Exploration of Effects of a Cognitive Schema Account on the Stigma of Schizophrenia: A Study in a French University Sample

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Title: Exploration of effects of a cognitive schema account on the stigma of schizophrenia: A study in a French university student sample

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The authors declare that they have no conflict of interest

Study not submitted to an ethics committee because it does not meet the criteria expected for this type of application.
Abstract

Amongst people with psychiatric disorders, people experiencing schizophrenia are among those who are victims of high levels of stigmatization. A research effort is necessary to identify new strategies that may help reduce the public stigma of schizophrenia. While educational strategies using cognitive accounts, and in particular Early Maladaptive Schemas (EMS), have shown promising results in the context of depression, they had never been evaluated in the context of schizophrenia. The present study compared the effect on public stigma of three different educational strategies, based on cognitive distortions, biogenetics, and Early Maladaptive Schemas. A total of 378 students were randomly assigned to one of four groups. Three experimental groups were presented with a vignette which introduced one out of three different etiological accounts of schizophrenia (Cognitive distortions, Early Maladaptive Schemas, or Biogenetics). The fourth group was presented with a text unrelated to schizophrenia. The participants completed questionnaires which measured their attitudes, empathic concern and social distance towards people with schizophrenia, before and after reading the text. The intervention using the Early Maladaptive Schemas etiology account for schizophrenia was the only one that led to a significant decrease in public stigma. The latter effect was driven mainly by an increase in the level of empathic concern towards people experiencing schizophrenia. Given that similar results have been observed for depression, and that the role of Early Maladaptive Schemas in many psychiatric disorders has been demonstrated, studying the effects of EMS explanations for other stigmatized disorders may be a promising research prospect for reducing the public stigma of psychiatric disorders.

Keywords: Stigma, causal attributions, empathic concern, early maladaptive schemas
1. Introduction

About one in four people will suffer from a psychiatric disorder in their lifetime (World Health Organization, 2001). Not only do individuals with psychiatric disorders have to deal with their symptoms, but they must also cope with the public stigma that they generally suffer from (Corrigan & Watson, 2002; Oexle & Corrigan, 2018; Utz et al., 2019).

Stigmatization is a process of exclusion leading an individual to be identified as abnormal or deviant, on the basis of a given characteristic which does not conform to a social norm and to which they are reduced (Goffman, 1963). Among all psychiatric disorders, people experiencing schizophrenia are victims of high levels of rejection and public stigma (Corrigan, 2016; Pescosolido et al., 2010; Yilmaz & Okanli, 2015). They are commonly perceived by lay people as dangerous, incompetent, and unpredictable (Sheehan et al., 2017). Schizophrenia is frequently and intimately associated with the term "violence" and is perceived as the "model of madness" by society (Castillo et al., 2008). Consistent with this observation, some of the symptoms of schizophrenia, such as inappropriate affect and the propensity to talk aloud to oneself, are manifest indicators of a psychiatric disorder and may lead to stigmatizing reactions (Corrigan, 2000).

Public stigma and discrimination are likely to have detrimental consequences for people with schizophrenia. The consequences can be observed within the psychological sphere (e.g., suicide; Farrelly et al., 2015), the social and professional sphere (Daumerie et al., 2012), the family sphere (Yao et al., 2020), and/or the sphere of medical care (Clement et al., 2015). In the specific case of France, studies have confirmed that the levels of stigmatization of schizophrenia are high (Angermeyer et al., 2015; Durand-Zaleski et al., 2012; Lampropoulos et al., 2018). According to attribution theory (Corrigan, 2000; Weiner et al., 1988; Weiner, 1995), an important factor that may contribute to the stigmatization of a
disorder is the etiological account that people attribute to this disorder. Specifically, perceived high levels of control of the disorder (i.e., one act on one’s condition) and perceived high levels of stability of the disorder (i.e., the disorder is maintained over time) are thought to reinforce public stigma. As a result, anti-stigma campaigns which have emphasized psychosocial factors (associated with high levels of control) and/or biological/biogenetic factors (associated with high levels of stability) as etiological accounts of schizophrenia have had mixed effects on measured levels of public stigma (see the meta-analyses of Kvaale, Gottdiener, et al., 2013; Kvaale, Haslam, et al., 2013; and the review of Thornicroft et al., 2016).

Accordingly, endorsing biological and/or biogenetic factors as the cause of a mental disorder fails to reduce discrimination and, instead, increases beliefs about the dangerousness and permanence of the disorder (Haslam & Kvaale, 2015; Kvaale, Gottdiener, et al., 2013; Kvaale, Haslam, et al., 2013). This may promote prejudice, fear, negative attitudes and desire for social distancing (Angermeyer & Matschinger, 2003; Angermeyer et al., 2015; Larkings & Brown, 2018; Read et al., 2006). Likewise, endorsing psychosocial accounts as the cause of mental disorders (e.g., accounts such as stress, death of a loved one, intense bullying during school years) have shown mixed effects on levels of public stigma (see the systematic review and meta-analysis of Schomerus et al., 2012). While in some studies stress-related accounts have been related to greater levels of tolerance for a given disorder (Schnittker, 2008; Van ‘t Veer et al., 2006), this is not true of all studies (Jorm & Griffiths, 2008; Martin et al., 2007). Similar mixed results have been observed using early-stressor accounts (Schnittker, 2008; Van ‘t Veer et al., 2006). In the specific case of schizophrenia, lay people may infer from psychosocial accounts that people are responsible for their disorder (e.g., when emphasizing the role of psychoactive substances during
adolescence, and more specifically cannabis), and this may increase public stigma as a result (Schomerus et al., 2014). On the other hand, while other psychosocial accounts (and notably childhood sexual abuse, can be associated with a low level of control (and thus with higher social acceptance), they may nevertheless drive lay people to consider schizophrenia as incurable (high level of stability), and this may increase public stigma as a result.

