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Kopfkino: Phases of quarantine among asymptomatic SARS-COV-2 carriers in Germany



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ABSTRACT

Although a majority of SARS-COV-2 diagnosis are asymptomatic, presymptomatic or minimally symptomatic, little has been described and understood about the illness careers of these individuals. This study explored the lived experience of a SARS-COV-2 diagnosis and subsequent quarantine among individuals in Germany who were diagnosed with SARS-COV-2 during the second wave of the pandemic (late 2020-early 2021), but whose diagnosis was unexpected due to a lack of a known contact, or the asymptomatic nature of their case at the time of diagnosis. In-depth interviews (n = 22) were conducted by phone or video call, audio-recorded, and transcribed verbatim. Routine debriefings guided data collection and facilitated analysis, which followed a framework approach. Regardless of age, gender or socioeconomic status, data consistently demonstrated a diagnosis and quarantine career marked by five emotional phases: overconfidence, shock and denial, coming to grips and asking questions, enduring, and cautious optimism as quarantine ended. These experiences suggest that providing trustworthy, easily accessible information regarding certain key aspects of the post diagnosis and quarantine period could benefit patients in terms of reducing stress, understanding the consequences of a diagnosis and mitigating foreseeable challenges in terms of personal, logistical and emotional issues. Follow-up research with providers and public health bureaus could inform how to best tailor such messaging for clients who experience an unexpected diagnosis.

1. Introduction

Qualitative literature in relation to the ongoing COVID-19 pandemic has focused largely on provider experiences (Ardebili et al., 2021; Aughterson, McKinlay, Fancourt, & Burton, 2021; Liu et al., 2020; Sun et al., 2020) coping strategies (Munawar & Choudhry, 2021; Roca et al., 2021), and perspectives of hospitalized patients (Cervantes et al., 2021; N. Sun, Wei, et al., 2021; Wu, Cheng, Zou, Duan, & Campbell, 2021) in relation to illness experience and quality of life, and workplace experiences. Noticeably less attention has been paid to individuals who have been diagnosed with SARS-COV-2, yet did not require hospitalization, and instead remained in quarantine at home (Lohiniva, Dub, Hagberg, & Nohynek, 2021).

As systematic reviews have shown, quarantine is universally challenging regarding mental health and psychological wellbeing

(Cavicchioli et al., 2021; Hossain, Sultana, & Purohit, 2020). Although the nature of challenges can vary across demographic groups – for example, women and older individuals are more likely to experience depression whereas men are at higher risk for alcohol use disorder – the overarching evidence highlights that regardless of age, gender or income status, and regardless of the nature of the illness that sparked quarantine (whether SARS (Laura Hawryluck, 2004; Mak, Chu, Pan, Yiu, & Chan, 2009), Ebola (James, Wardle, Steel, & Adams, 2019; Shultz et al., 2016) or Influenza A (Luyt et al., 2012)) people suffer in quarantine (Henssler et al., 2021).

Quarantine is nevertheless necessary in terms of preventing the spread of disease (including COVID-19) from infected patients or individuals with a high risk of being contagious to others (Kucharski et al., 2020).

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Quantitative research on the psychological effect of quarantine amid the ongoing pandemic is growing. One study in Pakistan emphasized the role of personalized stigma, disclosure concerns, concerns about public attitude and negative self-image among hospitalized individuals (Imran et al., 2020). Data from Portugal and China highlighted that individuals in quarantine report higher levels of anxiety and a lower quality of life (Ferreira, Pereira, da Fe Bras, & Ilchuk, 2021; Wang et al., 2021). Finally, in Scotland and Poland, quantitative surveys focused on laypeople found dietary changes during quarantine (Ingram, Maciejewski, & Hand, 2020; Sidor & Rzymiski, 2020) resulting in an unhealthier lifestyle with weight gain, increased alcohol consumption and worse sleep quality.

Echoing these quantitative findings, early qualitative literature on quarantine amid SARS-COV-2 focused primarily on the experience of health care professionals (Fawaz & Samaha, 2020) or hospitalized patients (N. Sun, Wei, et al., 2021; W. Sun, Wei, et al., 2021). Emerging studies among the general population in India (Maqbool, 2021), Denmark (Missel, Bernild, Christensen, Dagyan, & Berg, 2021), and Finland (Lohiniva et al., 2021) have further emphasized the universal experience of fear and stigma in quarantine, but also how an inability to enact everyday activities, an altered sense of self-perception and the existential threat COVID-19 poses, challenges individuals.

We are not aware of qualitative literature on the lay experience of quarantine amid SARS-COV-2 in Germany. Furthermore, while we note an expanding body of quantitative literature on asymptomatic COVID-19 (examining, for example, prevalence of asymptomatic disease spread (Yanes-Lane et al., 2020)), we find no qualitative literature teasing out the experiences of those who have been unexpectedly diagnosed, whether because they are asymptomatic, presymptomatic, have no known contact with a case, or did not recognize the onset of symptoms. Nevertheless, perspectives from this population are valuable because a majority of patients diagnosed with SARS-COV-2 are asymptomatic at the time of diagnosis (Oran & Topol, 2021; Yanes-Lane et al., 2020), and, for a variety of reasons, whether linked to vaccination status, a prior infection, or reduced perception of risk in general, future SARS-COV-2 cases may include an increasing amount of individuals who viewed themselves as exceptionally unlikely to contract the virus. Capturing perspectives from such individuals may support health system efforts to devise tailored messaging, bolster effective communication and pre-empt such individuals for experiences that are inherent to quarantine (which may ultimately facilitate their ability to prepare for and maintain their quarantine). Finally, literature in the field of psychology underscores that the manner in which people internalize and process information is often intertwined with whether they expected the information (“decision affect theory”) (Mellers, Schwartz, Ho, & Ritov, 1997), we therefore view insights from such individuals as valuable as it may inform health counselling, and structural or psycho-social supports.

This study fills gaps in the literature by qualitatively examining experiences among individuals who were unexpectedly diagnosed with SARS-COV-2 within a German setting.

2. Methods

2.1. Design and sampling

This qualitative study was nested within two larger studies related to rapid COVID-19 testing, i) the “Virusfinder” study (Deckert et al., 2021) which involved a home-based self-sampling mail-in COVID-19 test, and ii) the ACE-IT study, which compared antigen-detecting rapid diagnostic tests (Krueger, 2021). Of the respondents within these studies, respondents were eligible to participate if they were diagnosed with SARS-COV-2 (age >18) and if they self-reported a lack of COVID-19 symptoms at the time of testing (either due to the lack of a known contact, or the asymptomatic nature of their case). Respondents from the “Virusfinder” study were recruited via an invitation letter and via phone. Respondents from the “ACE-IT” were invited via phone. All respondents were purposively sampled, based on having a positive SARS-COV-2 test result.

