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## Communicating and reading emotion with masked faces in the Covid era: A short review of the literature

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### ABSTRACT

Face masks have proven to be key to slowing down the SARS-Cov2 virus spread in the COVID-19 pandemic context. However, wearing face masks is not devoid of “side-effects”, at both the physical and psychosocial levels. In particular, masks hinder emotion reading from facial expressions as they hide a significant part of the face. This disturbs both holistic and featural processing of facial expressions and, therefore, impairs emotion recognition, and influences many aspects of human social behavior. Communication in general is disrupted by face masks, as they modify the wearer’s voice and prevent the audience from using lip reading or other non-verbal cues for speech comprehension. Individuals suffering from psychiatric conditions with impairment of communication, are at higher risk of distress because masks increase their difficulties to read emotions from faces. The identification and acknowledgement of these “side-effects” on communication are necessary because they warrant further work on adaptive solutions that will help foster the use of face masks by the greatest number.

The benefits of wearing a face mask in preventing the spread of the virus in the context of the COVID-19 pandemic is not a subject of debate at the present time. Indeed, face masks are among the most cost-efficient non-pharmaceutical protections against the SARS-Cov2 virus and allow to maintain social and medical practices and group interactions as safely as possible (Li et al., 2020).

In France, wearing a mask is no longer mandatory since May 16, 2022, except in health care facilities. At the moment, hospitals and nursing homes are the only places that are still subject to mask requirement. Thus, obligation to wear a mask only concerns caregivers, patients and visitors of health and care facilities such as hospitals, pharmacies or medical laboratories. Mask wearing is currently “recommended” in transport, without obligation, as well as in “closed places where one is in direct promiscuity”, according to the French Ministry of Solidarity and Health.

Although it is definitely a protective gesture against the spread of the virus, the question of why the obligation to wear a mask is difficult to accept still remains. It appears that the primary reason why people refuse to wear a mask is the feeling of infringement of their freedom.<sup>1</sup> Kiefer (2020) wrote in a recent article (“Masque, Covid et liberté”; text in

French): “You really have to be stuck in your self-sufficiency ... to believe that freedom is expressed by the refusal of all constraints”. This suggests that this “liberticidal” feeling may be mainly explained by the constraints (physical, psychological, ...) resulting from wearing masks. Besides, the fact that wearing a mask is not devoid of inconvenience / “side-effects” may also be part of the reason why it is not always well tolerated. Indeed, physical downsides of wearing a mask have been described in the COVID-19 context and include *de novo* headaches or worsening of pre-existing headaches (Ong et al., 2020), as well as facial acne flare-up, a condition called “maskne” (diAltobrando et al., 2020; Teo, 2021) which is caused by a modification of the local cutaneous microbiota under the mask. Of course, mask wearing is associated with other types of physical constraints, first and foremost because masks cover half of the face, which is, as stated by Kiefer (2020): “... by far the most involved part of the body in what makes us unique and communicative people”. Let’s take the smile as an example: a recent communication suggests that because masks hide the smile, it may result in social isolation.<sup>2</sup> In their review entitled “Face masks: benefits and risks during the COVID-19 crisis”, Matuschek et al. (2020) argue in favor and against mask wearing. Among the arguments against the use of masks,

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<sup>1</sup> <https://www.forbes.fr/lifestyle/le-top-10-des-excuses-pour-ne-pas-porter-un-masque/>

<sup>2</sup> <https://www.infirmiers.com/ressources-infirmieres/ressources-infirmieres/quand-masque-musele-emotions.html>

they reported that "the lack of nonverbal communication when wearing a mask may make people feel insecure, disheartened or even psychologically troubled". Emotion reading has important implications for everyday social interactions, and face masks may complicate these interactions as they disturb emotion reading from facial expressions (Carbon, 2020b).