In an attempt to reduce public stigma against schizophrenia, the use of account which are neither biological/biogenetic nor psychosocial in nature, such as cognitive accounts, have been largely overlooked. It appears that, so far, the latter accounts have been mobilized mainly in the context of depression (Botha & Dozois, 2015). Yet, cognitive factors – such as cognitive distortions and early maladaptive schemas (EMS) – have been recently shown to play an important role in the development of symptoms in schizophrenia (Bortolon et al., 2013; Sundag et al., 2016). EMS develop during childhood, via interpersonal interactions, and form a template that guides the interpretation of later experiences. They are extremely stable, considered to be unconditional and automatic, and to increase the risk of developing a mental disorder (Schmidt et al., 1995). Cognitive models of schizophrenia suggest that exposure to negative life events during childhood (e.g., school harassment) promotes the development of EMS, including a threatening worldview, external attribution of negative events and experiences, which may favor the development of schizophrenia (Bentall et al., 2009; Howes & Murray, 2014). A number of studies have reported unusually high levels of EMS among people with schizophrenia (Boyda et al., 2018; Khosravani et al., 2019; Sundag et al., 2016).

Cognitive distortions refer to erroneous interpretations of situations (e.g., minimizing positive accomplishments, personalizing neutral events; Beck, 1979). They are important early risk factors for psychosis (de Paula et al., 2015; Gawęda et al., 2018). More precisely,
an exaggerated tendency to pay attention to threat (Prochwicz & Kłosowska, 2017), external attribution bias (So et al., 2015) or jumping to conclusions (McLean et al., 2017) are important factors driving delusions. In the same way, deficits in recognizing the source of information plays a central role in hallucinations (see the meta-analysis of Waters et al., 2012).

Because cognitive distortions may be perceived by lay people as controllable (Cook & Wang, 2011; Goldstein & Rosselli, 2003), accounts based on such factor may increase public stigma. On the other hand, EMS emerge during childhood as the result of the exposure of negative life events (which are uncontrollable; Young et al., 2003). Thus, EMS accounts emphasize the importance of external factors as causes of the disorder, they support the idea that patients have a reduced control over the disorder and, as a result, cannot be responsible for their pathology (Schomerus et al., 2014). In addition, unlike biogenetic factors, EMS are not immutable and could respond to therapy (perceived lower level of stability). In sum, emphasizing EMS accounts in anti-stigma campaign may be a more promising route in order to reduce public stigma against schizophrenia.

The present research explored how lay people’s beliefs regarding the causes of schizophrenia shape the stigmatization of populations experiencing this disorder. To this end, we exposed a sample of French university students to a text focusing on one of three possible etiological accounts of schizophrenia: Cognitive Distortions, Early Maladaptive Schemas (EMS) or Biogenetic factors (thus, each participant was exposed to just one account). We measured expressed levels of public stigma (stigmatizing attitude, desire for social distance, and empathic concern) just before and just after the educational intervention. We contrasted pre-to-post exposure changes in levels of stigma across the three etiological-account groups of participants, and compared to a group of participants
which received a (neutral) non-educational intervention (the control group). We expected to observe a larger pre-to-post-exposure decrease in levels of public stigma in the EMS-account group (given that EMS imply low levels of both controllability and stability). In addition, we expected to observe no decrease in levels of public stigma, in the cognitive-distortion-account group (given that cognitive distortions imply low stability but high controllability) and in the biogenetic-account group (given that biogenetic factors imply low controllability but high stability). Finally, in the control group, we expected no pre-to-post-exposure change in the levels of public stigma (see Table 1, which summarizes the characteristics of the Biogenetic, Cognitive Distortions, and EMS accounts and hypothesis).

Insert Table 1 here

2. Method

2.1. Participants

An a priori power analysis was conducted using Gpower (Erdfelder et al., 1996). The analysis indicated that a sample size of 332 participants (83 participants per group) would be sufficient to detect a significant interaction between our text conditions and moment of measurement (pre/post text exposure), with a power of .95 and an alpha of .05, based on a small effect size of 0.05 ($\eta^2_p$). Anticipating dropout and exclusion issues, a total of 415 students were recruited from an undergraduate introductory psychology course from [omitted for masked review] University, and randomly assigned to one of the four conditions of our experimental manipulation (Cognitive Distortions, EMS, Biogenetic, or Control condition). The participants completed the questionnaire in the lecture hall before the lecture started. Thirty-six participants did not complete the questionnaire and were excluded from the analyses, leaving a final sample of 379 participants (300 females, 2 undefined) aged between 16 and 58 ($M_{age} = 19.90$ years; $SD_{age} = 4.67$ years), assigned to the
following conditions: Cognitive Distortions condition (N = 99), EMS condition (N = 106),
Biogenetic condition (N = 107), or Control condition (N = 67).

