

Defeatist Performance Beliefs, Negative Symptoms, and Functional Outcome in Schizophrenia: A Meta-analytic Review

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Negative symptoms are a strong predictor of poor functional outcome in people with schizophrenia. Unfortunately there are few effective interventions for either negative symptoms or functional outcome, despite the identification of potential mechanisms. Recent research, however, has elucidated a new potential mechanism for negative symptoms and poor functional outcome: defeatist performance beliefs (DPB), or negative thoughts about one's ability to successfully perform goal-directed behavior that can prevent behavior initiation and engagement. We conducted 2 meta-analyses examining the relationship between DPB and both negative symptoms ($n = 10$ studies) and functional outcome ($n = 8$ studies) in people with schizophrenia. We found a small effect size for the relationship between DPB and negative symptoms, regardless of how negative symptoms were measured. We also found a small effect size for the relationship between DPB and functional outcome, which was significantly moderated by the method of assessing DPB and moderated by the sex composition of the study at a trend level. These findings highlight the potential of targeting DPB in psychosocial interventions for both negative symptoms and functional outcome.

Key words: defeatist performance beliefs/negative symptoms/functional outcome

Introduction

Negative symptoms, or diminished motivation/pleasure and diminished emotional expressivity,^{1–3} are a strong predictor of poor functional outcome in people with schizophrenia.^{4,5} While recent models^{6,7} have posited cognitive-affective factors that contribute to the development and maintenance of negative symptoms (eg, effort computation⁸ and anticipated pleasure⁹), this focus has not yet translated into effective psychosocial interventions

for negative symptoms,¹⁰ and by extension, improved functional outcomes. A small, but rapidly growing body of research has elucidated defeatist performance beliefs (DPB)—overgeneralized negative thoughts about one's ability to successfully perform goal-directed behavior—as a possible mechanism contributing to negative symptoms and poor functional outcome among people with schizophrenia.^{11–14} Given the promising results from this budding line of research, the goal of this manuscript was to conduct a meta-analytic review of the extant studies that have investigated the relationship between DPB, negative symptoms, and functional outcome.

DPB about a course of action can prevent the initiation of and engagement in motivated, goal-directed behavior. For example, imagine wanting to ask a colleague a question, but also having the belief that asking a question is a sign of weakness and will make you look inferior. In this scenario, having a DPB (asking questions signals inferiority and weakness) may prevent the initiation of a potential goal-directed behavior (asking a question), as well as engaging in a social interaction. While the investigation of DPB among people with schizophrenia has received greater attention in the past 10 years, most past research has focused on the role of dysfunctional attitudes more generally as a mechanism underlying motivation and pleasure deficits in people with depression.¹⁵ Building from their work in depression, Beck and colleagues^{11,12} proposed a cognitive model of schizophrenia. According to this model, neurocognitive deficits contribute to unsuccessful goal attainment, which over time give rise to dysfunctional attitudes, including DPB. These dysfunctional attitudes, in turn, lead to a decrease in motivation for future goal-related activities, which may contribute to functional outcome deficits. Beck and colleagues posit that DPB and dysfunctional attitudes in general, particularly towards social interactions, may

lead people with schizophrenia to a “point of safety,” where succumbing to dysfunctional attitudes may lessen goal-directed behavior and thus reinforce further disengagement with the social world.¹²

Recent research shows that DPB are related to both negative symptoms and functional outcome among people with schizophrenia. Greater DPB among people with schizophrenia have been linked to greater negative symptoms generally,^{11,13,16,17} but see,^{18,19} motivation/pleasure negative symptoms more specifically,^{14,20,21} and poorer functional outcome,^{13,14,18,21–23} but see.^{24,25} Importantly, whereas other proposed cognitive and emotional mechanisms contributing to negative symptoms and functional outcome have not yet been translated into effective interventions, early evidence suggests that interventions targeting DPB may be effective in reducing negative symptoms and improving outcome. Recent psychosocial treatment clinical trials for people with schizophrenia that have included a focus on dysfunctional attitudes generally, and DPB specifically, have found post-intervention reductions in negative symptoms,^{24–28} as well as improved global functioning²⁶ and functional outcomes in people with schizophrenia.^{25,26} While limited, these studies highlight the potential of DPB as a treatment target for reducing negative symptoms and improving functional outcomes among people with schizophrenia.