The aim of this review is to compile the literature that has recently dealt with the ways masks influence emotion reading and social interactions in the era of COVID-19. This review does not intend to judge whether wearing masks is right or wrong. Instead, it is meant to inform on the inconveniences of wearing masks, to try to understand the reluctances and propose adaptive solutions. In the first part of this review, general processing of facial emotions (without mask) will be presented. The second part of the review will focus on the impact of mask wearing on verbal and nonverbal communication. Finally, in the last part, we will propose few strategies that may help circumvent masks' inconveniences, especially those related to communication alteration.

## 1. General processing of facial emotions

### 1.1. Processing of facial emotion

As social animals, humans are expert in decoding emotions from facial expressions (Schyns et al., 2009). Neural responses to facial expressions (of fear or happiness) can occur with latencies barely exceeding 100 ms (Kawasaki et al., 2001), as recorded by EEG. Moreover, it seems that only 2 eye fixations are sufficient to recognize facial emotions (Schurgin et al., 2014). Previous research has demonstrated that emotion recognition can rely on individual facial features (e.g. happy mouth), on multiple facial features (e.g. disgusted nose and mouth), or be more holistic (e.g. fear) (Ellison and Massaro, 1997; Beaudry et al., 2013). Holistic facial emotion processing implies strong perceptual integration across the whole face, which is more than the sum of its parts (McKone et al., 2013; Tobin et al., 2015). Those elements *per se* augur the impact of face mask wearing on the ability to decode facial emotion, since the bottom half (including the nose and the mouth) of the face is concealed.

### 1.2. Featural processing

Specific regions of the face are particularly relevant for decoding emotions from facial expressions, but not all facial expressions are decoded equally:

*The eyes* are one of the most important features in face processing. In Baron-Cohen et al. (2001), the authors developed the renowned "Reading the mind in the eyes" test, and showed that quantifying the ability to decode the mental states of someone solely based on a picture of its eyes constitutes a reliable reading of the level of social cognition. In the general population, observers are inclined to focus primarily on the eyes when viewing static faces (e.g. Janik et al., 1978, Emery, 2000), dynamic faces, (e.g. Lewkowicz and Hansen-Tift, 2012), and during real-life interactions (e.g. Spezio et al., 2007). Face-detection is poorer when the eyes are masked (Lewis and Edmonds, 2003), not attended (Laidlaw and Kingstone, 2017) or given less attention (Hall et al., 2010). By contrast, face detection is enhanced when the first fixation is to the eyes, rather than the mouth (Hills et al., 2013). Moreover, looking just below the eyes has been identified as optimal for face recognition (Peterson and Eckstein, 2012). When viewing emotional faces, the eyes are particularly important for the detection of fear (Gillespie et al., 2015; Wells et al., 2016), sadness (Schurgin et al., 2014) and anger (Eisenbarth and Alpers, 2011; Blais et al., 2017). Similarly, recognizing fear is easier based on information from the top (where the eyes are located) rather than the bottom part of the face (Calder et al., 2000).

*The mouth* is the most diagnostic feature of the face for discriminating all basic facial expressions from one another, whether they are static (images) or dynamic (videos) (Blais et al., 2017). It is easier to recognize

happy expressions from the bottom rather than the top part of the face (Calder et al., 2000, Smith et al., 2005). Accordingly, gaze is biased towards the mouth region in happy expressions compared to all other expressions (Calvo and Nummenmaa, 2008; Eisenbarth and Alpers, 2011; Gillespie et al., 2015; Wells et al., 2016). Nevertheless, the dwell time on happy eyes is longer than on smiling mouths (Gillespie et al., 2015; Wells et al., 2016).

*The nose* is key for recognition of disgust. In (Schurgin et al., 2014), as the disgust intensity conveyed in the face increased, people showed greater fixation to the upper nose, close to the particularly salient wrinkle that appears between the eyes during an expression of disgust.

Masks only leave the eyes visible and accessible to the gaze during interactions. Since mouth seems important to detect happy expressions, and nose, to detect disgust, the decoding of these emotions in particular is likely to be impaired when individuals are wearing a face mask.