2.2. Compliance with Ethical Standards

All participants signed a consent form before participation and were informed that their answers would remain anonymous and that their participation was voluntary and could be withdrawn at any time. All the data were stored on a secure university computer. We respected the ethical principles of psychologists and the code of conduct of the American Psychological Association (American Psychological Association, 2002).

2.3. Measures

In the absence of validated tools in French language for our variables of interest, all scales used were translated in French via a back-and-forth translation procedure. Firstly, the English version was translated into French by an English native speaker specialized in this research field. Then, a French native speaker translated this document back into English. The two translations (English to French and French to English) were compared in order to ensure that they were both faithful to the original and that the items in the French version were clear. After the translation of the scales, the material (scales and vignettes) was proposed to 10 students (about 2 per condition) to check the correct understanding of the sentences.

2.3.1. Familiarity with schizophrenia and mental illness

To assess people’s familiarity with schizophrenia, we used a French translation of the Familiarity with mental illness scale (Corrigan et al., 2003). This 7-item questionnaire
measures participants’ familiarity with schizophrenia through everyday encounters with the pathology (e.g., interaction in the workplace, presence of people experiencing the pathology in the entourage or at home). Participants answered using a dichotomous "Yes"/"No" response to each item. Higher scores indicated higher familiarity with schizophrenia. We also included two additional questions in order to assess participants’ general familiarity with mental illnesses: "Do you have a diagnosis of mental disorder" and "Do you have a member of your family with a diagnosis of mental disorder". Both questions were answered using a dichotomous "Yes"/"No" response.

2.3.2. Attitudes

We used a French translation (Rouyre, 2016) of the Brief Version of the Attribution Questionnaire (AQ-9; Corrigan et al., 2002; Corrigan et al., 2003) in order to assess attitudes towards people experiencing schizophrenia. Each item from the attitude questionnaire assesses a reaction towards people with schizophrenia, exploring the domains of blame, anger, pity, help, dangerousness, fear, avoidance, segregation, and coercion (e.g., How angry do persons with schizophrenia make you feel?). Participants gave their answer using 9-point Likert scales (ranging from 1: "Not at all" to 9: "Very much"). Higher scores indicated more negative attitudes towards people with schizophrenia. For the sake of comparability with the other measures, we subsequently reversed the questionnaire score and transformed it into a percentage, leading to a percentage score of positive attitudes (from 0 to 100). The scale showed acceptable internal consistency (Cronbach’s α at T0 = .71 and T1 = .73, α = .82 for the English version, see Corrigan et al., 2017).

2.3.3. Social Distance
In order to evaluate social distance, we used a French translation of the Social Distance Items (Link et al., 1987), which is the most used tool for assessing public stigma of schizophrenia (Lampropoulos et al., 2018). It includes seven items displaying social situations (e.g., renting a room) and participants are asked to indicate the extent to which they would be willing to accept to share these situations with people experiencing schizophrenia, using a 4-point Likert scale ranging from 1 (“Definitely willing”) to 4 ("Definitely unwilling"). Higher scores indicated a preference for greater social distance. Scores were then reversed and transformed into a percentage, leading to a percentage score of social proximity (from 0 to 100). The scale showed very good internal consistency (Cronbach’s α at T0 = .86 and T1 = .89; α = .92 for the original version; see Link et al., 1987).

2.3.4. Empathic concern

In order to measure empathic concern, we used a French translation of the emotional response scale (Batson, 1987; Batson, 1991). Participants were instructed to indicate how much they felt each of six emotions (sympathy, soft-hearted, warm, compassionate, tender and moved) towards individuals experiencing schizophrenia, using a 7-point Likert scale ranging from 1 ("Not at all") to 7 ("Very much"). Higher scores indicated greater empathic concern. Scores were then transformed into a percentage score of empathic concern (from 0 to 100). The scale showed very good internal consistency (Cronbach’s α at T0 = .87 and T1 = .90, Cronbach’s α was between .63 and .82. for the English version, see Niezink et al., 2012).

2.4. Causal explanations of schizophrenia
Four texts were developed in French language and presented to the participants. Three of the texts detailed a specific factor identified as the main cause for the development of schizophrenia: Biogenetics, Cognitive Distortions, or EMS. As it was the case in the vignettes designed by Botha and Dozois (Botha & Dozois, 2015), these three texts were presented in the form of a (fictitious) scientific article, recently published in the "Journal of Behavioral and Cognitive Therapy" (for the EMS and Cognitive Distortions conditions) or the "Journal of Molecular Biology and Genetics" (for the Biogenetics condition) by a fictitious researcher, known worldwide and specialized in the field of schizophrenia. In the article, the researcher emphasized that all the data collected over the past thirty years indicate that schizophrenia is caused by factors related to Biogenetics/Cognitive Distortions/EMS (depending on the condition). All three texts had identical structures and similar contents, except for the target sentences regarding the cause of schizophrenia, that differed according to each condition (see Appendix A1 for the full version of the texts). A fourth text, unrelated to schizophrenia and presenting a topic related to quantum physics, was used in the control condition.

Procedure

After giving their consent, participants provided their basic sociodemographic data (age, sex), if they or their family members had a psychiatric disorder and indicated their familiarity with schizophrenia. Next, all participants read a short description of the daily life of an individual experiencing schizophrenia (the description is displayed in the Appendix), in order to prime a correct and realistic conception of the disorder (see Corrigan et al., 2017). Then, participants completed the questionnaires about attitudes (Corrigan et al., 2002), empathic concern (Batson, 1987; Batson, 1991), and social distance (Link et al., 1987).
towards people experiencing schizophrenia (i.e., pre-intervention measure of public stigma).