With growing interest in DPB, it is important to take a “snapshot” of the state of the literature to better understand the role of DPB in schizophrenia. To this end, we conducted 2 meta-analyses: one examining the link between DPB and negative symptoms and the other examining the link between DPB and functional outcome. Although Beck and colleagues identify other dysfunctional attitudes that may be related to negative symptoms and/or functional outcomes in people with schizophrenia, we opted to include only studies that assessed DPB given that this is the most frequent type of dysfunctional attitude that has been assessed in schizophrenia to date.

Next, we examined potential moderators of the relationship between DPB and negative symptoms or functional outcome. Given that DPB have been linked to both negative symptoms generally and motivation/pleasure negative symptoms more specifically, we investigated type of negative symptom measure (total score vs motivation/pleasure symptoms only) as moderator of the relationship between DPB and negative symptoms. There is no theoretical rationale or empirical evidence to suggest that the type of functional outcome measure used would differentially relate to DPB, and thus we did not investigate this as a potential moderator quantitatively. In addition, we conducted a qualitative analysis of the relationship between DPB and both negative symptoms and functional outcome, looking at patterns in the study effects sizes by factors such as study type (observational vs clinical trial), participant recruitment (high negative symptoms vs “all comers”), and measure type.

Given past research showing sex differences in functional outcome and in the relationship between symptoms and functioning in people with schizophrenia²⁹ we examined potential moderating effects of the sex composition of the studies. Because age may be related to the endorsement of dysfunctional attitudes,¹⁴ and differentially related to functional outcome in older compared to younger samples²⁴ we examined mean study age moderator of the relationships between DPB, negative symptoms, and functional outcome.

Methods

Search Strategy for the Meta-analysis

In order to identify relevant studies for the meta-analysis, we conducted a combined PubMed and PsycINFO search for all studies containing the following terms: a word base of “schizophren*” or “psychosis” and “dysfunctional attitudes,” “defeatist beliefs,” or “defeatist performance,” yielding 75 studies. Our inclusion criteria were as follows: (1) article written or translated in English (2 studies excluded), (2) article was an empirical study published in a peer-reviewed journal (4 studies excluded), (3) article included a negative symptom or functional outcome measure (10 studies excluded), (4) article included people diagnosed with schizophrenia or schizoaffective disorder (44 studies excluded), and (5) the study included a measure of DPB specifically (1 study excluded). Two articles that met inclusion criteria^{16,28} could not be included as we were unable to obtain data necessary for the analyses.

Further, 2 articles that met inclusion criteria contained overlapping samples with other included articles. First, the article by Green and colleagues²¹ contained almost all of the participants included in the Horan and colleagues sample²² plus additional participants, so we only included the former and not the latter in our analyses. Second, the Granholm and colleagues articles^{24,25} contained almost all of the participants in the Quinlan and colleagues sample,³⁰ so we only included the former and not the latter in our analyses. In all, 10 articles including 858 people with schizophrenia were included in the meta-analyses. These studies are described in [table 1](#) (Several authors were contacted via email for unpublished data, including: descriptive statistics [eg, means, SDs],^{11,13,14,16,17} sample characteristics [eg, % male, education],^{23,24} and/or correlations between the DAS DPB subscale and negative symptoms or functional outcome.^{13,17,18,23,24} Data from any clinical trials were at baseline rather than post-trial.)

