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***SV: Mental hälsa under covid19 pandemin i Sverige som en interaktion mellan personlighetsdimensioner och kontextuella faktorer***

***EN: Mental health during the covid19 pandemic in Sweden, as an interaction between personality and contextual factors***

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**Abstract (Eng)**

The covid19 pandemic has presented great challenges to mental health globally, in part due to restrictions implemented in the wake of the pandemic; such as social distancing, but also due to the fear and psychological distress associated with living during times of crisis. Prior studies have contributed to explaining covid19's effects on mental health by addressing either personality-based or contextual factors. The present study conceptualized and assessed an interaction of both dimensions. The sample consisted of 220 participants, all of whom had been living in Sweden during the pandemic. Our results confirm previous findings, and provide further evidence of psychological flexibility as a protective factor against bad mental health. We also found that certain demographic groupings experienced worse mental health than the rest of the population. These vulnerable groups were women and young people, and it may be interesting to consider this in future research. Our findings contribute to a better understanding of the interactions between different contextual and personality-based factors to covid19 in a Swedish context. For future research, it would be useful to investigate these interactions and correlations in other countries to see if such studies yield different results. It may also be interesting to consider employment status and sector; as that may explain part of the vulnerability to mental health during covid19.

*Keywords:* covid19, Sweden, mental health, personality, psychological flexibility, context, interaction

### **Abstract (Swe)**

Covid19 pandemin har inneburit stora utmaningar för psykisk hälsa globalt, dels på grund av begränsningar som införts för att minska smittspridningen såsom social distansering, men också rädslan som följer att leva under oroliga tider. Tidigare studier har bidragit till förklaringar av covid19's effekter på psykisk hälsa genom att fokusera på antingen personlighetsbaserade eller kontextuella faktorer. Den nuvarande studien konceptualiserade och bedömde en interaktion av båda dimensionerna. Vårt stickprov bestod av 220 deltagare som alla har bott i Sverige under pandemin. Våra resultat bekräftar och stärker tidigare forskning på psykologisk flexibilitet som en skyddande faktor mot dålig psykisk hälsa. Vi fann också att vissa demografiska grupperingar upplevde sämre psykisk hälsa än resten av befolkningen, dessa grupper var kvinnor och unga vuxna, vilket kan vara intressant att överväga i framtida forskning. Våra resultat bidrar till en bättre förståelse för samspelet mellan olika kontextuella och personlighetsbaserade faktorer för covid19 i ett svenskt sammanhang. För framtida forskning vore det intressant att undersöka dessa interaktioner och korrelationer även i andra länder, för att på så sätt se hur och om resultaten skiljer sig. Det vore även intressant att undersöka sysselsättning och sektor som personer jobbar inom, då detta möjligen kan bidra till förståelsen kring vilka demografiska grupper som är mest sårbara för psykisk ohälsa under covid19 pandemin.

*Nyckelord:* covid19, Sverige, psykisk hälsa, personlighet, psykologisk flexibilitet, kontext, interaktion

## **Introduction**

The covid19 pandemic has presented great challenges to mental health globally (Gloster et al., 2020). This is in part due to actions taken to restrain the virus, such as the implementation of social distancing, but also due to the fear and psychological distress associated with living during times of crisis (Presti et al., 2020). A study on the Chinese population concerning the impact of the covid19 pandemic on mental health (Xiong et al., 2020) shows that the pandemic is associated with highly significant levels of psychological distress that in many cases would meet the threshold for clinical relevance; high enough levels to warrant a diagnosis for mental illness. It has also become clear that there are differences in the way people are affected mentally by the pandemic (Gloster et al., 2020), and identifying these differentiating aspects makes possible their consideration when implementing mental-health interventions.

Allegedly, both individual characteristics and contextual factors contribute to the differences in how people's mental health is affected by the covid19 crisis. Interestingly, whereas both personality-based and contextual factors have been studied separately, there is a shortage of studies that look into the interaction between the two. The current study aims to contribute to filling in that gap, by considering two major categories of differentiating factors. Firstly, personality-based factors: ways in which individuals differ in terms of their personality. Secondly, contextual factors: ways in which individuals differ in terms of the context they find themselves in. The aim is to investigate potential interactions between the two dimensions. To be noted is that the present study was conducted in Sweden and is based on people who have been living in Sweden during the pandemic. Sweden has had fewer prohibitions; restrictions have instead been enforced based on recommendations (Regeringskansliet, 2021).

### **Individual factors associated with mental health and resilience during crisis**

The concept of psychological resilience in this paper refers to the ability of an individual to recover from a setback, adapt well in the face of trauma, and survive and thrive despite significant adversity and stress (Fletcher & Sarkar, 2013). Prior research shows that certain personality characteristics are associated with increased psychological resilience over time (e.g. Oshio et al., 2018) and that coping and emotion regulation strategies are also important in this context (Lee et al., 2019). Furthermore, there is ample evidence that attachment security is a key

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predictor of psychological resilience (Bender et al., 2018), as individuals with secure attachment, as opposed to their non-securely attached counterparts, tend to cope actively in times of stress (Li, 2008). Thus, also in the context of the covid19 pandemic, it is to be expected that, due to individual differences in resilience, people will be impacted differently in terms of their mental health.

The present study focuses on a select set of dimensions, based on prior findings, and these are extraversion, psychological flexibility, attachment, and loneliness. Extraversion, a personality dimension denoting; outgoing, sociable, upbeat, and assertive behavior, is found to be a contributing factor to resilience in the face of catastrophe (Riulli et al., 2002). Moreover, extraversion has proven valuable as a protective factor against generalized anxiety and depressive symptoms in the context of the covid19 pandemic (Nikčević et al., 2021). This is also in line with previous research in Finland indicating that extraversion is negatively correlated to symptoms of anxiety and depression in the general population (Jylhä & Isometsä, 2006).

