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Embitterment as a Specific Mental Health Reaction during the Coronavirus Pandemic

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Aggression · Anger · Anxiety · Corona-related anxiety · COVID · Embitterment · Emotions · Epidemiology · Psychopathology · Vulnerability

Abstract
Introduction: Embitterment can occur as a reaction to perceived injustice. During the pandemic and restrictions in daily living due to infection risk management, a range of many smaller or severe injustices have occurred. ***Objective:*** The aim of this study is to investigate what characterizes persons with high embitterment, mental illness, embitterment and mental illness, and those without embitterment or mental health problems. ***Methods:*** We conducted an online survey including persons from the general population in November 2020 and December 2020, the phase during which a second lockdown took place, with closed shops, restaurants, cultural and activity sites. 3,208 participants (mean age 47 years) gave self-ratings on their present well-being, burdens experienced during the pandemic, embitterment, wisdom, and resilience. ***Results:*** Embitterment occurred among 16% of the sample, which is a high rate in comparison with 4% during pre-pandemic times. Embitterment was weakly correlated with unspecific mental well-being. There were more persons with embitterment than those with embitterment and a mental health problem. Persons with embitterment reported less coronavirus-related anxiety than persons without embitterment. However, embittered persons reported more social and economic burdens and more frequent experiences of losses (job loss and canceling of medical treatments). Embittered persons perceive their own wisdom competencies on a similar level as persons with mental health problems or persons without mental health problems. ***Conclusion:*** Embitterment is a specific potentially alone-standing affective state, which is distinguishable from general mental health and coping capacities (here: wisdom). The economic and social consequences of pandemic management should be carefully recognized and prevented by policy.

Introduction

The fast spread of a new infectious disease due to a novel version of the coronavirus began in early 2020 and was named as a pandemic by the World Health Organization in March 2020. Subsequently, all countries in the world have continuously tried to fight against the spread of infections. Limitations in public and professional life have been set up by policy to reduce contact between peo-

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ple and reduce infection rates. These limitations – such as contact limitations, quarantine, the closing of shops, schools, sports center, other public institutions, and borders between regions and countries – partly result in the expected positive developments, that is, flattening the infection curve.

However, the restrictions also impair the daily duties and economic and social lives of young and old working people, and families in different ways: students and employees were forced to work from home; parents had to cope with homeschooling for their children, and undertaking their own job in home office in parallel. Older persons were identified as risk groups of severe illness in case of infection. Some people lost their jobs, while self-employed people faced the risk of insolvency. This new reality has been a major burden to many people for about a year now, challenging people's coping capacities and mental health [1]. This is especially true for people with mental disorders [2].

Injustice and Embitterment Potential during the Corona Pandemic

Besides the post-COVID neurasthenic syndrome [3] and developments of anxiety [1, 2] – which were widely identified secondary health problems during the pandemic – another affect needs to be considered, that is, embitterment [4]. Embitterment can occur as a reaction to perceived injustice [5]. When whole nations are faced with crisis and severe societal problems, many people see themselves confronted with injustices, and societal embitterment may occur and even be passed on [6].

During the pandemic and the limitations, there have been various instances of potential unfairness, either smaller or more severe, which affected many people, for example,

- Stores and hotels had to close down for months – even when having invested in hygiene concepts which correspond to the policy-given rules – and end up with hard economic problems or insolvency.
- A 70-year-old traveler canceled her journey in time, but the money was never passed back to her, with the mention that she could have taken the journey and stayed in a quarantined hotel during her vacation.
- A grandfather died alone in hospital due to forbidden visits.
- A vaccine has been developed in one's own country, but national policy missed to order a sufficient quantity of it for its own people, but rather exported vaccine to other countries.
- Students could not finish their exam classes and have to wait for another year to take exams and start their professional life.
- Hospital nurses in coronavirus units do not receive any extra payment for their large overwork time, while state employees who are sitting in warm secure offices receive extra coronavirus money.
- Infection rates inflate despite someone obeying all rules (wearing masks and avoiding meeting people), while others do not obey the rules.

