

Université de Montréal

**De la pratique à la maison à la réalité virtuelle : expérience subjective de personnes  
ayant un trouble psychotique avec anxiété sociale suivant une thérapie de pleine  
conscience**

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## Résumé

Cet essai a pour but d'explorer l'expérience subjective de personnes ayant un trouble psychotique avec anxiété sociale suivant une thérapie pleine conscience à travers 3 études différentes : un devis à cas unique ; une étude pilote ( $n=6$ ) sur l'expérience de la pratique à la maison dans le contexte de cette même thérapie ; et un devis à cas unique sur l'expérience de cette thérapie avec un volet de réalité virtuelle ajouté. L'intervention proposée a été généralement bien acceptée et appréciée par les participants, mais les devoirs (méditations) sont ressortis comme étant plutôt difficiles pour certains participants. La réalité virtuelle ajoutée a semblé avoir un impact positif potentiel dans la thérapie, étant également bien acceptée et appréciée par le participant. Des résultats quantitatifs sur l'anxiété sociale, la régulation émotionnelle cognitive, la pleine conscience et l'évitement expérientiel sont présentés dans différents tableaux. Cet essai montre que l'intervention présentée est faisable, appréciée par les participants et a un potentiel à être utile et thérapeutique, même si l'efficacité ne peut pas être établie dans cette étude exploratoire-une étude plus substantielle est nécessaire pour mesurer ses impacts, particulièrement l'exposition par la réalité virtuelle.

***Mots clés : psychose, anxiété sociale, pleine conscience, réalité virtuelle, TCC 3<sup>e</sup> vague, psychologie clinique***

## **Abstract**

This paper aims at exploring the subjective experience of a mindfulness-based intervention for people with a psychotic disorder and social anxiety in 3 different studies: a single case study; a pilot study ( $n=6$ ) regarding the experience of at-home practice in the context of that same therapy; and a single case study on the experience of the therapy with added virtual reality exposure. The intervention proposed was generally well-accepted and -appreciated by the participants, but the meditation homework stood out as rather difficult for some participants. The virtual reality addition appeared as having a potential positive impact in the therapy, being also well-accepted and -appreciated by the participant. Quantitative results on social anxiety, cognitive emotion regulation, mindfulness and experiential avoidance are shown in different tables. This paper shows that the intervention presented is feasible, appreciated by the participants and has potential to be useful and therapeutic, even though efficacy cannot be established in this explorative paper- a more substantial study is needed to measure its impacts, especially the virtual reality exposure.

***Keywords: psychosis, social anxiety, mindfulness, virtual reality, third-wave CBT, clinical psychology***

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## Liste des sigles

<b>SSRI</b>	Selective serotonin reuptake inhibitors
<b>CBT</b>	Cognitive behavioral therapy
<b>MBI</b>	Mindfulness-based interventions
<b>MBSR</b>	Mindfulness-based stress reduction
<b>VR</b>	Virtual reality
<b>CAM</b>	Compassion, acceptance and mindfulness
<b>SCID-5</b>	Structured Clinical Interview for Diagnosis (DSM-5)
<b>BPRS-E</b>	Brief Psychiatric Rating Scale-Expanded Version
<b>BSPS</b>	Brief Social Phobia Scale
<b>SAQ-A</b>	Social Anxiety Questionnaire for Adults
<b>CERQ</b>	Cognitive Emotion Regulation Questionnaire
<b>MAAS</b>	Mindful Attention Awareness Scale
<b>AAQ</b>	Acceptance and Action Questionnaire

## INTRODUCTION

### **Social isolation**

Social isolation is currently considered as a public health problem of utmost importance, being associated with greater usage of health services (Gerst-Emerson & Jayawardhana, 2015). People who have solid interpersonal bonds, on the contrary, benefit from a 50% higher survival rate over 7.5 years compared to socially disconnected people (Holt-Lunstad, Smith & Layton, 2010).

Certain vulnerable people are at a very high risk of being socially isolated, for example, elderly people or people with a psychic vulnerability. In fact, the latter are said to have smaller social networks, less friends and less people that can help them when in crisis. Moreover, social isolation is not only particularly prevalent in people with a psychic vulnerability, these people are said to be the most socially deprived (Macdonald, Hayes & Baglioni, 2000). Social isolation creates a fear of others and of judgement, linked to the stigma caused by the psychic vulnerability (Achim, Maziade, Raymond, Olivier, Mérette & Roy, 2011; Sündermann, Onwumere, Kane, Morgan & Kuipers, 2014). This fear or social anxiety exacerbates the social isolation and is detrimental to community commitment and to the development of interpersonal relationships (Kingsep, Nathan, & Castle, 2003; Lysaker, Yanos, Outcalt & Roe, 2010).

### **Social anxiety in psychosis**

People with a severe mental disorder are highly socially isolated. This is due to stigma- and this isolation makes these people lose their confidence regarding their ability to be adequate in social contexts and will thus avoid these contexts, developing then social

anxiety. According to some studies, about 30% of people with a severe mental disorder suffer from social anxiety added to their difficulties (depression, psychosis, bipolar disorder; Achim et al., 2011; Lecomte, Th roux, Paquin, Potvin & Achim, 2019). They then struggle going back to work or creating a social network. Social isolation creates a higher risk of mortality and morbidity (physical and mental health disorders; Holt-Lunstad et al., 2010; Gerst-Emerson & Jayawardhana, 2015). Accordingly, socially isolated people that have a mental health disorder are at a higher risk to be socially isolated, especially young adults with a mental health disorder (Achim et al., 2011).

Social anxiety is an important problem in people with psychotic disorders; as many as 23% of people with a schizophrenia diagnosis also have a social anxiety disorder (Achim et al., 2011). This social anxiety not only is an epiphenomenon of the psychotic symptoms or clinical paranoia, it also has more than one causal direction (Michail & Birchwood, 2009). According to these authors, it would be diagnosed through the same criteria that the SCAN and the SCID use. Social anxiety would worsen the psychotic disorder prognosis and is an obstacle to the general social recovery of the individual, worsening throughout time for those living in the community (Kingsep et al., 2003; Lysaker et al., 2010; Kumazaki, Kobayashi, Niimura, Kobayashi, Ito, Nemoto, Sakuma, Kashima & Mizuno, 2012).

Not everyone with a psychotic disorder has social anxiety, but social anxiety is the most prevalent anxiety disorder in people with a psychotic disorder (Achim et al., 2011). The presence of this anxiety disorder is twofold compared to people without a psychotic disorder (Kingsep et al., 2003; Pallanti, Quercioli & Hollander, 2004; Braga, Mendlowicz, Marrocos & Figueira, 2005). The comorbid social anxiety has received so far little attention

in the research and clinical areas, mostly because clinicians wrongly considered it as paranoia (Halperin, Nathan, Drummond & Castle, 2000; Kingsep et al., 2003; Pallanti et al., 2004). Despite that paranoia and social anxiety both come with avoidance of a threat and can coexist, in people with a psychotic disorder, some authors describe two sides of a similar phenomenon, where the fear of judgement or of being ridiculed in social anxiety would be less severe than the fear of persecution and of physical harm in paranoia (Gilbert, Boxall, Cheung & Irons, 2005; Freeman, Gittins, Pugh & Antley, 2008; Lysaker et al., 2010). A study has shown that the psychotic symptoms such as paranoid delusions have a tendency to get better with time, whereas social anxiety is often present before the first psychotic episode, and typically worsens with time (Kumazaki et al., 2012).