In the next step, they were randomly assigned to one of four conditions: Biogenetics, Cognitive Distortions, EMS or Control, and read the vignette relevant to their condition. Finally, they completed the questionnaires about attitudes, empathic concern and social distance towards people experiencing schizophrenia for a second time (i.e., post-intervention measure of public stigma).

Following the experiment, participants were informed about the purpose of the study. We took caution to emphasize that each scenario they were presented with displayed only one etiological account (Biogenetics, Cognitive Distortions, or EMS; or no account in the Control Group). Then, all the participant (irrespective of the group they belonged to) received exhaustive information about the multiple etiological accounts of schizophrenia.

2.5. Statistical analysis

We conducted a mixed model analysis of covariance (ANCOVA) using Measure (positive attitude, social proximity, and empathic concern; within-subject), Text condition (EMS, Cognitive Distortions, Biogenetics, Control; between-subject), and Moment of measurement (pre-intervention measure vs. post-intervention measure; within-subject) as the independent variables, and percentage score (for attitude, social proximity, and empathic concern) as the dependent measure. Familiarity, self-reported psychiatric disorder, self-reported psychiatric disorder in the participant’s family, sex, and age were included as the covariates in the analysis. Data were analyzed using the SPSS software (version 24).

3. Results
Figure 1 displays the detailed results distinguishing the effect of text condition for each of the measures and moment of measurement (see also Table 2 for the full descriptive statistics). A main effect of Measure was observed, $F(2, 718) = 5.57, p = .004$, $\eta^2_p = .015$.

Pairwise comparisons showed that scores significantly differed between each measure (all $p$s < .001). Participants scored higher on the positive attitude scale ($M = 72.76$) than on the empathic preoccupation scale ($M = 56.37$) and they scored higher on these two scales than on the social proximity scale ($M = 48.17$). Most importantly, with regards to our current purpose, the Moment of measurement x Text condition interaction was significant, $F(3, 359) = 4.11, p = .007$, $\eta^2_p = .033$. Before exploring the origin of this interaction with pairwise comparisons, and because Measure did not significantly interact with any of our independent variables, we first computed a composite score of acceptance (by averaging the percentage scores of positive attitude, social proximity, and empathic concern; $\alpha_{T0} = .67$, $\alpha_{T1} = .69$, suggesting acceptable reliability$^1$) only to later move on to analyses specific to each measure for the sake of completeness. Looking at the score of acceptance, pairwise comparisons using paired sample $t$-tests showed that only the EMS condition yielded an increase in acceptance of schizophrenia from T0 ($M_{\text{acceptance}} = 57.50; \text{SD}_{\text{acceptance}} = 15.07$) to T1 ($M_{\text{acceptance}} = 60.13; \text{SD}_{\text{acceptance}} = 15.82$), $t(105) = 4.23, p < .001$, Cohen’s $d = 0.41$. No significant difference was observed between T0 and T1 in the Cognitive Distortions, Biogenetics, or Control conditions (all $t$s < -1.07, all $p$s > .28; see Table A1, in appendix, for full descriptive statistics).

Going further into the specifics of each measure (while keeping in mind that Measure did not interact with the other variables), we observed a significant interaction between

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$^1$ In addition, it is worth noting that the three measures of stigma positively correlated, both at T0 (all $p$s < .001, all $r$s > .32) and T1 (all $p$s < .001, all $r$s > .34).
Moment of measurement and Text condition only for the empathic preoccupation measure, 

\[ F(3, 359) = 4.86, p = .003, \eta_p^2 = .039 \] (for the two other measures, all \( Fs < 1.46 \), all \( ps > .22 \)).

Pairwise comparisons showed a significant increase of empathic preoccupation only in the 
EMS condition, \( t(105) = -3.86, p < .001 \), Cohen’s \( d = 0.38 \).

Exploring our covariates, we observed a significant interaction between Measure and 
Sex, \( F(1, 359) = 6.87, p = .001, \eta_p^2 = .019 \). An exploration of the simple effects showed that 
women had higher scores than men (both at T0, and T1) only for empathic preoccupation 
(T0: \( M_{\text{male}} = 51.07, M_{\text{female}} = 57.18, p = .013 \), Cohen’s \( d = -0.32 \); T1: \( M_{\text{male}} = 51.88, M_{\text{female}} = 58.06, p = .02 \), Cohen’s \( d = -0.30 \)). All other \( ps > .27 \), alours other Cohen’s \( d < .13 \). Finally, we 
observed a marginal three-way interaction between Moment, Measure, and age, \( F(2, 718) = 
2.82, p = .061, \eta_p^2 = .008 \). Because this interaction falls short from significance and is not 
directly relevant for our current purpose, we do not go into further analysis.

Insert Table 2 and Figure 1 here

**Figure 1.** Differential scores (T1-T0) of positive attitude, empathic concern and social 
proximity regarding schizophrenia, as a function of text condition. The stars indicate a 
statistical difference between T0 and T1 (\( * p < .05; ** p < .01; *** p < .001 \)). Error bars 
indicate standard error of the mean.

