Need for Closure, Jumping to Conclusions, and Decisiveness in Delusion-Prone Individuals

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Abstract: *Need for closure* refers to a motivated need for certainty. *Jumping-to-conclusions bias* refers to the gathering of minimal data when making overconfident probabilistic judgments. Both constructs have been associated independently with delusion-proneness. Fifty-eight nonclinical adults were assessed for jumping-to-conclusions bias using an experimental reasoning task, and need for closure, decisiveness concerning real-life dilemmas, and delusion-proneness using questionnaires. Delusion-proneness was associated independently with need for closure and jumping-to-conclusions bias, with no evidence of a direct relationship between the latter two. These results discount the view that need for closure motivates a jumping-to-conclusions bias, leading, in turn, to delusion-proneness. The various facets of need for closure proved to be independent; while intolerance of ambiguity correlated positively with delusion-proneness, decisiveness correlated negatively. The finding that delusion-prone individuals are more indecisive in everyday life was replicated using different scales. Delusion-proneness is associated independently with jumping-to-conclusions bias on experimental reasoning tasks, intolerance of ambiguity, and indecision concerning real-life dilemmas.

Key Words: Reasoning, delusion, psychosis, beliefs.

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An influential study by Huq et al. (1988) stimulated a series of investigations into the reasoning processes of deluded and delusion-prone individuals. The approach of Huq et al. (1988) was consistent with the prevailing diagnostic definition of delusions, according to which delusional beliefs are based on "*incorrect inference* about external reality" (American Psychiatric Association, 1995, p. 783). Whereas Maher (1999) and Maher and Ross (1984) regarded delusions as essentially rational responses to unusual perceptual experiences, Huq et al. (1988) explored reasoning anomalies or biases that might be involved in the formation and maintenance of delusions. They showed participants two jars of beads, each containing colored beads in complementary ratios (e.g., 85% red and 15% yellow in one jar, the reverse in the other). The jars were then hidden from view and a series of beads was drawn (ostensibly at random) from one of the jars. Participants had to decide which jar the beads were being drawn from. Huq et al. (1988) found that, relative to controls (normal and psychiatric), deluded participants requested fewer beads before making their decision and rated their decision with greater confidence.

The findings of Huq et al. (1988) have been replicated a number of times (see, e.g., Fear and Healy, 1997; Garety, 1991), and the robustness of the findings demonstrated using a number of adaptations of the original paradigm (see Dudley and Over, 2003, for a review). The cognitive style implicated in such studies has come to be known as the *jumping-to-conclusions bias* (Garety and Freeman, 1999). The significance of this reasoning style derives from the assumption that individuals with such a bias will form unwarranted conclusions on the basis of scant evidence (Garety, 1991). The bias is thus thought to play a role in the formation and maintenance of delusional beliefs.

Colbert and Peters (2002) have suggested that the driving force behind the jumping-to-conclusions bias is *need for closure*, defined by Kruglanski (1989, p. 14) as "the desire for a definite answer on some topic, any answer compared with confusion and ambiguity." Colbert and Peters (2002) tested their idea in members of the general population who were assessed for delusion-proneness using the Peters et al. Delusions Inventory (PDI; Peters et al., 1996). Individuals with high PDI scores showed a jumping-to-conclusions bias and also greater need for closure when compared with a low PDI group. However, there was no evidence of a direct relationship between greater need for closure and the jumping-to-conclusions bias. Bentall and Swarbrick (2003) investigated need for closure in clinical patients with either current or remitted persecutory delusions. They found that both patient groups had greater need for closure than the healthy controls. However, Bentall and Swarbrick (2003) did not include a measure of jumping to conclusions in their study. We sought to provide evidence of a direct link between need for closure and jumping to conclusions by employing correlational techniques, rather than factorial techniques, as Colbert and Peters (2002) had done, to investigate the relationships between delusion-proneness, jumping-to-conclusions bias (on a probabilistic reasoning task), decisiveness in everyday life, and need for closure in nonclinical adults.

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METHODS

Participants

Participants were 58 first-year psychology undergraduates (21 male and 37 female), who participated in partial fulfillment of course requirements. The age range of the sample was 18 to 39 years, with a mean age of 21 (SD = 5.1 y).