Another aspect that is considered in the present study is psychological flexibility (PF), denoting the individual's ability to act in accordance with personal goals and values, in the presence of potentially interfering thoughts and feelings, and with a greater appreciation of what their current situation or context allows (Hayes et al., 2012). A study conducted in Sweden (McCracken et al., 2021) showed that individuals who described themselves as having more psychological flexibility (committed action and inflexibility) in times of covid19 experienced fewer symptoms of depression and anxiety. Moreover, an international study on the impact of the covid19 pandemic on mental health (Gloster et al., 2020) shows that individuals who describe themselves as psychologically flexible exhibit more resilience.

We also considered attachment. Attachment theory posits that it is by knowledge through experience that we can access supportive and comforting contact with other people, which leads to feelings of safety and security, and this is termed attachment security. Conversely, lack of such knowledge, presumably because of little experience of comforting support early on in life, leaves us feeling unsafe and/or threatened by what we encounter in the world, which is termed attachment insecurity (Bowlby, 1988). A study conducted in Italy on affective temperament,

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attachment style, and the psychological impact of the covid19 outbreak (Moccia et al., 2020) showed that attachment security is an influential factor when predicting the extent of the mental health burden caused by living during the pandemic. Specifically, the study found that “confidence in relationships” as an indicator of attachment security was a predictor of mental health whereas “valuing relationships as secondary” was not. The present study incorporated these attachment-based aspects of people’s approach to their close relationships as potentially relevant in explaining how lonely, anxious, or depressed they feel.

The last aspect included as an individual factor in the present study is loneliness, which is measured as feeling lonely overall when relating to different aspects of life. Loneliness has been shown to correlate with both increased depression and suicidal ideation (Killgore et al., 2020) and is therefore discussed as a signature mental health concern in the era of covid19, to be considered and followed up during the social isolation efforts associated with the pandemic.

### **Contextual Factors in resilience**

Contextual influences are evident both in how individuals develop and evolve their capacities (Bronfenbrenner & Morris, 2006) and in terms of capacity to cope at each given point in time (DeLongis & Holtzman, 2005). Moreover, it follows from the individual factors discussed above that the extent to which one’s relationships and salutogenic habits are disrupted constitutes a fundamental source of variability to the severity of impact at times of challenge. Thus, it is relevant to study disruptions in relationships and salutogenic habits as contextual factors that may influence people’s mental health during the covid19 pandemic.

In the present study, we operationalize the degree of disrupted personal relationships in two main ways, through the perceived degree of disruption of relationships and through the perceived degree of salience of communication through digital means. Previous research on the impact of covid19 social isolation (Bland et al., 2021) observed greater impairments to emotional and social cognition in people who experienced more disruption to their usual social connectivity during covid19 social isolation. Perceived degree of emotional fulfillment through communication by digital means is considered in the present study because the emotional fulfillment one can get from a digital interaction may mediate the effects of social isolation.

Prior research has noted that the covid19 pandemic has caused disruption to people's salutogenic habits, such as changes to the degree of physical activity and time spent on social media (Giuntella et al., 2021). For disruption of salutogenic habits, we consider the degree of perceived changes in everyday activity that cause disruption of one's healthy habits, self-care, and recreational activities, pre-pandemic as compared to during the pandemic. These perceived changes are relevant because they provide valuable contextual information to the study when looking for interactions between individual and contextual dimensions in resilience and mental health. Lastly, as regards salutogenic habits, we also consider social isolation, which is measured as the "perceived degree of disruption to interactions with people in physical spaces". Isolation is included in the present study because people vary in terms of compliance with government regulations. The degree of compliance may be strongly related to changes in the salutogenic habits of the individuals to get insight into the effect of disruptions.

### **Interactions Between Personality-Based and Contextual Factors**

Psychological resilience involves the capacity, processes, and/or outcomes of adaptation in the context of significant threats. These threats may come in the form of contextual changes, such as the changes brought about by the covid19 pandemic, and it may be argued that the extent to which individuals experience differences in context differs, as well as the extent to which the change in context affects the individual on a personal basis.

Prior studies have hinted at the importance of the interaction between personality-based and contextual factors. For instance, McCracken et al. (2021) mentioned that psychological flexibility significantly moderated the relationship between stressful life events and daily stress. Moreover, a meta-analytic review on loneliness and social isolation as risk factors for mortality (Holt-Lunstad et al., 2015) conclude that the influence of both objective and subjective social isolation on risk for mortality is comparable with other well-established risk factors for mortality. The covid19 literature has also suggested that people high in extraversion report greater concerns that the disruption in daily activities caused by the coronavirus will make them lonely (Aschwanden et al., 2020). However, while other studies have touched on the interaction

between contextual factors and personality factors, there appears to be a shortage of studies that dwells deeper into this process; making it the centerpiece of the study.

### **The Present Study**

The present study expands on previous research in several ways. While personality-based and contextual factors have been studied separately, there have been few studies concerning the interaction of both dimensions. The survey was conducted in Sweden, a context which is interesting in that there have been many recommendations but few forced restrictions, meaning that the individual choice is an influential factor (Regeringskansliet, 2021).

The following hypotheses were formulated:

**Hypothesis 1:** Based on findings by McCracken and colleagues (2021) we hypothesize that there is an inverse relationship between participants' scores on psychological flexibility (committed action and inflexibility) and their perceived mental health, operationalized as scores on depression and anxiety self-report measures. Moreover, based on the same study, we hypothesize that psychological flexibility will mediate the effect of loneliness on mental health for participants.

**Hypothesis 2:** Given that people high in extraversion reported greater concerns that the disruptions in everyday life caused by the corona crisis will negatively impact their relationships (Aschwanden et al., 2020), we hypothesize that extraversion will be linked to experienced disruption in relationships. We further suggest that this link will be mediated by the participants' experienced degree of emotional fulfillment through digital interactions. In addition, we expect that extraverted people will score lower on levels of experienced isolation because they are less likely to stay at home (Götz et al., 2021).