### 4. Discussion

Amongst the populations with psychiatric disorders, people experiencing 
schizophrenia belong to those suffering from particularly high levels of stigmatization 
(Corrigan, 2016; Sheehan et al., 2017; Yilmaz & Okanli, 2015). A research effort is necessary
to identify new strategies that may help reduce the public stigma of schizophrenia, and its associated multiple negative consequences for people experiencing this mental disorder. While educational strategies using cognitive accounts, and in particular Early Maladaptive Schemas (EMS), have shown promising results in the context of depression (Botha & Dozois, 2015), they had never been evaluated in the context of schizophrenia. The present study addressed this issue and compared the effect on public stigma of three different educational strategies, based on cognitive distortions, biogenetics, and EMS. In line with our expectations, the intervention using an EMS account for schizophrenia was the only one that led to a significant decrease in public stigma. In addition, the latter effect was driven mainly by an increase in the level of empathic concern towards people experiencing schizophrenia.

Why would an EMS account of schizophrenia be more efficient in reducing public stigma? In light of attribution theories (Corrigan, 2000; Weiner et al., 1988; Weiner, 1995), level of public stigma may depend on etiological account, specifically on control and stability criteria. Previous studies have shown strong positive relationships between patients’ levels of control over the development of their disorder (and, consequently, their level of responsibility for it) and public stigma towards the disorder in question (Lincoln et al., 2008; Schomerus et al., 2013). In addition, studies have highlighted a positive link between stability of the disorder (i.e., the impossibility to treat or reduce it) and public stigma (Phelan, 2005; Phelan et al., 2006). Because EMS accounts of schizophrenia emphasize the importance of external factors (e.g., childhood experiences, such as humiliations at school) as causes of the disorder, they highlight its low controllability. In addition, EMS accounts draw attention to the fact that the joint experience of similar situations experienced in childhood (during which EMS are built) and adulthood (during which EMS are activated) is partly responsible
for schizophrenia symptoms, putting light on the low level of stability of the disease over
time.

The EMS exposure effect was driven mainly by an increase in empathic concern
towards people experiencing schizophrenia. According to Batson et al. (2007), level of
empathy for another person in need depends on three dimensions: perceiving that the other
is in need, valuing the other’s welfare, and adopting the other’s perspective. In the EMS
condition, the example given in the vignette was related to a child being humiliated at
school, which is a common situation that the participants may have themselves experienced
during childhood. This may have increased their propensity to adopt the other’s perspective,
and, as a result, empathic concern. This result is all the more important given that much
research has evidenced that a high empathic concern is an important factor for prosocial
motivation and helping behaviors (Batson et al., 2007; Eisenberg & Miller, 1987). According
to this idea, emotional changes may induce cognitive changes (i.e., decrease in negative
attitudes) and behavioral changes (decrease in desire for social distance).

We believe that the present study may open new avenues for future research on the
prevention of stigmatization of schizophrenia. First, the present results shed light on the
necessity to raise public awareness of schizophrenia. Educational strategies based on
etiological accounts of schizophrenia may be used, and they should emphasize both the low
stability and low controllability of the disorder. We see a great importance in the necessity
to balance these two components in the explanation of schizophrenia, which is consistent
with the multidimensional and balanced approach proposed by Corrigan and Watson
(Corrigan & Watson, 2004). If biogenetic-related explanations (associated with low control
but high stability) are used, they may be accompanied by information about the efficacy of
treatments, in order to reduce the feelings of dangerousness and bad prognosis induced by
this kind of account. Second, our results call for the need to evaluate the effectiveness of the prevention methods used, the non-standardization of the different explanations being an important factor which possibly explains their mixed effects on public stigma (Lamboy & Saïas, 2013).

Our study can be seen as a replication of Botha and Dozois' (2015) work on depression, but applied to schizophrenia. Taken together, the results of these studies may suggest that studying the effects of EMS explanations for other stigmatized disorders may be a promising research endeavor for reducing the public stigma of psychiatric disorders. Indeed, the role of EMS in many psychiatric disorders has been extensively demonstrated (e.g., Hawke & Provencher, 2011; Nicol et al., 2020), and particularly in some stigmatized disorders such as addiction (e.g., Arpaci, 2019; Imperatori et al., 2017). Our present results, although promising, need to be taken with caution, for several reasons which we list here.

First, it is worth noting that our effect is a small one. The significant pairwise difference that we observed for the EMS condition (between T0 and T1) showed only a small effect size (Cohen’s d = .18). We acknowledge that many other factors (and their interaction) contribute to explaining public stigma. Second, our research follows an experimental paradigm, and aims to untangle the effects of distinct educational strategies presenting different types of etiological accounts of schizophrenia. As a result, each scenario was designed to emphasize only one cause for schizophrenia, and it stands to reason that the etiology of schizophrenia is multifactorial. Third, because EMS develop during childhood (Young et al., 2003), one may worry about the possibility that EMS accounts of schizophrenia may drive the public to blame the social environment, and especially the parents, for the development of schizophrenia in a child. This would be an undesirable side-effect of an anti-stigma campaign. Fourth, although the present results show a promising effect of EMS
accounts in the short term, they need to be replicated in the long term. Fifth, while our measures capture public stigma across three components, it does not assess the behaviors that may be influenced by public stigma. Finally, our sample consisted of predominantly French female university students who are certainly sensitive to the issue of mental health.