Materials and Procedure

Delusion-Proneness

The PDI (Peters et al., 1996) is a self-report instrument commonly used to assess proneness to delusional thinking in nonclinical groups. The PDI has been found to demonstrate good internal consistency and concurrent validity (Peters et al., 1999a), as well as satisfactory criterion validity (Peters et al., 1999b). Participants must respond "yes" or "no" to each of 21 items. For those items given a "yes" response, participants also rate associated distress, preoccupation, and conviction using a 5-point Likert scale. A total PDI score is calculated by summing the number of "yes" responses (range, 0–21). Separate scores for each PDI dimension are calculated by summing the ratings for each dimension across all "yes" responses (range, 0–105).

Jumping-to-Conclusions Bias: The Experimental Beads Task

An adaptation of the Huq et al. (1988) method was used as it was intended for use in testing clinical outpatients in a later study. These outpatients were to be tested in a range of settings (university, outpatient clinic, participants' homes). It was therefore impracticable to use similar equipment to that used in the study by Huq et al. (1988; i.e., screens to hide jars). Participants in the present study were shown a pair of jars, each containing red and yellow beads in complementary ratios of 85:15 and 15:85. Participants were informed of the respective ratios and were told that the experimenter had randomly selected one of the jars before the study and had then drawn a series of beads, with subsequent replacement, from the selected jar. Participants were informed that the series of colored beads had been recorded and that this series would now be read out, one colored bead at a time. Their task was to decide when they knew the jar the experimenter must have been drawing the beads from. A check was made to ensure that the instructions were fully understood, and then the series of ostensible draws was read out. After each color was named, participants were prompted, "Do you want to decide now or do you want to hear the next draw?" The order of the series was in fact predetermined, and was one of the orders used by Colbert and Peters (2002): RRRYRRRRR YYRRRRRRRY (where R refers to red and Y refers to yellow beads). The number of draws to reach a decision was recorded. Participants also rated their decision confidence using a 6-point Likert scale ranging from 50%/50% ("could be either container") to 100% ("absolutely certain").

Need for Closure

The Need for Closure Scale (NFC; Kruglanski et al., 1993) measures an individual's proclivity to obtain firm answers and to avoid ambiguity. Participants respond to 42 items using a 6-point Likert scale (1 = strong disagreement to 6 = strong agreement). Scores range from 42 to 252. Higher scores indicate greater need for closure. Five independent facets are also scored: desire for predictability (8 items), need for order (10 items), intolerance of ambiguity (9 items), decisiveness (7 items), and closed-mindedness (8 items).

Decisiveness Concerning Real-Life Dilemmas

The Milgram and Tenne (2000) scales of decisional procrastination were also used to examine different components of decisiveness in everyday life. These scales probe difficulties with making timely decisions regarding minor and major life matters. However, responses can be reverse scored to provide indices of decisiveness. For example, on the Routine Speed scale, respondents rate how quickly they reach decisions on each of 15 routine matters of daily life ("which restaurant to go to," "which movie to see"), using a 4-point Likert scale ranging from 1 = "immediately or very quickly" to 4 = "after considerable delay." On the Routine Comfort scale, respondents rate how comfortable they feel making the same 15 decisions, again on a 4-point Likert scale ranging from 1 = "comfortable and completely relaxed" to 4 = "very tense and uncomfortable." The last two scales, Important Speed and Important Comfort, each include 14 decisions about important matters ("which career to choose," "where to buy a new home/apartment"). Scores on the Routine scales range from 15 to 60, and on the Important scales from 14 to 56. Milgram and Tenne (2000) report good reliability and construct validity for their four scales. Responses were reverse scored so that higher scores indicated faster decision-making and greater ease when making decisions in everyday life (to maintain consistency with the scoring of the NFC facet decisiveness).

RESULTS

One participant who had rated his/her decision confidence at 50%/50% despite taking eight draws to reach a decision was excluded from the analyses. This confidence rating was more than 3 SDs below the mean confidence rating of the group (81.29%, SD = 9.85).