**Hypothesis 3:** We hypothesize that the attachment-related ways of experiencing and valuing close relationships will predict degree of relationship disruption and perceived loneliness. That is, depending on how much people value relationships, and how much confidence they have in their relationships, we expect different levels of experienced disruption in relationships and loneliness.

## Method

### Participants

The present study was answered to completion by 220 people, 161 of which were women (73%) and 58 were men (26%). Participation required that the participants were over the age of 15 and had been living in Sweden during the last year. The *Mean* age of participants was 43 years ( $SD=15.8$ ). Regarding education, 156 (70%) of the respondents had completed education at University level, while 3,6% of our sample had elementary school as their highest completed education. Therefore, our sample as a group were more educated than the average for the Swedish population (SCB, 2019). Also, 166 (76%) of participants were born in Sweden.

### Survey Design

An online survey with a mixed design was prepared, consisting of demographic between-subjects variables, scales concerning outcome variables; depression and anxiety, and measures of within-subject independent variables of psychological flexibility, extraversion, attachment, loneliness and self-constructed scales about contextual factors; degree of experienced disruption in relationships, experienced isolation, and degree of experienced emotional fulfillment of digital interaction. See *Table 1* for an overview.

### Measures

**Depression:** The Patient Health Questionnaire (PHQ-9) is a measure of depression based on DSM IV diagnosis criteria (Kroenke et al., 2001). The PHQ-9 has a dual-purpose to screen for signs of the presence of a depressive disorder and to grade depressive symptom severity. The participant self-assesses and answers the questions based on the instructions “Over the last two weeks, how often have you been bothered by any of the following problems?”. The scale goes from 0 “not at all”, to 3 “nearly every day”, and the points from the 9 items were summed up to a score that can range from 0 to 27. The cut-off points and thresholds are 5 (mild), 10 (moderate), 15 (moderately severe), and 20 (severe depression). The limit value 10 implies a potentially clinically significant condition. This limit value has shown good ability to distinguish between people with and without clinical depression. At the limit of 15 or more, active treatment is considered necessary. PHQ-9 showed in the present data adequate internal consistency at  $\alpha = .88$ .

**Anxiety:** General Anxiety Disorder Questionnaire (GAD-7) was created as a screening tool for General Anxiety Disorder in primary care settings (Spitzer et al., 2006) but it is commonly used as a measure of general anxiety symptoms across various settings and populations. The scale goes from 0 “not at all”, to 3 “nearly every day”. The participant self-assesses and answers the questions based on the instructions “Over the last two weeks, how often have you been bothered by any of the following problems?” The threshold values for mild, moderate and severe anxiety are 5, 10 and 15 points respectively. When screening for anxiety disorders, a recommended threshold value is 10 or higher. A cut-off score of 10 has been identified as the optimal point for sensitivity (89%) and specificity (82%) (Spitzer et al., 2006). GAD-7 has demonstrated strong psychometric properties in the general population, a confirmed 1-dimensional factor structure, and adequate internal consistency across subgroups ( $\alpha = 0.89$ ). Normative data provided for the general population showed that approximately 5% of subjects had GAD-7 scores of 10 or greater, and 1% had GAD-7 scores of 15 or greater (Löwe et al., 2008). The internal consistency shown in the present data of the GAD-7 based on the current sample was  $\alpha = .91$ .

**Psychological flexibility:** The Acceptance and Action Questionnaire (AAQ-2) is a measure of experiential avoidance and psychological inflexibility (Hayes et al., 2004). The participants are instructed to rate how true each statement is for them by selecting a number from 1 “never true” to 7 “always true” on a Likert scale. Higher total scores mean less flexibility (inflexibility), while lower total scores mean more flexibility. For some people, their scores move quickly (in the matter of a few weeks). For others, it might take longer (a few months). Scores around 24-28 are associated with the cutoffs on measures of symptoms, like depression or anxiety. Scores on the AAQ-2 have shown to have good reliability, ( $\alpha = .84$ ), and construct validity (Hayes et al., 2004; see also Lee et al., 2019). The internal consistency for AAQ-2 in the present study was  $\alpha = .9$ .

**Extroversion/introversion:** From the Mini-IPIP Scales a Tiny-Yet-Effective Measure of the Big Five Factors of personality, the extraversion subscale with 4 items was used (Donnellan et al., 2006). Participants were instructed to assess themselves; “To what extent are the following statements characteristic of you?” on a Likert scale where 1 is “not at all characteristic of me” and 6 is “very characteristic of me”. The internal consistency in the present study was  $\alpha = .77$ .

**Attachment:** Two subscales from the ASQ-short form (Karantzas et al., 2010) were included: (1) *Valuing relationships as secondary*, 4 items, and (2) *confidence*, 6 items. The participants answered “To what extent are the following statements characteristic of you?” on a Likert scale, where 1 is “not at all characteristic of me” and 6 is “very characteristic of me”. The internal consistency for ASQ-short in the present study was  $\alpha = .75$  for relationships as secondary and  $\alpha = .84$  for confidence (in relationships).

**Loneliness:** A 3-item loneliness Scale (Russell, 1996) was used, addressing the lack of companionship, feeling left out and feeling isolated from others. For each item, the participants answer by selecting either 1 “hardly ever”, 2 “sometimes“ or 3 “often”. Answers are summed up to a total score of 0 to 9 with higher scores indicating higher level of loneliness. The internal consistency for the loneliness scale in the present study was  $\alpha = .78$ .

**Degree of experienced isolation:** We measured this dimension with one question “Has your interactions with people in physical spaces been disrupted by the Covid19 situation?”, assessed on a Likert scale ranging from 1-5, from 1: “not disrupted” to 5: “disrupted to a high degree”.

