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

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22 The authors declare that they have no conflict of interest

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

25

1 **Abstract**

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

23

24 **Keywords:** Stigma, causal attributions, empathic concern, early maladaptive schemas

1 **1. Introduction**

2 About one in four people will suffer from a psychiatric disorder in their lifetime
3 (World Health Organization, 2001). Not only do individuals with psychiatric disorders have to
4 deal with their symptoms, but they must also cope with the public stigma that they generally
5 suffer from (Corrigan & Watson, 2002; Oexle & Corrigan, 2018; Utz et al., 2019).
6 Stigmatization is a process of exclusion leading an individual to be identified as abnormal or
7 deviant, on the basis of a given characteristic which does not conform to a social norm and
8 to which they are reduced (Goffman, 1963). Among all psychiatric disorders, people
9 experiencing schizophrenia are victims of high levels of rejection and public stigma (Corrigan,
10 2016; Pescosolido et al., 2010; Yilmaz & Okanli, 2015). They are commonly perceived by lay
11 people as dangerous, incompetent, and unpredictable (Sheehan et al., 2017). Schizophrenia
12 is frequently and intimately associated with the term "violence" and is perceived as the
13 "model of madness" by society (Castillo et al., 2008). Consistent with this observation, some
14 of the symptoms of schizophrenia, such as inappropriate affect and the propensity to talk
15 aloud to oneself, are manifest indicators of a psychiatric disorder and may lead to
16 stigmatizing reactions (Corrigan, 2000).

17 Public stigma and discrimination are likely to have detrimental consequences for
18 people with schizophrenia. The consequences can be observed within the psychological
19 sphere (e.g., suicide; Farrelly et al., 2015), the social and professional sphere (Daumerie et
20 al., 2012), the family sphere (Yao et al., 2020), and/or the sphere of medical care (Clement et
21 al., 2015). In the specific case of France, studies have confirmed that the levels of
22 stigmatization of schizophrenia are high (Angermeyer et al., 2015; Durand-Zaleski et al.,
23 2012; Lampropoulos et al., 2018). According to attribution theory (Corrigan, 2000; Weiner et
24 al., 1988; Weiner, 1995), an important factor that may contribute to the stigmatization of a

1 disorder is the etiological account that people attribute to this disorder. Specifically,
2 perceived high levels of control of the disorder (i.e., one act on one's condition) and
3 perceived high levels of stability of the disorder (i.e., the disorder is maintained over time)
4 are thought to reinforce public stigma. As a result, anti-stigma campaigns which have
5 emphasized psychosocial factors (associated with high levels of control) and/or
6 biological/biogenetic factors (associated with high levels of stability) as etiological accounts
7 of schizophrenia have had mixed effects on measured levels of public stigma (see the meta-
8 analyses of Kvaale, Gottdiener, et al., 2013; Kvaale, Haslam, et al., 2013; and the review of
9 Thornicroft et al., 2016).

10 Accordingly, endorsing biological and/or biogenetic factors as the cause of a mental
11 disorder fails to reduce discrimination and, instead, increases beliefs about the
12 dangerousness and permanence of the disorder (Haslam & Kvaale, 2015; Kvaale, Gottdiener,
13 et al., 2013; Kvaale, Haslam, et al., 2013). This may promote prejudice, fear, negative
14 attitudes and desire for social distancing (Angermeyer & Matschinger, 2003; Angermeyer et
15 al., 2015; Larkings & Brown, 2018; Read et al., 2006). Likewise, endorsing psychosocial
16 accounts as the cause of mental disorders (e.g., accounts such as stress, death of a loved
17 one, intense bullying during school years) have shown mixed effects on levels of public
18 stigma (see the systematic review and meta-analysis of Schomerus et al., 2012). While in
19 some studies stress-related accounts have been related to greater levels of tolerance for a
20 given disorder (Schnittker, 2008; Van 't Veer et al., 2006), this is not true of all studies (Jorm
21 & Griffiths, 2008; Martin et al., 2007). Similar mixed results have been observed using early-
22 stressor accounts (Schnittker, 2008; Van 't Veer et al., 2006). In the specific case of
23 schizophrenia, lay people may infer from psychosocial accounts that people are responsible
24 for their disorder (e.g., when emphasizing the role of psychoactive substances during

1 adolescence, and more specifically cannabis), and this may increase public stigma as a result
2 (Schomerus et al., 2014). On the other hand, while other psychosocial accounts (and notably
3 childhood sexual abuse, can be associated with a low level of control (and thus with higher
4 social acceptance), they may nevertheless drive lay people to consider schizophrenia as
5 incurable (high level of stability), and this may increase public stigma as a result.