### 1.3. Holistic processing

There is overwhelming evidence that faces are processed holistically - as unified wholes or "gestalts" - compared to other objects that are processed in a more analytic, part- or feature-based manner (Tanaka et al., 2016). How this process extends to the identification of facial emotions is less clear. A direct method to assess the holistic or analytic nature of facial emotion processing is to use composite faces. Composite faces combine two different facial expressions in the same face. Typically, one is shown in the top half and the other in the bottom half of the face. The holistic nature of facial emotion processing is supported when the emotion detection speed or accuracy is improved, that is, when the emotion conveyed by the two halves of the face are congruent (same expression), as opposed to when they are incongruent (Tanaka et al., 2012; Chiller-Glaus et al., 2011). The results of this composite task are somewhat inconsistent in the literature. The degree of holistic processing largely depends on the emotion to be identified. It is not exclusively holistic or featural, but likely results from a combination of both processes (Beaudry et al., 2013; Kilpeläinen and Salmela, 2020).

### 1.4. Individual differences

It is important to keep in mind that the results presented above represent an average behavior, mostly computed from WEIRD (Western, Educated, Industrialized, Rich, Democratic) populations (Heinrich et al., 2010). It has been demonstrated that face exploration widely varies among individuals (Mehouard et al., 2014). Many underlying factors of this variance have been identified. For instance, few studies suggest that culture shapes how we explore emotional faces, with East Asian observers following a more holistic strategy than Western Caucasian observers (Blais et al., 2008; Jack et al., 2009). Gender also seems to matter, with females often being better at decoding emotions, in particular from the eye region (Kirkland et al., 2013; Coutrot et al., 2016). Age also plays an important role, as older adults are less efficient at recognizing facial expressions, as compared to younger individuals. However, the effect of age varies across emotions: it is more pronounced for anger, fear, and sadness than for happiness and surprise, while it does not affect detection of disgust (Hayes et al., 2020). Older adults mainly focus on the lower part of the face, while younger adults are more explorative and repeatedly switch between the lower and higher halves of the face (Chaby et al., 2017). The nature of the stimuli (static or dynamic) and the task at hand also influence the way people explore face emotion. In (Blais et al., 2017), the authors demonstrated that the gaze behavior is most differentiated across facial expressions with subtle emotion (Vaidya et al., 2014) or when the task requires searching for the presence of a specific expression. When viewers seek evidence of emotion within neutral faces, their gaze behavior is biased by the target emotion. This indicates a goal-driven influence on eye-gaze patterns (Schurgin et al., 2014).

## 2. Impact of mask wearing on verbal and nonverbal communication

Face covering impacts communication across individuals (Saunders et al., 2020) and especially in those suffering from hearing loss. Indeed, in this population, mask wearing impairs the ability to communicate by mouth and lips speech-reading. In this section, we will focus on the different aspects of communication that are modified by mask wearing. In the first part of the section, the impact of masks on social interaction will be discussed in light of recent studies. In a second part, we will focus on how mask wearing impacts emotion reading and communication. A third part will be dedicated to the effect of mask wearing on voice, speech and intelligibility.

### 2.1. Social interaction

Social interactions are here addressed in terms of social distancing and social perception. Social distancing aims to reduce close contact between people. In addition to mask wearing, it is a main advice from WHO<sup>3</sup> to prevent the spread of COVID-19. Social perception refers to the ability to make interpretations and inferences about others based on their general physical appearance and their verbal and non-verbal communication patterns. It relies on emotion reading, voice, and body language to assume what others are thinking, feeling, or doing next (Aronson et al., 2010).