**Degree of experienced disruption in relationships:** Two items that assessed experienced disruption in relationships by asking about whether relationships with close/loved ones and relationships with acquaintances have been disrupted. Items were rated on a Likert scale ranging from 1-5 where 1 is “not disrupted” and 5 is “disrupted to a high degree”. The correlation between items was  $r = .549, p < .001$ .

**Measures of changes in habits:** 4 items that measured how everyday habits (relating to work and hobbies) had been impacted by Covid19. Items were rated on Likert scales where 1 stands for “I do it less than before the pandemic”, 7 “I do it more than before the pandemic”, and 4 stands for neutral “no difference”. Item 4 (“I physically meet people for socializing”) correlates negatively with the total scale, therefore there was no internal consistency in the measures of habits. The internal consistency for the remaining three items was  $\alpha = .49$ .

**Degree of experienced emotional fulfillment through digital interactions:** The participants were asked whether they feel similar levels of emotional fulfillment through digital interaction as in person ones, and answered on a Likert scale from 1 “not at all”, 3 “somewhat”, 5 “quite a bit”, to 7 “yes I am”.

### **Background information**

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In addition, demographic variables were assessed and measured. These were: gender, age, country of origin (country of birth) and highest completed education. The demographic variable age was coded as 15-25 ( $n=44$ , Young Adults), 26-35 ( $n=32$ , Adults), 36-45 ( $n=46$ , Middle Aged Adults), 46-60 ( $n=65$ , Mature Adults) and 61+ ( $n=33$ , Old Adults).

Table 1  
*Survey Overview*

Scale	Type of Questions	Answer Alternative	Items
Demographic data	Sex, Age, Education, Country of Origin	All different from each other. All variables in the form of fixed alternatives except age.	4
The Patient Health Questionnaire (PHQ-9)	Feeling depressed and tired. Over or under-eating. Thoughts of suicide and self-harm, etc.	Likert scale from 0-3. Higher scores indicate more depression.	9
General Anxiety Disorder Questionnaire (GAD-7)	Feeling anxious, nervous, and afraid. Worrying too much and not being able to stop, etc.	Likert scale from 0-3. Higher scores indicate higher anxiety.	7
The Acceptance and Action Questionnaire (AAQ-2)	Feeling afraid of feelings and losing control over them. Worries getting in the way of success, etc.	Likert scale from 1-7. Lower scores indicate higher psychological flexibility.	7
Mini-IPIP Scales a Tiny-Yet-Effective Measure of the Big Five Factors of personality	Talking to a lot of different people and being the life of the parties or don't talk to many people and keep in the background.	Likert scale from 1-6. Higher scores indicate extroversion. Lower scores indicate introversion. (2 reversed item)	4
Two subscales from the ASQ-short	Superficial relationships, achievements are more important than relationships. Feeling confident in relationships, etc.	Likert scale from 1-6. Higher scores indicate valuing relationships as secondary and more confidence (1 reversed item).	4 + 6
3-item Loneliness Scale	Feeling left out, isolated and lacking companionship.	Likert scale from 1-3. Higher scores indicate more loneliness.	3
Degrees of experienced isolation	Interactions in physical spaces ex: cafe.	Likert scale from 1-5. Higher scores indicate higher degrees of experienced isolation and disruption in relationships.	1
Degree of experienced disruption in relationships	The experienced disruption of both close relationships and with people frequently socialized with, but are not very close to.	Likert scale from 1-5. Higher scores indicate higher degrees of disruption in relationships.	2
Measures of changes in habits	Meeting people. Working/studying and doing hobbies at home, etc.	Likert scale from 1-7. Scores in the highest and lowest ends indicate more changes, in positive	4

Degree of experienced emotional fulfillment through digital interactions	Experiencing similar levels of emotional fulfillment during digital interactions as with in-person interactions.	and negative directions, respectively. Likert scale from 1-7. Higher scores indicate a higher emotional fulfillment from digital interactions.	1
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## Procedures

**Participant recruitment and data collection.** The questionnaire was shared on social media along with a short description regarding who the researchers are, what the study was about, and an estimate of the time it takes to complete the survey. The survey was shared in various online groups to add diversity to the sample, with the goal of attaining representative participation.

Before participants could enter the survey, they were informed about the study purposes, anonymity and voluntariness of their participation, and filled out a consent form confirming that they are over the age of 15, and have been living in Sweden during the last year. The participants were also given contact information. After providing written consent, the survey started. First, participants were asked to answer a series of demographic questions to specify gender, age, if they were born in Sweden and educational background. The survey then went onto assessment of mental health with questionnaires on depression and anxiety. Moving on, the participants were asked to answer a series of questionnaires relating to personality-based factors. In order, these are; psychological flexibility, extroversion/introversion, attachment (confidence and valuing relationships as secondary), and lastly a questionnaire measuring loneliness. Following this, there was a section relating to contextual factors, with questions about experienced disruption of relationships, degree of experienced isolation and, lastly, a question regarding degree of experienced emotional fulfillment through digital interaction. The survey ended with a message thanking participants and notifying them that their response was recorded.

## Data Preparation and Analysis

The collected data was transferred from *Qualtrics* (a survey tool) to *Jamovi* (*3rd generation*, a statistical spreadsheet) for analysis. Internal consistency, means, and standard

deviations for all study variables as well as cut-off scores for depression and anxiety are presented in *Table 2*. The measures used in the present study showed an overall good (in some cases excellent, in other acceptable) internal consistency that has given rise to data that is regarded as reliable for psychometric analysis. Considering the good internal consistency of the measures and the decent sample size ( $n = 220$ ), results can be considered valid. All variable distributions were examined for fit regarding assumptions of multivariate analysis. Demographic statistics were calculated to describe the study sample and reliability analyses were performed on the scales. Analysis of Variance was carried out to look for significant differences between groups, and a correlation matrix (*Table 3*) was made to look for correlations between all variables. To investigate and determine the hypotheses (*I-3H*), mediation analyses and a multiple linear regression model were calculated.