Measures

All included studies assessed DPB using the Dysfunctional Attitudes Scale (DAS³³). DPB items comprise a subscale of the broader DAS scale, and the calculation of this subscale score was done in 1 of 2 ways in the included studies ([table 1](#)): (1) according to the original DAS publication ($n = 8$ studies) and (2) based on the factor analysis

Table 1. Descriptive Data and Effect Size (ES) for the Relationship Between Defeatist Performance Beliefs (DPB), Negative Symptoms, and Functional Outcome

Study Citation	N	% Male	Age M (SD)	Negative Symptoms		Functional Outcome		DPB Version	Study Type
				Measure	ES	Measure	ES		
Beck et al ³¹	94	76	39.5	BPRS ^a	0.26 ^d	—	—	W & B	Observational
Couture et al ¹⁷	62	63	46.7 (8.4)	CAINS	0.27	—	—	W & B	Observational
Granholm et al ²⁵	127	53	41.2 (10.1)	SANS ^b	0.13	ILSS	-0.09	Cane et al	Clinical Trial
Strauss et al ¹³	46	61	41.7 (10.7)	BNSS	0.27	LOF	-0.31	W & B	Observational
Green et al ²¹	191	68	46.6 (9.8)	SANS ^b	0.26	RFS	-0.29	W & B	Observational
Park et al ¹⁸	49	71	49.6 (7.2)	SANS	0.004	BQOL	-0.31	W & B	Observational ^e
Ventura et al ¹⁴	71	79	21.7 (3.3)	SANS ^b	0.28	RFS	-0.31	W & B	Observational
Kiwanauka et al ²³	100	68	41.1 (10.6)	SANS ^c	0.22	LOF	-0.33	W & B	Observational
Granholm et al ²⁴	63	51	54.7 (7.4)	SANS ^b	0.23	ILSS	-0.13	Cane et al	Clinical Trial
Grant et al ¹¹	55	65	36.9 (9.9)	SANS	0.49	QLS	-0.45	W & B	Observational

Note: CAINS, Clinical Assessment Interview for Negative Symptoms; BPRS, Brief Psychiatric Rating Scale; SANS, Scale for the Assessment of Negative Symptoms; BNSS, Brief Negative Symptom Scale; ILSS, Independent Living Skills Survey; LOF, Level of Functioning Scale; RFS, Role Functioning Scale; BQOL, Brief Quality of Life Scale; QLS, Quality of Life Scale; W & B refers to the DPB subscale used in Weissman & Beck, 1978; Cane et al refers to the DPB subscale used in the Cane et al.³²

^aBPRS to calculate a proxy for “deficit syndrome” which we included here as a proxy for high and low negative symptoms.

^bReported SANS Experiential composite that was computed by combining the SANS avolition/apathy and anhedonia/asociality scales.

^cOnly reported the SANS affective blunting/alogia subscale score.

^dEffect size transformed from Cohen’s *d* effect size (*d* = 0.63) comparing difference in DPB between high and low deficit syndrome participants.

^eThe study measures were collected during a baseline assessment for a clinical trial.

conducted by Cane and colleagues³² ($n = 2$ studies). Both DPB scales contain 15 items, but only 12 of the 15 items are in common. Specifically, the Cane and colleagues³² version includes the following DAS scale items not included in the Beck and colleagues³³ subscale: “If other people know what you are really like, they will think less of you,” “I can not trust other people because they might be cruel to me,” and “If someone disagrees with me, it probably means that he does not like me.” The subscale used by Beck and colleagues, on the other hand, contains the following unique items: “Taking even a small risk is foolish because the loss is likely to be a disaster,” “People should have a reasonable likelihood of success before undertaking anything,” and “If I don’t set the highest standards for myself, I am likely to end up a second-rate person.”

All studies also included an assessment of the relationship between DPB and either negative symptom total scores using either the Scale for the Assessment of Negative Symptoms (SANS³⁴), Brief Psychiatric Rating Scale (BPRS³⁵), Clinical Assessment Interview for Negative Symptoms (CAINS³), and Brief Negative Symptom Scale (BNSS³⁶) or subscales of the SANS.