2.2. Data collection & analysis

This qualitative study included 22 semi-structured in-depth interviews, conducted in German (n = 21) and French (n = 1), via phone (n = 19) or video call (n = 3) from late December 2020 through early March 2021, of which 4 interviews were later excluded because they did not meet the inclusion criteria (their SARS-COV-2 diagnosis was expected or symptomatic). With one exception, all interviews were conducted within four months of a SARS-COV-2 diagnosis (one interview was conducted 10 months post-diagnosis). An interview guide (see Appendix) was pretested on members of the study team, fellow faculty in the university network and acquaintances unaffiliated with academia. The guide, which included a grand tour question (“Please walk me through the experience from the moments before being tested through the end of quarantine”) with relevant probes, was refined and later applied in interviews that lasted 30–105 min.

All respondents were consented prior to interviews, which took place remotely and aligned with guidance on qualitative data collection during lockdowns (Renosa et al., 2021). Data collection ceased once saturation of themes was reached. Throughout pretesting and data collection, the research team held routine debriefings to adjust new lines of inquiry, refine interviewer skills and identify themes (McMahon & Winch, 2018). All interviews were audio-recorded, transcribed verbatim, and coded in alignment with framework analysis (Pope, Ziebland, & Mays, 2000) using NVivo12.

Using debriefing notes and information-rich transcripts, an initial codebook was developed and validated across the research team before being applied to the full set of transcripts. The team then reviewed existing literature, identified a relevant and applicable theory (“An Injury Career Framework” (Chase, McMahon, & Winch, 2015)), and re-reviewed all transcripts and codes, in light of the phased chronology of an illness of injury career. The “Injury Career Framework” outlined in Chase Cava, E Fay, J Beanlands, McCay, & Wignall, 20052015 was developed to explore post-blast experiences among combat veterans- highlighting reoccurring challenges that veterans faced in their personal and professional lives. The theory furthermore projected the experiences into a “canyon” model highlighting gradual improvements in veterans’ lives.

2.3. Study setting and timing

This study took place in Heidelberg and its surrounding environs (the Rhein-Neckar Kreis) in southern Germany. The Rhein-Neckar Metropolitan Region is among the most important business hubs in Germany (Hege, 2012), with a GDP p.p. of 58.209€ in Heidelberg (almost 30% higher than the national average (Statistische Ämter des Bundes und der Länder, 2020)). The Rhein-Neckar Kreis includes 548.533 inhabitants, with Heidelberg city including 159.134 inhabitants (Statistisches Bundesamt Baden-Württemberg, 2020, 2021). Heidelberg is a young region by German standards, with an average age of 40,1 years (Statistisches Landesamt Baden-Württemberg, 2018). The city is known within Europe for hosting major research facilities, a leading university, and a top-ranked university hospital, the latter of which is also a major employer in Heidelberg (Heidelberg, 2021; Times Higher Education, 2021).

This study was conducted amid the second wave of the COVID-19 pandemic, when daily nationwide incidences ranged from 149 new cases per 100.000 inhabitants per day at the start of data collection (December 2020) (RKI, 2020) to 66 new cases per 100.000 inhabitants per day when the study concluded (March 2021) (RKI, 2021). During this time several COVID-19 restrictive measures on federal, state or local level were undertaken ranging from a night-time curfew to mandatory face masks (Baden-Württemberg, 2020).

Ethics approval

This study received ethics approval from the ethics committee of Heidelberg University (S-790/2020).

Funding

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3. Results

Across respondent types, regardless of gender, age, occupation, living arrangement or socioeconomic status (see Table 1), respondents consistently described a similar pattern when answering the question, “Please guide me through your experience, from the moments before you were diagnosed with COVID-19 up to today” (we used the term COVID-19 in interviews as this phrasing is commonly employed in the German lay public, but we recognize that SARS-COV-2 is technically accurate). We define the phases of this experience in the Peaks and Valleys framework (see Fig. 1), and below we share how respondents conceptualize each phase. We note that individuals do not stay within phases for an equal amount of time, furthermore, some individuals (see the yellow line in Fig. 1) do not dip quite as low in a negative emotional register. However, the experience of passing through each phase is reflected in all data.

3.1. Phase 1: confidence

Each respondent in our study recalled the moments immediately prior to testing as marked by oblivious overconfidence. As one man, age 50, recalled telling himself, “The devil would need to be involved for me to be positive”. Respondents described how their lifestyle (whether adherence to COVID-19 prevention measures, or lack of exposure to high-risk situations, caution in terms of avoiding crowds and minimizing outside contact) underpinned certainty of a negative test result. In instances when respondents recalled having symptoms that could reflect COVID-

Table 1
Characteristics of the study participants.

Characteristics	n (%)
Age groups	
18-29	2 (11,11%)
30-45	2 (11,11%)
46-59	6 (33,33%)
60-80	7 (38,89%)
>80	1 (5,56%)
Gender	
Female	9 (50%)
Male	9 (50%)
Education	
Highest education level	4 (22,22%)
Medium education level	7 (38,11%)
Lowest education level	4 (22,22%)
Only primary education	2 (11,11%)
Unkown	1 (5,56%)
Living situation	
Living alone	3 (16,67%)
Couple living together	9 (50%)
Family living together	5 (27,78%)
Flatshare	1 (5,56%)
Occupation	
Clerical Support	5 (27,8%)
Craft and Related Trades	4 (22,2%)
Plant and Machine Operators and Assemblers	1 (5,56%)
Professionals	6 (33,33%)
Student	1 (5,56%)
Skilled Agricultural, Forestry, and Fishery	1 (5,56%)

19, the symptoms were simultaneously dismissed with phrases like “an invisible threat (*phantomcorona*)” (FEMALE, 34), or symptoms were viewed as lacking the intensity associated with a SARS-COV-2 infection (“I dismissed it, you know, as just smoking-related” (MALE, 34)). Similarly, contact to a positive case was often described as too distant to pose a significant threat. This innate confidence in a negative status resulted in respondents viewing testing as unnecessary for themselves personally, but “important” (FEMALE, 69) “absolutely necessary” (FEMALE, 82) and of “very, very, very high, a very, very, very high importance” (MALE, 50) for society in a general. As one respondent said, “... I couldn't imagine getting COVID-19, not at all ... if I'm honest. You know? I always thought, ‘Well, others might get it but not me.’” (FEMALE, 62).

3.2. Phase 2: shock & denial

In the moments and early hours after receiving a positive test result, respondents almost exclusively described feeling “disbelief,” “terrified,” a “total shock”, or “a hammer blow” (multiple respondents used each adjective).