6 In an attempt to reduce public stigma against schizophrenia, the use of account which
7 are neither biological/biogenetic nor psychosocial in nature, such as cognitive accounts, have
8 been largely overlooked. It appears that, so far, the latter accounts have been mobilized
9 mainly in the context of depression (Botha & Dozois, 2015). Yet, cognitive factors – such as
10 cognitive distortions and early maladaptive schemas (EMS) – have been recently shown to
11 play an important role in the development of symptoms in schizophrenia (Bortolon et al.,
12 2013; Sundag et al., 2016). EMS develop during childhood, via interpersonal interactions,
13 and form a template that guides the interpretation of later experiences. They are extremely
14 stable, considered to be unconditional and automatic, and to increase the risk of developing
15 a mental disorder (Schmidt et al., 1995). Cognitive models of schizophrenia suggest that
16 exposure to negative life events during childhood (e.g., school harassment) promotes the
17 development of EMS, including a threatening worldview, external attribution of negative
18 events and experiences, which may favor the development of schizophrenia (Bentall et al.,
19 2009; Howes & Murray, 2014). A number of studies have reported unusually high levels of
20 EMS among people with schizophrenia (Boyda et al., 2018; Khosravani et al., 2019; Sundag
21 et al., 2016).

22 Cognitive distortions refer to erroneous interpretations of situations (e.g., minimizing
23 positive accomplishments, personalizing neutral events; Beck, 1979). They are important
24 early risk factors for psychosis (de Paula et al., 2015; Gawęda et al., 2018). More precisely,

1 an exaggerated tendency to pay attention to threat (Prochwicz & Kłosowska, 2017), external
2 attribution bias (So et al., 2015) or jumping to conclusions (McLean et al., 2017) are
3 important factors driving delusions. In the same way, deficits in recognizing the source of
4 information plays a central role in hallucinations (see the meta-analysis of Waters et al.,
5 2012).

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

16 The present research explored how lay people's beliefs regarding the causes of
17 schizophrenia shape the stigmatization of populations experiencing this disorder. To this
18 end, we exposed a sample of French university students to a text focusing on one of three
19 possible etiological accounts of schizophrenia: Cognitive Distortions, Early Maladaptive
20 Schemas (EMS) or Biogenetic factors (thus, each participant was exposed to just one
21 account). We measured expressed levels of public stigma (stigmatizing attitude, desire for
22 social distance, and empathic concern) just before and just after the educational
23 intervention. We contrasted pre-to-post exposure changes in levels of stigma across the
24 three etiological-account groups of participants, and compared to a group of participants

1 which received a (neutral) non-educational intervention (the control group). We expected to
2 observe a larger pre-to-post-exposure decrease in levels of public stigma in the EMS-account
3 group (given that EMS imply low levels of both controllability and stability). In addition, we
4 expected to observe no decrease in levels of public stigma, in the cognitive-distortion-
5 account group (given that cognitive distortions imply low stability but high controllability)
6 and in the biogenetic-account group (given that biogenetic factors imply low controllability
7 but high stability). Finally, in the control group, we expected no pre-to-post-exposure change
8 in the levels of public stigma (see Table 1, which summarizes the characteristics of the
9 Biogenetic, Cognitive Distortions, and EMS accounts and hypothesis).

10 Insert Table 1 here

11 2. Method

12 2.1. Participants

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

1 following conditions: Cognitive Distortions condition (N = 99), EMS condition (N = 106),
2 Biogenetic condition (N = 107), or Control condition (N = 67).