Nine of the 10 included studies investigated the relationship between DPB and functional outcome using either the Independent Living Skills Survey (ILSS³⁷), Role Functioning Scale (RFS³⁸), Level of Function Scale (LOF³⁹), Quality of Life Scale (QLS⁴⁰), Brief Quality of Life Scale (BQOL⁴¹), and the Community Adjustment Form (CAF⁴²). One study that included a measure of functional outcome³¹ was not included in the meta-analysis because the correlation between DPB and functional outcome was not reported, and we were unable to obtain these results from the authors. Thus, our meta-analysis of the relationship between DPB and functional outcome included only 8 studies. See [table 1](#) for the negative symptom and functional outcome measures used in these studies.

Data Analysis Plan

MetaWin 2.0 statistical package⁴³ was used to conduct meta-analyses. Effect sizes for each study were represented by z -transformed Pearson’s r correlations between DPB and negative symptoms or functional outcome. One study³¹ divided participants into high and low deficit syndrome groups and reported a Cohen’s d effect size, which we converted to z -transformed Pearson’s r coefficients.⁴³ Each study’s effect size was weighted by estimating the inverse of the sum of the between- and within-study variance. The weighted effect sizes were then summed and divided by the sum of the weights to derive a summary (mean) weighted effect size. The square root of the inverse of the sum of the weights provided an estimate of the standard error of the summary effect size. To further evaluate effect sizes, we divided the mean effect size by the estimated standard error of the mean and plotted it on a z -distribution to determine whether it was significantly different from 0 at

a 2-tailed alpha level of .05.⁴⁴ The statistic Q_{total} was calculated to represent the total heterogeneity of the effect sizes included in the analyses.⁴³ To determine whether there was significant variability between the effect sizes, Q_{total} was tested against a chi-square distribution with $df = n - 1$.

We calculated 2 summary effect sizes: one for the relationship between DPB and negative symptoms and one for the relationship between DPB and functional outcome. We used categorical meta-regression to examine whether type of negative symptom measure (negative symptom total vs motivation/pleasure negative symptoms only) moderated the relationship between DPB and negative symptoms. Finally, we examined whether these effect sizes were moderated by sex or age composition of the study samples. That is, we conducted separate meta-regressions with average sample age or percentage of male participants as the predictor variable and the study effect-sizes as the outcome variable. Because there are only a small number of studies included in these meta-analyses, the moderator analyses may be underpowered and their results should be interpreted as preliminary (but, see REF for Amer Psy).

To address the “file drawer” problem (the tendency for null results to remain unpublished) we calculated Orwin’s *Fail-safe N* for each analysis. The *Fail-safe N* quantifies how many studies with negligible effect-sizes (defined here as $r = \pm .10$) would need to be added to the analyses in order to reduce the cumulative effect size to that specified effect-size.⁴⁴

Results

Preliminary Analyses

The correlation of DPB with negative symptoms, and functional outcome by study are included in [table 1](#) and illustrated in [figures 1](#) and [2](#). All but one of the studies included chronic schizophrenia-spectrum samples; 1 study¹⁴ included participants under age 35 and 1 study²⁴ included an older sample (ages 45–79). All studies included mostly men, with only 2 studies included over 40% women ([table 1](#)).^{25,26} Two of the studies were clinical trials,^{25,26} one reported baseline correlational data but participants were recruited as part of a larger clinical trial,¹⁴ and the rest were observational studies. Two of the studies specifically recruited participants who endorsed negative symptoms,^{11,31} while the rest did not select specifically for negative symptoms.

Overall, the relationships between DPB and negative symptoms and functional outcome were consistent across studies, with 7 of 10 studies (70%) reporting a significant relationship between DPB and negative symptoms and 6 of 8 studies (89%) reporting a significant relationship between DPB and functional outcome.