### **Ethical Considerations**

The present study followed the ethical considerations that apply in research with humans; the consent requirement, the information requirement, the good use requirement and the confidentiality requirement as described in “etikprövningslagen” (2003:460), the Swedish equivalent of the law concerning ethical considerations in the context of experimental research. The survey builds to a large extent on standardized and well established psychometric instruments that have been used extensively in previous studies. There have never been any reports of harm from responding to the questions included in these instruments. The data collected is sensitive, as it partly concerns mental health, but not personal. No personal information whatsoever was collected from participants (anonymity), and because data collection was carried out broadly, the risk of secondary identification through the few background information items included in the study is next to none. Collected data was handled and stored in accordance with Lund University guidelines.

## **Results**

### **Descriptive Data**

Means and standard deviations for all study variables as well as cut-off scores for depression and anxiety are presented in *Table 2*. The mean depression and anxiety among

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participants attests to mild degrees of depression, ( $M=8.4$ ,  $SD=6.31$ ) (Kroenke et al., 2001) and anxiety, ( $M=6.48$ ,  $SD=5.52$ ) (Spitzer et al., 2006). Significant gender differences were found in depression (for women  $M=9$ ,  $SD=6.49$ , and for men  $M=6.59$ ,  $SD=5.5$ ;  $F(1, 121) = 6.55$ ,  $p < .01$ ) and anxiety, (for women  $M=7.18$ ,  $SD=5.53$ , for men  $M=4.44$ ,  $SD=5.07$ ;  $F(1, 112) = 10.84$ ,  $p < .001$ ). Notably, the mean depression score among women almost reached the cutoff point for being considered moderately depressed (cut-off for moderately depressed is a score of 10). Country of origin provided no notable results in differences of depression, but did for anxiety ( $F(1, 81.8) = 5.12$ ,  $p = .026$ ). Participants who were not born in Sweden ( $M = 8.04$ ,  $SD = 5.97$ ) reported significantly higher levels of anxiety compared to participants born in Sweden ( $M = 5.98$ ,  $SD = 6.29$ ).

Age showed significant differences for both depression  $F(4, 97.3) = 10.2$ ,  $p < .001$ , and anxiety  $F(4, 95) = 11.7$ ,  $p < .001$ . Young adults (ages 15-25) was the age group with the highest mean of depression ( $M=13$ ,  $SD=6.25$ ) and anxiety ( $M=10.8$ ,  $SD=4.98$ ), while the lowest scores was obtained by old adults (ages 61+), ( $M=4.82$ ,  $SD=5.26$  depression,  $M=3.70$ ,  $SD=5.36$  anxiety). There was also a difference between age groups in psychological flexibility,  $F(4, 94.2) = 7.113$ ,  $p < .001$ , which indicated that young adults are significantly less psychologically flexible (more inflexible) than older. Regarding psychological flexibility, there was in addition a significant gender difference,  $F(1, 104.5) = 3.98$ ,  $p = .049$ , men ( $M=13.83$ ,  $SD= 8.36$ ) scored lower than women ( $M=16.38$ ,  $SD=8.47$ ).

With respect to isolation there was a significant difference between participants born in Sweden ( $M=3.92$ ,  $SD=1.41$ ) and those not born in Sweden ( $M=4.50$ ,  $SD=.98$ ),  $F(1, 129) = 11.4$ ,  $p < .001$ , indicating that participants born in Sweden have experienced less disruptions to their interactions in physical spaces. Isolation also depended on education,  $F(3, 31.5) = 6.17$ ,  $p = .002$ . Participants that reported having a postgraduate ( $n=62$ ) scored highest on isolation ( $M=4.52$ ,  $SD=.92$ ), with the trend showing that less education indicated less perceived isolation. As regards disruption to relationships, there were no significant differences with respect to the demographic variables.

There was a group difference between ages and changes in habits,  $F(4, 95.3) = 6.378$ ,  $p < .001$ , that indicated that younger people (ex: young adults  $M=.28$ ,  $SD=1.09$ , middle aged adults

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$M=.63$ ,  $SD=.7$ ) had changed their habits more than older people (old adults  $M= -0.49$ ,  $SD=.92$ ). Moreover, there was almost a significant difference ( $p=.054$ ) based on gender. Women ( $M= .21$ ,  $SD= .95$ ) had increased their score in habits, changing them more, meanwhile the results for men indicated the opposite (engaging in those habits less) or no change in habits ( $M = -.08$ ,  $SD=.97$ ).

Table 2  
*Descriptive Statistics of the Major Variables*

Scale	<i>M</i>	<i>SD</i>	Cut-off value	n over cut-off (%)
The Patient Health Questionnaire (PHQ-9)	8.40	6.31	$\geq 10$ (moderately depressed)	88 (40%)
General Anxiety Disorder Questionnaire (GAD-7)	6.48	5.52	$\geq 10$ (anxious)	58 (26%)
The Acceptance and Action Questionnaire (AAQ-2)	15.7	8.50	$\geq 24$ (inflexible)	42 (19%)
Mini-IPIP Scales a Tiny-Yet-Effective Measure of the Big Five Factors of personality	3.65	1.11	-	-
Subscales ASQ-short (valuing relationship as secondary)	2.48	1.04	-	-
Subscales ASQ-short (confidence)	3.77	1.06	-	-
3-item Loneliness Scale	4.96	1.79	-	-
Degrees of experienced isolation	4.06	1.34	-	-
Degree of experienced disruption in relationships	3.01	1.27	-	-
Measure of change in habits	.128	.963	-	-
Degree of experienced emotional fulfillment through digital interactions	2.56	1.57	-	-

### Association among individual variables

Pearson correlations amongst the major study variables were examined (Table 3). A few of our most noteworthy results were in relation to psychological flexibility. Inflexibility correlated significantly with both depression ( $r = .72$ ,  $p < .001$ ) and anxiety ( $r = .72$ ,  $p < .001$ ), as well as with both loneliness ( $r = .48$ ,  $p < .001$ ) and confidence in relationships ( $r = -.35$ ,  $p <$

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.001). Thus, in our sample, it appears that inflexible individuals had worse mental health and more feelings of loneliness. In addition, psychologically flexible individuals were more confident in their relationships.