3

4 **2.2. Compliance with Ethical Standards**

5

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

11

12 **2.3. Measures**

13 In the absence of validated tools in French language for our variables of interest, all
14 scales used were translated in French via a back-and-forth translation procedure. Firstly, the
15 English version was translated into French by an English native speaker specialized in this
16 research field. Then, a French native speaker translated this document back into English. The
17 two translations (English to French and French to English) were compared in order to ensure
18 that they were both faithful to the original and that the items in the French version were
19 clear. After the translation of the scales, the material (scales and vignettes) was proposed to
20 10 students (about 2 per condition) to check the correct understanding of the sentences.

21

22 **2.3.1. Familiarity with schizophrenia and mental illness**

23 To assess people's familiarity with schizophrenia, we used a French translation of the
24 Familiarity with mental illness scale (Corrigan et al., 2003). This 7-item questionnaire

1 measures participants' familiarity with schizophrenia through everyday encounters with the
2 pathology (e.g., interaction in the workplace, presence of people experiencing the pathology
3 in the entourage or at home). Participants answered using a dichotomous "Yes"/"No"
4 response to each item. Higher scores indicated higher familiarity with schizophrenia. We also
5 included two additional questions in order to assess participants' general familiarity with
6 mental illnesses: "Do you have a diagnosis of mental disorder" and "Do you have a member
7 of your family with a diagnosis of mental disorder". Both questions were answered using a
8 dichotomous "Yes"/"No" response.

9

10 **2.3.2. Attitudes**

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

23

24 **2.3.3. Social Distance**

1 In order to evaluate social distance, we used a French translation of the Social
2 Distance Items (Link et al., 1987), which is the most used tool for assessing public stigma of
3 schizophrenia (Lampropoulos et al., 2018). It includes seven items displaying social situations
4 (e.g., renting a room) and participants are asked to indicate the extent to which they would
5 be willing to accept to share these situations with people experiencing schizophrenia, using a
6 4-point Likert scale ranging from 1 ("Definitely willing") to 4 ("Definitely unwilling"). Higher
7 scores indicated a preference for greater social distance. Scores were then reversed and
8 transformed into a percentage, leading to a percentage score of social proximity (from 0 to
9 100). The scale showed very good internal consistency (Cronbach's α at T0 = .86 and T1 =
10 .89; α = .92 for the original version; see Link et al., 1987).

11

12 **2.3.4. Empathic concern**

13 In order to measure empathic concern, we used a French translation of the
14 emotional response scale (Batson, 1987; Batson, 1991). Participants were instructed to
15 indicate how much they felt each of six emotions (sympathy, soft-hearted, warm,
16 compassionate, tender and moved) towards individuals experiencing schizophrenia, using a
17 7-point Likert scale ranging from 1 ("Not at all") to 7 ("Very much"). Higher scores indicated
18 greater empathic concern. Scores were then transformed into a percentage score of
19 empathic concern (from 0 to 100). The scale showed very good internal consistency
20 (Cronbach's α at T0 = .87 and T1 = .90, Cronbach's α was between .63 and .82. for the English
21 version, see Niezink et al., 2012).