People with a psychotic disorder and social anxiety are more likely to develop alcohol and psychotropic substance addictions, and have higher rates of suicide and relapse, and a lesser quality of life in general (Halperin et al., 2000; Kingsep et al., 2003; Pallanti et al., 2004; Braga et al., 2005; Tolman, Himle, Bybee, Abelson, Hoffman & Van Etten-Lee, 2009).

### **Social cognition and cognitive biases**

The symptoms found in social anxiety are linked to the perception and interpretation of the social contexts: such cognitive processes are considered inherent to social cognition. Social cognition can be defined as the inclusion of all processes used to group, interpret and treat social information and, finally, interact on the interpersonal level referring to these interpretations (Corrigan & Penn, 2001; Green & Leitman, 2008). It is well known that individuals with a psychotic disorder have many social deficits, such as difficulties in social functioning and limited social skills: deficits which are relatively

stable throughout time. According to some authors, the social deficits are even more pronounced in people with a psychotic disorder in comparison to people with other psychiatric disorders (Mueser & Bellack, 1998; Khoury, Lecomte, Comtois & Nicole, 2013). In the last decade, many researchers have concluded that the social cognition deficits could explain many, if not all, of the social deficits and of the difficulties in social functioning found in psychotic disorders (Couture, Penn & Roberts, 2006; Pinkham, Penn, Green, Buck, Healey & Harvey, 2013).

Thus, many studies suggest that social cognition could directly predict, or at least be a mediator of, social functioning and the quality of life of people with psychosis (Roncone, Mazza, Frangou, De Risio, Ussorio, Tozzini & Casacchia, 2004; Addington, Saeedi & Addington, 2006; Brune, Abdel-Hamid, Lehmkamper & Sonntag, 2007). According to a group of experts from the NIMH (National Institute of Mental Health), social cognition can be divided into different domains: emotion recognition (recognizing facial emotions), theory of mind (recognizing others' mental states, social knowledge (knowing social regulations), attribution styles (self-blaming or giving others negative intentions), and emotional regulation (how one deals with their strong emotions; Pinkham et al., 2013).

Despite that many authors talk of social cognition deficits, suggesting a stable characteristic phenomenon, recent studies rather suggest that specific cognitive biases, malleable to change, explain the difficulties in the mentioned social cognition domains (Morrison & Heimberg, 2013).

Individuals with a psychotic disorder are known to have a bias called 'jumping to conclusions' which means they can take decisions with little information (Woodward,

Munz, Leclerc & Lecomte, 2009). It is considered a bias because it improves as delusions improve, after a treatment, for example (Sanford, Lecomte, Leclerc, Wykes & Woodward, 2013). Another bias is rather linked to the third social cognition domain: attribution. People with a psychotic disorder, especially those who have paranoia or social anxiety, have a tendency to see negative events as coming from external causes (giving others negative intentions), and do it excessively (Bentall & Kaney, 2005). Considering these biases, the theory of mind deficit (difficulty in recognizing others' mental states) documented in psychotic disorders, in social anxiety, and in people who have both, could in fact be the result of these biases while being linked to other social cognition deficits (Hirsch, Clark & Mathews, 2006; Moritz, Kerstan, Veckenstedt, Randjbar, Vitzthum, Schmidt, Heise & Woodward, 2011; Achim, Ouellet, Lavoie, Vallières, Jackson & Roy, 2013). Also, more attention focused on a potential threat, a tendency to see negative intentions in others (attribution style), decisions based on too little information and not following social regulations or contexts (social knowledge), could bring to misinterpret others' thoughts and actions (Green, Bearden, Cannon, Fiske et al., 2012).

Emotional regulation, which is the ability to control one's own emotional reactions when facing stress, has also been documented as dysfunctional in people with social anxiety and in people with a psychotic disorder (with or without comorbid social anxiety), who naturally turn to avoidance and resignation rather than coping strategies (Ventura, Nuechterlein, Subotnik, Green & Gitlin, 2004; Lysaker et al., 2010; Morrison & Heimberg, 2013).

Finally, some authors point out the importance of focusing on experiential avoidance in therapies for people with a psychotic disorder, since it would be a predictor

of the level of distress linked to their psychotic symptoms (Varese, Morrison, Beck, Heffernan, Law & Bentall, 2016).

### **Mindfulness-based interventions in psychosis**

There are currently no treatment guidelines for people who have a psychotic disorder and present with comorbid social anxiety. Pilot studies have so far reported early preliminary results on the efficacy of standard treatments for social anxiety, such as selective serotonin reuptake inhibitors (SSRI), benzodiazepine, and group cognitive behavioral therapy (CBT). SSRI and benzodiazepine medication can be efficient but come with unpleasant side effects that can interact with the side effects from antipsychotic medication (Stahl, 2011).

Group CBT for social anxiety was investigated in recent pilot studies without control groups suggesting that people with schizophrenia, or early psychosis, and social anxiety committing to a group CBT saw significant improvements post-therapy in social anxiety (Halperin et al., 2000; Kingsep et al., 2003; Montreuil, Malla, Joobar, Bélanger & Lepage, 2012; Lepage et al., 2014).

A larger, and recent study, found that recruitment was extremely difficult when offering group CBT for social anxiety in people with schizophrenia (Lepage et al., 2022). Indeed, despite that group CBT is a promising treatment, many individuals with schizophrenia and social anxiety won't benefit from it whether because they will refuse to show up (fear of the group format, perceived as extremely anxiety provoking for them) or because their neurocognitive deficits interfere with the learning of concepts or cognitive strategies (Velligan, Draper, Stutes, Maples, Mintz, Tai & Turkington, 2009; Haglund, Cabaniss, Kimhy & Corcoran, 2013;). Studies on group CBT for psychosis (without social

anxiety) suggest that as much as one third of the participants approached refuse to participate to a group (Spidel, Lecomte & Leclerc, 2006; Villeneuve, Potvin, Lesage & Nicole, 2010).

People with a psychotic disorder are documented to have important neurocognitive deficits that affect attention, verbal memory and executive functioning (Green, Kern, Braff & Mintz, 2000). Treatment options that don't rely much on verbal and intellectual skills are necessary for these people, but also for those with comorbid social anxiety. Mindfulness/3<sup>rd</sup> wave CBT is a promising treatment of that type.

In order to decrease social anxiety and improve social inclusion, mindfulness has proven to be of interest in people with psychotic disorders. Indeed, it appears to improve emotional regulation and decrease symptoms of anxiety (Goldin & Gross, 2010; Spidel, Lecomte, Kealy & Daigneault, 2017). Recent randomized controlled trials have demonstrated that mindfulness-based therapies using acceptance, self-compassion and mindfulness (mindfulness-based interventions; MBI) are as effective as traditional CBT for social anxiety in people without schizophrenia, necessitate few verbal and cognitive skills, and are even effective in people with moderate intellectual deficits (Arch, Ayers, Baker, Almklov, Dean & Craske, 2013; Idusohan-Moizer, Sawicka, Dendle & Albany, 2013; Kocovski, Fleming, Hawley, Huta & Antony, 2013). Furthermore, recent results suggest that MBI might fare better than CBT for social anxiety in people who have comorbid disorders (Arch & Ayers, 2013).