Embitterment

As a reaction to injustice, embitterment is a specific negative affect with anger, destructive rage and thoughts of revenge, and resulting social participation problems. Embitterment can occur as a post-traumatic embitterment reaction after a negative or unjust life event [7], or in other forms, for example, as an embitterment-prone personality, complex embitterment after multiple negative or unjust life events, or embitterment as a secondary symptom in the context of other disorders [5]. Independent of the type in which it occurs, embitterment holds special importance due to its negative side effects in work and life participation: embitterment was found in one out of 5 applicants for a disability pension [8]. High embitterment is associated with low life satisfaction [9], as well as workplace problems and sick leave, higher perceived stress, and low well-being [9–11]. Embitterment can develop when a person's basic beliefs or life values are damaged, for example, by a life event that is perceived as deeply unjust [7, 12]. Embitterment as such is an affect that can be measured dimensionally [12].

In sum, embitterment may be associated with general psychopathology, such as anxiety or mood disturbances, but it is not the same. Embitterment can be distinguished from general well-being because it is a specific own quality of affect (embitterment, destructive rage, and thoughts of revenge) with specific severe consequences [7, 12].

Research Questions

During the management of the coronavirus pandemic, injustices have happened to people, based on which embitterment might occur as a reaction. Accordingly, relevant research questions are:

1. Do people perceive embitterment during the pandemic with a similar frequency like in normal times (before the coronavirus pandemic), or more often?
2. Does embitterment occur independent of other mental health problems, that is, are there persons with embitterment but not general mental health problems

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Table 1. Type of burdens perceived during the pandemic by people with or without mental health problem or increased embitterment (PTED score) in comparison.

Burdens perceived during the pandemic	Persons without mental health problem and without embitterment (n = 1,953) NN	Persons with mental health problem and without embitterment (n = 751) M	Persons without mental health problem and with embitterment (n = 306) E	Persons with mental health problem and with embitterment (n = 198) ME	Significance of difference between the groups by χ^2 p value	Spearman's correlation of PTED-value with burdens r
I have no relevant burdens, %	24.8	21.6	4.9	2.5	0.000	−0.262**
I have had a corona virus infection, %	1.7	3.1	2.6	1.0	0.103	0.018
A closely related person had a corona virus infection, %	5.5	6.3	5.2	4.5	0.770	−0.018
A closely related person died in consequence of a corona virus infection, %	0.9	0.3	0.3	0.5	0.294	−0.012
I have lost my workplace, %	3.2	4.9	6.2	12.1	0.000	0.113**
A closely related person has lost her/his workplace, %	10.0	8.7	19.3	16.2	0.000	0.122**
Due to the pandemic protection means I had financial losses which impacted my daily life, %	20.4	18.0	41.2	29.8	0.000	0.182**
I have experienced violence while living near together in my household, %	0.7	0.4	2.0	3.5	0.000	0.069**
I feel overload due to living near together in my household, %	14.9	19.2	27.1	29.3	0.000	0.158**
I perceived a loss of social contacts, %	78.8	77.0	89.9	91.4	0.000	0.197**
I am suffering from the loss of social contacts, %	50.8	55.1	81.0	85.9	0.000	0.280**
I have problems with self-care and self- management due to the pandemic security means (visiting authorities and going shopping), %	3.9	4.8	14.4	20.2	0.000	0.164**
I experienced canceling of (medical) therapies due to the pandemic security means, %	23.9	29.3	42.8	55.6	0.000	0.201**
I do not have the necessary technique to use online communication channels, such as WhatsApp, Skype, or others, %	2.0	2.8	3.6	5.6	0.015	0.065**

Means (standard deviation) or percentages are reported. Comparison of persons with embitterment (E), mental health problem (M), embitterment and mental health problems (ME), and without any mental health problems (NN). The list of burdens includes separate and very different aspects (see online suppl. Material Table B). Therefore, individual statistical tests have been calculated. * $p < 0.05$; ** $p < 0.01$.

(E), and persons who have a mental health problem (M) but no increased embitterment?
3. What characterizes and potentially distinguishes persons with high embitterment (E), persons with general mental health problem (M), persons with embitterment, and mental health problem (EM) and persons without embitterment or mental health problem (NN)?