22

23 **2.4. Causal explanations of schizophrenia**

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

16

17 **Procedure**

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

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

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

12

13 **2.5. Statistical analysis**

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

22

23 **3. Results**

1 Figure 1 displays the detailed results distinguishing the effect of text condition for
2 each of the measures and moment of measurement (see also Table 2 for the full descriptive
3 statistics). A main effect of Measure was observed, $F(2, 718) = 5.57, p = .004, \eta_p^2 = .015$.
4 Pairwise comparisons showed that scores significantly differed between each measure (all p s
5 $< .001$). Participants scored higher on the positive attitude scale ($M = 72.76$) than on the
6 empathic preoccupation scale ($M = 56.37$) and they scored higher on these two scales than
7 on the social proximity scale ($M = 48.17$). Most importantly, with regards to our current
8 purpose, the Moment of measurement x Text condition interaction was significant, $F(3, 359)$
9 $= 4.11, p = .007, \eta_p^2 = .033$. Before exploring the origin of this interaction with pairwise
10 comparisons, and because Measure did not significantly interact with any of our
11 independent variables, we first computed a composite score of *acceptance* (by averaging the
12 percentage scores of positive attitude, social proximity, and empathic concern; $\alpha_{T0} = .67, \alpha_{T1}$
13 $= .69$, suggesting acceptable reliability¹) only to later move on to analyses specific to each
14 measure for the sake of completeness. Looking at the score of acceptance, pairwise
15 comparisons using paired sample t -tests showed that only the EMS condition yielded an
16 increase in acceptance of schizophrenia from T0 ($M_{\text{acceptance}} = 57.50; SD_{\text{acceptance}} = 15.07$) to T1
17 ($M_{\text{acceptance}} = 60.13; SD_{\text{acceptance}} = 15.82$), $t(105) = 4.23, p < .001$, Cohen's $d = 0.41$. No
18 significant difference was observed between T0 and T1 in the Cognitive Distortions,
19 Biogenetics, or Control conditions (all t s < -1.07 , all p s $> .28$; see Table A1, in appendix, for
20 full descriptive statistics).

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

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 $> .34$).

1 Moment of measurement and Text condition only for the empathic preoccupation measure,
2 $F(3, 359) = 4.86, p = .003, \eta_p^2 = .039$ (for the two other measures, all F s < 1.46 , all p s $> .22$).
3 Pairwise comparisons showed a significant increase of empathic preoccupation only in the
4 EMS condition, $t(105) = -3.86, p < .001$, Cohen's $d = 0.38$.

5 Exploring our covariates, we observed a significant interaction between Measure and
6 Sex, $F(1, 359) = 6.87, p = .001, \eta_p^2 = .019$. An exploration of the simple effects showed that
7 women had higher scores than men (both at T0, and T1) only for empathic preoccupation
8 (T0: $M_{\text{male}} = 51.07, M_{\text{female}} = 57.18, p = .013$, Cohen's $d = -0.32$; T1: $M_{\text{male}} = 51.88, M_{\text{female}} =$
9 $58.06, p = .02$, Cohen's $d = -0.30$). All other p s $> .27$, all other Cohen's $d < .13$. Finally, we
10 observed a marginal three-way interaction between Moment, Measure, and age, $F(2, 718) =$
11 $2.82, p = .061, \eta_p^2 = .008$. Because this interaction falls short from significance and is not
12 directly relevant for our current purpose, we do not go into further analysis.

13

14 Insert Table 2 and Figure 1 here

15

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

20

21 **4. Discussion**

22 Amongst the populations with psychiatric disorders, people experiencing
23 schizophrenia belong to those suffering from particularly high levels of stigmatization
24 (Corrigan, 2016; Sheehan et al., 2017; Yilmaz & Okanli, 2015). A research effort is necessary

1 to identify new strategies that may help reduce the public stigma of schizophrenia, and its
2 associated multiple negative consequences for people experiencing this mental disorder.
3 While educational strategies using cognitive accounts, and in particular Early Maladaptive
4 Schemas (EMS), have shown promising results in the context of depression (Botha & Dozois,
5 2015), they had never been evaluated in the context of schizophrenia. The present study
6 addressed this issue and compared the effect on public stigma of three different educational
7 strategies, based on cognitive distortions, biogenetics, and EMS. In line with our
8 expectations, the intervention using an EMS account for schizophrenia was the only one that
9 led to a significant decrease in public stigma. In addition, the latter effect was driven mainly
10 by an increase in the level of empathic concern towards people experiencing schizophrenia.

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

1 for schizophrenia symptoms, putting light on the low level of stability of the disease over
2 time.