Meta-analyses also confirmed that MBI are effective for anxiety disorders in general (Hedge's  $g=.96$ ; Khoury, Lecomte, Fortin, Masse, Therien, Bouchard, Chapleau, Paquin & Hofmann, 2013), as well as in people with psychotic disorders (Hedge's  $g=.52$



to .41 Khoury, Lecomte, Gaudiano & Paquin, 2013). In these two meta-analyses, the specific outcomes measured were clinical outcomes (e.g., anxiety, depression, pain, blood pressure) and mindfulness outcomes in the former, and positive symptoms, negative symptoms, affective symptoms, thought disorder, functioning, re-hospitalization, quality of life, and mindfulness/acceptance/compassion in the latter, through the use of validated measures from baseline to follow-up. Khoury, Lecomte, Fortin, Masse, Therien, Bouchard, Chapleau, Paquin & Hofmann, (2013) noted that for controlled studies, the total quality score varied from a minimum of 1 (lowest quality) to a maximum of 11 (highest quality) with a mean of 4.84 (SD=2.19). For pre-post studies, the total score varied from a minimum of 0 to a maximum of 5, with a mean of 2.93 (SD=1.19). Khoury, Lecomte, Gaudiano & Paquin (2013) concluded that the quality score of the studies varied from a minimum of 3 (lowest quality) to a maximum of 10 (highest quality) with a mean of 5.69 (SD=2.39).

MBI focus on thoughts and behaviors while using strategies rooted in Buddhist principles, such as acceptance, self-compassion and mindfulness. Mindfulness in particular refers to focussing on the present moment while observing one's thoughts, experiencing only the 'now' moment, and often involves meditation. Most MBI studies on social anxiety used mindfulness-based stress reduction (MBSR; Morrison & Heimberg, 2013), which includes intensive meditation sessions- such meditation intensity is not recommended for people who experienced psychosis, because it may cause decompensation (Dyga & Stupak, 2015). Indeed, according to these authors, the treatment is adapted for people with a psychotic disorder, in that the meditation focused on the breath is shortened from 30-40 minutes to 10 minutes, and the 'body scan' is shortened from 3 minutes to 1 minute. In fact, MBI are useful with these people (see Khoury, Lecomte, Gaudiano & Paquin, 2013)

to diminish psychotic symptoms and general distress, but only when a more balanced approach is used that implies 3<sup>rd</sup> wave cognitive behavioral strategies such as acceptance, self-compassion and mindfulness, with shorter and carefully adapted meditation practices. The idea is to help individuals focus on tangibles things in the moment (i.e. sensations, breath), what is important for them (values), and help them practice acceptance (learning to live with), self-compassion (stop self-judgement) and utilize these strategies every day.

MBI with individuals with psychotic disorders can be delivered individually or in small groups (Chadwick, 2014). A total of 4 to 8 sessions are typically delivered, weekly, and last about 50 minutes per session (Cullen, 2011; Khoury, Lecomte, Gaudiano & Paquin, 2013; Spidel et al., 2017). Multiple studies have determined the efficacy of a MBI to reduce anxiety symptoms, including symptoms of trauma, in people with psychotic disorders. Studies also suggest that MBI improves emotional regulation, an important aspect of social cognition, in people with schizophrenia and anxiety (Brown, Davis, LaRocco & Strasburger, 2010; Khoury, Lecomte, Comtois, & Nicole, 2013; Bullis, Boe, Asnaani & Hofmann, 2014; Spidel et al., 2017).

Most studies have focused on demonstrating empirical evidence of MBI, few have described the subjective experience of participating in a MBI intervention when presenting with schizophrenia and a comorbid anxiety disorder such as social anxiety. Given the increasing popularity of MBI interventions for people with psychotic disorders, it is of high relevance to better understand the subjective experience of people receiving such therapies (MBI), in order to understand the process linked to change, and eventually target the more 'active' elements that can improve the effect of the therapy.

## **New technologies**

On their part, information technologies were often said to worsen social disconnectedness. They are being used more and more every day and are being more exploited. In the context of intervention with people with a psychotic disorder, information technologies could be, on the contrary, an important tool for social reconnection. Indeed, virtual reality (VR) in particular could be a tool for social exposure, which is considered to help social relationships and contacts. In a mindfulness context, it could also be used for virtual exposure to anxiety provoking social contexts.

The *Université du Québec en Outaouais* and its cyberpsychology laboratory, directed by Stéphane Bouchard, have demonstrated the benefits of VR by treating people with an anxiety disorder, and have shone light on the efficiency of VR for anxiety (Wiederhold & Bouchard, 2014). A preliminary study has shown as interesting results of a VR therapy (where VR was used for exposure to anxiety provoking social contexts) compared to a classic CBT with people with a social anxiety disorder (Klinger, Bouchard, Légeron, Roy, Lauer, Chemin & Nugues, 2005). However, no study has investigated the potential impact of the addition of VR in a MBI for people with a psychotic disorder with comorbid social anxiety.

Indeed, VR has the advantage of offering a possibility of exposure that is more accessible, that counteract the avoidance caused by the too anxiety provoking contexts. Exposure is thus important to help people with social anxiety. With the emergence of information technologies and their ever growing accessibility, if exposure in this context seems to have an added value, a greater study could be conducted.

## **Objectives**

According to the different information described previously, it is pertinent to remember that social anxiety in people with a psychotic disorder aggravates social isolation and contributes to a lesser quality of life, but that this social anxiety is treatable with a MBI. Moreover, the impact that can have the use of VR to treat this social anxiety is as interesting as classic MBI. Because of this novel approach (mindfulness and VR), it is important to verify the experience of a person receiving the therapy without the VR, verify the experience of daily mindfulness practice, and finally verify the experience of a person receiving the therapy with the VR.

As such, we propose to explore the subjective experience of people with comorbid social anxiety and schizophrenia in 3 studies using a mixed-method design (qualitative and quantitative): a single case study on the experience of mindfulness-based therapy; a pilot study (6 individuals) regarding the experience of at-home practice in the context of mindfulness-based therapy; and a single case study on the experience of mindfulness-based therapy with added virtual reality (VR) exposure.

## METHODS

### CAM intervention

The MBI intervention studied in this paper is named CAM (for compassion, acceptance and mindfulness; Khoury, Lecomte, Comtois, & Nicole, 2013). It is a weekly 8-session individual therapy tailored for individuals with psychosis. Both a group and individual version of the manual exist, but for people with social anxiety, only the individual format was used in this study. Every session focuses on a theme (see Table 1 for details), and each session includes different activities with elements to explore and questions to answer with the participant. All sessions end with a different guided meditation, that which becomes the daily homework of the week.

**Table 1**

***Structure and content of the CAM (compassion – acceptance – mindfulness) intervention***

<b>Session number and title</b>	<b>Contents</b>	<b>Homework</b>
1- Introduction	Explanation of the therapy, introduction to mindfulness, meditations (mindful eating and soothing breathing).	Meditate daily (soothing breathing guided meditation).
2- Values	Defining one's values, differences between values and goals, meditation (soothing breathing).	Meditate daily (soothing breathing guided meditation).
3- What's keeping me from achieving my values ?	Discussion of this theme, meditation (creating a safe space).	Meditate daily (creating a safe space guided meditation).
4- Acceptance	Differences between acceptance and resignation, detachment (being an external observer), meditation (acceptance).	Meditate daily (acceptance guided meditation).