Disruption of relationships correlated with both anxiety ( $r = .26, p < .001$ ), depression ( $r = .25, p < .001$ ) as well as loneliness ( $r = .25, p < .001$ ), isolation ( $r = .52, p < .001$ ) and degree of difference emotional fulfillment between face-to-face and digital interactions ( $r = -.16, p < .05$ ). That is; in our sample, individuals who experienced disruptions in their relationships had worse mental health, experienced less emotional fulfillment by digital interaction as well as more loneliness and experienced isolation.

Furthermore, confidence in relationships correlated negatively with anxiety ( $r = -.23, p < .001$ ), depression ( $r = -.27, p < .001$ ) and with valuing relationships as secondary ( $r = -.25, p < .001$ ) as well as positively with extraversion ( $r = .49, p < .001$ ). Thus, individuals who were more confident in their relationships had better mental health, valued their relationships more, and were more extraverted. Another interesting finding was that changes in habits correlated with isolation ( $r = .21, p < .01$ ). Meaning that more change in habits seemed to occur in unison with more isolation.

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Table 3  
*Inter-Correlations Among Variables*

### Correlation Matrix

Scale	1	2	3	4	5	6	7	8	9	10	11
<b>Anxiety (1)</b>	---										
<b>Depression (2)</b>	.80 ***	---									
<b>PF (3)</b>	.72 ***	.72 ***	---								
<b>Extraversion (4)</b>	-.03	-.05	-.16 *	---							
<b>ASQ RELS. (5)</b>	.001	.08	.04	-.11	---						
<b>ASQ CONF. (6)</b>	-.23 ***	-.27 ***	-.35 ***	.49 ***	-.25 ***	---					
<b>Loneliness (7)</b>	.5 ***	.5 ***	.48 ***	-.16 *	.11	-.43 ***	---				
<b>DisruptionR (8)</b>	.26 ***	.25 ***	.16 *	.02	-.01	.08	.25 ***	---			
<b>Emotional F (9)</b>	-.1	-.13 *	-.09	.09	.04	.19 **	-.1	-.16 *	---		
<b>Habits (10)</b>	.02	.04	.02	.06	.01	.11	.02	.06	.08	---	
<b>Isolation (11)</b>	.18 **	.11	.14 *	-.008	-.12	.07	.15 *	.52 ***	-.07	.21 **	---

Notes.; \* p < .05, \*\* p < .01, \*\*\* p < .001. PF = Psychological flexibility. ASQ RELS= Attachment, relationships as secondary. ASQ CONF= Attachment, confidence in relationships. DisruptionR= Degree of experienced disruption in relationships. EmotionalF= Emotional fulfillment

**Hypothesis 1:** Psychological flexibility (PF) is negatively associated with depression and anxiety (Table 3). The hypothesized mediation models included direct paths from loneliness to depression or anxiety as well as indirect paths via PF. The mediation analysis showed that all direct and indirect paths (Model 1 & 2) were significant, indicating that parts of the effects of loneliness on depression and anxiety were partly explained by psychological flexibility.

Model 1

*Mediation Estimates: Depression*

Effect	Label	Estimate	SE	Z	p	% Mediation
Indirect	a × b	1.080	.157	6.86	< .001	60.7
Direct	c	.701	.182	3.86	< .001	39.3
Total	c + a × b	1.781	.205	8.69	< .001	100.0

Note.; A = Loneliness x PF, B= PF x Depression C= Loneliness x Depression

Model 2

*Mediation Estimates: Anxiety*

Effect	Label	Estimate	SE	Z	p	% Mediation
Indirect	a × b	.948	.138	6.88	< .001	60.5
Direct	c	.620	.158	3.92	< .001	39.5
Total	c + a × b	1.567	.179	8.76	< .001	100.0

Note.; A = Loneliness x PF, B= PF x Anxiety C= Loneliness x Anxiety

**Hypothesis 2:** Extraversion was not associated with experienced disruption in relationships, nor was this link mediated by experienced degree of emotional fulfillment through digital interactions. Moreover, extraverted people did not score significantly lower on levels of experienced isolation, but they did in loneliness (Table 3). Because extraverted people scored lower on levels of loneliness, it seemed prudent to see if extraversion was a protective factor for the effect of loneliness on mental health by performing a mediation analysis, but it was not.

**Hypothesis 3:** Neither of the two attachment related variables, predicted the degree of experienced disruption to relationships. However, in a multiple linear regression model, “confidence” as a predictor explained 19% of the variance in perceived loneliness ( $R^2 = .187, p <$

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.001), whereas relationships as secondary was not a significant predictor. That is; depending on how much confidence people have in their relationships they experience different levels of loneliness, with more confidence suggesting less loneliness (*Model 3*). We also performed a test of collinearity and looked at the Q-Q plot, neither of which indicated irregularities in our results. Because confidence in relationships was associated with less loneliness, it seemed prudent to see if it were a protective factor for the impact of loneliness on mental health, but it was not.

Model 3

*Model Coefficients: Loneliness*

Predictor	Estimate	SE	t	p
Intercept	7.6616	.549	13.943	< .001
ASQ CONF	-.7253	.107	-6.800	< .001
ASQ RELS	.0130	.109	.120	.905

Note.; multiple regression model measuring “valuing relationships as secondary” and “confidence in relationships” in relation to loneliness.

