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Are you sure? Delusion conviction moderates the behavioural and emotional consequences of paranoid ideas

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Introduction. Paranoid beliefs strongly impact behaviour and emotion: Most people with paranoid delusions engage in safety behaviours and a relevant minority even commits violent acts under the influence of delusional thoughts. The present study examined whether different levels of belief conviction modulate subsequent behaviour and emotion. To be able to control for important confounds, we set up an analogue study using nonclinical participants.
Methods. Participants were recruited from the general population ($N = 1935$) and asked to fill out the Paranoia Checklist. Individuals had to imagine being persecuted by a secret service, whereby the level of subjective conviction was set at 20%, 40%, 60%, 80%, 90%, or 100%. Subsequently, participants had to estimate for 37 behavioural and emotional items how they might respond to this threat.
Results. Three quarters of the sample affirmed the presence of at least one paranoid idea from the Paranoia Checklist over the duration of a month. The level of belief conviction and paranoia was positively associated with behavioural and emotional consequences.
Conclusions. Our investigation suggests that a higher degree of belief conviction aggravates the behavioural consequences of persecutory beliefs in a linear fashion. The study is limited by its "what if" character and should be replicated with clinical participants. The study suggests that treatment approaches that aim to reduce overconviction may positively impact behaviour in psychosis.

Keywords: delusions; paranoia; schizophrenia; conviction; violence; safety behaviour

Introduction

Delusions are commonly defined as fixed false beliefs, that is, misconceptions that are held with strong and undue conviction (American Psychiatric Association, 2000). Although persecutory (paranoid) delusions are traditionally regarded as a core feature of schizophrenia, no positive symptom – including delusions – is pathognomonic (Carpenter, Strauss, & Muleh, 1973). Models contending a rigid sick-versus-normal dichotomy have been increasingly challenged by data suggesting a continuum of paranoid delusional beliefs in the general population (Freeman et al., 2005). The present study relates to the consequences of delusional beliefs and examines the factors that distinguish "actors" (i.e., people acting on delusional

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beliefs by means of safety behaviour or even violent acts) from "nonactors". Before we review the relevant literature, we first summarise studies on the prevalence of delusional beliefs in the general population given that the present study was conducted with an analogue sample.

Prevalence of delusional ideas in the general population

Delusional ideas are quite common in the general population. Verdoux and van Os (2002) found that 25.5% of their nonclinical sample ($N = 462$) endorsed the feeling of being persecuted. In another survey, 28.4% of a general population sample confirmed at least one psychotic symptom (Kendler, Gallagher, Abelson, & Kessler, 1996). Almost half of the 324 college students (47%) assessed by Ellet, Lopes, and Chadwick (2003) experienced an episode of paranoid ideation, for example, the belief that others intended to harm them psychologically and/or physically. Still higher scores were found by Peters, Joseph, and Garety (1999) in a sample of 320 individuals: 61% of their nonclinical participants believed in telepathy and nearly 75% of the respondents had felt that some people are not what they seem to be. In a large Australian sample (Scott et al., 2008) including 2,441 individuals, endorsement of individual items varied between 5.5% ("Do you ever feel as if you are a robot or zombie without a will of your own?") and 77% ("Do you ever feel as if some people are not what they seem to be?"). Similarly, in the study by Johns et al. (2004) on 8,580 respondents, paranoid ideas showed a large range from 1.5 to 21.2%.

Importantly, prevalence rates largely differ depending on content and design: Studies involving younger samples, self-report assessments, multiple response options (as opposed to a binary "yes/no" format or interviews), and "normalising" contextual variables (e.g., instructions emphasising the normality of the items) seem to yield higher prevalence rates.

Problems of definition and measurement with paranoid delusions

Although the APA definition of delusions (see earlier) is of heuristic value, it is clearly not applicable to all delusional cases. First, delusion conviction in patients oscillates over time (Peters et al., 2012; Sharp et al., 1996): A large subgroup of patients with delusions does not display 100% conviction into their beliefs. Furthermore, delusional beliefs are often paralleled by alternative views: Delusional patients often entertain the possibility that they might be mistaken (Garety et al., 2005). Second, some patients are not fully resistant to counterevidence: Delusional contents typically evolve over time to incorporate new and initially conflicting information.