5- Compassion	The role of compassion and acceptance in painful thoughts and emotions, discussion, meditation (self-compassion).	Meditate daily (self-compassion guided meditation).
6- Compassion towards others and in one's own well-being	Exploration of this theme, meditation (compassion towards others).	Meditate daily (compassion towards others guided meditation).
7- Other useful ways to feel good	Descriptive writing, exploration of different strategies to feel good, meditation (half-smile).	Meditate daily (guided meditation of choice).
8- Feedback session	The role of positive emotions in well-being, feedback on overall experience, meditation (Vipassana).	Vipassana guided meditation.

## Questionnaires

For all 3 studies combined, a validated French version of the following scales was used, and they were administered by trained doctoral level students (according to the required standards of the scales when necessary). To confirm the presence of a social anxiety disorder, the anxiety section of the Structured Clinical Interview for DSM-5 (SCID-5; First, 2015) was used. In general, the instrument's fidelity varies with the disorder assessed ( $\kappa=0.57$  to 1.00) and its validity would be superior to other structured clinical interviews (First, 2015).

The Brief Psychiatric Rating Scale-Expanded Version (BPRS-E) is a semi-structured interview that was used to document psychiatric symptoms (Ventura, Nuechterlein, Subotnik, Gutkind, & Gilbert, 2000; Mouaffak, Morvan, Bannour, Chayet, Bourdel, Thepaut, Kazas, Guelfi, Millet, Olié, & Krebs, 2010 ). A lower score indicates an improvement in symptomatology (0 = *absent* to 7 = *extremely severe*).

To measure social anxiety, the Brief Social Phobia Scale (BSPS; Davidson, Potts, Richichi, Ford, Krishnan, Smith & Wilson, 1991) and the Social Anxiety Questionnaire for Adults (SAQ-A; Caballo, Salazar, Irurtia, Arias, Hofmann & the CISO-A Research Team, 2010; Bravo, Lecomte, Corbière & Heeren, 2019) were used. Both instruments measure different dimensions of social anxiety.

The BSPS is a scale that measures social anxiety through 7 items which are attributed a level of fear with a 5-point Likert scale (from 0 = *not at all* to 4 = *very much*). A level of avoidance is also measured with a 5-point Likert scale (from 0 = *never* to 4 = *always*). It finally has 4 items that measure the physiological manifestations of anxiety with a 5-point Likert scale (from 0 = *not at all* to 4 = *very much*). The instrument has shown acceptable inter-judge and test-retest fidelity, and adequate internal consistency and concurrent validity (Davidson et al., 1991). Its social anxiety dimensions are fear, avoidance, and arousal.

The SAQ-A measures social anxiety through 30 items that represent a social context that can create discomfort, with the use of a 5-point Likert scale that indicate the level of discomfort, tension or nervousness (from 1 = *not at all* to 5 = *extremely*). Its internal consistency is adequate ( $r=0.86$  to  $0.92$ ; Caballo et al., 2010). Its social anxiety dimensions are 5 feared social contexts: Talk in public/with people with authority; interactions with the opposite sex; expressing unhappiness, disgust or discontentment; being criticized or embarrassed; and interactions with strangers.

To measure emotional regulation, the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij & Spinhoven, 2001; Jermann, Van der Linden, d'Acremont & Zermatten, 2006) was used. The scale contains 36 items rated with a 5-point Likert scale

(1 = *almost never* to 5 = *almost always*). It measures 9 cognitive strategies for the regulation of emotions: self-blaming; blaming others; acceptance; refocusing on planning; catastrophizing; etc. These 9 dimensions were grouped under ‘adaptive regulation’ and ‘non-adaptive regulation,’ for the reversed items. The test-retest fidelity of the instrument is good ( $r=0.63$ ) and the convergent validity is strong according to the authors.

To measure mindfulness, the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003; Jermann, Billieux, Larøi, d’Argembeau, Bondolfi, Zermatten & Van der Linden, 2009) was used. This scale measures one’s level of presence and ability to stay present throughout daily activities, emotions and sensations. The scale contains 15 items rated with a 6-point Likert scale (1 = *almost always* to 6 = *almost never*). The instrument has strong convergent and divergent validity with other psychological wellness scales, and has a good internal fidelity ( $\alpha=0.89$ ; Brown & Ryan, 2003; MacKillop & Anderson, 2007).

In order to assess experiential avoidance, the Acceptance and Action Questionnaire (AAQ; Hayes, Bissett, Strosahl, Wilson et al., 2000; Monestès, Villatte, Mouras, Loas et Bond, 2009) was used. This scale aims at measuring one’s reluctance to feel their emotions and uncomfortable thoughts, their desire to control or alter their internal experiences and their ability to face them. Seven items are rated with a 7-point Likert scale (1 = *never true* to 7 = *always true*). Barraca Mairal (2004) has shown studies detailing adequate psychometric properties of the scale, such as internal consistency and predictive as well as construct, convergent and concurrent validity.



## **- Study 1**

### **Objectives**

Because of the novelty of the intervention, it is important to first report the subjective experience of a participant receiving the intervention, without any VR exposure. All the while, it is interesting to look, for descriptive purposes, at the potential improvement of the participant on different relevant variables.

### **Participant (Id. 1)**

A participant was recruited from a clinic for people with psychotic disorders. He was a single, African-Canadian man of 30 years of age, had a social anxiety diagnosis with a first non-affective psychotic episode. He had been using cannabis on a daily basis for the past 15 years. To confirm the presence of a social anxiety disorder, the social anxiety section of the Structured Clinical Interview for Diagnosis (DSM-5) (SCID-5; First, 2015) was administered at baseline. Inclusion criterion: desire to receive help with social anxiety. Exclusion criterion: presence of another comorbid disorder other than substance misuse, checked at recruitment with the participant's psychiatrist.

### **Data**

The participant responded to a full battery of questionnaires before the intervention (baseline/T0), after the intervention (T1) and at a 2-month follow-up (T2), for a total participation duration of 4 months. The therapist collected descriptive data after every session- the notes were read and summarized. The participant also responded to a feedback questionnaire of 8 questions on overall experience (from what went well to what the participant wants to continue working on) at session 8 (last session)- the comments were read to highlight the most salient ideas (phenomenological analysis).

## Measures

To assess the positive and negative psychiatric symptoms, to make sure these symptoms were stable throughout time, the Brief Psychiatric Rating Scale-Expanded Version (BPRS-E; Ventura et al., 2000) was used. The Brief Social Phobia Scale (BSPS; Davidson et al., 1991) and the Social Anxiety Questionnaire for Adults (SAQ-A; Caballo et al., 2010) were used to measure social anxiety since both questionnaires have different dimensions. To measure emotional regulation, the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2001) was used. Mindfulness was measured with the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). Finally, experiential avoidance (or psychological flexibility), was assessed with the Acceptance and Action Questionnaire(AAQ; Hayes et al., 2000).