Every respondent described realizing that, up until this moment, they had been downplaying their own risk of COVID-19 largely because they had been following prevention approaches or because they didn't perceive their risk as high. Now, on the heels of a positive diagnosis, they felt suddenly vulnerable, but also confused because the diagnosis contradicted their feelings of health and their sense of low SARS-COV-2 infection risk. Some respondents (see the yellow line in Fig. 1) described feeling less negatively affected by the diagnosis and described repeating to themselves phrases such as “let's wait and see” or “it's no use going crazy anyways”. (MALE, 59)

To reconcile confusion about positive test results, despite low (perceived) threat levels primarily due to absence (or near-absence) of symptoms, respondents described denying the results with phrases such as „I just couldn't believe it” (FEMALE, 52) and “How could I have it? I don't feel anything at all” (FEMALE, 34). Several began questioning the effectiveness of non-pharmaceutical measures such as social distancing and wearing masks, asking questions such as, “Does the mask actually do anything? ... Do they actually work at all, the masks? No, they don't work at all in my opinion” (MALE, 34)

Along with questioning prevention measures, respondents described downplaying the danger of the diagnosis, as one respondent said, “I was positively, totally shocked in principle, but also kind of, ‘Well, if this is all it is, I'll be fine.’” (FEMALE, 62). At the same time, several respondents described checking themselves for symptoms. One respondent described needing to “sit down ... and listen ... asking myself, ‘Is that a symptom? Do I have symptoms or something?’” (MALE, 77). Some respondents described realizing that they did, in fact, have a light throat tickle or a faint cough, but that they had been telling themselves that “Corona couldn't possibly have anything to do with it” (FEMALE, 69).

While in the midst of confusion, shock, and denial, respondents described calling household or close family members and informing their families of a need to prepare for quarantine. Shortly after this initial phase of phone calls, respondents also contacted workplace contacts; and described this as being “responsible” (MALE. 77) and necessary.

3.3. Phase 3: coming to grips and asking questions

After an initial phase of disbelief, respondents described processing the extent and fuller meaning of their diagnosis. One respondent described joking with his girlfriend about his diagnosis, making light of the word “positive” in relation to his diagnosis, yet realizing once the public health office (*Gesundheitsamt*) called that his situation was in fact “serious” (MALE, 34).

So yeah, I am positive okay, it ain't that bad, and then later [I started thinking] This can also end quite differently, right? This is not just the flu, right? But I have to say uh uh um under some circumstances

ASYMPTOMATIC SARS-COV-2 Peaks and valleys post SARS-COV-2 diagnosis

This graphic illustrates five universally experienced stages among individuals who reported no symptoms of COVID-19 prior to their diagnosis. Stages remained consistent regardless of age, gender, education level and socioeconomic status.

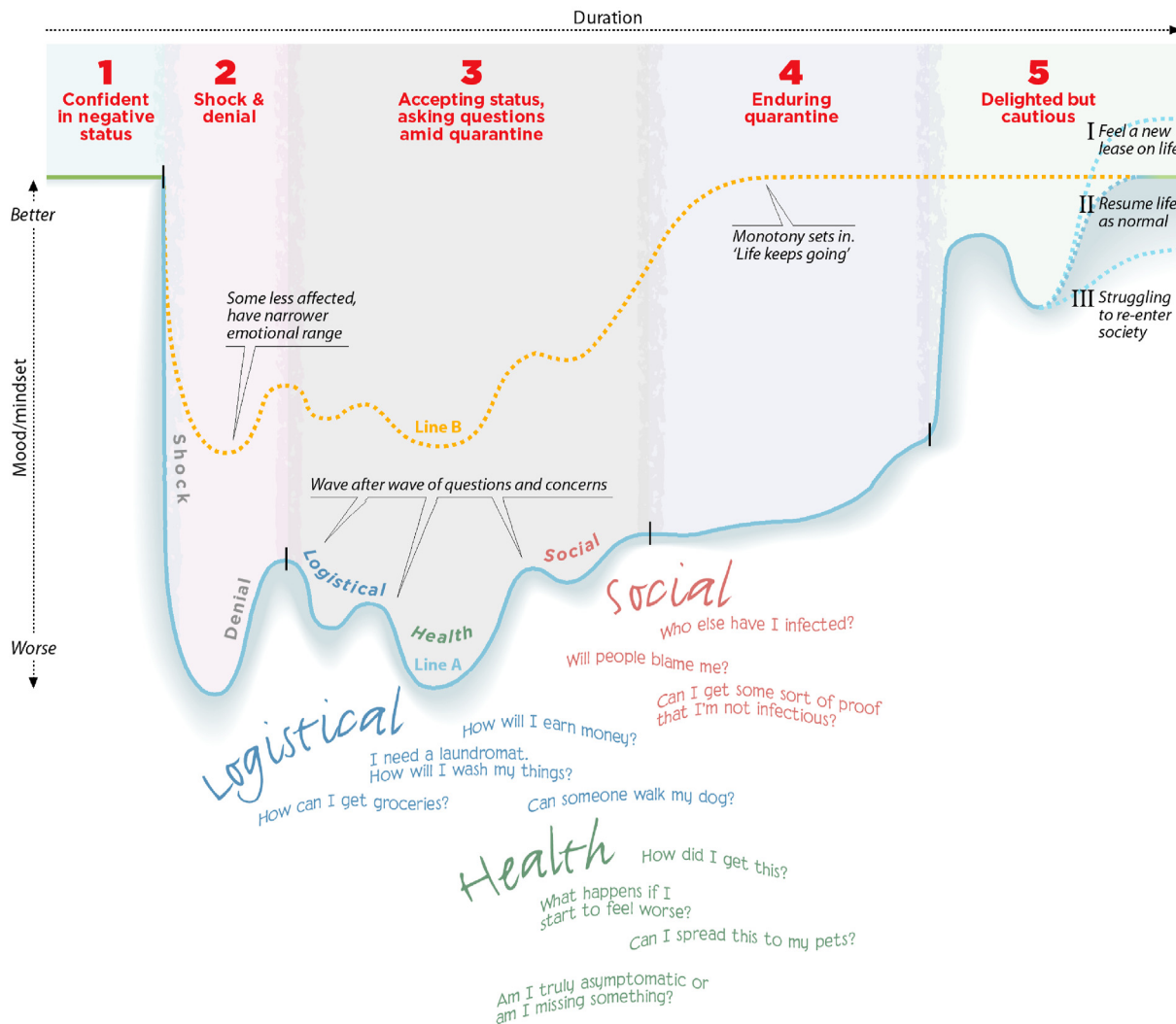


Fig. 1. Phases within quarantine.

this can end fatally. (Mhm when did this feeling come?) [short pause] Several hours later " - (MALE, 34)

The first point of new contact was local health authorities, which respondents described in a generally “pestering” light because authorities provided more questions than answers (particularly related to who needs to be contacted, quarantine duration and how to behave in quarantine, e.g. whether to separate members of the household and if so in which manner (positive and/or negative household members sequestered or together). Respondents also disliked the manner in which recommendations could change on a day-to-day basis or on the same day across different platforms (emails, phone calls etc.), “You actually didn't really know what was going on anymore” (MALE, 59).

As time passed and respondents settled into quarantine, they described grappling with questions that fall into three overarching

categories and followed a particular chronology: quarantine logistics, then personal health, and finally social interactions.

Respondents described how they began their quarantine by asking themselves questions related to organisational aspects such as buying groceries, and making sure their pets are cared for (see Table 2). Another logistical concern involved effectively separating household members, which was facilitated for some respondents by more living space. These pragmatic issues dominated an initial phase of quarantine, and while many concerns steadily resolved (e.g. children and neighbours often offered to go shopping) concerns related to financial losses due to lost work hours, the cancellation of a holiday booking or reservation, and worries about job security persisted throughout quarantine.