Psychiatric standard scales such as the Positive and Negative Syndrome Scale (PANSS; Kay, Opler, & Lindenmayer, 1989) solely differentiate according to the contents of the delusional belief (persecutory, grandiose, etc.), but do not isolate qualitative aspects such as conviction, distress, or the number of concurrent delusional beliefs. To the best of our knowledge, only the Psychosis Rating Scales (PSYRATS; Haddock, McCarron, Tarrier, & Faragher, 1999) allow for such a fine-grained analysis, whereby correlational analysis suggests that belief conviction forms a separate factor that is only weakly associated with other aspects of delusions such as interference and preoccupation (Peters et al., 2012).

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Acting on delusions

Delusional beliefs shape both behaviour and emotion. According to Freeman and colleagues (2007), virtually all patients show behavioural changes in response to (paranoid) delusional beliefs. In their study, 96% of the patients had used safety behaviours in the last month, defined as actions intended to prevent the occurrence of a feared (catastrophic) event.

A statistical association between violence and psychosis (for a meta-analysis, see Douglas, Guy, & Hart, 2009) and psychotic-like experience (for a large population study, see Kinoshita et al., 2011) is beyond doubt. Large and Nielssen (2011) estimate that, prior to initial treatment, one third of first-episode patients engage in some kind of violent behaviour, one out of six commits an act of more severe violence, and one in 100 patients commits an assault causing serious injury.

At present, it has not been fully elucidated what sets "actors" (i.e., people acting on delusional beliefs) apart from "nonactors". So far, paranoid delusional content (Wessely et al., 1993) in combination with distress (Bo, Abu-Akel, Kongerslev, Haahr, & Simonsen, 2011; van Dongen, Buck, & van Marle, 2012) and other emotional problems (e.g., impulsivity) have been put forward as risk factors for violence. A recent meta-analysis (Large & Nielssen, 2011) established the following risk factors for violence of any severity (in descending order of importance): involuntary treatment, forensic history, hostile affect, symptoms of mania, illicit substance use, lower levels of education, younger age, male gender, and the duration of untreated psychosis. However, another meta-analysis (Fazel, Gulati, Linsell, Geddes, & Grann, 2009) suggests that the relationship between psychosis and violence is mainly mediated by comorbid substance abuse.

Based on older literature, Junginger (1996) suspected that conviction is associated with acting on delusions. In agreement with this, Häfner and Böker (1982) found an association between the degree of delusional systematisation, which likely goes along with higher belief conviction, and the likelihood of acting upon the belief. The review by Bjørkly (2002) concludes that "violence may appear as a forced choice in patients who experience persecutory delusions associated with a strong idiosyncratic conviction of being threatened and forced to defend oneself" (p. 625). However, one of the few investigations that directly examined the relationship between conviction and paranoia (Buchanan et al., 1993) did not find differences with respect to belief conviction between "actors" and "nonactors".

The present study

The present study aims to resolve inconsistencies and ambiguities in the aforementioned body of literature by manipulating important moderators systematically. Knowing more about the impact of conviction on daily life may also be valuable with respect to treatment. Evidence suggests that bias modification programmes such as metacognitive training (MCT) reduce delusion conviction via exercises challenging cognitive biases (Moritz, Vitzthum, Randjbar, Veckenstedt, & Woodward, 2010). However, it is unclear how changes in delusion conviction manifest in patients' daily life. Further, expanding our still-poor knowledge about the consequences of conviction may also help clinicians anticipate the degree to which patients are a danger to themselves and/or others.

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Our interest in belief conviction thus has two main sources: (1) the aforementioned tentative, but not fully conclusive studies linking belief conviction and acting upon delusions; and (2) data showing that metacognitive training (MCT, see earlier) ameliorates delusion conviction.

We explore the interaction between the propensity for paranoia and belief conviction on the likelihood to act on it as well as its impact on emotion. In view of the high prevalence of delusional symptoms in the general population and its continuous distribution (Freeman, 2006; Verdoux et al., 1998), we conducted an analogue experiment using a large sample drawn from the general population. Individuals were confronted with the scenario that a secret service is after them. Participants were requested to imagine how they would act or feel if they were either 100%, 90%, 80%, 60%, 40%, or 20% convinced that this was true. Subsequently, they had to estimate on a four-point scale how they might respond to this threat. Even though the persecution was simulated, there is tentative evidence that imagined behaviour is a good proxy for real behaviour (Robinson & Clore, 2001).

Prior to the experiment, all individuals were asked to fill out the Paranoia Checklist. We expected that people with high levels of paranoid ideas would contemplate more (aggressive) behavioural acts than people with low levels of paranoid ideas. Further, we assumed an exponential relationship between conviction and behaviour/emotion. Finally, and on a more descriptive level, we were interested in the distribution of paranoid symptoms across the general population.

