150) adult participants. Participants will watch a series of sad, scary, and neutral movies while electrophysiology recordings are made. Then they will complete a range of questionnaires assessing social and emotional functioning, physical health symptoms, early life adversity, and physical health assessments.

4.2 Keywords

egg, stress, emotions, physiology

4.3 Background

While we often describe our emotions as "gut feelings", surprisingly little research has examined how emotions and the gastrointestinal system interact. Physiological methods such as heart rate and sweat response are common indicators of emotional arousal, but the electrograstrogram (EGG) is seldom used in psychological research. Given that gastrointestinal and mental heath problems

are highly comorbid, with anxiety five times higher in individuals with irritable bowel syndrome (IBS) than in those with no IBS symptoms (Lee et al., 2009), gastrointestinal activity may serve as a useful indicator of emotional functioning. In one study, researchers found that movie clips capturing emotions of fear, disgust, and sadness, elicited a greater EGG response relative to a neutral condition (Vianna & Tranel, 2006).

Interestingly, few studies have explored the way that individual differences, such as anxiety, depression, stress, and early adversity might influence the EGG response to these negatively emotionally arousing movie clips. For example, stress in early life can affect both emotional and gastrointestinal symptoms and functioning. One study demonstrated that previous adverse care experiences were associated with both increased anxiety and incidence of gastrointestinal symptoms in youth (Callaghan et al., 2019). In addition, early adversity was associated with changes in gastrointestinal microbiome diversity that were correlated with neural activation to emotional faces (Callaghan et al., 2019).

Using electrogastrography, we seek to investigate the relationship between gastric myoelectrical activity and emotionally arousing movie clips. We also hope to explore factors that might influence gastrointestinal responses to emotional arousal, and whether and how physical sensations are associated with emotions and physiological responses. We also hope to evaluate how EGG sits with other physiological measures, such as heart rate and sweat response, in order to explore whether emotional patterning of physiological responses contribute to meaningful differences in emotion regulation, the stress response, and mental health.

4.4 Specific Aims

The study will test several hypotheses.

1. Establish a relationship between emotionally arousing stimuli and the EGG response.
    - There will be a greater EGG response (i.e. average peak amplitude) for the sad and scary movie condition relative to the neutral movie condition.
    - The intensity of subjective emotion will be positively correlated with EGG response.
2. Investigate the individual differences that might influence the EGG response to stress (such as early life stress, current stress, trait variables, etc.)
    - Increased levels of emotional distress, such as anxiety and depression, will be associated with greater EGG response during the emotionally arousing movie conditions.
    - Early life stress will be associated with greater EGG response in the emotionally arousing movie conditions, relative to individuals who

did not experience early life stress.
- Greater current and perceived stress will be associated with greater EGG response in the emotionally arousing conditions.

3. Examine how the EGG response sits with other physiological indices (such as heart rate and sweat response)
   - The EGG response will be associated with other physiological indices of emotional arousal, such as heart rate and sweat response.
4. Explore the ways in which physical sensations are associated with emotions and physiological responses
   - Lower interoceptive awareness will be associated with greater physiological responses to emotionally arousing stimuli.
   - Higher somatic symptomology will be associated with greater physiological responses to emotionally arousing stimuli.
   - Distinct dimensions of physical sensations and physiological responding will be positively correlated.
   - Gastrointestinal symptoms will be associated with both greater anxiety and greater EGG response to emotionally arousing stimuli.

Bibliography

Bai, Y., Lin, C.-C., Lin, C.-Y., Chen, J.-Y., Chue, C.-M., and Chou, P. (2004). Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatric Services (Washington, D.C.)*, 55(9):1055–1057.

Lau, J. T. F., Yang, X., Tsui, H. Y., Pang, E., and Wing, Y. K. (2006). Positive mental health-related impacts of the SARS epidemic on the general public in Hong Kong and their associations with other negative impacts. *The Journal of Infection*, 53(2):114–124.

MacGeorge, E. L., Samter, W., Feng, B., Gillihan, S. J., and Graves, A. R. (2004). Stress, social support, and health among college students after september 11, 2001. *Journal of College Student Development*, 45(6):655–670.