Jumping-to-Conclusions Bias and Delusion-Proneness

Pearson correlations are reported throughout the paper (Spearman rank correlations were also examined but findings were similar). The correlation between the total PDI score and draws to decision was nonsignificant ($r = -.17$, $p = 0.21$). However, participants with higher total PDI scores rated their decisions with greater confidence ($r = .42$, $p = 0.001$). A regression analysis with backward reduction was also used to explore whether any particular dimension of delusion-proneness (distress, preoccupation, or conviction), or combination of dimensions, might be associated with fewer draws to decision (Table 1). Results indicated that the PDI dimensions of conviction and preoccupation were working against each other—that is, higher levels of conviction (having adjusted for the effects of preoccupation) were associated with fewer draws to decision, whereas greater preoc-

TABLE 1. Raw Correlation Coefficients and Statistics for the Final Reduced Model Predicting Draws to Decision and Decision Confidence, With the Initial Predictor Variables Being the Three PDI Dimensions

	Raw Correlation Coefficients		Final Reduced Model		
	r	Sig	Standardized β	*t*	Sig.
Predicting draws to decision					
PDI distress	−0.10	.441			
PDI preoccupation	−0.06	.660	.585	1.96	.05
PDI conviction	−0.19	.164	−.715	−2.39	.02
Predicting decision confidence					
PDI distress	0.42	.001	.55	2.49	.01
PDI preoccupation	0.28	.038	−.78	−2.59	.01
PDI conviction	0.40	.002	.67	2.41	.02

cupation (i.e., ruminating more about implausible thoughts) was associated with more draws to decision. A pattern very consistent with this was found when a similar regression analysis was used to predict decision confidence (Table 1); in this case, higher levels of conviction and concomitant distress were associated with greater confidence, whereas greater preoccupation was associated with lower confidence ratings.

Need for Closure and Delusion-Proneness

The NFC total score was not related to any measure of delusion-proneness (Table 2). However, there were significant correlations with the NFC facets intolerance of ambiguity and decisiveness. Intolerance of ambiguity correlated positively with all aspects of delusion-proneness (number of implausible thoughts endorsed, conviction, preoccupation, and distress). In contrast, decisiveness correlated negatively with PDI scores. The latter result was unexpected and led us to examine the various dimensions of delusion-proneness: distress, preoccupation, and conviction, in more detail. Results indicated that distress was the primary mediator of the relationship between decisiveness and delusion-proneness. In more detail, backward reduction regression analyses revealed that neither PDI conviction ($t = .26$, $p = 0.79$) nor PDI preoccupation ($t = .51$, $p = 0.61$) predicted NFC decisiveness once PDI distress ($\beta = -36$, $t = 2.71$, $p = 0.009$) had been taken into account. To put it simply, participants who were more distressed by their implausible thoughts reported being less decisive.

Decisiveness Concerning Real-Life Dilemmas and Delusion-Proneness

Indices of decisiveness in everyday life (as assessed using the Milgram and Tenne scales) correlated negatively with PDI scores (Table 2). As was found with the NFC facet decisiveness, individuals with higher PDI scores were slower and felt less at ease when making decisions concerning real-life dilemmas. However, regression analyses similar to those carried out above indicated that, once again, it was primarily distress, rather than conviction or preoccupation, that predicted feelings of unease and tardiness when making routine and important life decisions. For example, neither PDI conviction ($t = .13$, $p = 0.90$) nor PDI preoccupation ($t = .29$, $p = 0.78$) predicted Routine Comfort once PDI distress ($\beta = -34$, $t = 2.58$, $p = 0.013$) had been taken into account.

Jumping-to-Conclusions Bias, Need for Closure, and Decisiveness in Everyday Life

The experimental indices of jumping to conclusions (draws to decision and decision confidence) were correlated with NFC scores, as well as the measures of decisiveness derived from the Milgrim and Tenne scales. In brief, there was no evidence of a direct relationship between greater need for closure, as assessed using the NFC scales, and jumping to conclusions (i.e., fewer draws to decision and greater decision confidence). The only result to reach statistical significance was a positive correlation between the NFC facet

TABLE 2. Correlations of PDI Delusion-Proneness Scores With NFC Scores (Total and Facet) and the Measures of Decisiveness, Derived From the Milgrim and Tenne (2002) Scales

	PDI Total	PDI Distress	PDI Preoccupation	PDI Conviction
Need for closure				
Total score	.03	.08	.10	.18
Need for order	0.12	.15	.20	.24
Intolerance of ambiguity	0.30*	.36**	.32*	.30*
Decisiveness	−0.34*	−.36**	−.28*	−.25
Desire for predictability	0.13	.17	.14	.24
Close-mindedness	−0.12	−.04	−.06	.02
Milgrim and Tenne's decisiveness scales				
Routine speed	−.20	−.24	−.24	−.17
Routine comfort	−.41**	−.35**	−.30*	−.27*
Important speed	−.32*	−.37**	−.25	−.31*
Important comfort	−.23	−.27*	−.12	−.19