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Methods

Participants and procedure

Participants were approached via WiSo-panel, a German academic online service allowing researchers to advertise scientific studies. Studies assert that WiSo-panel, as well as similar services such as Mturk or Studyresponse in the USA, provides reliable data (Göritz, 2007; Judge, Ilies, & Scott, 2006; Piccolo & Colquitt, 2006). The study was set up using the software package Unipark® (Globalpark AG, 2011). Upon invitation, participants were first asked to provide informed consent before detailing their age, gender, educational level, and current job situation. The survey proceeded with questions on ethical leadership in organisations, all of which were unrelated to the current study and will be presented elsewhere. Subsequently, the Paranoia Checklist (Freeman et al., 2005) and our newly developed "what if" delusion paradigm (see later) were administered.

A total of 7,096 individuals from the general population were invited for participation in the study. Of these, 2,012 (28%) completed the core part of our study (Paranoia Checklist and the "what if" paradigm). Blind to analyses, data from 77 participants were discarded who entered the same value in the Paranoia Checklist[1] or the "what if" paradigm, leaving a total of 1,935 individuals (27% screening-to-inclusion ratio; see Table 1).

Paranoia Checklist

The Paranoia Checklist (Freeman et al., 2005) consists of 18 items (see Table 2) that are assessed on a five-point scale ("rarely", "once a month", "once a week", "several

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Table 1. Means, standard deviations, and percentage for background and psychopathological characteristics across the six subgroups.

	Level of conviction for "what if" scenario						
Variable	*20% (n = 325)*	*40% (n = 323)*	*60% (n = 325)*	*80% (n = 318)*	*90% (n = 325)*	*100% (n = 319)*	*Statistics*
Age in years	44.17 (16.21)	44.06 (16.00)	43.65 (15.46)	44.18 (15.52)	43.09 (15.46)	43.46 (16.18)	$F(5, 1925) = 0.25$, $p > .9$
Sex (% female)	58.2%	58.1%	57.7%	59.9%	58.2%	58.8%	$\chi^2(1) = 0.42$, $p > .9$
School (% university degree)	26.5%	30.1%	28.7%	26.2%	25.2%	34.2%	$\chi^2(1) = 8.84$, $p > .05$
Paranoia Checklist	27.01 (12.03)	26.81 (11.58)	25.92 (10.66)	25.35 (10.22)	25.75 (10.24)	25.93 (9.42)	$F(5, 1929) = 1.16$, $p > .3$

times a week'', ''at least once a day''). A recent study (Moritz, Van Quaquebeke, & Lincoln, 2012) showed that the Paranoia Checklist is best represented by two dimensions called ''suspiciousness'' and ''core paranoia'' (results from the latter subscale will be explored separately). Previous studies have confirmed good psychometric properties of the scale (Freeman et al., 2005; Lincoln, Peter, Schafer, & Moritz, 2010; Lincoln, Ziegler, Lüllmann, Müller, & Rief, 2010). The core paranoia items are as follows: ''I can detect coded messages about me in the press/TV/radio'', ''I am under threat from others'', ''There is a possibility of a conspiracy

Table 2. Percentage of endorsement on the items of the Paranoia Checklist, split for response options.

Item of the Paranoia Checklist	*Rarely*	*Once a month*	*Once a week*	*Several times a week*	*At least once a day*
1. I need to be on my guard against others.	56.1	19.7	13.3	8.6	2.3
2. There might be negative comments being circulated about me.	54.2	22.6	14.2	7.0	2.0
3. People deliberately try to irritate me.	65.7	17.8	10.1	5.1	1.2
4. I might be being observed or followed.	81.8	9.5	4.8	2.6	1.4
5. People are trying to make me upset.	65.7	19.4	9.7	3.9	1.3
6. People communicate about me in subtle ways.	67.3	19.7	8.2	3.9	0.9
7. Strangers and friends look at me critically.	57.2	23.2	11.8	6.3	1.6
8. People might be hostile towards me.	62.4	22.2	9.2	4.5	1.6
9. Bad things are being said about me behind my back.	62.7	21.3	9.6	5.0	1.4
10. Someone I know has bad intentions towards me.	73.9	14.0	6.7	3.9	1.5
11. I have a suspicion that someone has it in for me.	82.9	9.1	4.2	2.5	1.2
12. People would harm me if given an opportunity.	73.5	15.1	6.2	3.3	1.9
13. Someone I don't know has bad intentions towards me.	84.2	8.6	4.7	1.5	1.0
14. There is a possibility of a conspiracy against me.	91.3	3.8	2.8	1.4	0.7
15. People are laughing at me.	64.5	21.2	8.8	3.9	1.5
16. I am under threat from others.	91.3	4.5	2.5	1.0	0.7
17. I can detect coded messages about me in the press/TV/radio.	95.3	1.8	1.7	0.8	0.3
18. My actions and thoughts might be controlled by others.	89.8	6.4	1.9	1.2	0.7