At a slightly later phase in quarantine, respondents began asking questions and seeking answers regarding their health and regarding the SARS-COV-2 (see Table 3). Respondents recalled asking themselves if

Table 2

Quotes related to logistical concerns amid quarantine.

"You then notice, that the washing machine is in the basement. How many towels do I have left and stories like that. We live in an apartment building with six flats and of course we did not go down to the cellar. And then the dirty laundry started to pile up in the bathroom" - (FEMALE, 34)

"My son brought me something to eat. He lives in (town) and then he brought me something to eat and for my girlfriend, her brother did it [bring food]." - (MALE, 77)

"And then it popped into my head "Okay, if I need to stay home now, who is going to pay me? For my attendance. I mean it is always about money. I mean I have to finance my life. If I must stay home unpaid for 10 days, I will notice it immediately if I cannot go to work. Because you are again left a little stranded by the health authorities [Gesundheitsamt]" - (MALE, 34)

they might be experiencing symptoms or a worsening of symptoms, which they likened to a "Kopfkino" (lit. "head cinema", referring to a sense that a film is running in one's head, it cannot be turned off, and it often contains scenes that are bothersome but also intriguing) (MALE, 53) that "wreaked havoc on your brain (*Kopf zerbrechen*)" (MALE, 53). Such worries were amplified among respondents who felt more threatened by COVID-19, whether because they had heard or witnessed suffering among relatives and friends, they felt more susceptible due to a high individual risk profile, or they had started to experience more severe symptoms. Respondents who described their cases as mild reported engaging with the internet and with other information sources notably less, and they described fewer and less profound concerns about COVID-19's health effects.

"For (my husband and me) well, he was not so, he saw that I was well [...] and so he took it easy, [...] like I did in principle too." - (FEMALE, 62)

"I was without symptoms, then my wife also felt better. Then she also didn't worry or worried less, less." - (MALE, 50)

During this phase, several respondents described having more time on their hands to sit and begin pondering, as one respondent said, "over and over again: when did I actually get infected?" (MALE, 34). While some quickly found an answer, for others this uncertainty persisted throughout quarantine and only gradually faded. Coupled with this question, respondents expressed concern about whether or to what extent they may have infected others. Respondents described worrying about being blamed for "bringing COVID-19" into communities, families, or workplaces. They described feeling guilt that they may have made another person "seriously ill" (MALE, 34) or even "killed somebody by infecting them" (MALE, 50). Respondents who had been in contact with relatives who are classified as high risk described acute concerns in this regard. Respondents who were among the first in a workplace cluster described the dread of revisiting the workplace or being forever accused of "spoiling Christmas" (MALE, 34).

Respondents described the passage of time as a main factor for feeling better about their own health, using phrases like "Certainty grew, that I would not get anything anymore" (FEMALE, 21). Even calculating when symptoms are most likely to start or worsen and "From day to day, when less and less or nothing happened, I would say, yes, you actually just feel more positive." (MALE, 53) and "I knew so, ah yes, only one more week" (FEMALE, 21).

Typically, after a few days, questions and concerns related to social interactions set in (see Table 4). All respondents went through the same

Table 3

Quotes related to health concerns amid quarantine.

"But at that time I felt terrible. Everybody who then told me [after getting tested]: "I am negative" "I am negative", it took a load off my mind." - (MALE, 50)

"What if? Let me put it this way: What if it had become worse for me? Or or? What could have happened? That is what I was struggling with" - (MALE, 45)

"I have been tested positive for a week now. I do not want to say that I took a deep breath, but I just hoped that I would not be one of those who somehow start to get problems [symptoms] on the 8th/9th or 10th/11th day" - (MALE, 27)

process and asked themselves similar questions (see Table 3), but some respondents (note the yellow line in Fig. 1) did not feel particularly bothered about how their social lives may be affected given their SARS-COV-2 status. This phase of questioning seemed to last the longest and proved most pertinent in retrospect as respondents gauged whether they may become "social outcasts (*Aussätziger*)" (several respondents) after quarantine. Respondents described how they "didn't really want to tell anyone" (MALE, 41) about their diagnosis and how they felt reluctant to talk to friends about the diagnosis. Respondents feared that individuals might be "afraid of you" (FEMALE, 62) or single you out with phrases such as "SHE had it" (FEMALE, 82), or "That's the gentlemen who had corona" (MALE, 50), or as some kind of "zombie [...] felon [...] murderer" (MALE, 41). Respondents feared becoming part of a "rumour mill" (multiple respondents) and they described hoping that "nobody knows about it" (FEMALE, 82)

Respondents described profound concerns about the health of other household members or fears of infecting others ("Was it my fault? Did I infect them?" (MALE, 34)). These concerns were exacerbated when respondents could not see or speak with social contacts who were experiencing a severe COVID-19 case. Respondents' worries about others' health often dissipated as their contact persons received negative test results, describing it as "a load off my mind" (MALE, 50), or as the health status of those diagnosed as positive improved. Even respondents who did not knowingly infect anyone felt guilty for causing others distress associated with being a contact person and, in some cases, for behaviour prior to their diagnosis that resulted in having contacts who needed to be informed ("that makes you somehow somehow feel guilty" (FEMALE, 62)).

3.4. Phase 4: enduring quarantine

After several days, while questions regarding health and especially regarding social interactions still dominated the quarantine experience, respondents' relation to their quarantine shifted, describing their situation as "locked up" (FEMALE, 69) or "stuck" (FEMALE, 52).

"So we have a three-room apartment and the place was getting narrower and narrower from day to day ... not being able to go out the door is actually a challenge. ... Probably then it also has a bit of this, I don't know, *loss of control* you maybe can't call it that, but actually this (lack of) free range of movement, even that does something to your head." - (FEMALE, 34)

Four main factors that helped respondents cope included having a "garden and house" (MALE, 41), not living alone, keeping in touch with contacts via social media, and being able to work remotely ("Thank God I was allowed to work [...] that was already worth a lot." (FEMALE, 52)). Respondents who had experienced a similarly restrictive situation before (because they had, for example, suffered an immobilizing injury) described this as helpful in a pragmatic sense, while others began distracting themselves by watching TV, playing board games, or cleaning their homes.

Table 4

Quotes related to social stigma concerns amid quarantine.

"The other person will be afraid of you (Mhm.) You better not say anything" - (FEMALE, 62)

"The problem is also that people hide it, yes. Ah, if my neighbour finds out that I've had, uh, Corona now. (Mmh.) He doesn't want to have anything to do with me." - (MALE, 41)

"I can't say much about the positive test. I just accepted it and when the time was done, then you can go out again. (Mhm. You mean, you didn't tell people about the test result in a big way?) //No, no, I didn't. You just also know (*murmur*) it's like for God's sake. (*respondent imitates others voices*) 'She has it and it's contagious and such. Get out of the way!' I just wanted to avoid that." - (FEMALE, 82)

"Yes, as I said, this, this Gebabbel (*chatter*). [...] it's just strange that people talk so much, I just wanted to avoid these rumours, this chatter, yes, this rumour mill and so on, this talk of the people, I just wanted to avoid it." - (MALE, 50)

"Even my siblings didn't know, I didn't tell them anything either." - (MALE, 50)

Respondents tasked with separating themselves from their partners within their households also expressed the physical distance as a “shitty feeling” (MALE, 27) because “you are somehow missing something” (MALE, 59).