#### 2.1.1. Social distancing

It has recently been argued that mask wearing could lead to social isolation and may also negatively influence social behavior. According to the work from Cartaud et al. (2020), the interpersonal distance (IPD) is significantly reduced when participants are wearing a face mask, as they are perceived as being more trustworthy. Interpersonal distance of 1.5 to 2 m is recommended to avoid COVID-19 spread<sup>4</sup> but this distance is a serious challenge to behavioral norms (Welsch et al., 2020). It exceeds the classical social distance during encounters with strangers (1 m). Gender seems to influence the level of IPD. In particular, physical and social distancing is influenced by emotional content of the face instead of the "covered" condition for females and more by the "covered" condition for males (Calbi et al., 2021).

In sum, mask wearing influences social distancing by reducing IPD and IPD is more influence in women by facial emotion than by masks.

#### 2.1.2. Social perception

Many individual differences have been identified in the social judgment of mask-wearers. High sensitivity to pathogen disgust predicts lower judgments of trustworthiness and lower social desirability. In addition, high social anxiety predicts higher perception of illness and lower judgments of trustworthiness. Moreover, generalized social trust predicts higher judgments of trustworthiness and lower perception of illness (Olivera-La Rosa et al., 2020). These elements could feed social isolation.

The perception of mask-wearers is influenced not only by their own personality traits but also by the feelings of their entourage towards mask wearing. Indeed, feeling uncomfortable with mask-wearing impairs the social perception of other mask-wearers. Individuals who perceive masks as ineffective, constraining, and producing high psychological distress exhibit a negative bias in the assessment of trustworthiness, even when masks cover positive emotional expression (Biermann et al., 2021). In addition, when individuals exhibit social difficulties such as social anxiety (SA), they are particularly susceptible

to discomfort because of the ambiguity caused by the fact that the face of their interlocutor is partially occluded by the mask (Kishimoto and Ding, 2019; Moscovitch and Hofmann, 2007). Since individuals with SA are likely to interpret ambiguous cues in negative ways (for a review, see Chen et al., 2020), the ambiguity and uncertainty of social interactions increases, so is the likelihood of negative interpretation. For people with higher levels of SA, masked social encounters may amplify negative interpretation biases by activating their pre-existing vulnerabilities associated with selective memory recall during post event rumination, vigilant-avoidant facial processing, and diminished theory of mind abilities (Saint and Moscovitch, 2021).

Regarding social perception, it has been suggested that mask wearing also influences bargaining. Indeed, in the work from Fafouta & Organian (2020), socioeconomic exchange was modified by face-mask wearing and participants accepted more unfair offers in the masked condition than in the control condition. This result could be interpreted as a psychological distance effect (Kim et al., 2013; Mendoza et al., 2014). Indeed, mask-wearers/interlocutors could be perceived as more socially distant and participants were more likely to accept unfair proposals. Decision making was more likely to be guided by 'cold' processing (Kim et al., 2013).

In sum, the data presented above suggest that the influence exerted by mask wearing on social interaction and social perception is connected to the perception of the mask itself rather than the fact that masks occult half of the face.

### 2.2. Influence on emotion perception

Holistic processing, the hallmark of face perception, is drastically reduced when faces are masked (Ferrari et al., 2016). If facial masks, by covering the bottom half and part of the top half of the face, jeopardize the holistic process of emotional decoding, it still allows the perception of the eyes, which are one of the most important features involved in face processing. In Carbon (2020b), authors tested the impact of wearing face masks on emotion reading. Results showed that emotion recognition was strongly reduced with the exception of "frightened" and "neutral" faces. If fearful emotion could be perceived thanks to the eyes, neutral emotion was overrepresented, since many emotional states such as "happy", "sad" and "angry" were misinterpreted as neutral. Hence, the genuine emotional state was not perceived anymore. Anger and disgust emotions were also confused. Disgust was interpreted as anger in about a third of the trials. Authors highlighted the fact that in their study, people paid a lot more attention to faces but, in real life conditions, they would have showed lower level of attention, increasing the risk of misinterpreting emotions.