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against me", "My actions and thoughts might be controlled by others", and "Someone I don't know has bad intentions towards me".

"What if" delusion scenario

For the final part of the survey, all participants were asked to imagine how they would feel and respond if a secret service (not further specified) was pursuing them. Each subject was then randomly allocated to one of six conditions (between-subject design). The conditions differed solely in terms of subjective conviction: Participants were told to be 20%, 40%, 60%, 80%, 90%, or 100% convinced about the authenticity of the threat.[2] Afterwards, 37 items capturing potential responses to the threat were presented (see Table 3). Each item had to be answered on a four-point scale (i.e., 1 = "yes", 2 = "mostly yes", 3 = "mostly no", 4 = "no"). Items were derived from clinical experience and studies regarding acting on delusions (e.g., Freeman et al., 2007).

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Results

Baseline characteristics

The sample predominantly consisted of female participants (see Table 1). The six subsamples (split by level of conviction) did not significantly differ on background characteristics. Further, no differences were observed on the Paranoia Checklist total score ($M = 26.13$, $SD = 10.73$, median: 22; see Table 1), which is comparable with a recent online study (Moritz et al., 2012; Sample 1: 26.44 [11.67]; Sample 2: 26.88 [11.32]). There was a slight excess of individuals with a university degree in the 100% conviction group, but Bonferroni-corrected post hoc tests did not yield a significant difference (all $ps > .1$). The mean score for the core paranoia subscale (five items) was 5.84 ($SD = 2.41$; median: 5). Table 2 shows that up to 55.8% of the individuals acknowledged presence of at least one paranoid symptom over the past month (participants endorsed either "once a month", "once a week", "several times a week", or "at least once a day"). Cumulated over the entire scale, 75% of the sample reported at least one monthly paranoid symptom, and core (i.e., psychosis-prone) paranoid symptoms occurred in 22% of the sample (core paranoia subscale).

Factor analysis of the "what if" items

We submitted all "what if" items to a principal component analysis with Varimax-rotation to identify distinct response dimensions. Sampling was adequate as expressed by a Kaiser-Myer-Olin score of .97. Bartlett's test of sphericity was significant ($p < .001$). Five dimensions were extracted according to the Kaiser-Guttman criterion (eigenvalue > 1), accounting for 54.23% of the total variance. Mean communalities were .54 (range: .36–.64). Table 3 displays the factor scores for each item. The first factor (called "delete traces") captured items relating to the deletion of cues and behaving inconspicuously, for example, using a prepaid phone or burning (rather than throwing away) personal things. The second factor (called "drastic security") represented elaborated security/safety measures like building a bunker or buying a bullet-proof vest. The third factor (called "simple security")

Table 3. Factor solutions for the 37 "what if" items.