Basic prevalence data from this study (frequency of embitterment) have been reported shortly in a previous study [13]. Results reported in this present study go widely beyond and add original data.

Method

Procedure

We conducted an online survey including persons from the general population in Germany, Switzerland, and Austria. We included all age-groups, professions, and genders. Participants were elicited by advertising on 70 very different websites and mailing lists (e.g., news-nachrichten.de, facebook.com, buergersagt.de, and nachrichten.com) and through 20 personal contacts and snowballing. We announced a "study on coping and resources in corona times" without mentioning the word "embitterment." The aim was to reach a broad heterogenous range of participants who are similar to a national representative sample in some core characteristics (e.g., gender and age distribution and rate of mental health problems).

The survey was conducted in November 2020 and December 2020, during the phase in which a second lockdown with closed shops, restaurants, cultural, and activity sites was held in the investigated German-speaking region. Among 3,353 persons who began to fill in the questionnaire, 3,208 could be analyzed with sufficient data.

Instruments

Sociodemographics and Burdens during the Pandemic

Participants were first asked to report their gender, age, highest professional qualification, and whether and which burdens they had experienced during the pandemic. Thirteen categories of potential burdens were asked (Table 1). The items on corona-related anxiety have been used in a previous study [14] after being checked for content validity. Items on burdens have been checked for content validity by persons from different professions as well.

Mental Health Problems

Participants were asked: "Do you think that you are suffering from mental health problems that are not somatic but psychological in nature (anxiety, depressive mood, sleeping problems, and severe social conflicts)? Have these problems been lasting for several weeks and made you feel suffering and impaired in daily duties? Have you been already in treatment due to these problems?" The first 2 questions were similarly used in another study [15] and have been used to identify persons with clinically relevant mental health problems. All of these who agreed [15] fulfilled criteria of any diagnosis in an additional structured interview (MINI International Neuropsychiatric Interview [16]).

Mental Well-Being WHO-5

The WHO-5 well-being rating [17, 18] – which is broadly established internationally – was used to assess general mental well-being, namely whether the person felt well, relaxed, active, and full of interest in life. The rating uses a 6-step scale ranging from 5 = "I feel like this all the time" to 0 = "I never feel like this." The mean score of the 5 items was used in the analysis, whereby it can be understood as a score of general mental well-being. In our study, "well-being" indicates the acute general well-being and mental health perception.

Embitterment: PTED Scale

Embitterment was assessed using the 19-item PTED embitterment self-rating scale [12]. It starts with the statement "During the past months of this year there was a severe and negative life event" which is followed by answers such as "that hurt my feelings and caused considerable embitterment," "that triggers feelings of satisfaction when I think that the responsible party has to live through a similar situation," or "that caused me to withdraw from friends and social activities." Ratings are made on a 5-point Likert scale, from 0 = "not true at all" to 4 = "extremely true." The mean score of the PTED scale is used as a measure for the degree of embitterment. The PTED scale measures dimensional embitterment, that is, it can be used independently of 1 specific event, but as a screening of the general embitterment load that the person perceived due to critical life events in recent months. A score of ≥2.5 has been empirically proven to indicate high, that is, clinically relevant, embitterment [12]. The PTED scale can be used for embitterment as a dimensional phenomenon, but not as a tool for categorical diagnostic of an embitterment disorder. Until now, the PTED scale has been used internationally for measuring the level of embitterment, for example, in general population samples or general clinical samples [5, 9]. Cronbach's alpha of the PTED scale was 0.96 in this present study. We used ≥2.5 as a cutoff to indicate clinically relevant embitterment [12].