## Discussion

The present study investigated factors and predictors for mental health, aiming to increase the knowledge on the effects of interactions between personality-based and contextual factors on people living during the covid19 pandemic. Our findings indicate that the effect of loneliness was less potent among individuals with higher levels of PF, which is in accordance with our first hypothesis. Also, we found that confidence in relationships mitigated the effect of loneliness on participants, which is in line with our third hypothesis. Interestingly, while extraversion was not related to isolation as hypothesized, it was related to less loneliness.

### The role of demographic characteristics

Age was significantly related to measures of mental health, with young adults reporting the worst mental health among all groupings, and old adults showing the least amount of symptoms for anxiety and depression. This is in line with a study made by

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Folkhälsomyndigheten (2021), showing that symptoms of depression, anxiety, sleep disorders, and stress increased among Swedish elementary school, high school, and university students during the pandemic. Furthermore, of interest is also that old adults had the highest degree of experienced psychological flexibility, while young adults were the least flexible group. That may be due to older adults having more life experience and thus being more used to adapting themselves to times of crisis.

There is also a relation in regards to levels of education and isolation. Participants who had completed studies at a postgraduate level showed the highest scores in isolation, while those who had only completed elementary school showed the lowest. The measure of isolation in the present study was in regards to meeting people in physical places, such as cafés. This could indicate that more educated individuals are more likely to follow the recommendations as put forward by the government, and thus are more likely to experience a higher degree of perceived isolation.

As for gender, we found several interesting effects that deserve discussion. Women in our sample scored higher on depression and anxiety than men. One can thus ask the question; Are women, mental-health-wise, more negatively affected by the pandemic than men are? According to European Parliament news (2021), the covid19 pandemic has increased gender disparities in the EU. The care workers in the EU are mainly women (76%), therefore women have been more exposed to the virus. Women are overrepresented in essential services, which mostly remained open during the pandemic. In the EU, women account for 95% of workers in domestic cleaning and home help fields, 93% of childcare workers and teachers, 86% of personal care workers in health services, and 82% of all cashiers. The same source notes that women are a large part of the services workforce (84%), including the sectors hit hardest by the pandemic and thus are facing the most job losses; for instance the tourism and retail sectors. Also, there has been an increase in domestic violence against women in concordance with restrictions that have made it harder for victims to get help. According to SCB (2021), assistant nursing in-home care, home health care, or in nursing homes is Sweden's most common profession. This occupational group consists of 132,300 employees. It is also a very female-dominated field, with 91% women. In Sweden, the restrictions have also meant that children with the usual cold symptoms have been at

home and that many parents have thus had very unpredictable circumstances when there is and when there is no childcare. Therefore, there are many reasons why women may be more negatively affected by covid19 than men. However, women generally score higher than men in depression (Psouni et al., 2017), which is important to consider when interpreting these results.

### **The influence of psychological flexibility on mental health and perceived loneliness**

Individuals who described themselves as more psychologically flexible in times of covid19 experienced fewer symptoms of depression and anxiety. Moreover, the effect of psychological flexibility on mental health was large and significant, thus, it is unlikely that this result was attained by chance. It appears that PF is a very important factor in determining the degree to which one is susceptible to mental health effects of living during covid19 as well as potentially other similar situations. This is in agreement with previous research by McCracken and colleagues (2021). Furthermore, our results predicted that parts of the effects of loneliness on depression and anxiety were partly explained by psychological flexibility. More specifically, they indicated that the effect of perceived loneliness during the covid19 pandemic was less potent among individuals who are high in PF. These findings also coincide with prior research on psychological flexibility and mental health (Gloster et al., 2020), and agrees with the notion mentioned in the paper that interventions that promote psychological flexibility may mitigate the impact of the pandemic on mental health.

### **Extraversion in association to disruption in relationships and digital interactions**

In contrast to our hypothesis and previous research (Aschwanden et al., 2020), extraversion was not associated with experienced disruption in relationships, nor was this link mediated by experienced degree of emotional fulfillment through digital interactions. Moreover, extraversion was not significantly associated with experience of isolation. The reasons for these unexpected results may have been first, that while more extraverted people report greater concerns that the disruptions in everyday life caused by the corona crisis will negatively impact their relationships (Aschwanden et al., 2020), the “worry” may not necessarily translate into their relationship with people being disturbed. Rather, based on the same study, it may be balanced by people high in extraversion also having a greater sense of global self-efficacy and more positive evaluations of their lives, health, and changes in society.

Secondly, we expected the link between extraversion and experienced disruption of relationships to be mediated by the experienced degree of emotional fulfillment through digital interactions because extraverted people who experience fulfilling digital interactions seemed more likely to get their social needs fulfilled, however, it may be that because there have been few restrictions in Sweden and in combination with the freedom of choice (Regeringskansliet, 2021), extraverted individuals may be less likely to comply with policy interventions (Götz et al., 2021), therefore they were not necessarily limiting themselves to digital communication. According to the same logic, it makes sense why extraversion was not significantly associated with the experience of isolation. But, loneliness was negatively associated with extraversion, which makes sense in light of extraverted people being more likely to have an extensive social network. Also, because extroverted people have more positive evaluations of their lives and health, it may translate to less worry about getting the virus (this may be interesting for future research) and therefore resulting in less compliance with policy interventions. We performed a mediation analysis to see whether extraversion was a protective factor against mental health during the pandemic, but such was not the case. This is interesting, considering that our results also showed that extraverted people experienced less loneliness during the pandemic and that loneliness itself was associated with worse mental health.