Negative Symptoms and DPB

A qualitative examination of patterns in the relationship between DPB and negative symptoms by participant

recruitment (high negative symptoms vs all people with schizophrenia diagnosis), study type, specific symptom measure, and DAS version did not uncover any readily apparent pattern. For example, while one of the studies¹¹ that specifically recruited participants with negative symptoms reported the largest effect size, the other study³¹ that recruited negative symptom participants has an effect size similar to studies that recruited “all comers.”

The cumulative effect size of the relationship between DPB and negative symptoms represented a small effect-size, $r = .24$ that was significantly different from zero, $Z = 6.96$, $P < .001$ (table 2). We next conducted categorical meta-regression to determine if the relationship between DPB and negative symptoms was significantly different depending on whether a study reported overall

negative symptoms ($n = 5$) vs motivation/pleasure negative symptoms ($n = 5$). There was no significant effect of type of negative symptom assessment (table 3). Studies reporting overall negative symptoms did have a slightly larger effect size, but there are likely too few studies at this point to detect a significant effect size difference based on type of negative symptom assessment. The relationship between negative symptoms and DPB may vary depending on how negative symptoms are assessed, which is an important consideration for future studies. Finally, we conducted continuous meta-regressions to examine whether sample age or sex composition moderated the relationship between negative symptoms and DPB. Neither the average age of participants nor sex composition significantly predicted this relationship (table 4).

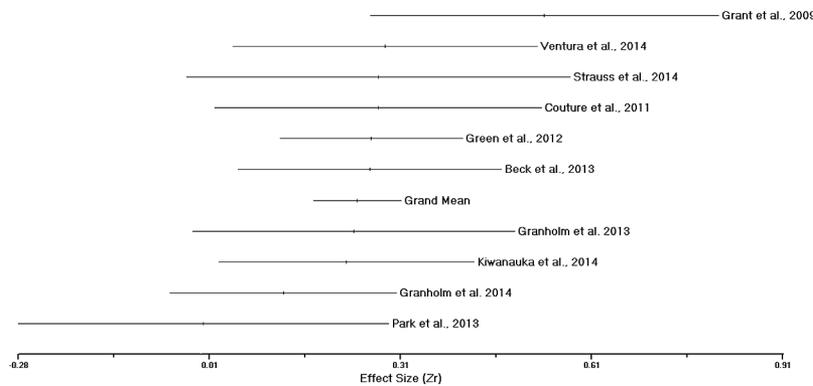


Fig. 1. Study effect sizes of the relationship between defeatist performance beliefs and negative symptoms with 95% CIs.

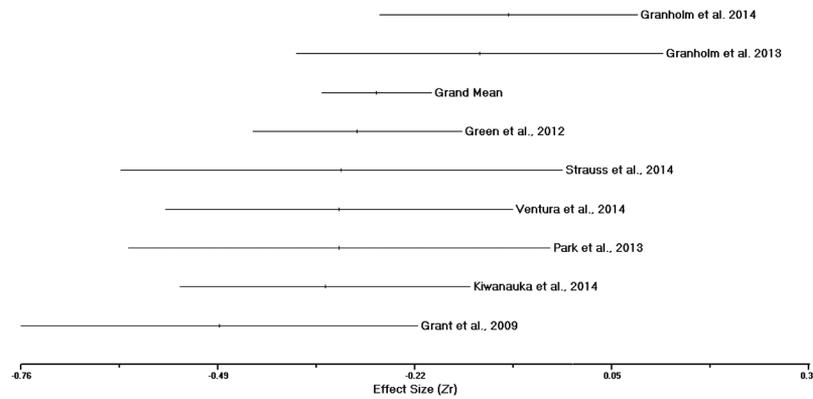


Fig. 2. Study effect sizes of the relationship between defeatist performance beliefs and functional outcome with 95% CIs.