Several respondents described how knowing a specific quarantine duration imbued them with a sense of control, “I mean, it was foreseeable, how many days (were left)” (MALE, 53) and they described telling themselves, “These two weeks ... will pass” or “it’s almost over” (FEMALE, 52).

Some respondents (see yellow line) were not as affected by the quarantine and said, for example, “it’s fine so far” (MALE, 53) or “it’s nothing special” (FEMALE, 52). Such respondents were typically those who remained asymptomatic (or did not fear symptoms), those who could relatively easily work from home, or those who simply enjoyed alone time or having “a small locked-in vacation” (MALE, 27).

“I continued working quite normally and um could also ... work quite normally and um yes actually like um yes I didn’t really mind the quarantine.” - (MALE, 50)

3.4.1. Phase 5: Delighted but cautious

With notable exceptions, respondents described leaving quarantine as “wonderful” (FEMALE, 52) and “liberating” (FEMALE, 21). Everyday activities such as going for a walk outside made respondents feel like a “dog with two tails (*Honigkuchenpferd*)” (FEMALE, 34). Respondents also described it as “a relief that I can shop alone again” (MALE, 77) and not have to rely on outside help. Being able to visit family, see other people, or “to give someone a hug” (FEMALE, 52) also played a large role in the experience of leaving quarantine.

As the end of quarantine approached, three main patterns emerged among respondents. Some respondents (I) felt better than before the quarantine experience, some (II) felt essentially the same, and some (III) felt worse than they had prior to their quarantine experience.

Those who felt better than before (I) were not bothered or distracted by concerns about immunity or infectiousness. “No, I didn’t really think about [potentially still being infectious]. I thought that was over now” (FEMALE, 69). These respondents were certain that they were no longer infectious, citing reasons such as being told by health authorities, trusting that masks would prevent spread, or referring to their lack of symptoms. These individuals described leaving quarantine directly and going shopping or visiting their families. They often believed themselves to be immune afterward, at least for a period of time, and described feeling “grateful” (FEMALE, 34) because they managed quarantine and SARS-COV-2 infection well.

Those who described resuming life in a similar general sense (II) as they had prior to quarantine often were not as affected by the quarantine (B). They described leaving quarantine as a mundane event, and they did not experience the same rush of happiness upon re-entering society.

“Like, thank God, now I can get out again so’// [...] It wasn’t like that. [...] For me it was there was not really a big difference.” - (MALE, 59)

Among those who felt significantly worse (III), many described feeling apprehensive about leaving their homes. These respondents described making decisions about leaving quarantine as an exercise in “difficult questions, always” (MALE, 62) because of concerns about being contagious, having a recurring case or navigating society while feeling like a “walking time bomb” (MALE, 50). This uncertainty was reinforced in a context of consistently contradictory information stemming from health authorities regarding when one can exit quarantine. Respondents often wanted a confirmatory test after quarantine to feel “calmer psychologically” (FEMALE, 62) and to know “you can be let loose on humanity again” (MALE, 34). They often described requests for written confirmation of their status, as they wanted to see tangible

documentation that they had fully recovered, which the health authorities (*Gesundheitsamt*) were unable to provide.

“[...], it’s a little bit funny then to think, okay before I was a high risk [...] and now I get to go out because I didn’t have any symptoms for two days? Yes? Can I get out now? It feels very suspicious [...] It makes you feel a bit stupid, when you think, is this really true now? Have I really recovered?” - (MALE, 50)

Group III respondents described a self-imposed “week of quarantining myself” to ensure “that I really would not infect anyone” (MALE, 74). These respondents also peppered interviewers with questions regarding the possible origin of Covid-19 infections, the duration of immunity, the risks associated with new mutations, the availability of antibody tests, and the potential for long-term after-effects.

Within Fig. 1, we place the line for Group III respondents at a slightly lower level than their pre-diagnosis level because of their description of how others interacted with them following quarantine (“people were treating me weirdly” (MALE, 41)). Respondents described how others could ask “mean” questions that immediately made them feel “like an outcast” (MALE, 50).

“(I felt) free and nevertheless mentally and morally not free (What do you mean by mentally, morally not free?//) //Ah yes when you go out, when you run into people, when you then go to the doctor, it’s like he knows exactly ‘Oh, he has had Corona’ and then it is like ‘Oh’ or ‘Better watch out there’ and ... It is, that is a very weird situation.” - (MALE, 74)

Although Group III respondents often did not want to “advertise” (MALE, 50) their status, they described sensing a “rumour mill” (several respondents) that churned out information regarding who had tested positive. “Our neighbours, they knew that right away too, but they didn’t know it through us” (MALE, 53). Respondents described a variety of behaviours enacted by others that felt stigmatizing: people in the neighbourhood would “change the side of the road” (MALE, 62), family and friends described having “a fear of contact” (FEMALE, 70), friends would sit further away when having a coffee. Some respondents themselves described “changing the side of the road” and maintaining exceptional distance in the early phase after quarantine, because of uncertainty about lingering infectiousness.

Respondents across groups were often confronted and asked to share their experience of COVID-19, and while questions from close friends were often received positively, inquiries from acquaintances were deemed intrusive.

After quarantine, nearly all respondents described a change in their perception of the virus. As one participant said, the virus moved from being a distant concern to something that can be anywhere and is “absolutely real” (MALE, 34).

“So, we are, like, not invincible, that must be made clear to everyone. And even if you do 1000 times everything right [you can still get COVID-19]” - (MALE, 53)

“And in the beginning, we joked endlessly about it. And now, *after* [getting Covid], we aren’t doing that any longer [...] Now everything is a bit different” - (MALE, 34)

4. Discussion

This study uniquely explores the lived experiences of unexpectedly diagnosed asymptomatic SARS-COV-2 carriers in Germany. Three major findings were derived from the data. First, all respondents undergo reoccurring stages, facing similar questions, uncertainty and fears; secondly stages remain consistent regardless of age, gender or socioeconomic background; and, finally, stigma, uncertainty and fear feature

prominently in the experience post SARS-COV-2 diagnosis.

The process wherein individuals pass through phases after a given diagnosis or experience has been described in literature on suicidal crises among those affected (Reisch, 2012), grief among dying patients (Ross, 2015), post-TBI among veterans (Chase et al., 2015) and resettlement among refugees (Gonsalves, 1992) to name a few. Our figure, “The SARS-COV-2 Peaks and Valleys” model builds most pointedly on an “injury career” (Chase et al., 2015), which described an experience trajectory among blast-exposed veterans who were later found to have experienced a traumatic brain injury (TBI). Dubbed “The Canyon Model” the authors of that study highlight seven phases through which soldiers pass on the path to recovery (“injury”, “downplaying”, “detaching”, “oblivious/in denial”, “wake-up call”, “getting help”, “new normal”). Similar to the Canyon Model (Chase et al., 2015), data from this study emphasizes a unifying experience among those who are given an unexpected (in their own view) SARS-COV-2 diagnosis. Our model extends the Canyon by highlighting differences in intensity, but also a chronological progression not only between phases but also within each phase, providing deeper insight into the experience.