Future research is warranted to consolidate and generalize these results. Replications need to be conducted with a more representative population. In addition, it would be interesting to evaluate the effects of these interventions over the longer term. In line with the proposals of Casados (2017), it also appears necessary to explore the effects of EMS accounts on behaviors promoted by public stigma, such as discriminatory behaviors, treatment use, or support for programs or legislature related to schizophrenia. In addition, the effects of familiarity are particularly important and complex, as detailed in the article by Corrigan and Nieweglowski (2019). In the future, this variable would benefit from further study in a detailed manner and with a diverse population with different levels and types of familiarity. Finally, it stands to reason that the etiology of schizophrenia is multifactorial, it is warranted which will explore the many factors jointly that explain schizophrenia (e.g. Cognitive and Biogenetic).

Conclusion

Given the many detrimental consequences of stigma for people with schizophrenia, it is necessary to identify new interventions that may help reduce the public stigma of schizophrenia. Our results show that the Early Maladaptive Schemas etiology account may lead to a decrease in public stigma. Consequently, emphasizing EMS accounts in anti-stigma campaign may be a more promising route in order to reduce public stigma against schizophrenia and potentially for other stigmatized mental disorders.
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Guilford Press.
Table 1. Characteristics emphasized in the Biogenetic, Cognitive Distortions, and Cognitive Schemas accounts of Schizophrenia in terms of control of etiology and stability, and the resulting predictions formulated in the present study.

<table>
<thead>
<tr>
<th>Biogenetic account</th>
<th>Cognitive Distortions account</th>
<th>EMS account</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of etiology of the disorder</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Stability of etiology of the disorder over time</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Hypotheses from the present research regarding public stigma</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Table 2. Mean (and SD) of positive attitude, empathic concern and social proximity regarding schizophrenia at T0 and T1, as a function of text condition.

<table>
<thead>
<tr>
<th>Text Condition</th>
<th>Measure</th>
<th>T0</th>
<th>T1</th>
<th>Difference (T1-T0)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMS</strong></td>
<td><em>Empathic Concern</em></td>
<td>54.57 (20.67)</td>
<td>58.38 (21.43)</td>
<td>3.81</td>
</tr>
<tr>
<td></td>
<td><em>Positive Attitude</em></td>
<td>71.72 (14.44)</td>
<td>73.55 (13.87)</td>
<td>1.83</td>
</tr>
<tr>
<td></td>
<td><em>Social Proximity</em></td>
<td>46.21 (22.62)</td>
<td>48.45 (24.73)</td>
<td>2.24</td>
</tr>
<tr>
<td>Text Condition</td>
<td>Measure</td>
<td>T1</td>
<td>T0</td>
<td>T1-T0</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Genetic</strong></td>
<td>Empathic Concern</td>
<td>60.85 (20.03)</td>
<td>60.21 (21.71)</td>
<td>-0.64</td>
</tr>
<tr>
<td></td>
<td>Positive Attitude</td>
<td>72.74 (12.81)</td>
<td>73.57 (14.26)</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>Social Proximity</td>
<td>49.41 (20.76)</td>
<td>50.89 (22.44)</td>
<td>-1.48</td>
</tr>
<tr>
<td><strong>Cognitive Distortion</strong></td>
<td>Empathic Concern</td>
<td>54.11 (17.98)</td>
<td>54.72 (20.26)</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td>Positive Attitude</td>
<td>71.00 (12.76)</td>
<td>71.49 (13.82)</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>Social Proximity</td>
<td>45.43 (20.72)</td>
<td>45.54 (22.04)</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Empathic Concern</td>
<td>52.61 (17.22)</td>
<td>51.43 (18.51)</td>
<td>-1.18</td>
</tr>
<tr>
<td></td>
<td>Positive Attitude</td>
<td>73.76 (12.72)</td>
<td>74.73 (12.92)</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>Social Proximity</td>
<td>50.29 (21.48)</td>
<td>50.36 (23.16)</td>
<td>0.07</td>
</tr>
</tbody>
</table>

**Figure 1.** Differential scores (T1-T0) of positive attitude, empathic concern and social proximity regarding schizophrenia, as a function of text condition. The stars indicate a
statistical difference between T0 and T1 (* $p < .05$; ** $p < .01$; *** $p < .001$). Error bars indicate standard error of the mean.
A1. Short description of the daily life of an individual with schizophrenia

Please read carefully the text below. Later, we will ask you a few questions regarding the content of this text.

"Some people may be affected by a serious mental illness called schizophrenia. These people can go to university, work in the field of justice and live in a self-contained apartment. They do not always present symptoms, but when they do, they can sometimes hear voices, or think that the CIA is watching them. Aside from these specific symptoms of schizophrenia, they can also feel very anxious, which can cause them to miss work on some days. People with schizophrenia are often hospitalized and take medication for their illness."

Control condition

Please carefully read the article below. Later, we will ask you a few questions regarding the content of the article. This article was published in the August-28 edition of this year's "Journal of the American Academy of Quantum Physics". The "Journal of the American Academy of Quantum Physics" is a journal that covers the latest news about quantum physics. It is highly respected in its academic field.