Wisdom

Wisdom is the ability to solve unsolvable life problems. The 12-WD-S [19] is a clinimetrically conceptualized self-report questionnaire measuring 12 general wisdom-related attitudes, self-perception, and self-attributions with 12 items. Each of the 12 statements stands for one of the different wisdom dimensions: factual and procedural knowledge; contextualism; value relativism; change of perspective; empathy; relativization of problems and aspirations; self-relativization; self-distance; perception and acceptance of emotions; emotional serenity and humor; long-term perspective, uncertainty tolerance. The introductory statement is "In the following you will find statements which describe how people react to problems and burdens in life. You may agree or disagree or be undecided. Please answer all items." Statements then followed, including the following examples: "It is better to be content with what you have, instead to shed tears about what you do not have" (relativization of problems and aspirations), "I try not to take myself too important" (self-relativization), "What is good or bad depends essentially on the framework conditions" (contextualism), "In my opinion, everyone should be happy in his own way" (value relativism), "Before I respond to a problem, it is important for me to first understand what the problem is" (factual and procedural knowledge), or "I am a person who thinks what happens will happen" (uncertainty tolerance). The task of the participants is to in-

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Table 2. Study participants with or without mental health problem or increased embitterment (PTED score ≥2.5) in comparison

Characteristics	Persons without mental health problem and without embitterment (n = 1,953) 60.87% NN	Persons with mental health problem and without embitterment (n = 751) 23.4% M	Persons without mental health problem and with embitterment (n = 306) 9.5% E	Persons with mental health problem and with embitterment (n = 198) 6.17% ME	Significance of difference between the groups by ANOVA p value (with bonferroni correction) or χ^2	Spearman correlation of PTED-value with other characteristics r * $p < 0.05$ ** $p < 0.01$
Sex female, %	55.5	67.2	56.1	57.6	0.000	−0.041*
Professional degree, %						
Without professional qualification	6.0	5.7	5.3	5.6		
Apprenticeship	30.9	39.3	31.6	43.7		
Master of crafts	6.3	5.6	4.3	8.6	0.000	−0.074**
College or university degree	50.5	44.9	51.6	39.6		
Promotion	6.3	4.5	7.2	2.5		
Age	47.35 (14.2)	47.38 (12.7)	48.00 (12.7)	48.46 (11.3)	0.637	0.014
Household members, n	2.17 (0.8)	2.01 (0.8)	2.19 (0.8)	2.00 (0.8)	Overall 0.000 NN vs. M 0.000, NN vs. ME 0.028 M vs. E 0.004, ME vs. E 0.055 ME vs. M 1.000, NN vs. E 1.000	0.003
My physical fitness is presently (in comparison to time before pandemic) (1: much worse – 5: much better)	2.55 (0.8)	2.48 (0.8)	1.85 (0.7)	1.85 (0.7)	Overall 0.000 NN vs. E 0.000, NN vs. ME 0.000 M vs. E 0.000, M vs. ME 0.000 ME vs. E 1.000, NN vs. M 0.225	−0.329**
I am afraid that closely related persons get sick of the coronavirus (1 not at all – 5 very much)	2.02 (1.1)	2.14 (1.1)	1.53 (0.9)	1.83 (1.2)	Overall 0.000 NN vs. E 0.000, M vs. E 0.000 M vs. ME 0.003, ME vs. E 0.016 NN vs. M 0.065, NN vs. ME 0.133	−0.209**
I am afraid that I get sick of the coronavirus (1 not at all – 5 very much)	1.67 (0.9)	1.77 (1.0)	1.28 (0.7)	1.54 (0.9)	Overall 0.000 NN vs. E 0.000, M vs. ME 0.010 M vs. E 0.000, ME vs. E 0.019 NN vs. M 0.079, NN vs. ME 0.319	−0.217**
Crisis management by my employer gave me a good orientation (1 not at all – 5 very much)	2.47 (1.3)	2.41 (1.3)	1.79 (1.1)	1.70 (1.0)	Overall 0.000 NN vs. E 0.000, NN vs. ME 0.000 M vs. E 0.000, M vs. ME 0.000 ME vs. E 1.000, NN vs. M 1.000	−0.252**
Crisis management by the policy is realistic (1 not at all – 5 very much)	1.99 (1.2)	2.10 (1.2)	1.24 (0.7)	1.32 (0.8)	Overall 0.000 NN vs. M 0.159, NN vs. E 0.000 NN vs. ME 0.000, M vs. E 0.000 ME vs. E 1.000, ME vs. M 0.000	−0.346**

Table 2 (continued)