If face masks reduce the accuracy of emotion recognition, an effect which tends to be exacerbated in older adults, they also undermine perceived closeness, and increase perception of trustworthiness, likability, and closeness for target persons expressing negative emotions (Grundmann et al., 2021). Exploratory analyses further revealed that the use of face masks buffers the adverse influence of negative (vs. nonnegative) emotion expressions on perceptions of trustworthiness, likability and closeness (Grundmann et al., 2021). Overall, calm facial expressions covered with masks are evaluated as being less trustworthy and, to an even stronger extent, less happy than uncovered facial expressions (Biermann et al., 2021). However, the work from Swain et al. (2022) demonstrated that "happy" and "surprised" faces are equally perceived with and without masks, even though the mouth, and so the smile, is occluded. Therefore, this study confirmed that mask wearing particularly impacts perception of disgust and sadness. In addition, the authors highlighted the existence of a positive effect of social intelligence on the ability to correctly identified anger, sadness and surprise from masked faces (emotions that seem difficult to identify with the mask).

Face masks not only impair emotion reading but also modify the perception of ourselves (Carbon, 2020b). The sentiment to feel "strange"

<sup>3</sup> <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

<sup>4</sup> CDC. (2020). Social distancing. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>

when wearing a mask is substantially reduced after mere exposure to social groups of masked individuals. If these results suggest that face masks are likely to impair facial emotion decoding, it is hard to precisely predict to what extent. The use of eye cues increases as people are more exposed to others wearing masks, implying that emotion perception may not be an immutable ability (Barrick et al., 2021). These results support the hypothesis that masks impact our ability to perceive facial emotion. People seem to adapt their emotion reading on masked faces by focusing on visual cues to a greater extent, and particularly on the information conveyed by the region of the eyes. The important role of the eye region in social interaction is supported by another recent study by Schmidt-mann et al. (2020). The study evaluated the temporal components of facial expression processing and demonstrated that facial expression of complex mental states can be recognized, above chance level, within a fraction of a second, based on the information collected specifically from the eye region.

The impact of face masks on emotion perception is exacerbated in older adults (Grundmann et al., 2021). Chaby et al. (2017) investigated gaze strategies involved in facial emotional processing during aging. Eye movements were recorded in participants that were looking at basic facial expressions. Older adults performed worse than younger adults in identifying facial expressions, except for joy and disgust. Noticeably, older adults used a focused-gaze strategy as they focused their attention on the lower part of the face only, the part concealed by face masks. By contrast, younger adults used an exploratory-gaze strategy, repeatedly visiting the upper and lower facial areas and were less impacted by the concealment of the lower part of the face. This finding is consistent with the result of a meta-analysis showing that older adults explore more the mouth and less the eyes during facial emotion processing compared to younger adults (Grainger and Henry, 2020). Hence, older people might lack expertise in exploring upper facial regions, which is necessary when the lower face is covered by a mask. Those changes in communication associated to face masking could even accelerate cognitive decline in the long run (Schroeter et al., 2021). As social cognition is already affected by aging and dementia, strategies have to be developed to cope with these profound changes in communication in older individuals.

Data suggest that 7- to 13-year-old children are able to make accurate inferences about emotions, even when parts of the face are covered (Ruba and Pollak, 2020). This suggests that while children may face some challenges when interacting with others wearing masks, it is unlikely that mask wearing would dramatically impair children's social interactions in their everyday lives (Ruba and Pollak, 2020). It has also been demonstrated that the ability of 9- to 10-year-old children to read emotions is impaired similarly to adults on an overall performance level, but that the impact of mask wearing on their performance to decipher specific emotions is quite different. Mask wearing impacts children's perception of disgust, fear and sadness drastically, the perception of happiness mildly, but improves the perception of anger and neutral emotion (Carbon and Serrano, 2021).

