Inside Out

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2020-05-05

Contents

Chapter 1

Introduction

Physiology of Emotional Reactivity

It is no surprise that often people experience strong emotional responses in their bodies. However, physical symptoms, particularly gastrointestinal symptoms, have scarcely been studied as a measure of emotional arousal. This study will explore the relationship between physical and emotional symptoms and health. In addition, we will explore the impact of the COVID-19 pandemic on physical and emotional health.

Chapter 2

Inside Out

2.1 Summary

The purpose of this two-part study is to explore the relationship between somatic symptoms and emotions in adults.

Recruitment target: $n = 150$.

2.1.1 COVID-19

Part 1 will be an online study that 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.

Participants will complete a range of questionnaires assessing social and emotional functioning, physical health symptoms, early life adversity, physical health, and a range of questionnaires assessing the impact of COVID-19.

2.1.2 EGG Follow-Up

Part 2 will be an in-person study that will explore the relationship between gastrointestinal activity and emotions utilizing electrogastrography.

Participants who had previously completed Part I will return for an in-person session in the lab in which they 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.

2.2 Keywords

stress, emotions, mental health, somatic symptoms, egg, physiology

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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, Yang, Tsui, Pang, & Wing, 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, Samter, Feng, Gillihan, & Graves, 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 questionnaires 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 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.

2.4 Specific Aims

2.4.1 COVID-19

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.)
3. Examine how specific somatic symptoms in the context of stress may relate to mental health

2.4.2 EGG Follow-Up

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)
4. Explore the ways in which physical sensations are associated with emotions and physiological responses

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

Title	Name	Description	Reference
stai	State-Trait Anxiety Inventory	The State-Trait Anxiety Inventory (STAI) is a commonly used measure of trait and state anxiety. It can be used in clinical settings to diagnose anxiety and to distinguish it from depressive syndromes.	
bdi	Beck depression inventory	Developed for the assessment of symptoms corresponding to criteria for diagnosing depressive disorders listed in the DSM IV	
mental_health_history	Mental health history	A questionnaire to assess mental health history	

3.1.5 Social

Title	Name	Description	Reference
uclals	UCLA loneliness scale	A 20-item scale designed to measure one's subjective feelings of loneliness as well as feelings of social isolation.	
scq	Social craving questionnaire	A measure designed to address social cravings.	Made by BABLab
asc	Adolescent social connection and coping during COVID-19	This questionnaire is designed to learn about the ways you connect with people, and how it makes you feel. This might be affected by the COVID-19 outbreak, especially when following physical distancing or shelter-in-place orders.	

Title	Name	Description	Reference
mspss	Multidimensional scale of perceived social support	The Multidimensional Scale of Perceived Social Support (MSPSS) is a brief research tool designed to measure perceptions of support from 3 sources: Family, Friends, and a Significant Other. The scale is comprised of a total of 12 items, with 4 items for each subscale.	
scs	Social comparison scale	This scale was developed by Allan and Gilbert (1995) to measure self-perceptions of social rank and relative social standing. This scale uses a semantic differential methodology and consists of 11 bipolar constructs.	

3.1.6 Personality

Title	Name	Description	Reference
bfi_10	Big five personality inventory	Inventory that measures an individual on the big five factors of personality (extraversion, agreeableness, conscentiousness, neuroticism, and openness to experience).	
ius	Intolerance of uncertainty scale	The Intolerance of Uncertainty Scale includes items relating to the idea that uncertainty is unacceptable, reflects badly on a person, and leads to frustration, stress, and the inability to take action	

3.1.7 Lifestyle

Title	Name	Description	Reference

- 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 1 - COVID - Methods

4.1 Information

Enrollment Participants will sign up for lab session slots at least 48 hours ahead of time to ensure ability to consent and complete home session. We will set the SONA to reflect the 48 hour rule as well as instruct participants that they must complete the online session before their scheduled lab session.

Consent The researcher will email the participant the consent form to review and sign electronically. Any questions will be answered at this time. We will direct female participants to wear a sports bra and a comfortable t-shirt. We will mention that we have a hospital gown if they prefer. We will also mention that it might be a male experimenter, so for all participants to look at the diagram and be sure they are comfortable (female experimenter can be available if necessary). We will also ask male participants if they are comfortable shaving any chest/stomach hair for the session and will send them a photo demonstrating the regions involved. We will also tell participants that their response time will be monitored, so to please read and respond carefully to all surveys.

Home Session Assign the participant a Participant ID Log the ID, name, email address, and contact information (if given) into the ID drive Enroll the participant on REDCap Email the participant (using the email template) the home session REDCap link, including instructions for the home and lab session. Lab Session Before the lab session, the researcher will check the home session submissions and record the time to completion to ensure that responses are being paid attention to.

All lab sessions take place between 12 p.m. and 6 p.m. Participants are instructed not to eat for 1 hour before their session.

Participants will complete several questionnaires in the lab including the med_check, female health, panas, stai_state, and info.

A two part SONA study will require the participant to complete the home session before the lab session.

The researcher will book the Bear's Den using the calendar system.

Drink bottle of water Consent Apply physiology stickers Round 1 of movie watching Complete PANAS Round 2 of movie watching Complete PANAS Round 3 of movie watching Complete PANAS Height, weight, and waist measurement Debrief Files Each participant file should include

3 physio files 3 psychopy files 1 photocopy of the run sheet Run Sheet Will include

Observer ratings of startle scale Notes on laughing nervously, jumping, screaming, shrieking (to account for movement) Data Analysis Will include factor analysis for somna

Chapter 5

References

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