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

15 We believe that the present study may open new avenues for future research on the
16 prevention of stigmatization of schizophrenia. First, the present results shed light on the
17 necessity to raise public awareness of schizophrenia. Educational strategies based on
18 etiological accounts of schizophrenia may be used, and they should emphasize both the low
19 stability and low controllability of the disorder. We see a great importance in the necessity
20 to balance these two components in the explanation of schizophrenia, which is consistent
21 with the multidimensional and balanced approach proposed by Corrigan and Watson
22 (Corrigan & Watson, 2004). If biogenetic-related explanations (associated with low control
23 but high stability) are used, they may be accompanied by information about the efficacy of
24 treatments, in order to reduce the feelings of dangerousness and bad prognosis induced by

1 this kind of account. Second, our results call for the need to evaluate the effectiveness of the
2 prevention methods used, the non-standardization of the different explanations being an
3 important factor which possibly explains their mixed effects on public stigma (Lambooy &
4 Saias, 2013).

5 Our study can be seen as a replication of Botha and Dozois' (2015) work on
6 depression, but applied to schizophrenia. Taken together, the results of these studies may
7 suggest that studying the effects of EMS explanations for other stigmatized disorders may be
8 a promising research endeavor for reducing the public stigma of psychiatric disorders.
9 Indeed, the role of EMS in many psychiatric disorders has been extensively demonstrated
10 (e.g., Hawke & Provencher, 2011; Nicol et al., 2020), and particularly in some stigmatized
11 disorders such as addiction (e.g., Arpaci, 2019; Imperatori et al., 2017). Our present results,
12 although promising, need to be taken with caution, for several reasons which we list here.
13 First, it is worth noting that our effect is a small one. The significant pairwise difference that
14 we observed for the EMS condition (between T0 and T1) showed only a small effect size
15 (Cohen's $d = .18$). We acknowledge that many other factors (and their interaction)
16 contribute to explaining public stigma. Second, our research follows an experimental
17 paradigm, and aims to untangle the effects of distinct educational strategies presenting
18 different types of etiological accounts of schizophrenia. As a result, each scenario was
19 designed to emphasize only one cause for schizophrenia, and it stands to reason that the
20 etiology of schizophrenia is multifactorial. Third, because EMS develop during childhood
21 (Young et al., 2003), one may worry about the possibility that EMS accounts of schizophrenia
22 may drive the public to blame the social environment, and especially the parents, for the
23 development of schizophrenia in a child. This would be an undesirable side-effect of an anti-
24 stigma campaign. Fourth, although the present results show a promising effect of EMS

1 accounts in the short term, they need to be replicated in the long term. Fifth, while our
2 measures capture public stigma across three components, it does not assess the behaviors
3 that may be influenced by public stigma. Finally, our sample consisted of predominantly
4 French female university students who are certainly sensitive to the issue of mental health.

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

17

18 **Conclusion**

19 Given the many detrimental consequences of stigma for people with schizophrenia, it
20 is necessary to identify new interventions that may help reduce the public stigma of
21 schizophrenia. Our results show that the Early Maladaptive Schemas etiology account may
22 lead to a decrease in public stigma. Consequently, emphasizing EMS accounts in anti-stigma
23 campaign may be a more promising route in order to reduce public stigma against
24 schizophrenia and potentially for other stigmatized mental disorders.

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2 Table 1. Characteristics emphasized in the Biogenetic, Cognitive Distortions, and Cognitive
3 Schemas accounts of Schizophrenia in terms of control of etiology and stability, and the
4 resulting predictions formulated in the present study.