In the recent study from Gori et al. (2021), the authors concluded that the use of masks influences our ability to infer facial expressions at any age and that the human capacity to read emotions from facial configurations when a face mask is present becomes particularly reduced in toddlers (3–5 years). Authors suggested that this is related to different age-related developmental stages of face processing neural pathways associated with emotional reasoning. The results from the Gori et al. study raise the question of whether deprivation of facial visual features/cues might alter or delay the development of social skills associated with face perception in young children.

### 2.3. Effect on voice, speech and intelligibility

Wearing a face mask causes voice attenuation and distortion (Goldin et al., 2020; Giovanelli et al., 2021). Face masks attenuate sound level by 3–4 dB and filter sound frequencies mostly between 2 and 7 KHz (Goldin et al., 2020). Since these frequencies are important for speech

intelligibility (i.e. Chi et al., 1999) and there is an attenuation of the transmitted sound, it is quite logical to hypothesize that the transmission of speech is impaired with mask wearing. The influence of the mask on communication impacts both the speaker and the listener. The speaker, in particular, has to increase vocal intensity to compensate for sound attenuation. In addition, according to Ribeiro et al. (2020), the use of face masks could alter pneumo-phono-articulatory coordination which results in difficulty to coordinate speech and breathing. As a result, mask-wearers may experience a higher level of vocal fatigue. These difficulties could explain why some people choose to lower their mask on their chin to when they speak, even if the risk of dispersion of viral particles increases. The listener also suffers from discomfort in communication when speakers wear face masks. Knowles & Badh (2022) studied the impact of masks on spectral speech acoustics in healthy individuals. They confirmed that masks act as a low-pass filter and demonstrated that attenuation of sound with distance increases. The authors concluded that masks hamper speech intelligibility for listeners.

It is to note that a recent study from Cohn et al. (2021) revealed that wearing a fabric face mask does not uniformly affect speech intelligibility across styles (i.e. casual, clear and emotional). Data from this study indicate that speakers make different speech adaptations when they wear a face mask (compared to when they are not masked) and that these adjustments consequently affect intelligibility for listeners. In fact, the study from Cohn et al. (2021) shows that when speakers are able to produce a clear speech while wearing a face mask, their utterances are *more* accurately understood by listeners than when they do not wear a mask (Cohn et al., 2021).

To sum up, face mask wearing modifies non-verbal and verbal communication but allows communication and transmission of non-verbal cues. Some perceived constraints are more linked to the perception of the mask by the wearer itself than to objective impairment of communication. Face mask wearing needs adaptations to promote a good inter-individual communication.

### 3. Strategies that may alleviate communication difficulties resulting from mask wearing

In this last part, we propose solutions to facilitate communication in situations where face mask is not optional and we propose teleconsultation as an alternative for people with "constitutional" communication impairment.

The use of transparent masks, in replacement of fabric and medical masks, could be beneficial, on the one hand, to allow holistic processing of face reading, and, on the other hand, to help restore mouth and lips speech reading for people with hearing impairment. The use of transparent face masks may be particularly suitable as they may have lower impact on people's ability to recognize others' identity and emotional states (Carbon, 2020; Carragher and Hancock, 2020; Freud et al., 2020) and they may also have minimal influence, when used for longer periods of time, on experience-dependent synaptic plasticity on which facial identity and emotion recognition rely. Indeed, compared to standard medical face masks, transparent masks significantly spare the capability to recognize emotional face expressions. It is to note, however, that while transparent masks (unlike standard masks) do not impair emotion recognition, they seem to impair subsequent re-identification of the same, unmasked, face (like standard masks) (Marini et al., 2021).