## Analyses

Phenomenological qualitative analysis was performed on the therapist's notes as well as on the participant's feedback at the end of the therapy. The themes that emerged were pointed out through the use of inductive coding, which was done in three steps, in order to detail the experience of the participant: step 1 was to read the qualitative data (the therapist's notes and the feedback of the participant); step 2 was to group the information in many specific themes; and step 3 was to group the themes in more general themes in order to have only a few themes (3 themes emerged in the end). These themes are described in the results section according to the order of importance given by the participant, and the therapist. Regarding this feedback, 8 questions were asked to the participant, who wrote down his answers: *What went particularly well for you during the sessions? ; What did you appreciate most during the sessions? ; What did you appreciate less? ; What did you learn*

*the most? ; Did you try to accomplish anything new?; What did you discover about yourself? ; What do you wish to remember from your experience? ; and What will you continue to work on in the future?*

## RESULTS - Study 1

### Qualitative data

Similar themes emerged from the therapist's notes taken after every session and the participant's feedback: Appreciation of the therapy, difficulty meditating, and openness to self-compassion, acceptance, and to being calm.

With regards to the appreciation of the therapy, the participant appeared to appreciate coming to the therapy— this was noticeable by his constant presence and by the fact that he was never late. He forgot to show up once, due to an important increase in his academic study needs. During the sessions, he appeared motivated, cooperative and thankful for the intervention. The participant mentioned really appreciating the communication with the therapist, how notions were explained, the fluidity between himself and the therapist, the integration in his daily life of what he had learned, and the different topics covered. *'I appreciate that the therapist took time to think and elaborate on each topic with me'*. He wished to remember the tools, the different perspectives, the compassion, which he would like to express through art to hang at home, or a tattoo. He also wished to continue working on the half-smile, observing his breath, disidentifying from his emotions and having more compassion for himself and others. Finally, he mentioned making an appointment at the barber shop: *'I had stopped going because of my social anxiety.'*

With respect to difficulties meditating (daily 10-minute guided meditations), the participant seemed to have given up on it. Indeed, he mentioned having tried to meditate after the first session, without success, and was no longer willing to try again the following days. Overall, he did not meditate, except for the in-session guided meditations. He

mentioned he disliked most of all the homework: *‘The in-session meditations are easier because they are more personalized based on what was discussed during the session, and because I am directly addressed to.’*

Lastly, concerning openness to self-compassion, acceptance, and to being calm, the participant considered that he learned a lot about self-compassion, which he felt he entirely lacked prior to the therapy. He also considered himself calmer as a driver, as well as more aware, saying he used to be very aggressive while driving, as he now practices mindfulness by himself during the day despite the fact that it takes him considerable efforts. He acknowledged that he often lacked patience and self-compassion: *‘I was very hard on myself and my loved ones, but I discovered at the end of the therapy that I actually was capable of acceptance of myself and others.’*

### Quantitative data

See Table 2 for the participant’s scores on each scale for every assessment.

**Table 2**

*Mean scores (studies 1 & 3)*

Moment in time	T0 (baseline)	T1 (post- therapy)	T2 (2- month follow-up)	T0 (baseline)	T1 (post- therapy)	T2 (2- month follow-up)
<b>Id</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>8</b>	<b>8</b>	<b>8</b>
<b>BPRS-E (max. 7)*</b>	1.38	1.46	1.42	1.65	2.04	1.73
<b>BSPS (fear; max. 4)*</b>	3.57	3.86	3.43	3.57	3.43	3.14
<b>BSPS (avoidance; max. 4)*</b>	3.57	3.14	3.57	3.00	3.43	3.00
<b>BSPS (physio.; max. 4)*</b>	2.50	2.00	2.50	1.25	2.00	1.75
<b>SAQ-A (total; max. 5)*</b>	4.23	4.07	4.27	4.33	4.13	4.33
<b>SAQ-A (talking; max. 5)*</b>	4.00	4.00	4.50	4.00	4.00	4.17
<b>SAQ-A (opp. sex; max. 5)*</b>	4.60	4.50	4.50	4.83	4.33	4.50

<b>SAQ-A (express contrariety; max. 5)*</b>	4.50	4.00	4.17	4.00	3.83	3.67
<b>SAQ-A (be criticized; max. 5)*</b>	3.50	3.50	3.67	4.17	4.33	4.83
<b>SAQ-A (strangers; max. 5)*</b>	4.50	4.33	4.50	4.67	4.17	4.50
<b>CERQ (+ regulation; max. 5)</b>	3.35	3.35	3.55	2.25	2.10	2.40
<b>CERQ (- regulation; max. 5)*</b>	1.75	1.81	2.75	3.81	3.88	3.76
<b>MAAS (max. 6)</b>	3.40	3.47	3.40	3.40	3.47	3.80
<b>AAQ (max. 7)*</b>	5.71	5.00	5.14	5.00	6.86	7.00

\*A lower score indicates an improvement

Legend:

BPRS-E: Brief Psychiatric Rating Scale-Expanded Version

BSPS: Brief Social Phobia Scale

SAQ-A: Social Anxiety Questionnaire for Adults

CERQ: Cognitive Emotional Regulation Questionnaire

MAAS: Mindful Attention Awareness Scale

AAQ: Acceptance and Action Questionnaire

It is interesting to note that, despite the fact that the participant's fear regarding his social anxiety (on the BSPS scale) originally increased after the therapy, his avoidance actually decreased simultaneously and thus the participant seems to have exposed himself more, which can help explain why his fear regarding his social anxiety first increased. On the social anxiety scale (SAQ-A), his scores either improved or stayed stable after the therapy, but at the 2-month follow-up, they sometimes worsened (talking in public/with people with authority, be criticized/embarrassed). Finally, his AAQ scores indicate that his experiential avoidance decreased, meaning he was more willing to feel his emotions and uncomfortable thoughts, accepted his internal experiences more and had a better ability to face them. This can help explain why his negative emotional regulation on the CERQ worsened, since he may have been more comfortable to face and report his negative

emotions and thoughts (an example of an item would be '*I always think of the fact that what I went through is terrible*').

## **METHODS - Study 2**

### **Objectives**

Given that homework is an essential part of the treatment and difficult for many, as depicted in study one, this study aimed at investigating homework adherence with weekly homework diaries.

### **Participants (Id. 2-7)**

Six (6) participants with social anxiety were recruited from a clinic for people with psychotic disorders. Inclusion criteria: non-affective psychotic disorder and social anxiety disorder; stabilized positive symptoms (voices and/or delusions); receiving services in a participating clinic; and offered informed consent. Exclusion criteria: unable to read; non-fluid in French; under the influence of drugs or alcohol during treatment; or has already received a mindfulness-based intervention in the last year.

### **Data**

The participants responded to a full battery of questionnaires before the intervention (baseline/T0) and after the intervention (T1), and 3 specific scales once a week during the treatment, for a total participation duration of 10 weeks. Qualitative data were collected during the post-treatment interview and in the participants' daily logbook.

### **Measures**

During the 8-week intervention, the participants were asked to keep a daily logbook to report the time (in minutes) they spent practicing mindfulness and to discuss their personal experience, in order to encourage their practice and, at the same time, explore the

total time they spent meditating. They were also asked to complete the CERQ, MAAS and AAQ weekly.

### **Analyses**

T-tests and calculations of effect sizes according to Cohen's (1992) benchmarks were conducted to determine if significant changes emerged between the beginning and the end of the therapy on the different variables (CERQ, AAQ and MAAS). A semi-structured interview was conducted once the therapy was over with each participant, and was recorded. Their impressions and comments noted in their daily logbook were also discussed. With the use of inductive coding, the themes that emerged were categorized as: the obstacles met, the benefits observed and the level of appreciation of the exercises.