	Component				
Items	*Delete traces*	*Drastic security*	*Simple security*	*Emotional response*	*Violent measures*
I would reinstall my PC in order to delete spy software that might have been installed.	**.682**	.192	.143	.200	.131
I would use a prepaid phone (i.e., without contract where I would have to put a name down).	**.665**	.137	.283	.131	.107
I would rather burn than throw away personal things like letters if I wanted to get rid of them.	**.615**	.070	.262	.212	.177
I would no longer carry my phone with me.	**.611**	.408	.007	.097	−.055
I would delete all traces of my internet activity.	**.607**	.107	.244	.259	.099
I would no longer use the internet at home.	**.566**	.423	.194	.130	−.047
I would place marks in my home to check whether someone entered my place whilst I was absent (e.g., stick a hair between the door jamb).	**.553**	.120	.266	.187	.414
I would take apart my landline phone to look for bugs.	**.535**	.406	.085	.124	.248
I would change my way to work.	**.504**	.260	.485	.107	.106
Even around friends and family I would be careful of what I say.	.465	.191	.272	.148	.298
I would not eat what others offered me.	.391	.362	.366	.116	.202
I would build a bunker.	.021	**.705**	.130	−.049	.156
I would buy a bulletproof vest.	.173	**.658**	.304	−.014	.218
I would change my name.	.225	**.656**	.341	−.017	−.010
I would emigrate to another country.	.249	**.619**	.132	.084	.016
Euphoria ("The more danger the more honour")	.075	**.616**	−.121	.009	.120
I would x-ray my house to look for emitters (bugs).	.277	**.607**	.155	.098	.223
I would hire a detective.	.149	**.521**	.420	.162	.102
I would double lock the door.	.392	.099	**.648**	.201	.132
I would install security door locks.	.411	.152	**.613**	.173	.156
I would buy pepper spray.	.179	.217	**.592**	.133	.331
Fear	.238	.069	**.552**	**.513**	.105
I would change my telephone number.	.440	.337	**.533**	.102	−.117
I would look around more often.	.368	.048	**.520**	.391	.181
I would constantly monitor the hallway through the peephole.	.214	.412	**.511**	.112	.153

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Table 3 (*Continued*)

	Component				
Items	*Delete traces*	*Drastic security*	*Simple security*	*Emotional response*	*Violent measures*
I would change my appearance and dress inconspicuously.	.398	.420	.423	.102	.015
I would install security cameras.	.350	.392	.396	.044	.370
Astonishment/disbelief	.159	−.047	−.023	**.761**	−.013
I would not be able to believe it.	.054	−.029	−.001	**.739**	−.099
Feelings of helplessness.	.195	.026	.403	**.593**	.055
I would search for reasons of why one would have it in for me.	.333	−.082	.234	**.582**	.269
Anger	.167	.170	.196	**.529**	.224
I would try to assure my innocence.	.064	.196	.444	.486	.002
I would get informed about secret services.	.389	.059	.127	.482	.171
I would go to the police.	.011	.210	.389	.392	−.110
I would be prepared to use force if I felt threatened.	.184	.265	.055	.092	**.690**
I would arm myself.	.165	.454	.215	−.042	**.578**

Note: Loadings of at least .5 are highlighted in bold type.

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captured common safety measures like changing one's telephone number or installing safety locks. The fourth dimension (called "emotional response") represented emotional consequences like surprise, disbelief, anger, and helplessness. The final dimension (called "violent measures") was composed of only two items: to arm oneself and being ready to hurt someone if feeling threatened. Based on the factor solution, we composed five subscales containing items with a minimal loading of at least .5 on the respective dimension (Cronbach's alpha: $\alpha = .88$, .83, .87, .81, and .65). Seven items could not be allocated to any of the factors (see Table 3).

Impact of background variables and conviction on "what if" response factors

First, we explored if demographic variables impacted the behavioural and emotional consequences for the paranoia-relevant scenario. Males scored higher on all subscales ("yes" or "mostly yes" responses were pooled; all $ps < .03$) except for emotional responses, where female participants showed higher scores ($p < .001$). Age was negatively correlated with all measures at a small to medium (albeit significant) size, at least $r = -.05$, $p = .03$. The strongest relationship emerged with simple security measures, $r = -.25$, $p < .001$. For drastic and simple security measures (at least $p < .005$), as well as for violent actions ($p = .05$), participants with a university degree scored lower than those without.

To examine the effect of belief conviction on subjects' responses, we performed a mixed 5×6 two-way ANOVA with the five "what if" subscales as within-subject factors and the six conviction levels (20–100%) as between-subject factors. Endorsement ("yes" or "mostly yes" responses in percentages were pooled; Table 4) served as

the dependent variable. The "what if" factor achieved significance, $F(4, 7712) = 1692.39$, $p < .001$, $\eta^2_{partial} = .47$, owing to discrepant prevalences across the five subscales. As can be derived from Figure 1a, drastic and violent measures were less often considered, whereas (negative) emotional responses were quite common. At a small to medium effect size, the conviction effect was significant, $F(5, 1928) = 15.75$, $p < .001$, $\eta^2_{partial} = .04$: Figure 1a indicates that there was a linear increase in actions and emotional responses from 20% to 100%. The interaction was significant at a small effect size, $F(20, 7712) = 3.05$, $p < .001$, $\eta^2_{partial} = .008$: Although most "what if" subscales showed a strong increase from 20% to 100% conviction (delete traces: 54% increase in magnitude; drastic security: 53% increase in magnitude; simple security: 45% increase in magnitude; violent measures: 42% increase in magnitude), this was less so for emotional responses (17% increase in magnitude), perhaps owing to a ceiling effect.