Along with reflecting the Canyon Model, our findings also echo Kübler-Ross' five stages of grief model (Ross, 2015), which outlines the manner in which terminally ill patients move chronologically through shock, denial, anger, bargaining, and depression. In our study, we also found participants to experience particularly shock, denial, and depression. Unlike the Kübler-Ross model, however, we did not find a chronological progression through these phases, with phases of anger and bargaining being scarcely present.

Many of our findings echo earlier work outlined in the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984). The Transactional Model of Stress and Coping outlines how an individual assessment of a given situation influences the experienced emotional outcome afterward. A “stressor” is initially interpreted (“primary appraisal”), afterward the available resources are analysed (“secondary appraisal”), this can result in stress (“insufficient resources”) which can be overcome by coping, either “problem-focused”, i.e., trying to change the situation, or “emotion-focused”, i.e., trying to change the internal relationship to the situation, and afterward, the situation is re-evaluated (“reappraisal”) and either resolved or the cycle repeats. Insights from our respondents highlight behavioural patterns exhibited in the interviews. Almost all respondents consider COVID-19 a threat in their primary appraisal and often used emotion-focused coping, citing their mild/absent symptoms or good physical condition to cope with the situation. Other studies looking at close contacts in quarantine in China (Chen et al., 2020) or COVID-19 patients in quarantine (Ndejjo, Naggayi, Tibiita, Mugahi, & Kibira, 2021) also described various coping strategies, particularly emotion-focused coping in the form of distraction of some kind, used by respondents. These findings mirror our data: respondents watched TV, played board games, or began to clean their homes. Problem-focused coping can be observed particularly well by focusing on one respondent, who began to research information about COVID-19. When he found out the probability of time-delayed symptoms and when they are most likely to start, he changed his assessment of the danger COVID-19 poses to him (reappraisal).

Several of our findings are reflected in earlier research stemming from the SARS-1 outbreak in 2003. Cava and colleagues described a chronological progression through phases (“life before quarantine”, “finding out”, “being in quarantine”) (Cava, E Fay, J Beanlands, McCay, & Wignall, 2005). Within each phase, Cava highlighted challenges such as “separation, rejection, stigma, or scrutiny” during quarantine and “uncertainty and fear” that haunted the participants throughout the whole experience, which is reflected in our own study. Although the found predominance of “isolation” within quarantine was not present in our data (Cava et al., 2005). Hawryluck looked into the psychological impact of quarantine and found frequent symptoms of post-traumatic stress disorder (PTSD) and depression among those quarantined (Laura Hawryluck, 2004). The found symptoms were similar regardless of

whether exposure SARS-1 was present or not, emphasizing the impact of quarantine itself independent of exposure. In post-SARS Hong Kong, mirroring our findings, Siu and colleagues described stigma (Siu, 2008) with stigmatization especially at the workplace, and hesitancy of disclosing one's infectious status troubling participants.

In the context of the current pandemic (Chen et al., 2020), described experiences inherent to quarantine time periods (“early stage”, “middle stage”, “late stage”) in China. Respondents in that study, which focused on close contacts of those with COVID-19, emphasized themes of fear, stigma, coping, and “looking forward to ending the quarantine soon”, which – in light of our own study – suggests that close contacts in quarantine experience similar emotional responses as those quarantined upon diagnosis. Taken as a whole, the findings that quarantine entails a similar process and challenges independent of the infectious status underscores the importance of considering social and emotional support amid quarantine regardless of viral diagnosis. Mirroring the findings of (Siu, 2008), (Chen et al., 2020; Lohiniva et al., 2021; N.; Sun, Wei, et al., 2021) show that stigma played a significant role in people's experience with the COVID-19 diagnosis, especially post-quarantine with several studies also mentioning subsequent hesitancy regarding disclosing one's own infectious status (Imran et al., 2020; Lohiniva et al., 2021; W.; Sun, Wei, et al., 2021).

In terms of limitations, we emphasize that to be eligible for inclusion in our study, respondents would have had to agree to opt into an additional COVID-19 test (criteria for the “ACE-IT”) or they would have had to agree to conduct a home-based self-sampling mail-in test (to be included into the “Virusfinder” study). Respondents included in the study also had to accept an invitation to participate in an interview lasting around 45 min. This may lead to a sampling bias in the sense that respondents who are willing to conduct additional tests to aid a scientific study might be more likely to associate positive feelings towards science and studies, or they might be more concerned about COVID-19 or their status. We further highlight an inability to draw comparisons across socioeconomic groups, or to tease out experiences among at-risk, marginalized or otherwise compelling populations (people with disabilities, low-income populations, or caretakers of small children or adolescents (or children and adolescents themselves) etc.). Finally, we highlight that this data, collected from December 2020 to March 2021, reflects concerns that were poignant at that time but precede current discourse on several issues such as virus mutations or long Covid etc.

Looking ahead, this research contains valuable points that can guide policymakers and health care providers, especially local health authorities. As conflicting or inadequate information appears to be a reoccurring problem in respondents' quarantine experiences (Fawaz & Samaha, 2020; Maqbool, 2021), communicating the first steps to follow after receiving a positive test result, may help individuals in terms of practical organization and coping. Questions about what to do after quarantine, when quarantine ends, and what to do if symptoms worsen should be pre-emptively described and conveyed in a written format. Although some respondents had received this information over the phone, uncertainty remained. With studies highlighting the positive impact of traditional media on vaccine acceptance, those media outlets could also be used to share missing information about quarantine (Piltch-Loeb et al., 2021). This might also bolster normalization and de stigmatization in the public eye, with individuals therefore not just being better informed, but also more open about disclosing their status.

The prevalence of adopted coping mechanisms suggests that some form of coping is needed by people in quarantine, which highlights a possibility for public health interventions that can support those in quarantine to cope with the situation in a healthy manner. This seems particularly relevant for people who are unable to continue their everyday lives, for example, those who cannot work from home. This can be addressed by sending an email or letter with answers to the most frequently asked questions, suggested activities during quarantine, and a guide to follow post-diagnosis. We recommend local health authorities insert this information into their routine when informing positive cases.

Another key issue to address is the experienced stigma after leaving quarantine, which speaks to a need to educate the public about the infectiousness of patients post-quarantine and how to behave towards those patients. Health education could not only improve the wellbeing of those infected but also encourage them to communicate their infectious status faster and more openly, enabling timely support by the local health authorities and the prevention of further spreading.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmqr.2022.100070>.