Characteristics	Persons without mental health problem and without embitterment (n = 1,953) 60.87% NN	Persons with mental health problem and without embitterment (n = 751) 23.4% M	Persons without mental health problem and with embitterment (n = 306) 9.5% E	Persons with mental health problem and with embitterment (n = 198) 6.17% ME	Significance of difference between the groups by ANOVA p value (with bonferroni correction) or χ^2	Spearman correlation of PTED-value with other characteristics r * $p < 0.05$ ** $p < 0.01$
Number of perceived burdens due to coronavirus pandemic (x out of 13 categories marked as valid by the participant)	2.17 (1.4)	2.30 (1.4)	3.36 (1.5)	3.56 (1.6)	Overall 0.000 NN vs. M 0.272, NN vs. E 0.000 NN vs. ME 0.000, ME vs. E 0.769 M vs. E 0.000, ME vs. M 0.000	0.380**
Well-being (WHO-5 mean score, sum score) within past 2 weeks (0 never – 5 all the time)	1.57 (0.6) 7.86 (3.01)	1.50 (0.6), 7.51 (2.77)	1.15 (0.5), 5.80 (2.58)	1.09 (0.5), 5.47 (2.29)	Overall 0.000 NN vs. M 0.046, NN vs. E 0.000 NN vs. ME 0.000, ME vs. E 1.000 ME vs. M 0.000, M vs. E 0.000	−0.258**
Embitterment (PTED scale mean score) (0 not true at all – 4 extremely true)	0.96 (0.8)	1.14 (0.8)	2.97 (0.4)	3.02 (0.4)	Overall 0.000 NN vs. M 0.000, NN vs. E 0.000 NN vs. ME 0.000, M vs. E 0.000 M vs. ME 0.000, ME vs. E 1.000	
Wisdom (WD-12 scale mean score) (0 do not agree at all – 5 agree exactly)	3.69 (0.5)	3.67 (0.5)	3.65 (0.5)	3.61 (0.5)	Overall 0.098 NN vs. M 1.000, NN vs. E 0.707 NN vs. ME 0.213, M vs. E 1.000 ME vs. E 1.000, ME vs. M 0.848	−0.083**
Resilience (RS 13 mean score) (0 not at all – 6 very much)	4.56 (0.8)	4.21 (0.9)	4.34 (0.9)	3.84 (1.10)	Overall 0.000 NN vs. M 0.000, NN vs. E 0.000 NN vs. ME 0.000, M vs. E 0.171 ME vs. E 0.000, ME vs. M 0.000	−0.186**

Means (standard deviation) or percentages are reported (N = 3,208).

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dicate on a 6-point Likert scale (0 = do not agree at all to 5 = agree exactly) the extent to which they agree with each of the 12 statements. A global wisdom score can be calculated as an average score across all items.

Resilience

The RS-13 Resilience Scale [20] is a short form of the RS-25 and is a self-report measure of individual coping ability or psychological resilience. Resilience is understood as the flexible ability to functionally regulate positive affect in a situation- and context-specific manner, personal competence, and acceptance of life and self with 13 items using a 7-point Likert scale from 0 = "I disagree" to 6 = "yes I agree." Reliability: in this study, Cronbach's alpha of the RS-13 was 0.86. For statistical analysis, the mean of the 13 items was used; this can be understood as a value for the level of average resilience.

Participants

Participants were on average 47.5 years old (SD = 13.6, range 14–92), and 55% were female. Half of the participants were academics with a college or university diploma (54.3%), 39.9% had finished an apprenticeship, and 5.8% were without professional qualification. Most (69.3%) were married or in a relationship. One-quarter (25.7%) live alone, 37.3% live with a partner, and 36.9% live in a household with 3->5 persons. 29.9% reported that they have mental health problems with impairments and already been in treatment due to this. This is similar to the general epidemiology of mental health problems, which is constantly about 30% [21]. For detailed comparison data see online suppl. Material A; for all online suppl. material, see www.karger.com/doi/10.1159/000517447.