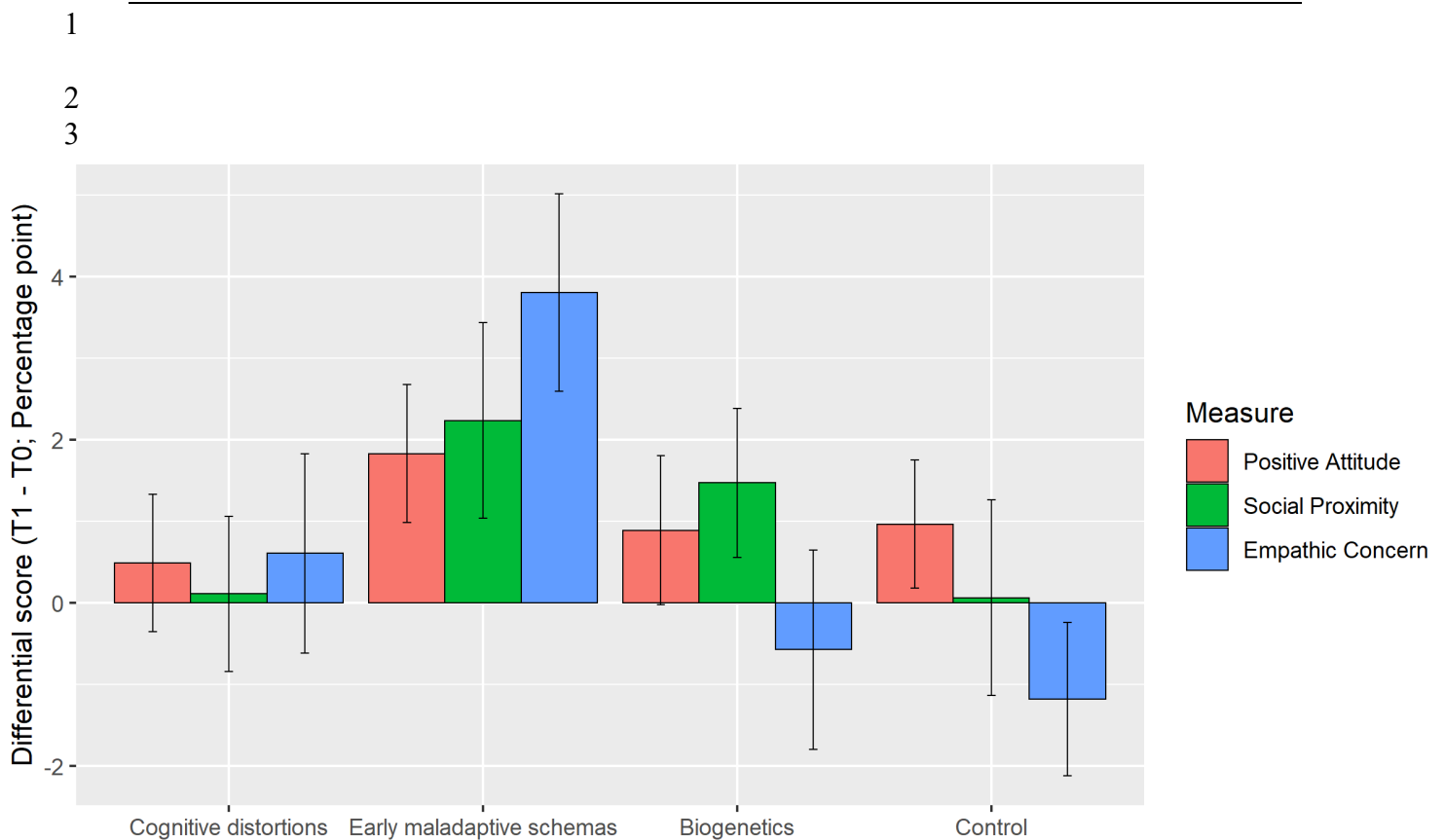
		Biogenetic account	Cognitive Distortions account	EMS account
Etiological account	Control of etiology of the disorder	Low	High	Low
	Stability of etiology of the disorder over time	High	Low	Low
	Hypotheses from the present research regarding public stigma	None	None	Decreased

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

Text Condition	Measure	T0	T1	Difference (T1-T0)
EMS	<i>Empathic Concern</i>	54.57 (20.67)	58.38 (21.43)	3.81
	<i>Positive Attitude</i>	71.72 (14.44)	73.55 (13.87)	1.83
	<i>Social Proximity</i>	46.21 (22.62)	48.45 (24.73)	2.24

Genetic	<i>Empathic Concern</i>	60.85 (20.03)	60.21 (21.71)	-0.64
	<i>Positive Attitude</i>	72.74 (12.81)	73.57 (14.26)	0.83
	<i>Social Proximity</i>	49.41 (20.76)	50.89 (22.44)	-1.48
Cognitive Distortion	<i>Empathic Concern</i>	54.11 (17.98)	54.72 (20.26)	0.61
	<i>Positive Attitude</i>	71.00 (12.76)	71.49 (13.82)	0.49
	<i>Social Proximity</i>	45.43 (20.72)	45.54 (22.04)	0.11
Control	<i>Empathic Concern</i>	52.61 (17.22)	51.43 (18.51)	-1.18
	<i>Positive Attitude</i>	73.76 (12.72)	74.73 (12.92)	0.97
	<i>Social Proximity</i>	50.29 (21.48)	50.36 (23.16)	0.07