References

- Ardebili, M. E., Naserbakht, M., Bernstein, C., Alazmani-Noodeh, F., Hakimi, H., & Ranjbar, H. (2021). Healthcare providers experience of working during the COVID-19 pandemic: A qualitative study. *American Journal of Infection Control, 49*(5), 547–554.
- Aughterson, H., McKinlay, A. R., Fancourt, D., & Burton, A. (2021). Psychosocial impact on frontline health and social care professionals in the UK during the COVID-19 pandemic: A qualitative interview study. *BMJ Open, 11*(2), Article e047353.
- Baden-Württemberg, L. (2020). Baden-Württemberg erlässt landesweite Ausgangsbeschränkungen. Retrieved from <https://www.baden-wuerttemberg.de/de/service/alle-meldungen/meldung/pid/baden-wuerttemberg-erlaest-landesweite-ausgangsbeschraenkungen/>.
- Cava, M., E Fay, K., J Beanlands, H., McCay, E., & Wignall, R. (2005). The experience of quarantine for individuals affected by SARS in Toronto. *Public Health Nursing, 22*(5), 398–406.
- Cavicchioli, M., Ferrucci, R., Guidetti, M., Canevini, M. P., Pravettoni, G., & Galli, F. (2021). What will be the impact of the covid-19 quarantine on psychological distress? Considerations based on a systematic review of pandemic outbreaks. *Healthcare (Basel), 9*(1). <https://doi.org/10.3390/healthcare9010101>
- Cervantes, L., Martin, M., Frank, M. G., Farfan, J. F., Kearns, M., Rubio, L. A., et al. (2021). Experiences of latinx individuals hospitalized for COVID-19: A qualitative study. *JAMA Network Open, 4*(3), Article e210684.
- Chase, R. P., McMahon, S. A., & Winch, P. J. (2015). Injury careers after blast exposure among combat veterans deployed to Iraq or Afghanistan. *Social Science & Medicine, 147*, 309–316. <https://doi.org/10.1016/j.socscimed.2015.11.015>
- Chen, D., Song, F., Tang, L., Zhang, H., Shao, J., Qiu, R., et al. (2020). Quarantine experience of close contacts of COVID-19 patients in China: A qualitative descriptive study. *General Hospital Psychiatry, 66*, 81–88. <https://doi.org/10.1016/j.genhosppsych.2020.07.006>
- Deckert, A., Anders, S., de Allegri, M., Nguyen, H. T., Soares, A., McMahon, S., et al. (2021). Effectiveness and cost-effectiveness of four different strategies for SARS-CoV-2 surveillance in the general population (CoV-surv study): A structured summary of a study protocol for a cluster-randomised, two-factorial controlled trial. *Trials, 22*(1), 39. <https://doi.org/10.1186/s13063-020-04982-z>
- Fawaz, M., & Samaha, A. (2020). The psychosocial effects of being quarantined following exposure to COVID-19: A qualitative study of Lebanese health care workers. *International Journal of Social Psychiatry, 66*(6), 560–565. <https://doi.org/10.1177/0020764020932202>
- Ferreira, L. N., Pereira, L. N., da Fe Bras, M., & Ilchuk, K. (2021). Quality of life under the COVID-19 quarantine. *Quality of Life Research, 30*(5), 1389–1405. <https://doi.org/10.1007/s1136-020-02724-x>
- Gonsalves, C. J. (1992). Psychological stages of the refugee process: A model for therapeutic interventions. *Professional Psychology: Research and Practice, 23*(5), 382.
- Hege, H.-P. (2012). Deutschland: Metropolregion rhein-neckar. *Strategische Regionalplanung, 237*, 132.
- Heidelberg, S. (2021). Heidelberg in zahlen. Retrieved from <https://www.heidelberg.de/hd/HD/Rathaus/Heidelberg+in+Zahlen.html>.
- Henssler, J., Stock, F., van Bohemen, J., Walter, H., Heinz, A., & Brandt, L. (2021). Mental health effects of infection containment strategies: Quarantine and isolation—a systematic review and meta-analysis. *European Archives of Psychiatry and Clinical Neuroscience, 271*(2), 223–234. <https://doi.org/10.1007/s00406-020-01196-x>
- Hossain, M. M., Sultana, A., & Purohit, N. (2020). Mental health outcomes of quarantine and isolation for infection prevention: A systematic umbrella review of the global evidence. *Epidemiol Health, 42*, Article e2020038. <https://doi.org/10.4178/epih.e2020038>
- Imran, N., Afzal, H., Aamer, I., Hashmi, A., Shabbir, B., Asif, A., et al. (2020). Scarlett letter: A study based on experience of stigma by COVID-19 patients in quarantine. *Pakistan Journal of Medicine, 36*(7), 1471–1477. <https://doi.org/10.12669/pjms.36.7.3606>
- Ingram, J., Maciejewski, G., & Hand, C. J. (2020). Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Frontiers in Psychology, 11*, 588604. <https://doi.org/10.3389/fpsyg.2020.588604>
- James, P. B., Wardle, J., Steel, A., & Adams, J. (2019). Post-ebola psychosocial experiences and coping mechanisms among Ebola survivors: A systematic review. *Tropical Medicine and International Health, 24*(6), 671–691. <https://doi.org/10.1111/tmi.13226>
- Krueger, L. (2021). Accuracy and ease-of-use of seven point-of-care SARS-CoV-2 antigen-detecting tests: A multi-centre clinical evaluation [Krueger L et al. Accepted in EBioMedicine].
- Kucharski, A. J., Klepac, P., Conlan, A. J. K., Kissler, S. M., Tang, M. L., Fry, H., et al. (2020). Effectiveness of isolation, testing, contact tracing, and physical distancing on reducing transmission of SARS-CoV-2 in different settings: A mathematical modelling study. *The Lancet Infectious Diseases, 20*(10), 1151–1160. [https://doi.org/10.1016/s1473-3099\(20\)30457-6](https://doi.org/10.1016/s1473-3099(20)30457-6)
- Laura Hawryluck, W. L. G., Robinson, S., Pogorski, S., Galea, S., & Styracore, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases, 10*(7), 1206–1212.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.
- Liu, Q., Luo, D., Haase, J. E., Guo, Q., Wang, X. Q., Liu, S., et al. (2020). The experiences of health-care providers during the COVID-19 crisis in China: A qualitative study. *Lancet Global Health, 8*(6), e790–e798.
- Lohiniva, A. L., Dub, T., Hagberg, L., & Nohynek, H. (2021). Learning about COVID-19-related stigma, quarantine and isolation experiences in Finland. *PLoS One, 16*(4), Article e0247962. <https://doi.org/10.1371/journal.pone.0247962>
- Luyt, C. E., Combes, A., Becquemin, M. H., Beigelman-Aubry, C., Hatem, S., Brun, A. L., et al. (2012). Long-term outcomes of pandemic 2009 influenza A(H1N1)-associated severe ARDS. *Chest, 142*(3), 583–592. <https://doi.org/10.1378/chest.11-2196>
- Mak, I. W. C., Chu, C. M., Pan, P. C., Yiu, M. G. C., & Chan, V. L. (2009). Long-term psychiatric morbidities among SARS survivors. *General Hospital Psychiatry, 31*(4), 318–326. <https://doi.org/10.1016/j.genhosppsych.2009.03.001>
- Maqbool, Z. (2021). Experiences of quarantine for individuals during the COVID-19 outbreak in Kashmir: A qualitative study. *Indian Journal of Social Psychiatry, 37*(1), 71–76. https://doi.org/10.4103/ijsp.ijsp.206_20
- McMahon, S. A., & Winch, P. J. (2018). Systematic debriefing after qualitative encounters: An essential analysis step in applied qualitative research. *BMJ Global Health, 3*(5), Article e000837. <https://doi.org/10.1136/bmjgh-2018-000837>
- Mellers, B., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science, 8*, 423–429.
- Missel, M., Bernild, C., Christensen, S. W., Daggaran, I., & Berg, S. K. (2021). It's not just a virus! Lived experiences of people diagnosed with COVID-19 infection in Denmark. *Qualitative Health Research, 31*(5), 822–834. <https://doi.org/10.1177/1049732321990360>
- Munawar, K., & Choudhry, F. R. (2021). Exploring stress coping strategies of frontline emergency health workers dealing covid-19 in Pakistan: A qualitative inquiry. *American Journal of Infection Control, 49*(3), 286–292.
- Ndejjo, R., Naggayi, G., Tibiita, R., Mugahi, R., & Kibira, S. P. S. (2021). Experiences of persons in COVID-19 institutional quarantine in Uganda: A qualitative study. *BMC Public Health, 21*(1), 482. <https://doi.org/10.1186/s12889-021-10519-z>
- Oran, D. P., & Topol, E. J. (2021). The proportion of SARS-CoV-2 infections that are asymptomatic: A systematic review. *Annals of Internal Medicine, 174*(5), 655–662.
- Piltch-Loeb, R., Savoia, E., Goldberg, B., Hughes, B., Verhey, T., Kayyem, J., et al. (2021). Examining the effect of information channel on COVID-19 vaccine acceptance. *PLoS One, 16*(5), Article e0251095. <https://doi.org/10.1371/journal.pone.0251095>
- Pope, C., Ziebland, S., & Mays, N. (2000). Analysing qualitative data. *BMJ, 320*(7227), 114–116. <https://doi.org/10.1136/bmj.320.7227.114>
- Reisch, T. (2012). Wo kann suizidprävention ansetzen? Vorschlag eines 6-phases-modells suizidaler krisen. *Psychiatrische Praxis, 39*(6), 257–258.
- Renosa, M. D. C., Mwamba, C., Meghani, A., West, N. S., Hariyani, S., Ddaaki, W., et al. (2021). Selfie consents, remote rapport, and zoom debriefings: Collecting qualitative data amid a pandemic in four resource-constrained settings. *BMJ Global Health, 6*(1). <https://doi.org/10.1136/bmjgh-2020-004193>
- RKI. (2020). Täglicher lagebericht des RKI zur coronavirus-krankheit-2019 (COVID-19): 29.12.2020. Retrieved from https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/Dez_2020/Archiv_Dezember.html.
- RKI. (2021). Täglicher lagebericht des RKI zur coronavirus-krankheit-2019 (COVID-19): 03.03.2021. Retrieved from https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/Maerz_2021/Archiv_Mrz_2021.html.
- Roca, J., Canet-Vélez, O., Cemeli, T., Lavedán, A., Masot, O., & Botigüé, T. (2021). Experiences, emotional responses, and coping skills of nursing students as auxiliary health workers during the peak COVID-19 pandemic: A qualitative study. *International Journal of Mental Health Nursing*.
- Ross, E. K. (2015). *Attitudes toward death and dying, on death and dying*. Elisabeth Kübler Ross, 1973. Routledge.
- Shultz, J. M., Althouse, B. M., Baingana, F., Cooper, J. L., Espinola, M., Greene, M. C., et al. (2016). Fear factor: The unseen perils of the Ebola outbreak. *Bulletin of the Atomic Scientists, 72*(5), 304–310. <https://doi.org/10.1080/00963402.2016.1216515>
- Sidor, A., & Rzymiski, P. (2020). Dietary choices and habits during COVID-19 lockdown: Experience from Poland. *Nutrients, 12*(6), 1657.
- Siu, J. Y.-m. (2008). The SARS-associated stigma of SARS victims in the post-SARS era of Hong Kong. *Qualitative Health Research, 18*(6), 729–738.
- Statistische Ämter des Bundes und der Länder. (2020). Bruttoinlandsprodukt, Bruttowertschöpfung in den kreisfreien Städten und Landkreisen der Bundesrepublik