Most participants (80.6%) were situated in Germany, 16.3% in Switzerland, 2.4% in Austria, and 0.7% in other countries. All 3 German-speaking countries perceived similar restrictions at the time of investigation, with slight differences. For example, in Germany stores, hotels, cultural and sport sites were closed, whereas in Switzerland some of these were left open, but persons could go there only under restrictions, for example, reduced number of persons, reduced services, and strictly obeying hygienic rules, especially wearing a face mask.

2% of all investigated have had a coronavirus infection. 20.0% of the sample said that they did not perceive relevant burdens and that their daily life was going on like before the pandemic. These findings are similar to findings from another ongoing worldwide study [22].

Results

Frequency of Embitterment

Among the whole heterogenous sample of all ages and professions, 15.76% report a significantly high embitterment score. In a previous national representative survey, 4% of 2,531 persons from the general population had a high PTED score [23].

79.2% of the present sample reported having experienced burdens during the pandemic. In a previous national representative sample, 31.4% reported critical life events and burdens [24].

Embitterment and Mental Health Problems

29.9% of the present investigation reported having a mental health problem, which is similar to epidemiological findings [21]. Embitterment and mental illness occur in different groups (Table 2), and they are thus independent phenomena. The correlation between high embitterment and the presence of a mental health problem is small ($r = -0.109^{**}$). For correlations of all study variables, see online suppl. Material B, C.

There are no age differences between the 4 groups, and household members vary between 2 and 2.19 persons, which does not seem to reflect a practical significant difference (although statistically significant due to the sample size). Persons with embitterment (E and ME) are less afraid that a closely related person or one becomes sick of coronavirus than persons without any mental health problems (NN) or persons with a mental health problem (M) (Table 2).

Embittered persons (E and ME) feel less physically fit than E and M. Embittered persons (E and ME) perceive the crisis management of their employer and the policy worse than NN and M. Embittered persons report a higher number of burdens and lower well-being than NN and M.

Both embittered persons (E) and persons with a mental health problem (M) feel less resilient in comparison with persons without any mental health problems (NN). However, in terms of wisdom, there are more similarities: all 4 groups agree to wisdom statements to similar degrees.

Regarding the burdens experienced during the pandemic, there are no differences concerning the directly coronavirus-related events (Table 1): in all groups, a similar percentage already had the infection (1–3.1%), reported that closely related persons had been infected (4.5–6.3%), or reported cases of death of closely related persons due to the virus (0.3–0.9%). Differences can be seen in economic and social burdens: than NN and M, embittered persons more commonly report workplace loss (6–12%), overload with household duties (27–29%), self-management (14–20%), loss of social contacts (90%), canceled medical treatments (43–56%), and financial losses (30–41%) (Table 1).

Discussion

Frequency of Embitterment

Embitterment occurred among 16% of this nonclinical sample, which is a quite high rate in comparison with 2.4% [24] or 4% [23] in pre-pandemic times. Even if persons with mental health problems were excluded for rea-

sons of potential confounding, there are still 9.5% remaining who have high embitterment scores, which is 3 times higher rate than normally. When looking into the literature, we find that embitterment has already been brought into discussion in the context of the coronavirus pandemic [4]. Our research is the first to join and add to this approach with empirical data.

One possible reason for this increased rate of embitterment is that critical events and injustices have happened more often than normally during the pandemic, or that people perceive the ongoing and fast-changing conditions during the whole year of the pandemic with increasing anger. Embitterment is one of the few mental health conditions that occur in an event-related manner. This means that embitterment can be triggered in healthy persons by events of injustice [5].

Mental Health Problems and Specialties of Embitterment

Mental health problems were reported by 29.9% of the whole sample. This indicates that the investigated sample here is representative of the general population epidemiology concerning mental health, which regularly counts about 30% fulfilling criteria of any mental disorder [21].

There are several specific phenomena that occur differently in embittered persons compared with the other groups. First, embitterment was not strongly correlated with unspecific mental well-being. This is similar to previous research that found moderate associations between embitterment and general psychopathology [9, 25], but also highlighted the specificness of embitterment.