Table 2. Mean Weighted Effect Sizes Computed for the Relationship Between Defeatist Performance Beliefs and Both Negative Symptoms and Functional Outcome

	Number of Studies	Number of Participants	Mean Weighted Effect-Size	95% CI	Q_{total}	Orwin <i>Fail-safe N</i>
Negative symptoms	10	858	0.25	0.17 to 0.32	9.03	14.4
Functional outcome	8	702	-0.27	-0.38 to -0.17	6.88	13.7

Note: Q_{total} , total heterogeneity of the sample of effect sizes.

Functional Outcome and DPB

A qualitative examination of the relationship between DPB and functional outcome indicates that studies that used the ILSS to measure functional outcome and the Cane et al. version to measure DPB reported weaker relationships between these 2 variables to DPB. Participants in these studies were also recruited as part of clinical trials. Again, Grant and colleagues¹¹ reported the largest effect size between DBP and functional outcome, and was the only study that used the QLS as a functional outcome measure and also the only study to recruit participants with negative symptoms specifically to report the relationship between DPB and functional outcome.

The cumulative effect size of the relationship between DPB and functional outcome was significant, $r = -.27$,

$Z = -6.18$, $P < .001$, representing a small effect size (table 2). We then conducted continuous meta-regressions to examine whether sample age or sex composition predicted variability in the relationship between DPB and functional outcome. The average age of participants did not significantly predict the relationship between DPB functional outcome. However, sex composition predicted a stronger relationship between DPB and functional outcome, $P = .03$. That is, the studies that included more men found a stronger (ie, more negative) relationship between DPB and functional outcome (figure 3). This effect should be interpreted with caution as it appears to be driven by the only 2 studies^{25,26} that included over 40% women. When we excluded these 2 studies from the analysis, we no longer observed a significant moderator effect for sex.

Table 3. Mean Effect Sizes Predicted by Motivation/Pleasure Negative Symptoms vs Negative Symptom Totals and Defeatist Performance Beliefs Subscale Version

		Number of Studies	Effect Size by Group	Q_{between}	P -value
Negative symptoms					
Symptom measure	Total Negative symptoms	5	0.29	2.13	.14
	Motivation/Pleasure only	5	0.19		

Note: Q_{between} , variation in effect sizes between the groups; P -value, significance of the variance between groups tested against a chi-square distribution.

Table 4. Mean Effect Sizes of the Relationship Between Defeatist Performance Beliefs, Negative Symptoms, and Functional Outcome as Predicted by Participant Age and Sex Composition

	Slope	Q_{model}	Model P -value	Q_{error}	Error P -value
Negative symptoms					
Mean age	-0.004	0.75	.39	8.05	.43
% Male	0.27	0.40	.53	8.17	.42
Functional outcome					
Mean age	0.004	0.68	.40	5.78	.45
% Male	-0.97	4.68	.03	4.01	.67

Note: Q_{model} , heterogeneity in effect sizes explained by the model; Q_{error} , residual error variance.

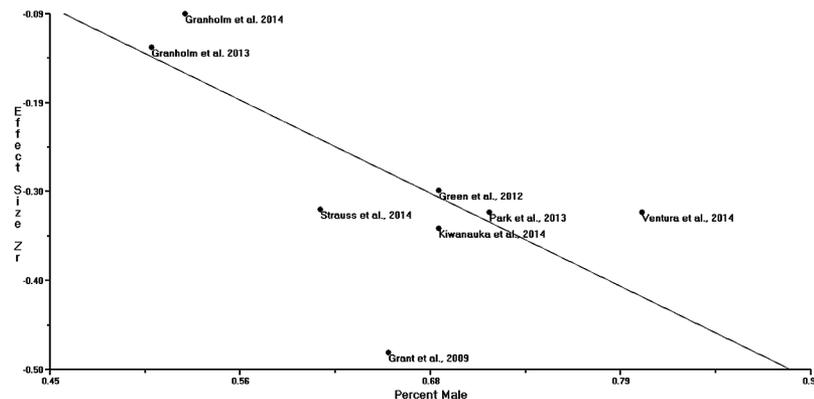


Fig. 3. Plot of effect sizes of the relationship between defeatist performance beliefs and functional outcome as a function of the sex composition of each study.