*$p < 0.05$; **$p < 0.01$; ***$p < 0.005$.

decisiveness and draws to decision ($r = .41, p = 0.003$)—i.e., participants who self-reported being more decisive in real life actually took more draws to reach their decision on the Beads Task. However, we suggest treating this result with some caution since this was a single significant finding in the context of a general pattern of nonsignificant results concerning the relationships between need for closure and jumping to conclusions. Regarding the Milgrim and Tenne measures, results were generally nonsignificant. However, there were two unexpected negative correlations between self-reported decisiveness concerning real-life decisions and confidence ratings on the Beads Task: participants who expressed greater confidence in their decision on the Beads Task expressed less comfort ($r = -.32, p = 0.016$) and greater tardiness ($r = -.26, p = 0.049$) when facing important real-world decisions. We address this apparent paradox below.

DISCUSSION

Greater need for closure and jumping-to-conclusions bias have been associated independently with delusion-proneness, leading to speculation that greater need for closure motivates a jumping-to-conclusions bias which in turn leads to delusion-proneness. However, no study to date has provided evidence of a direct relationship between greater need for closure and jumping to conclusions. We sought to do so by investigating the relationships between need for closure, jumping-to-conclusions bias (on an experimental reasoning task), decisiveness concerning real-life dilemmas, and delusion-proneness in nonclinical adults.

Results indicated that the jumping-to-conclusions bias may be associated more specifically with a propensity to hold implausible beliefs with unwarranted conviction. That is, higher levels of conviction regarding implausible ideas (as assessed using the PDI) were associated with fewer draws to reach a decision on the experimental reasoning task (one of our indices of jumping-to-conclusions bias), whereas greater preoccupation with implausible ideas was, instead, associated with more draws to reach a decision. In a somewhat similar vein, higher confidence ratings on the experimental task (our other index of jumping-to-conclusions bias) were also associated with higher levels of conviction regarding implausible ideas (as well as more concomitant distress), whereas greater preoccupation with implausible ideas was associated with lower confidence ratings on the experimental task.

Results also indicated that need for closure, as operationalized by the Kruglanski et al. (1993) NFC Scale, is not a unitary construct in relation to delusion-proneness. That is, NFC intolerance of ambiguity and NFC decisiveness dissociated; whereas intolerance of ambiguity correlated positively with all aspects of delusion-proneness, decisiveness correlated negatively. However we note here that it was primarily heightened distress concerning implausible thoughts that predicted indecision concerning real-world dilemmas, as assessed using the NFC decisiveness scales.

We found no evidence of a direct relationship between need for closure and jumping-to-conclusions bias on an experimental reasoning task, consistent with the findings of Colbert and Peters (2002). Our findings in this regard cast doubt on the view that a greater need for closure plays a motivational role in the genesis of delusions, at least a motivational role mediated by the jumping-to-conclusions bias. Garety et al. (see Garety and Hemsley, 1994 for review and discussion) have suggested that delusional and delusion-prone people show a jumping-to-conclusions bias on experimental probabilistic reasoning tasks because they fail to evaluate current data in the light of past learned regularities and thus place greater weight on the content of immediate experience—i.e., the current draw in an experimental reasoning task. The idea that the contents of immediate experience might be given undue weight in delusional people (i.e., not weighted according to past learned regularities) has similarities with the idea that delusional people have a difficulty with overriding a universal bias to place greatest weight on the evidence of one's own senses (Langdon and Coltheart, 2000). In more detail, Langdon and Coltheart (2000) have suggested that delusional people fail to override the automatic salience of first-person evidence to give equal weight to one's own experience, the views of other people and general knowledge. We also borrow from Kapur (2003) here; Kapur (2003) suggests that psychosis is characterized by dopamine disregulation leading to the aberrant assignment of salience to everyday experience. Drawing on Garety, Hemsley et al., Langdon and Coltheart (2000), and Kapur (2003), we suggest that delusional and delusion-prone people express unwarranted conviction in their implausible ideas and jump to conclusions on an experimental reasoning task because they attach inappropriate heightened salience to whatever presents to consciousness as an internally generated first-person representation of reality. In the case of an experimental reasoning task, this would be a hypothesis of which jar was selected that is based on the current bead draw. In extreme cases, one would therefore predict that some delusional people would make their decision as soon as they were presented with the first draw. Huq et al. (1988) and Garety et al. (1991) found precisely this: e.g., Garety et al. (1991) reported that 11 of the 27 delusional subjects they tested made their decision after the first draw. In the case of implausible ideas that come to consciousness as self-generated notions, these might also be associated with an inappropriate sense of heightened salience, leading to the unwarranted sense of conviction. For example, a delusion-prone person may hear a background buzz while on the telephone and be unable to ignore it due to the inappropriate heightened salience. What may come to mind automatically in that moment, also associated with an inappropriate heightened salience, is the notion that "the CIA are bugging my phone." Such notions are implausible but not readily discounted by other first-person data. They might trigger the normal tendency to confirm hypotheses (Dudley and Over, 2003), leading eventually to the adoption and maintenance of a delusional belief.