## RESULTS - Study 2

### Qualitative data

Firstly, regarding the obstacles met during the mindfulness practice, participants reported boredom (n=2), a desire to move or restlessness (n=3), irritability or frustration (n=3), uncontrollable thoughts (n=5), invasive emotions (n=1) and the presence of psychotic symptoms (n=2). The participants reported obstacles to meditate like a lack of time (n=4), fear to be disturbed (n=2), difficulty to 'do nothing' (n=1), fear psychotic symptoms may arise (n=1), difficulty to do the practice alone (n=3), a lack of interest (n=1), a feeling that the exercises are counter-intuitive (n=1) or not helping (n=1) and redundancy of the exercises (n=2).

Secondly, regarding the benefits observed by the participants with respect to the mindfulness exercises, they reported a relaxing effect (n=5), a decrease in their anxiety symptoms (n=3), a greater curiosity of themselves (n=2), a tendency to avoid less (n=1), an increase in energy (n=1) and focus (n=2), a greater awareness of the body (n=1), a return to power regarding their difficulties (n=3), more self-compassion (n=4) and a tendency to be more in an acceptance state than a resistance state (n=3).

Thirdly, with respect to the content, structure and the form of the exercises, the participants reported having appreciated when there was space for creativity and imagination (n=3), when the exercises were less directive, that is to say when the images were not imposed by the therapist (n=1), when the exercises called in images or metaphors (n=2) or values and spiritual content (n=3), when the instructions were more precise and the therapist was more guiding with his voice (n=4), and when the silences were shorter (n=4). Plus, the participants mentioned having appreciated the capacity of the therapist to

be respectful of their rhythm (n=3) and the non-judging attitude and acceptance of the therapist (n=4). Some mentioned it was easier to do the exercises with the therapist compared to at home (n=4) and the possibility to speak to the therapist was very helpful (n=4). Finally, the most appreciated exercises were: self-compassion (n=2), compassion towards others (n=3) and visualizing a safe space (n=4).

Lastly, one participant mentioned the therapy facilitated her quitting medication, one mentioned using mindfulness to calm his panic attacks and another to stay calm in public transportation. One participant mentioned the voices were first initially present during the meditations, but they eventually disappeared by themselves. Finally, one participant mentioned having more intense psychotic symptoms during a session (the exercises were shortened and pushed to the next week, when she felt ready).

### Quantitative data

See Table 3 for the participants' scores on each scale for every assessment.

**Table 3**

#### *Mean scores (study 2)*

<b>Id</b>	<b>Total meditation practice (minutes)</b>	<b>T0 Emotional regulation scores (CERQ; max. 5)</b>	<b>T1 Emotional regulation scores (CERQ; max. 5)</b>	<b>T0 Mindfulness scores (MAAS; max. 6)</b>	<b>T1 Mindfulness scores (MAAS; max. 6)</b>	<b>T0 Experiential avoidance scores (AAQ; max. 7)*</b>	<b>T1 Experiential avoidance scores (AAQ; max. 7)*</b>
<b>2</b>	539	2.11	2.89	3.73	3.67	4.86	5.29
<b>3</b>	414	2.36	3.47	3.53	4.27	3.29	1.71
<b>4</b>	150	3.39	3.94	3.53	3.33	4.43	3.86
<b>5</b>	0	3.47	2.89	3.27	2.93	4.86	4.57
<b>6**</b>	180	2.36	. (2.22 at S7)	4.47	. (4.93 at S7)	4.86	. (4.00 at S7)
<b>7**</b>	644	2.42	. (2.75 at S8)	3.80	. (4.40 at S8)	4.71	. (4.00 at S8)

\* A lower score indicates an improvement

\*\* Participants who missed T1 but completed the therapy

The mean number of days per week the participants practiced mindfulness was 3.21 days ( $SD=2.09$ ) and the mean duration of the meditations was 12.18 minutes ( $SD=1.89$ ). T-tests indicated no significant results on the 3 scales across time due to the poor statistical power. About the CERQ scores, on which a higher score indicates an improvement, the means on T0 and T1 were respectively 96.67 ( $SD=21.15$ ) and 118.75 ( $SD=18.39$ ), with an effect size of  $d=.63$  (mild effect according to Cohen, 1992). This improvement of 22.08 is higher than the SD and may point to an improvement of mild magnitude on cognitive emotional regulation. About the MAAS scores, on which a higher score also indicates an improvement, the means on T0 and T1 were respectively 55.83 ( $SD=6.15$ ) and 53.25 ( $SD=8.46$ ), with an effect size of  $d=.07$  (small effect according to Cohen, 1992). This decrease in mindfulness skills of 2.58 is lower than the SD and may point to no relevant change. Finally, about the AAQ scores, on which a lower score indicates an improvement, the means on T0 and T1 were respectively 31.50 ( $SD=4.32$ ) and 27.00 ( $SD=10.80$ ), with an effect size of  $d=.60$  (mild effect according to Cohen, 1992). This improvement of 4.50 is only higher than the SD of T0 and may point to an improvement of mild magnitude on experiential avoidance in the participants.

A correlation on whether the time spent meditating had an impact on the scores of the 3 scales was conducted, and no correlation was significant, except for the emotional regulation measure on week 5 (see Table 4). The correlations were in the way we expected them to be, which is from moderate to high for all scales, for 4 weeks for the emotional regulation measure, for 2 weeks for the mindfulness measure and for 4 weeks for the experiential avoidance measure.

**Table 4**

*Correlations between the time spent meditating and the different variables (study 2)*

		<b>CERQ</b>	<b>MAAS</b>	<b>AAQ</b>
	<b>n</b>	<b>r</b>	<b>r</b>	<b>r</b>
<b>Week 1</b>	5	0.10	0.60	-0.30
<b>Week 2</b>	6	0.77	-0.37	-0.26
<b>Week 3</b>	4	-	-	-
<b>Week 4</b>	5	0.10	-0.30	0.30
<b>Week 5</b>	6	0.81*	0.59	-0.65
<b>Week 6</b>	6	0.60	-0.31	-0.49
<b>Week 7</b>	6	0.64	-0.76	-0.03
<b>Week 8</b>	3	-	-	-

\*p<.05

Legend:

CERQ: Cognitive Emotional Regulation Questionnaire

MAAS: Mindful Attention Awareness Scale

AAQ: Acceptance and Action Questionnaire

## **METHODS - Study 3**

### **Objectives**

As social anxiety comes with avoidance of social contexts, this case study looked at exposure. In order to increase exposure, we added a gradual VR exposure of a classroom. Indeed, exposure can be extremely anxiety provoking in people with anxiety disorders and VR can act as an exposure tool without as much social consequences. Considering this novel intervention (a 3<sup>rd</sup>-wave CBT with VR for people with a psychotic disorder and social anxiety), it is important to first report the subjective experience of a participant, for if exposure seems feasible and potentially helping, a greater study on VR as exposure in a 3<sup>rd</sup>-wave CBT for the population studied could be conducted.