### **Attachment in relation to disruption in relationships and loneliness**

Depending on how much confidence people have in their relationships they experience different levels of loneliness; less loneliness when they are more confident in their relationships. However, the same was not true for the other attachment dimension of valuing relationships as secondary. The explanation for this may be that while individuals may not value their relationships that much and thus experience less loneliness as a result of being able to continue relationships, this does not necessarily mean that they are less lonely overall. A similar case can be made for why neither of the attachment-related ways of experiencing and valuing close relationships predicted the variation in people's degree of experienced disruption in relationships. While individuals that value their relationships less might care less about disruptions to relationships, it may not be a sufficient reason to predict that they experience less disruption to their relationships. Rather, because they place relationships as secondary, they do not expect that

others will be there for them in times of need, which thus may lead to more superficial relationships and less closeness. Also, while we expected confidence in relationships to predict part of the variation in people's experienced degree of relationship disruption, it may yet be that we missed taking into account that people who are confident in their relationships may value their relationships more and thus be more dependent on retaining them. Thus our findings are partly in contrast to previous studies that suggest that features of secure attachment (such as confidence in relationships) appeared to be protective for the risk of higher psychological burden during the COVID-19 outbreak (Moccia et al., 2020).

We performed a mediation analysis to see whether confidence in relationships was a protective factor against mental health during the pandemic, but such was not the case. This is interesting considering that our results indicated that people who were more confident in their relationships experienced less loneliness during the pandemic and that loneliness itself was associated with worse mental health.

### **Correlations between mental health, context, and personality-based factors**

Besides our main hypotheses, we also found several other correlations between mental health, personality-based and contextual factors. Isolation was linked to both loneliness and inflexibility, which is quite intuitive. Someone who experiences more isolation is likely more inclined to be lonely as well as less capable of adapting to being isolated. Moreover, our results indicate that experiences of less emotional fulfillment with digital interaction, correlated with depression and less confidence in relationships. Again, this is reasonable. During the covid19 pandemic, a large part of the correlations between individuals take place via digital means, and people who experience less fulfillment through these means of communication may thus experience more symptoms of depression than others who may be more comfortable with digital communication. The negative link to confidence in relationships may be related to how attachment insecurity is associated with placing relationships as secondary, as one does not expect that other people will be decisive support in times of need, leading to more superficial relationships.

Lastly, we also found that the perceived degree of experienced disruption in relationships correlates with depression, anxiety, loneliness, and inflexibility. The observed impact on mental health and loneliness coincides with prior research by Bland and colleagues (2021). However, that which perhaps is less intuitive is how inflexibility relates to disruption in relationships. A potential explanation for this is that being less capable of adaptation may also mean being less likely to adapt to new ways of interacting with people and the world in general. Moreover, considering that the present sample was taken from the Swedish population where restrictions were relatively few, it may be expected that countries wherein more restrictions were imposed and thus changes in their situation are likely to be larger, that thus inflexibility would show a larger effect as regards correlation with disruption in relationships.

### **Limitations and suggestions for Future Research**

Notwithstanding its strengths, there are limitations to the present study. First, the selected method, an online survey, made it easier to gather a sufficient number of participants and it was also a reasonable choice considering economical limitations and recommendations against going out in public during the covid19 pandemic. Although this way of collecting data is practical, it is not without disadvantages. It can be challenging to get a representative sample. For example; the participants in this study were mainly female 73%. A predominance of women in the sample may potentially be due to women spending more time on social media or/and being more willing to participate in research. Regardless of why more women responded, it may be reasonable to try and incorporate tactics to even the scale as a way to get a more representative sample. One could go about this by for instance gathering participants from groups on social media where the majority of the members are men. Furthermore, another limitation to have in mind when considering the results of our study is that our sample was skewed in terms of education; our average participant was more educated than the average Swede.

Also, we had people who did not complete the survey ( $n=91$ ) and that were thus not included in any data analysis. Failure to complete the survey may be due to language difficulties or time constraints. In future studies, it may be wise to include, at the end of the survey, a question on experienced language difficulties. Language difficulties can be threatening to the concept validity, which also can affect the internal validity of the survey. Another possible solution would

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be to create two different versions of the survey (one in English and one in Swedish) and give participants the ability to choose which version they are most comfortable answering. A possible reason for failure to complete the survey could also have been that people with certain features are more restless and less likely to commit; there might be a self-selection bias. For instance, less educated people may be less prone to complete a questionnaire in a foreign language; this may explain part of the skewness in our sample towards higher educated people.

The present study was conducted in Sweden. Therefore, it is less generalizable to countries with different contextual conditions. Even cultural differences could be reflected in the result in unexpected ways with samples from different countries. It would be interesting to investigate these variables in more countries to get a larger picture over the generalizability of these results. As well as investigating differences between countries depending on how strict their restrictions are.

For future studies, it may be interesting to further investigate how personality-based and contextual factors interact to explain the mental health effect of people living during times of crisis; investigating contexts other than the covid19 pandemic. Moreover, it would be insightful to conduct similar research to ours but with consideration to other demographics. For instance, to perform research in other countries or focusing more specifically on a certain segment of the population. Our research indicated that young people and women were more likely to be impacted negatively in terms of their mental health during the covid19 pandemic, thus it may be interesting to center in on these groupings to get a better understanding of why these individuals are vulnerable and by extension to have the necessary knowledge to do something about it. It would also be prudent to consider employment status and sector, as this may cause vulnerability in the context of a crisis such as covid19. For instance, to investigate how working in the highly pressured healthcare industry impacts mental health; and if the overrepresentation within this sector by women may be related to them, in general, having significantly worse mental health than men during the pandemic. Lastly, for future research it would be fitting to add a demographic variable that differentiates between people living alone and those who live with others; and this because it may be reasonable to consider in relation to loneliness and mental health.

### Conclusion

The present study has discussed mental health during the covid19 pandemic in Sweden, as an interaction between personality and contextual factors. Our key findings were that; psychological flexibility served as a protective factor against loneliness and mental health in our sample, which agrees with previous research on the subject. We also found that neither extraversion nor confidence in relationships was a protective factor against mental health during the pandemic. Moreover, certain demographic groupings experienced worse mental health than the rest of the population. These vulnerable groups were women and young people. The present study was limited by a predominance of female participants and a sample skewed towards higher education; all of which is important to consider when assessing the generalizability of our findings.

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