Even though masks cover the bottom half of the face and impair the decoding of some emotions, they allow to perceive the eyes, which are a critical for emotion reading. According to Ellen Carr (2020), "through face masks, direct eye contact can still establish intent, clarity, connection and compassion". Carr explains the importance of wearing a mask in many particular clinical procedures and especially in oncology practice. She describes moments of frustration when trying to communicate through a face mask. Interestingly, Carr proposed different ways to improve communication, such as learning from actors (how they communicate via body language, the way they project their voice or



enunciate, etc....), developing the ability to really “listen” and focus on others’ eyes, which have long been considered as being the “window to the soul”. The ability to really listen can be related to the notion of mindful communication. Indeed, nonverbal communication is just as important as the words we use (Zulman et al., 2020). Schlögl & Jones (2020) described a way to improve communication in order to take intentional control of our nonverbal communication in this time of masked faces. This way of communication relies on three steps: i) attend mindfully: create a ritual to focus our attention, become more aware of our characteristic gestures and body language, and practice the habit of underlining everything we say with gesture and pantomime; ii) behave calmly: approach people from the front, drop down to eye level, project a positive, calm attitude, and avoid body language that shows frustration, anger or impatience; iii) communicate clearly: use short, simple sentences and underline your words with gestures. These approaches are particularly recommended for healthcare providers need to communicate with older individuals, but it can also be very useful when teachers need to interact with young children or teenagers. With children in particular, being aware of the power of non-verbal communication and remaining patient is fundamental (Swaminathan and Meera, 2020).

In line with the “personal protective equipment (PPE) Portrait” strategy tested in two Ebola care units in 2014–2015 (<https://ppeportrait.org/>), a recent study evaluated if the addition of a portrait photograph on medical PPE outfits during practice may influence the way patients perceive healthcare professionals that wear masks (Wiesmann et al., 2021). According to the authors, PPE Portraits bolstered social bonds and camaraderie in medical facilities between visiting nurses and physicians and their coworkers that had never seen their faces. PPE Portraits were particularly beneficial in palliative medicine and hospice contexts. Medical teams used PPE Portraits to initiate communication and establish social bonds with patients and their families.

As stated earlier, mask wearing impacts both verbal and nonverbal communication. When individuals are psychologically healthy, the impact of mask wearing on verbal communication can be counteracted by the use of transparent face protections. On the other hand, developing aware communication can alleviate the nonverbal effect of mask wearing. When individuals suffer from socioemotional disorders, strategies need to be adapted. Indeed, many socioemotional disorders are associated with deficits in the ability to perceive and interpret facial emotion (Baron-Cohen and Wheelwright, 2004; Blair, 2005; Marsh et al., 2007). In particular, it has been demonstrated that Autism Spectrum Disorders (Pelphrey et al., 2002; Harms et al., 2010), schizophrenia (Sasson et al., 2007; Kohler et al., 2010), and social phobia (Horley et al., 2003) are associated with deficits in emotion perception. Mask face is obviously recommended in psychiatric practice when patient and doctor need to have a presential interaction and when there is a risk that the use of conventional masks may increase communication difficulties. When communication cannot be “healthy”, teleconsultation could be, otherwise, a great tool/strategy to overcome the negative influence of mask wearing, and could particularly be beneficial for bidirectional communication (from practitioner to patient and from patient to practitioner) and evaluation of mental states (Thirthalli et al., 2020). Although telepsychiatric sessions have been experienced as being more superficial by participants so far, no difference was observed in post-session positivity in patients with attention deficit/hyperactivity disorder (Wyler et al., 2021).

To conclude, this review is not intended to discourage people from wearing face masks in the COVID-19 context, far from it. Rather, it aims at highlighting the fact that wearing masks modifies the way people interact, although it does not completely disrupt social and medical interactions. If we have to learn to live with the virus and need to use masks on a regular basis, we may have to find new strategies to counteract the negative effects of mask wearing and adapt these strategies to gender, age and socioemotional state of people.

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## Authors’ contributions

Celine Ramdani and Antoine Coutrot drafted the article. Celine Ramdani, Antoine Coutrot and Michael Ogier critically revised the manuscript for important intellectual content. All co-writers approved the submitted version of the manuscript.

## Availability of data and material

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## Declaration of competing interest

The authors declare no conflicts of interest.

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