### **Participant (Id. 8)**

One participant was recruited from a clinic for people with psychotic disorders. He was a single, Canadian man of 23 years of age, had a social anxiety disorder diagnosis and a schizoaffective disorder diagnosis. To confirm the presence of a social anxiety disorder, the social anxiety section of the SCID-5 was administered at baseline. Inclusion criterion: desire to receive help for social anxiety. Exclusion criterion: presence of another comorbid disorder other than substance misuse, checked at recruitment with the participant's psychologist.

### **Intervention**

The participant received the same CAM intervention previously described (see Table 1 for details of the intervention). For this study, an exposure element was added to the therapy, where the participant was asked to expose himself, through the use of oculus VR goggles, to a classroom full of people, after every session from session 3 to session 8

(see Table 5 for details; see Image 1). Indeed, in people with a psychotic disorder, the 3 main factors of their social anxiety would be, first, to perform in front of a public, second, social interactions, and finally being observed (Romm, Rossberg, Berg, Hansen, Andreassen & Melle, 2011). This virtual class was created by the VR engineers at *SuperSplendide*. The participant was asked to gradually expose himself, from staying silent in front of the class to having to orally present during 5 minutes something previously prepared. It was possible to choose different conditions of the classroom, which were standardized, for example, the condition ‘Conviviality’ meant that the people sitting in the classroom were generally happy, polite and attentive, whereas the condition ‘Anxiety’ meant that the people were anxious and shaking their legs, for example. It was also possible to make the classroom change during the exposure, if the participant agreed, by for example making one person or the whole class laugh, yawn, whisper, etc.

**Table 5**

*Hierarchy of virtual reality exposure (study 3)*

Exposure session #	Therapy session #	What was asked to do to the participant	Conditions of the VR class	Total exposure time (minutes)	Total talking time (minutes)	Min. level of anxiety reached (%)	Max. level of anxiety reached (%)
1	3	Stand in front of class, without speaking	All mixed	4	0	30	90
2	4	Stand in front of class, without speaking	Distraction, then Apathy	6	0	10	40
3	5	Speak of something liked (improvised)	Apathy, then Distraction	3	2	20	80
4	6	Technical difficulties – exposure skipped (Speak of a cause close to heart for 3 minutes - improvised)	Conviviality	N/A	N/A	N/A	N/A
5	7	Speak of own qualities as in a job interview (improvised)	Anxiety, then Judgement	6	4	30	80
6	8	Prepared subject of choice	Mixed (Anxiety, Judgement,	5	5	30	50

			Conviviality, Apathy)				
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**Data**

The participant responded to a full battery of questionnaires before the intervention (baseline/T0), after the intervention (T1) and at a 2-month follow-up (T2), for a total participation duration of 4 months. The therapist collected descriptive data after every session- the notes were read and summarized. The participant also responded to a feedback questionnaire of 8 questions on overall experience (from what went well to what the participant wants to continue working on) at session 8 (last session), just as in study 1- the comments were read to highlight the most salient ideas (phenomenological analysis).

**Measures**

The same measures were used for this study as in study 1. During every exposure session, the level of anxiety of the participant was noted (see Table 5 for details).

**Analyses**

Phenomenological qualitative analysis was performed on the therapist’s notes as well as on the participant’s feedback at the end of the therapy. Regarding this feedback, the same questions were used as in study 1. The themes that emerged, through the use of inductive coding, are presented according to the importance given by the participant, and the therapist.

## RESULTS - Study 3

### Qualitative data

Similar themes emerged from the therapist's notes taken after every session and the participant's feedback: Difficulty with the exposure, avoidance with regards to the therapy, and ease to meditate.

With respect to the exposure through the use of VR (see Table 5 for the hierarchy of exposure that was used), the participant was generally happy to be able to expose himself to what caused him anxiety without having to live with the social consequences that may follow. However, he said he was highly anxious to do so (*'To expose myself to my social anxiety with the VR was rather difficult'*), specifying he had always made up excuses of all kinds to avoid oral presentations at school- *'For me, to expose myself to talk in front of a class was something I would never have done before.'* He also said he was taking advantage of the VR to see it as a challenge, and he chose, when he could, what was most anxiety-provoking to him, for example, talking about his qualities as if he was at a job interview instead of simply talking of something he liked, and asked the therapist to make the class laugh when he was speaking to expose himself further to what caused him the most anxiety.

The participant appeared to have avoided, to some extent, the therapy, cancelling many sessions for various reasons. As soon as the first session, the participant cancelled due to high levels of social anxiety, saying he was having a panic attack. He then mentioned being too anxious in the morning, so the next sessions were scheduled in the afternoon instead. Because of his tendency to cancel, the therapy lasted 4 months rather than 2 months, including a 2-week break during the Christmas holiday. The participant mentioned several times that he was not doing well during the period of our therapy, apologizing. He



was particularly scared of starting the VR exposure and cancelled repeatedly before the first exposure. Despite that, he considered that what he had learned most was to recognize his true values and the practice of self-love.

With regards to his ease to meditate (the daily 10-minute guided meditation homework), the participant had already started a daily practice by his own for 3 weeks prior to knowing he would start the therapy. During the first weeks of the therapy, he meditated daily with ease and had fun in the process, meditating twice a day sometimes. *'I appreciate the way the sessions were structured and the meditations.'* However, he mentioned having a preference for the meditations he was used to, using the app 'Headspace,' rather than the meditations that were provided with the therapy every week, except for week 4, during which he used the meditation related to that week. Halfway through the therapy, the participant started meditating less, for example, 3 times a week. He did not meditate at all between the last 2 sessions, because of a demanding job he had just started. He specified that he was particularly not doing well during this period, saying he had a 'breakdown' in part because he feared his social anxiety would follow him all his life. Despite that, he wished to continue working on his daily meditations to gain a better state of mind, once the therapy had ended.

In general, thanks to the exposure, the participant seemed to have left the therapy with a greater sense of pride in himself and his abilities, despite his very high apprehension regarding the therapy and the exposure. He nevertheless went through all the therapy and the exposures and he managed to feel calmer toward these. Moreover, with the fact that the participant had always avoided speaking in front of a class, and had no intention of doing so in the future, the exposure was quite powerful in his opinion.

## **Quantitative data**

See Table 2 for the participant's scores on each scale for every assessment.

Considering the addition of exposure in this study, it is interesting to note that the participant's fear on the BSPS dropped down from 3.57 (T0) to 3.43 (T1) and then to 3.14 (follow-up), which is a notable change considering that the maximal score on this scale is 4. Again, with regards to the potential effects of the VR exposure, the participant reported, on the SAQ-A, lower anxiety levels regarding talking to the opposite sex and talking to strangers. They both went down after the therapy (respectively from 4.83 to 4.33 and from 4.67 to 4.17), and then went a little up at follow-up (both 4.50), but still lower compared to T0, on a maximal score of 5. The anxiety related to expressing contrariety first dropped after the therapy (from 4.00 to 3.83) and then even lower at follow-up (3.67), again on a maximal score of 5.

On the contrary, he avoided more after the therapy (BSPS; from 3.00 to 3.43), and had more physiological symptoms of anxiety (BSPS). His anxiety towards being criticized worsened (SAQ-A; from 4.17 to 4.33 to 4.83), and his experiential avoidance particularly worsened (AAQ; from 5 to 6.86 to 7). These results are in accordance with the fact that the patient kept cancelling the sessions and repeating to the therapist that he was sorry and was going through a major personal crisis that he did not link to the therapy. This seemed to have made it hard for him to come to therapy, and seems to show on some of his scores.