"Fission is largely the result of electrostatic factors." This is the first conclusion of an article recently published in the Journal of the American Academy of Quantum Physics. The author of this article is Dr Morel Edouard from Paris-Sorbonne University, who is renowned worldwide for his expertise in quantum physics. Dr Morel and his collaborators have investigated the factors that may be involved in the appearance of antineutrons in the fission process. They concluded: "Taking into account all the data gathered over the past 30 years, we can conclude that fission is the phenomenon by which the nucleus of a heavy atom (nucleus that contains many nucleons, such as uranium and plutonium nuclei) is divided into several lighter nuclides, usually two nuclides. This reaction results in the emission of neutrons and antineutrons (usually two or three), and a very important release of energy." These results have been praised by many researchers working in quantum physics, more specifically on fission, who now base their work on the results obtained by Dr Morel and his collaborators."

Biogenetic condition

Please carefully read the article below. Later, we will ask you a few questions regarding the content of the article. This article was published in the August-28 edition of this year's "Journal of Molecular Biology and Genetics". The "Journal of Molecular Biology and Genetics" is a journal that covers the latest news about genetics and the improvement of the well-being of the individual. It is highly respected in its academic field.
"Schizophrenia is largely the result of genetic factors." This is the first conclusion of an article recently published in the "Journal of Molecular Biology and Genetics". The author of this article is Dr Morel Edouard of Paris-Sorbonne University, who is renowned worldwide for his expertise in schizophrenia. Dr Morel and his collaborators have investigated the factors that may be involved in the onset of symptoms of schizophrenia. They concluded: "Taking into account all the data gathered over the past 30 years, we can conclude that genetic factors, linked to an excessive amount of neurotransmitters in the brain, a reduction of the volume of the grey matter, and abnormalities in some cortical circuits (all genetically predisposed), are the main causes of schizophrenia. For example, an individual with a parent experiencing schizophrenia has 30% risk of developing schizophrenia symptoms in their life." These results have been praised by many researchers working on schizophrenia, who now base their work on the results obtained by Dr Morel and his collaborators.

**Cognitive distortion condition**

Please carefully read the article below. Later, we will ask you a few questions regarding the content of the article. This article was published in the August-28 edition of this year's "Journal of Behavioral and Cognitive Therapy". The "Journal of Behavioral and Cognitive Therapy" is a journal that covers the latest news about psychopathology and cognitive and behavioral therapy. It is highly respected in its academic field.

"Schizophrenia is largely the result of cognitive factors." This is the first conclusion of an article recently published in the "Journal of Behavioral and Cognitive Therapy". The author of this article is Dr Morel Edouard of Paris-Sorbonne University, who is renowned worldwide for its expertise in schizophrenia. Dr Morel and collaborators have investigated factors that may be involved in the onset of symptoms of schizophrenia. They concluded: "Considering all the data gathered over the past 30 years, we can conclude that reasoning errors largely influence the onset of schizophrenia symptoms. One example of reasoning error may be that if someone blames you, it means that everyone blames you, which is called over-generalization. When this type of thoughts develops over time and multiplies, the symptoms of schizophrenia may appear." These results have been praised by many researchers working on schizophrenia, who now base their work on the results obtained by Dr Morel and his collaborators.

**EMS Condition**

Please carefully read the article below. Later, we will ask you a few questions regarding the content of the article. This article was published in the August-28 edition of this year's "Journal of Behavioral and Cognitive Therapy". The "Journal of Behavioral and Cognitive Therapy" is a journal that covers the latest news about psychopathology and cognitive and behavioral therapy. It is highly respected in its academic field.

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this article is Dr Morel Edouard of Paris-Sorbonne University, who is renowned worldwide for its expertise in schizophrenia. Dr Morel and collaborators have investigated factors that may be involved in the onset of symptoms of schizophrenia. They concluded: "Considering all the data gathered over the past 30 years, we can conclude that dysfunctional cognitive schemas, in other words errors of interpretation, which have their origin in events experienced during childhood, are the primary factors influencing the symptoms of schizophrenia. We can take the example of a child who is humiliated by his schoolmates. When this type of behavior is repeated in adulthood, the dysfunctional schema of mistrust built during childhood can then activate and generate very strong negative thoughts and emotions favoring the emergence of erroneous ideas that take the form of delusions. These results have been praised by many researchers working on schizophrenia, who now base their work on the results obtained by Dr Morel and his collaborators.

Appendix 2

Short description of the daily life of an individual with schizophrenia – French version

Veuillez lire attentivement le texte ci-dessous. Nous vous poserons quelques questions concernant le contenu de ce texte par la suite.

« Certains individus peuvent présenter une maladie mentale grave appelée schizophrénie. Ils peuvent faire des études universitaires, travailler dans le domaine de la justice et vivre dans un appartement autonome. Ils n'ont pas toujours des symptômes, mais lorsqu'ils les ont, ils peuvent parfois entendre des voix, penser que la CIA les surveille. Mis à part ces symptômes spécifiques de la schizophrénie, ils peuvent également se sentir très anxieux ce qui peut les amener à manquer des journées de travail. Les personnes atteintes de schizophrénie sont souvent hospitalisées et prennent des médicaments pour leur maladie. »