What is perplexing here is why an attachment of inappropriate heightened salience to internally generated notions does not also lead to decisiveness in everyday life. Our results suggest that, if anything, delusion-proneness, or at least delusional distress, is associated with indecisiveness concerning real-life dilemmas. There were other indications that decisiveness, as indexed by fewer draws to decision and

higher confidence on an experimental reasoning task, does not align with feelings of decisiveness when confronting real-world dilemmas. In particular, higher confidence ratings on the experimental task were associated with less self-reported ease and greater tardiness when making important life decisions. What is important here, we think, is to be clear about the precise meaning of indecisiveness in everyday life that is associated with delusion-proneness. We suggest that the better conception is vacillation rather than indecision. To support our view, we draw on evidence reported elsewhere that delusional and delusion-prone people are corrigible when performing probabilistic reasoning tasks (Colbert and Peters, 2002; Garety, 1991; Garety et al., 1991; Huq et al., 1988). To clarify, Colbert and Peters (2002) used two versions of the Beads Task. The first was similar to ours; on the second, participants rated their certainty that beads were coming from one jar or the other over a series of 10 draws. Colbert and Peters (2002) found that high PDI individuals were swayed more by disconfirmatory evidence on the second task—e.g., when 90% certain that beads were coming from jar A (let us say containing red and yellow beads in the ratio of 85:15), a yellow bead caused a drop in certainty of 11.4% in the high PDI group, whereas the low PDI group hardly changed their certainty rating at all (a drop of only 1%). In line with the findings of Colbert and Peters (2002), we suggest that delusion-prone individuals self-report higher levels of indecision in everyday life because they are conscious of vacillating back and forth when faced with real-life dilemmas. This vacillation in everyday life, we suggest, might occur in circumstances where the reasons for or against a particular decision are readily apparent, self-evident. As the self-evident reasons come to mind, the delusion-prone person feels, first, a sense of conviction for and, next, a sense of conviction against, leaving them with an overriding sense of indecisiveness and, perhaps, intolerance of ambiguity.

Some limitations of the present study need to be acknowledged before final conclusions can be made. First, we have used correlation techniques and, although these complement the factorial approach of Colbert and Peters (2002), they have also resulted in our reporting many correlation coefficients, thus increasing the chance of Type 1 error. Rather than adjusting α, we have taken the approach of considering all data as worthy of note if significant at a 0.05 α level, and placing greater weight on consistent patterns of results. Nevertheless, we acknowledge the need to replicate our findings in a larger sample. Second, we did not include the two versions of the Beads Task. In hindsight, this would have been preferable, given our reliance on the past findings concerning this second version of the task to interpret the present study's findings of a relationship between indecisiveness, rather than decisiveness, concerning real-life dilemmas and delusion-proneness.

CONCLUSION

The findings of the present study highlight a number of issues to be considered in future research. First, the evidence that a jumping-to-conclusions bias may be related to a specific propensity to hold implausible beliefs with unwarranted conviction highlights the need to explore multiple dimensions of delusion-proneness (e.g., as assessed using the PDI). Second, our findings concerning decisiveness in everyday life highlight the need to be cautious when inferring real-world implications of experimental indices of an overconfident and hasty reasoning style. We have drawn on ideas expressed previously by a number of researchers (Garety and Hemsley, 1994; Kapur, 2003; Langdon and Coltheart, 2000) to suggest that delusion-prone individuals attach an inappropriate heightened salience to whatever presents to immediate consciousness as an internally generated (first-person) representation of reality. It might be this inappropriate salience that then causes the unwarranted conviction in implausible ideas, the jumping-to-conclusions bias on an experimental probabilistic reasoning task, and the intolerance of ambiguity and indecisiveness concerning real-life dilemmas that we found in relation to delusion-proneness.

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