Second, there were more persons with embitterment than persons with embitterment and mental health problems. This shows that embitterment may occur as an alone-standing and specific reactive mental health problem. Accordingly, it can be distinguished from general mental health problems as such. This is in line with previous findings which have investigated embitterment in normal times, in which no worldwide enduring life burden such as a pandemic was present [5, 6, 24–26].

A third indicator for the specialty of embitterment is that persons with embitterment reported less coronavirus-related anxiety (e.g., becoming infected) than persons without embitterment. However, embittered persons suffered more from social and economic burdens, lower well-being, and more frequent experiences of losses (job loss and canceling of medical treatments). Embittered persons are not anxious, but angry, reporting the potential social and economic reasons. As seen from psychopathological perspective, this shows again that embitterment and anxiety are different, affecting qualities which do not necessarily co-occur. In an earlier study, it has been similarly found that embitterment is a complex affect which comes along with feelings of injustice (in 100% of embitterment cases), rage (91.7%), anger, and revenge (85%), but only in 64% anxiety has been mentioned as an accompanying symptom [27].

Fourth, despite being reduced in well-being, embittered persons (E and ME) perceive their own wisdom competencies similarly like others (M and NN). Embitterment is an affective state, which is distinguishable from problem-solving or coping capacities. This fits with recent research that has found embitterment to be weakly correlated with wisdom ($r = -0.15$) [19].

Limitations and Strengths

The sample investigated here was a large heterogenous sample, covering all age-groups and gender. In core characteristics, such as the base rate of 30% having mental disorders (independent from corona-specific mental health problems), the sample is comparable with the general epidemiology [21]. In other characteristics, however, the study sample was not identical with the general population (e.g., half academics in this present sample); thus, the data cannot be generalized to the representative general population. We do not know whether there was a confounding effect in recruitment (e.g., advertisements attracting persons with good coping, or in contrast persons who want to express their anger concerning corona), it may also be that there is an over- or underestimation of embitterment.

However, there is an overweight of academics (possibly due to personal recruitment, or more academics are interested in information websites where the study was posted), which may have an impact on the findings. For example, technical equipment problems were only reported by a small number of participants, which might be due to the fact, that the sample was composed of academics who usually have relatively good socioeconomic and technical resources.

This study has been conducted in the German-speaking context. The question is whether similar or other rates of embitterment have developed during the pandemic in other regions of the world. Indeed, a continuation of international research on embitterment during the pandemic is necessary.

An open question is whether embitterment and other mental health load will decrease after the pandemic ends. Earlier experiences, for example, from the context of the global economic crisis, that found mental health load is

rather an acute sign of burden which decreases when the stressor is disappearing [28, 29]. Such acute reactions to global burdens must not be confused with mental disorders, which are regularly chronic and independent of life events. Within the time 2005–2011, the rate of mental disorders remained the same [21]. Longitudinal data, over the course of the pandemic, need to be completed in order to describe the mental health development.

Conclusion

Embitterment can be clearly distinguished from anxiety during the coronavirus pandemic. Moreover, embitterment is not bound to other clinically relevant mental health problems, but rather it appears as an own affect quality. Our findings add to the existing evidence because they show that the specificness of embitterment is not only observable normally, but also in times of a globally enduring large psychosocial and economic stressor (such as a pandemic and its related restrictions for daily life).

Policy and public health should be aware of embitterment phenomena, which may – if it becomes chronic in some people – lead to severe mental health problems and social medicine consequences (long-term sick leave and early retirement) [7, 25], which produces large costs for the health system.

Economic and social consequences [1, 2,4, 22, 30] of pandemic management should be carefully recognized and prevented, for example, by keeping economic and social restrictions and burdens as small as possible and of short duration, as well as finding ways of pandemic management that consider these possible mental health consequences of economic and social restrictions.

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Statement of Ethics

The study was reviewed and approved by the ethics and data protection committee of the Technische Universität Braunschweig (Number: MA_2020-17). All the participants gave written informed consent.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest.

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Author Contributions

B.M. designed the study, provided the research question, analyzed the data, and wrote the manuscript. A.S. and C.V. collected the data, conducted the literature search, and added to the manuscript.

Data Availability Statement

Data are available from the authors upon request.

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