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High versus low paranoid participants

Following the psychometric high-risk approach advocated by Chapman and Chapman (1985; see also Lenzenweger & Korfine, 1994), persons who scored at least two standard deviations above the mean of the Paranoia Checklist (48 points or higher) were compared to individuals who did not score more than 0.5 standard deviations above the mean (31 points or lower). As can be seen in Table 5, individuals scoring high on the Paranoia Checklist scored much higher overall than individuals scoring low, except for emotional responses.

We aimed to repeat the mixed ANOVA on the impact of belief conviction on the "what if" response categories with a sample of individuals scoring high versus low on paranoia. Because of the multiple conviction conditions and the rather small sample of participants scoring at least two standard deviations above the mean ($n = 93$), only 15–16 individuals (average) would have remained per condition. Therefore, we eventually decided to split the group into a subgroup scoring at least one point on the core paranoia subscale ($n = 434$, 22.4%) versus those without any paranoid symptom.[3] "Yes" or "mostly yes" "what if" responses in percentages served as the dependent variable. To avoid repetition, exposition of results from the three-way mixed ANOVA were confined to the effect of paranoia status and its interactions (all other factors and interactions maintained their status of significance). The group effect of paranoia, $F(1, 1922) = 30.03$, $p < .001$, $\eta^2_{partial} = .01$, but not its interaction

Table 4. Difference in percentages of the amount of behavioural and emotional consequences ("yes" and "rather yes" responses were pooled) as a function of a reduction in belief conviction.

	Decrement in conviction in %				
Subscales	*100 to 20%*	*100 to 40%*	*100 to 60%*	*100 to 80%*	*100 to 90%*
Delete traces	−117.19	−42.30	−38.13	−16.86	−10.32
Drastic security	−79.58	−31.31	−67.06	−18.99	−3.11
Simple security	−108.56	−44.58	−33.13	−12.63	−9.20
Emotional response	−57.26	−22.13	−18.53	−6.55	−5.51
Violent measures	−73.50	−17.69	−81.97	−5.80	−18.42

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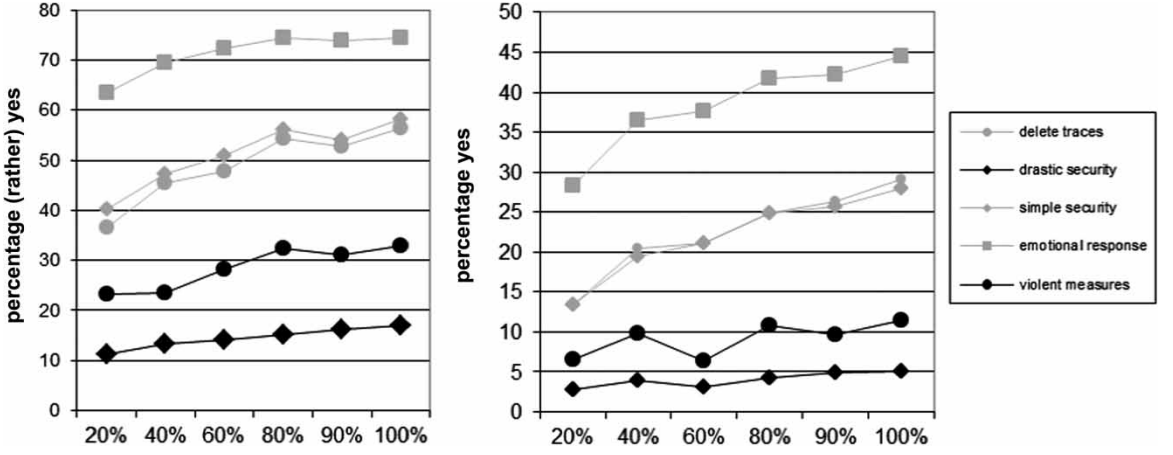


Figure 1. The linear increase of behavioural and emotional consequences as a function of conviction: (a) "yes" or "rather yes" responses were pooled; (b) "yes" responses only.

Table 5. Comparison of high scorers versus low scorers on the Paranoia Checklist for the "what if" subscales; means and standard deviations (in brackets) of percentage endorsement.