Control condition – French version

Veuillez lire attentivement l'article ci-dessous. Nous vous poserons quelques questions par la suite concernant le contenu de l'article suivant. Cet article a été publié dans l'édition du 28 août du « Journal de l’Académie Américaine de Physique Quantique» de cette année. Le « Journal de l’Académie Américaine de Physique Quantique» est un journal qui couvre les dernières nouvelles concernant la physique quantique et très estimé dans le cursus académique. « La fission est en grande partie le résultat de facteurs électrostatiques ». C'est la première conclusion d’un article récemment publié dans le « Journal de l’Académie Américaine de Physique Quantique ». L'auteur de cet article est le Dr Morel Edouard de l’Université Paris-Sorbonne, qui est mondialement réputé pour son expertise sur la physique quantique. Dr Morel et ses collaborateurs ont mené des recherches sur les facteurs
Il a été conclu que la fission est le phénomène par lequel le noyau d'un atome lourd (noyau qui contient beaucoup de nucléons, tels les noyaux d'uranium et de plutonium) est divisé en plusieurs nucléides plus légers, généralement deux nucléides. Cette réaction se traduit par l'émission de neutrons et d'antineutrons (en général deux ou trois), et un dégagement d'énergie très important. Ces résultats ont été salués par de nombreux chercheurs travaillant en physique quantique, plus spécifiquement sur la fission, qui basent maintenant leurs travaux sur les résultats obtenus par le Dr Morel et ses collaborateurs.

Biogenetic condition – French version

Veuillez lire attentivement l'article ci-dessous. Nous vous poserons quelques questions par la suite concernant le contenu de l'article suivant. Cet article a été publié dans l'édition du 28 août du « Journal de Biologie Moléculaire et Génétique » de cette année. Le « Journal de Biologie Moléculaire et Génétique » est un journal qui couvre les dernières nouvelles concernant l'évolution de la génétique et l'amélioration du bien-être de l'individu, il est très estimé dans le cursus académique.

« La schizophrénie est en grande partie le résultat de facteurs génétiques ». C'est la première conclusion d'un article récemment publié dans le « Journal de Biologie Moléculaire et Génétique ». L'auteur de cet article est le Dr Morel Edouard de l'Université Paris-Sorbonne, qui est mondialement réputé pour son expertise auprès des personnes présentant une schizophrénie. Le Dr Morel et ses collaborateurs ont mené des recherches sur les facteurs possiblement impliqués dans l'apparition des symptômes de la schizophrénie. Ils en ont conclu : « En tenant compte de l'ensemble des données obtenues au cours des 30 dernières années, nous pouvons conclure que les facteurs génétiques tels que la quantité trop importante des neurotransmetteurs dans le cerveau, la réduction du volume de matière grise, et les anomalies des circuits corticaux (tous prédisposés génétiquement) sont les principales causes de la schizophrénie. Par exemple, un individu dont un des parents est schizophrène a, de par son patrimoine génétique, 30% de risque de développer dans sa vie des symptômes de la schizophrénie. Ces résultats ont été salués par de nombreux chercheurs travaillant sur la schizophrénie qui basent maintenant leurs travaux sur les résultats obtenus par le Dr Morel et ses collaborateurs.

Cognitive distortion condition – French version

« La schizophrénie est en grande partie le résultat de facteurs cognitifs ». C’est la première conclusion d’un article récemment publié dans le « Journal de Thérapie Comportementale et Cognitive ». L’auteur de cet article est le Dr Morel Edouard de l’Université Paris-Sorbonne, qui est mondialement réputé pour son expertise auprès des personnes présentant une schizophrénie. Dr Morel et ses collaborateurs ont mené des recherches sur les facteurs possiblement impliqués dans l’apparition des symptômes de la schizophrénie. Ils en ont conclu : « En tenant compte de l’ensemble des données obtenues au cours des 30 dernières années, nous pouvons conclure que des erreurs de raisonnement influencent la survenue des symptômes de la schizophrénie. Un exemple d’erreur de raisonnement peut-être le fait de croire que si une personne vous en veut, ça signifie que tout le monde vous en veut, ceci se nomme la sur-généralisation. Lorsque ce type de pensées se développe dans le temps et se multiplient, les symptômes de la schizophrénie peuvent apparaître. » Ces résultats ont été salués par de nombreux chercheurs travaillant sur la schizophrénie, qui basent maintenant leurs travaux sur les résultats obtenus par le Dr Morel et ses collaborateurs.

EMS Condition – French version


« La schizophrénie est en grande partie le résultat de facteurs cognitifs ». C’est la première conclusion d’un article récemment publié dans le « Journal de Thérapie Comportementale et Cognitive ». L’auteur de cet article est le Dr Morel Edouard de l’Université Paris-Sorbonne, qui est mondialement réputé pour son expertise auprès des personnes présentant une schizophrénie. Dr Morel et ses collaborateurs ont mené des recherches sur les facteurs possiblement impliqués dans l’apparition des symptômes de la schizophrénie. Ils en ont conclu : « En tenant compte de l’ensemble des données obtenues au cours des 30 dernières années, nous pouvons conclure que les schémas cognitifs dysfonctionnels, autrement dit les erreurs d’interprétation, qui prennent leur origine dans les expériences vécues au cours de l’enfance, sont les premiers facteurs influençant les symptômes de la schizophrénie. Si l’on prend l’exemple d’un enfant qui subit des humiliations de la part de ses camarades d’école. Lorsque ce type de comportement se répéttera à l’âge adulte, le schéma dysfonctionnel de « méfiance » construit au cours de son enfance pourra alors « s’activer » et générer des pensées et des émotions négatives très fortes favorisant l’émergence d’idées erronées qui prennent la forme d’idées délirantes. Ces résultats ont été salués par de nombreux chercheurs travaillant sur la schizophrénie qui basent maintenant leurs travaux sur les résultats obtenus par le Dr Morel et ses collaborateurs.