5 *Figure 1.* Differential scores (T1-T0) of positive attitude, empathic concern and social
6 proximity regarding schizophrenia, as a function of text condition. The stars indicate a

- 1 statistical difference between T0 and T1 (* $p < .05$; ** $p < .01$; *** $p < .001$). Error bars
- 2 indicate standard error of the mean.
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Appendix 1

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.

1
2
3 "Schizophrenia is largely the result of genetic factors." This is the first conclusion of an article
4 recently published in the "Journal of Molecular Biology and Genetics". The author of this
5 article is Dr Morel Edouard of Paris-Sorbonne University, who is renowned worldwide for his
6 expertise in schizophrenia. Dr Morel and his collaborators have investigated the factors that
7 may be involved in the onset of symptoms of schizophrenia. They concluded: "Taking into
8 account all the data gathered over the past 30 years, we can conclude that genetic factors,
9 linked to an excessive amount of neurotransmitters in the brain, a reduction of the volume
10 of the grey matter, and abnormalities in some cortical circuits (all genetically predisposed),
11 are the main causes of schizophrenia. For example, an individual with a parent experiencing
12 schizophrenia has 30% risk of developing schizophrenia symptoms in their life." These results
13 have been praised by many researchers working on schizophrenia, who now base their work
14 on the results obtained by Dr Morel and his collaborators.
15

16 **Cognitive distortion condition**

17
18 Please carefully read the article below. Later, we will ask you a few questions regarding the
19 content of the article. This article was published in the August-28 edition of this year's
20 "Journal of Behavioral and Cognitive Therapy". The "Journal of Behavioral and Cognitive
21 Therapy" is a journal that covers the latest news about psychopathology and cognitive and
22 behavioral therapy. It is highly respected in its academic field.
23

24 "Schizophrenia is largely the result of cognitive factors." This is the first conclusion of an
25 article recently published in the "Journal of Behavioral and Cognitive Therapy". The author of
26 this article is Dr Morel Edouard of Paris-Sorbonne University, who is renowned worldwide
27 for its expertise in schizophrenia. Dr Morel and collaborators have investigated factors that
28 may be involved in the onset of symptoms of schizophrenia. They concluded: "Considering
29 all the data gathered over the past 30 years, we can conclude that reasoning errors largely
30 influence the onset of schizophrenia symptoms. One example of reasoning error may be that
31 if someone blames you, it means that everyone blames you, which is called over-
32 generalization. When this type of thoughts develops over time and multiplies, the symptoms
33 of schizophrenia may appear." These results have been praised by many researchers working
34 on schizophrenia, who now base their work on the results obtained by Dr Morel and his
35 collaborators.
36

37 **EMS Condition**

38 Please carefully read the article below. Later, we will ask you a few questions regarding the
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40 "Journal of Behavioral and Cognitive Therapy". The "Journal of Behavioral and Cognitive
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42 behavioral therapy. It is highly respected in its academic field.
43

44 "Schizophrenia is largely the result of cognitive factors." This is the first conclusion of an
45 article recently published in the "Journal of Behavioral and Cognitive Therapy". The author of

1 this article is Dr Morel Edouard of Paris-Sorbonne University, who is renowned worldwide
2 for its expertise in schizophrenia. Dr Morel and collaborators have investigated factors that
3 may be involved in the onset of symptoms of schizophrenia. They concluded: "Considering
4 all the data gathered over the past 30 years, we can conclude that dysfunctional cognitive
5 schemas, in other words errors of interpretation, which have their origin in events
6 experienced during childhood, are the primary factors influencing the symptoms of
7 schizophrenia. We can take the example of a child who is humiliated by his schoolmates.
8 When this type of behavior is repeated in adulthood, the dysfunctional schema of mistrust
9 built during childhood can then activate and generate very strong negative thoughts and
10 emotions favoring the emergence of erroneous ideas that take the form of delusions. These
11 results have been praised by many researchers working on schizophrenia, who now base
12 their work on the results obtained by Dr Morel and his collaborators.
13