	High scorers (2 SD above mean; n = 93)		*Normal scorers (lower-equal 0.5 SD above mean; n = 1747)*		
	M	*SD*	*M*	*SD*	*t-test*
"Yes" or "rather yes"					
Delete traces	56.14	(28.95)	48.32	(31.24)	$t = 2.53$, $p = .013$
Drastic security	43.96	(32.08)	12.48	(19.50)	$t = 9.37$, $p < .001$
Simple security	57.29	(32.43)	50.88	(32.49)	$t = 1.85$, $p = .064$
Emotional response	60.38	(32.75)	72.09	(29.34)	$t = 3.38$, $p = .001$
Violent measures	58.06	(37.80)	26.49	(36.05)	$t = 8.21$, $p < .001$
"Yes"					
Delete traces	21.34	(26.60)	22.57	(25.90)	$t = 0.44$, $p > .6$
Drastic security	13.82	(21.42)	3.44	(10.82)	$t = 4.64$, $p < .001$
Simple security	24.55	(29.35)	22.15	(27.42)	$t = .82$, $p > .4$
Emotional response	27.49	(31.07)	39.56	(31.36)	$t = 3.62$, $p < .001$
Violent measures	16.13	(30.54)	8.48	(23.39)	$t = 2.38$, $p = .019$

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with level of conviction, $F(5, 1922) = 1.78$, $p > .1$, $\eta^2_{\text{partial}} = .00$, achieved significance. This indicates that highly paranoid persons consider more behavioural responses overall. The increment across the different levels of conviction, however, was comparable – albeit starting from different baseline levels – between the two groups. This result was qualified by an interaction of Paranoia × "What if" subscales, $F(4, 7688) = 30.01$, $p = .002$, $\eta^2_{\text{partial}} = .01$: High-paranoid individuals showed increased levels for all four action subscales, whereas the emotional response was blunted. The three-way interaction was insignificant, $F(20, 7688) = 0.51$, $p > .9$, $\eta^2_{\text{partial}} = .00$.

Regression analyses

To verify that the relationship between condition and consequences is indeed linear as visual inspection suggests, we conducted a number of regression analyses. We tested if the relationship between convictions and the five "what if" subscales (mean scores) is best represented by a linear, quadratic, cubic, logarithmic, or exponential model. Selection was aided by graphical inspection of the plots and the residuals indicating no irregularities. For all dimensions the linear model best represented the data: delete traces, $\beta = .20$, $R^2 = .04$, $t(1933) = 9.08$, $p < .001$; drastic security, $\beta = .11$, $R^2 = .01$, $t(1933) = 5.09$, $p < .001$; simple security, $\beta = .18$, $R^2 = .03$, $t(1933) = 8.19$, $p < .001$; emotional response, $\beta = .15$, $R^2 = .02$, $t(1933) = 6.89$, $p < .001$; violent measures: $\beta = .12$, $R^2 = .01$, $t(1933) = 5.27$, $p < .001$. The pattern remained essentially the same when analyses were repeated for subjects high versus low on paranoia.

We essentially repeated the aforementioned ANOVA, but this time only included items for which full endorsement was expressed ("yes" responses in percentages) as one may argue that contents responded to with "yes" are more likely to be initiated than (attenuated) "mostly yes" responses. Again, the "what if" subscale factor was

significant, $F(4, 7712) = 925.87$, $p < .001$, $\eta^2_{partial} = .32$. At a small to medium effect size, the effect of conviction was significant as well, $F(5, 1928) = 15.52$, $p < .001$, $\eta^2_{partial} = .04$. This is explained by a linear increase in behavioural and emotional responses from 20% to 100% (see Figure 1b). For the same reason as the one before, the interaction was significant, $F(20, 7712) = 5.17$, $p < .001$, $\eta^2_{partial} = .013$: delete traces: 117% increase in magnitude; drastic security: 80% increase in magnitude; simple security: 109% increase in magnitude; emotional response: 57% increase in magnitude; violent measures: 73% increase in magnitude. Table 4 shows the estimated impact of a reduction in delusion conviction on behaviour and emotion (i.e., decrement calculated as the difference in percentages between lower levels of conviction [20–90%] and full conviction [100%]). The values in Table 4 were derived from the difference scores of the values presented in Figure 1a.

Discussion

The present study explored the impact of delusion conviction on behaviour and emotion. Our investigation was inspired by a small, but emerging literature examining the distinguishing factors between paranoid people who act on their delusions and those who do not (e.g., van Dongen et al., 2012; Wessely et al., 1993). Although conviction has been assumed to play a vital role, the available evidence is inconclusive (Buchanan et al., 1993). We were interested in simulating how such changes manifest in terms of behaviour and emotion. To control for important key variables and confounds, we planned the study as an analogue study.