## **DISCUSSION**

The aim of this paper was to explore the subjective experience of people with comorbid social anxiety and schizophrenia in 3 studies. These studies enabled us to explore different facets of the person's subjective experience, and led us to explore further specific aspects, namely obstacles to meditation and mindfulness, and exposure to a social anxiety provoking situation.

### **Common points**

Some common points stand out from all three studies. First, the intervention was generally well appreciated and accepted by the participants which is an important aspect related to the feasibility of the intervention.

Second, the meditation homework was described as difficult for some participants. Indeed, of all 8 participants, 2 participants did not meditate at all, one of which was encouraged to do the homework daily (study 2), and only 2 participants seem to have meditated everyday as was suggested. Contrary to our study, a paper on meditation for psychosis showed that, of all participants (n=15), 14 of them meditated at home as was asked- around 4 times more than in our study (Brown et al., 2010). This can be explained by the fact that the focus regarding the therapy in our study was to treat social anxiety, whereas Brown and colleagues' focus was on mindfulness meditation training, which may have played a role on the participants' motivation to meditate at home and on their level of meditation skill. Also, as explored in another study, meditation in general can be difficult mainly because meditation is a skill that takes practice and because troubling thoughts and feelings that are hard to manage can come up (Lomas, Cartwright, Edginton & Ridge, 2015).

Thirdly, with regards to the participants' positive experiences, the participants generally noticed that what was most effective was the in-session guided meditations, when the instructions were more precise and the therapist was more guiding with his voice, and when the silences were shorter. This goes in accordance with Brown and colleagues' promising findings, in which they used as much non-formal meditation practices as formal ones, which can help explain the high adherence to the meditation exercises, since the mind gets less distracted in non-formal practice (Brown et al, 2010).

Finally, in our study, the most effective exercise seems to have been the 'visualizing a safe space,' in which the participants are invited to imagine themselves in a place where they feel the safest, and imagine the senses being awakened according to the environment, for example, feeling the wind if they are by the ocean in their mind, hearing the tree leaves if they are in a forest, or smelling their favorite candle if they are in their bedroom. This exercise may be particularly effective at bringing a state of calmness to the meditator. The non-judging attitude and acceptance of the therapist seem to have been a key factor also. Indeed, these elements were noted on the qualitative level by the therapist as well as by the participants as what were the most helpful aspects of the therapy, and should be noted for future research.

### **Social anxiety**

Some behavioral changes, on the social anxiety level, were noted across the three studies, such as participant 1 making an appointment at the barber shop. Another participant mentioned now being able to use mindfulness skills to stay calm when using public transport, and the simple fact that participant 8 was able to expose himself with the

VR is important considering that he had, all his life, avoided any type of oral presentation at school.

### **Other studies**

With regards to important elements for future research, in a recent study, participants noted that what was most important to them in their experience of a MBI was being able to use mindfulness and making sense of mindfulness and coping (Ashcroft, Barrow, Lee & MacKinnon, 2011). Also, this may go in accordance with the fact that our participants preferred the ‘visualizing a safe space’ exercise, which can be further from the basic meditation exercises like focusing on the breath, on the body, etc., in which the mind may get more distracted. This suggests that it may be of importance to effectively train the participants on mindfulness skills before asking them to practise on their own at home.

According to Brown and colleagues (2010), when interviewed on their experience of a MBI for anxiety in psychosis, their study showed that what was most frequently noted by the participants were cognitive changes (better ways of thinking, new thoughts and ideas), focus on the present, relaxation, self-awareness and acceptance, and negative outcome themes were all of low incidence (1 or 2 participants) and were about sad feelings and bad memories. These findings are similar to the ones of this paper, that is, when exploring the subjective experience of the participants, a relaxing effect stood out, as well as a decrease in anxiety symptoms, more self-compassion and more acceptance, with a low incidence of negative outcome.

Finally, a recent study suggests that MBI for psychosis is experienced as safe, enjoyable and having a positive impact on mood symptoms (Yat Tong et al., 2016), a qualitative analysis reveals improvements concerning cognition, distress and

psychopathology, and mechanisms, processes and safety of MBI for psychosis were explored and confirmed (Böge, Karadza, Fuchs, Ehlen, Tam Ta, Thomas, Bajbouj & Hahn, 2020). However, no studies to date seem to have explored the experience of people with a psychotic disorder and social anxiety receiving a MBI with VR exposure, enhancing the importance of conducting a bigger study in this field because of the intervention's potential positive impacts, that is in order to lower social anxiety and avoidance, and improve emotional regulation in people with a psychotic disorder, thus improving their quality of life and social connection.

### **Considerations**

On another note, we put forward the fact that mindfulness practice can be important in study 2, in which we observed improvement to some extent on emotional regulation, mindfulness and experiential avoidance, suggesting that encouraging participants to do the daily meditation homework might be of benefit. We still recognize that avoidance is a big problem in social anxiety, especially in psychosis, hence the 3<sup>rd</sup> study. Since social anxiety seems to create an important drop-out rate in group therapies, this intervention could be a better format for people with a psychotic disorder and social anxiety. Indeed, some participants were absent for some sessions due to avoidance, which were rescheduled, but no participant dropped-out of all 3 studies and all completed the treatment despite that. With regards to this, a more flexible individualistic approach for the most anxious could be highly useful. Moreover, the VR exposure could be an effective intermediate solution since real exposure is too anxiety provoking for people with a psychotic disorder and social anxiety, and because it was well accepted and appreciated by the participant, just as shown in other studies (Veling, Counotte, Pot-Kolder, van Os, & van der Gaag, 2016; Riches,

Bird, Chan, Garety, Rus-Calafell & Valmaggia, 2020). Lastly, the difficulties doing the meditation homework and the participants' comments enable us to acknowledge that training to meditation skills could be added to this kind of therapy, and it could be helpful to personalize and make the meditations easier according to each person.

### **Limitations**

Some limitations stand out of this paper. Indeed, in studies 1 and 3, the researcher (writer) of this paper was also the therapist, however, for ethical purposes, all assessments were conducted by a fellow researcher. Indeed, by being the therapist, it is possible that more efforts were deployed by them driven by a desire for the participants to enjoy and benefit from the therapy, as well as for the study to have a positive outcome. This might have also impacted the interpretations of results in the sense that the researcher, in their role of therapist, might have noted more positive aspects coming from the experience of the participants.

It is also important to consider the possible social desirability present for the two participants' feedback done at session 8, which is done with the therapist, and not with a researcher (contrary to T0, T1 and T2). They thus may have inhibited themselves to note any negative aspect coming from their experience.

Also, study 2 suggests that the time spent meditating might have a potential positive impact on outcomes measured but it is impossible to affirm so, and a study of better amplitude should be conducted to further study this aspect.

Finally, in study 3, the participant cancelled and postponed the sessions so many times that the effects of the therapy on him are questionable.

## **Conclusion**

This paper shows that the intervention presented is feasible, appreciated by the participants and has potential to be useful and therapeutic, even though efficacy cannot be established in this explorative paper. Indeed, a more substantial study is needed to measure its impacts. Thus, the 3 studies presented in this paper suggest that this intervention deserves to be studied more, particularly the VR exposure and the meditation encouragement.



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## Annexe 1

### Image 1

### VR classroom (study 3)