- Deutschland. Retrieved from <https://www.statistikportal.de/de/veroeffentlichungen/bruttoinlandsprodukt-bruttowertschoepfung-0>.
- Statistisches Bundesamt Baden-Württemberg. (2020). Baden-Württemberg: Großstädte verlieren einwohner. Retrieved from <https://www.statistik-bw.de/Presse/Pressemitteilungen/2020285>.
- Statistisches Bundesamt Baden-Württemberg. (2021). Bevölkerung nach Nationalität – vierteljährlich. Retrieved from <https://www.statistik-bw.de/BevoelkGebiet/Bevoelkerung/01035055.tab?R=KR226>.
- Statistisches Landesamt Baden-Württemberg. (2018). Jüngste bevölkerung in Heidelberg, älteste in baden-baden. Retrieved from <https://www.statistik-bw.de/Presse/Pressemitteilungen/2018016>.
- Sun, N., Wei, L., Shi, S., Jiao, D., Song, R., Ma, L., et al. (2020). A qualitative study on the psychological experience of caregivers of COVID-19 patients. *American Journal of Infection Control*, 48(6), 592–598.
- Sun, N., Wei, L., Wang, H., Wang, X., Gao, M., Hu, X., et al. (2021). Qualitative study of the psychological experience of COVID-19 patients during hospitalization. *Journal of Affective Disorders*, 278, 15–22. <https://doi.org/10.1016/j.jad.2020.08.040>
- Sun, W., Zhou, Y., Chen, W. T., Huang, F., Sun, M., Shen, L., et al. (2021). Disclosure experience among COVID-19-confirmed patients in China: A qualitative study. *Journal of Clinical Nursing*, 30(5–6), 783–792. <https://doi.org/10.1111/jocn.15616>
- Times Higher Education. (2021). World university rankings 2021. Retrieved from https://www.timeshighereducation.com/world-university-rankings/2020/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats.
- Wang, Y., Shi, L., Que, J., Lu, Q., Liu, L., Lu, Z., et al. (2021). The impact of quarantine on mental health status among general population in China during the COVID-19 pandemic. *Molecular Psychiatry*. <https://doi.org/10.1038/s41380-021-01019-y>
- Wu, C., Cheng, J., Zou, J., Duan, L., & Campbell, J. E. (2021). Health-related quality of life of hospitalized COVID-19 survivors: An initial exploration in Nanning city, China. *Social Science & Medicine*, 274, 113748. <https://doi.org/10.1016/j.socscimed.2021.113748>
- Yanes-Lane, M., Winters, N., Fregonese, F., Bastos, M., Perlman-Arrow, S., Campbell, J. R., et al. (2020). Proportion of asymptomatic infection among COVID-19 positive persons and their transmission potential: A systematic review and meta-analysis. *PLoS One*, 15(11), Article e0241536. <https://doi.org/10.1371/journal.pone.0241536>