Our sample was drawn from the general population. Three quarters of the sample affirmed at least one item of the Paranoia Checklist over the past month, and 22% also acknowledged at least one core paranoid belief (e.g., "There is a possibility of a conspiracy against me") over the past month (for roughly comparable results see Poulton et al., 2000). Hence, in line with Freeman (2006), Garety et al. (2005), and others (Verdoux & van Os, 2002), our data corroborates that paranoia is represented along a continuum in the general population and is far more common than the full-blown clinical picture of psychosis (which approximately affects 1% of the population).

Unexpectedly, a linear (nonexponential) relationship emerged between belief conviction and subsequent actions: The greater the belief conviction, the higher the behavioural and emotional consequences, including grave actions like buying a bulletproof vest or being willing to injure someone when feeling threatened. As expected, people high on delusion conviction displayed overall elevated frequencies relating to actions. Conversely, increments in conviction led to more negative emotions in low-paranoia individuals only. Although the level of negative emotions was blunted in the paranoid group, it rose as a function of conviction. Prior studies have detected that acting on delusions is associated with higher levels of distress (Bo et al., 2011). We think further investigation is needed to determine whether this relationship is either moderated or even mediated by level of conviction (i.e., higher belief conviction > more negative emotions and distress > enhanced probability to act on delusions).

Before we close the paper, we would like to acknowledge several limitations of the study. First, we obtained only indirect evidence as we recruited nonclinical participants. A simulation may clearly deviate from how people would respond under real subjective threat, although there is evidence that imagined and real

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behaviour show some correspondence (Robinson & Clore, 2001). In line with studies on clinical samples (Large & Nielssen, 2011), we also found a linkage between the severity on the subscale "violent measures" and young age, low education, and male gender, which tentatively speaks for the validity of the results. Nevertheless, results need to be confirmed in individuals actually varying in paranoid belief conviction. Investigations with clinical samples, however, are plagued with methodological challanges that we were able to control with our experimental design. For example, clinical participants differ on multiple confounds such as delusional content (paranoid, grandiose, etc.) and comorbid psychiatric symptoms and medication. Even if patients share the same delusional subtype, for example paranoia, the nature of the threat felt by the patient – be it a neighbour or a mighty organisation such as a secret service – makes a big difference (Sundag, 2012). Thus, these factors need to be accounted for. Second, we split the group at the median. Our psychometric high-risk approach (Chapman & Chapman, 1985; Lenzenweger & Korfine, 1994) did not prove feasible as subsamples were very small (high-risk participants had to score at least two standard deviations above the mean) and differed across conditions on background variables. A within-subject design would have eliminated this confound. However, participants would have likely seen through the present manipulation, thereby burdening the interpretation of the results. Third, we chose only one delusional theme (i.e., the paranoid belief involving a secret service) and the range of consequences was limited. Results might be different for other delusional themes in view of findings that persecutory delusions are more likely to be acted upon (Wessely et al., 1993). A less-potent persecutor than a secret service might have elicited weaker reactions and ideas of reference; grandiose ideas especially will elicit a different response pattern. Thus, future studies should closely look at other moderators for acting on delusion.

To summarise, the present results concur with older assumptions that greater conviction fuels behavioural consequences of paranoid ideas. Our results are compatible with the basic tenets of metacognitive training in psychosis (Moritz et al., 2010), which claim that the attenuation of delusion conviction reduces both the likelihood of harmful acts against others as well as emotional distress. The study suggests that reducing belief conviction may result in a number of positive consequences on behaviour and emotion. When delusion conviction is decreased from 100 to 60%, the result is an 82% reduction for violent measures and 19% reduction for emotional responses. Interestingly, and contrary to our initial assumption, a drop from utter (100%) to lower degress of conviction does not follow an exponential pattern but is largely linear. Future studies are needed to confirm if these inferences hold in a clinical sample using a longitudinal design.

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Notes

1. Strings of "1" (minimal score) in the Paranoia Checklist were accepted as possible entries
2. Since we considered an exponential relationship between conviction and the consequences, we added 90% as an intermediate level.

3. When using a cutoff of two standard deviations, we faced the additional problem that subsamples differed with respect to age ($p = .01$ for overall model), which has been found to moderate responses (see respective Results section).

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