14 **Appendix 2**

15 16 17 18 **Short description of the daily life of an individual with schizophrenia – French version**

19
20
21 **Veillez lire attentivement le texte ci-dessous. Nous vous poserons quelques questions**
22 **concernant le contenu de ce texte par la suite.**
23

24 « Certains individus peuvent présenter une maladie mentale grave appelée schizophrénie. Ils
25 peuvent faire des études universitaires, travailler dans le domaine de la justice et vivre dans
26 un appartement autonome. Ils n'ont pas toujours des symptômes, mais lorsqu'ils les ont, ils
27 peuvent parfois entendre des voix, penser que la CIA les surveille. Mis à part ces symptômes
28 spécifiques de la schizophrénie, ils peuvent également se sentir très anxieux ce qui peut les
29 amener à manquer des journées de travail. Les personnes atteintes de schizophrénie sont
30 souvent hospitalisées et prennent des médicaments pour leur maladie. »
31

32 **Control condition – French version**

33
34 Veillez lire attentivement l'article ci-dessous. Nous vous poserons quelques questions par la
35 suite concernant le contenu de l'article suivant. Cet article a été publié dans l'édition du 28
36 août du « Journal de l'Académie Américaine de Physique Quantique » de cette année. Le «
37 Journal de l'Académie Américaine de Physique Quantique » est un journal qui couvre les
38 dernières nouvelles concernant la physique quantique et très estimé dans le cursus
39 académique. « La fission est en grande partie le résultat de facteurs électrostatiques ». C'est
40 la première conclusion d'un article récemment publié dans le « Journal de l'Académie
41 Américaine de Physique Quantique ». L'auteur de cet article est le Dr Morel Edouard de
42 l'Université Paris-Sorbonne, qui est mondialement réputé pour son expertise sur la physique
43 quantique. Dr Morel et ses collaborateurs ont mené des recherches sur les facteurs

1 possiblement impliqués dans l'apparition des antineutrons dans le processus de fission. Ils
2 en ont conclu : « En tenant compte de l'ensemble des données obtenues au cours des 30
3 dernières années, nous pouvons conclure que la fission est le phénomène par lequel le
4 noyau d'un atome lourd (noyau qui contient beaucoup de nucléons, tels les noyaux
5 d'uranium et de plutonium) est divisé en plusieurs nucléides plus légers, généralement deux
6 nucléides. Cette réaction se traduit par l'émission de neutrons et d'antineutrons (en général
7 deux ou trois), et un dégagement d'énergie très important. » Ces résultats ont été salués par
8 de nombreux chercheurs travaillant en physique quantique, plus spécifiquement sur la
9 fission, qui basent maintenant leurs travaux sur les résultats obtenus par le Dr Morel et ses
10 collaborateurs.

11

12

Biogenetic condition – French version

13

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

20

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

36

37

Cognitive distortion condition – French version

38 Veuillez lire attentivement l'article ci-dessous. Nous vous poserons quelques questions par la
39 suite concernant le contenu de l'article suivant. Cet article a été publié dans l'édition du 28
40 août du Journal de Thérapie Comportementale et Cognitive de cette année. Le « Journal de
41 Thérapie Comportementale et Cognitive » est un journal qui couvre les dernières nouvelles
42 concernant la psychopathologie et la thérapie cognitive et comportementale. Il est très
43 estimé dans le cursus académique.

44

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

15
16

EMS Condition – French version

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18 suite concernant le contenu de l'article suivant. Cet article a été publié dans l'édition du 28
19 août du Journal de Thérapie Comportementale et Cognitive de cette année. Le « Journal de
20 Thérapie Comportementale et Cognitive » est un journal qui couvre les dernières nouvelles
21 concernant la psychopathologie et la thérapie cognitive et comportementales et est très
22 estimé dans le cursus académique.

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

41