Discussion

In response to growing interest in DPB as a potential mechanism and treatment target in schizophrenia, we conducted a meta-analytic review evaluating the relationship between DPB and both negative symptoms and functional outcome in people with schizophrenia. Our results indicate that there is shared variance between DPB and negative symptoms and between DPB and functional outcomes, with the effect sizes of these relationships falling in the small range.

Greater DPB have been linked to more severe negative symptoms, especially motivation/pleasure symptoms in people with schizophrenia, with effects in the small to moderate range. Our meta-analytic results indicate that the summary effect size of relationship between DPB and negative symptoms is small but significant. However, given that DPB only accounted for about 5% of the variance in negative symptoms it is likely that negative symptom reduction is being driven by a confluence of mechanisms. Indeed, previous interventions^{24,25,27,28} have included several components that may have worked synergistically, such as learning problem-solving and social skills to help actively challenge DPB. An important step for future intervention research will be to elucidate the specific effect of decreasing DPB on negative symptoms among people with schizophrenia.

The relationship between DPB and functional outcome also had a small, but significant effect size. It is unclear, however, how much of the explained variance in functional outcome is shared with negative symptoms vs being unique to DPB. That is, mediation techniques in meta-analysis are still being developed and validated; as a result, we were unable to account for whether the significant meta-analytic relationship between DPB and functional outcomes is mediated by negative symptom severity, as suggested by previous research.¹² However, results from studies using structural equation modeling have found a direct path from DPB to negative symptoms and from negative symptoms to functional outcome.^{21,23,24} Given that all the studies in this meta-analysis were cross sectional, it is unclear whether DPB contribute to poor functioning independent of their association with negative symptoms, or if poor functioning may feed back to strengthen DPB in a reciprocal relationship. It will be important to investigate these relationships longitudinally to understand how DPB relate to negative symptoms and functional outcome across time.

We also found that sex composition of the study predicted the relationship between DPB and functional outcome at a trend level, such that the higher the percentage of men in the sample, the stronger the relationship was between DPB and functional outcome. Interpretation of this result poses a challenge because there is scant research examining sex differences in DPB in schizophrenia.

Two additional considerations regarding the interpretation of our results is that sex composition of the studies is confounded with DAS scale version and the ILSS functioning scale.³⁷ That is, 2 studies with the highest percentage of women were also 2 of the 3 studies that used the Cane and colleagues³² DAS scale. These findings are further confounded by the use of the ILSS functioning scale in the 3 studies that used the Cane and colleagues' version of the DAS. Thus, it is unclear whether these findings reflect a sex difference, a DPB measure effect, use of the ILSS, all, or none. It would most helpful if future research on DPB, negative symptoms, and functional outcome in schizophrenia included more women. Additionally, researchers should be aware that different measures of DPB and functional outcome might capture slightly different constructs that may impact the strength of these relationships.

While the results of this meta-analysis provide evidence for the relationships between DPB and both negative symptoms and functional outcome, they do not address when DPB might come online. Of the 10 studies included in this meta-analysis, only one included a relatively young sample of people with recent-onset schizophrenia. To our knowledge, only one study has investigated DPB in people at risk for developing schizophrenia,⁴⁵ finding that DPB were present prior to the onset of illness and suggesting the intriguing possibility that DPB may be part of a constellation of risk factors for schizophrenia. Additional research needs to be done on the relationship between DPB and both symptoms and functional outcome in people at risk and with recent-onset schizophrenia to examine how much variance DPB explains in symptoms and functioning in these groups compared to chronic and more stable schizophrenia. Descriptively, the largest effect size in this meta-analysis came from a study including people with high negative symptoms and low functioning. Extending the study of DPB to a broader range of samples is thus an important public health issue insofar as understanding when DPB emerge and how they are linked with negative symptoms and functioning across the course of the disorder will more clearly illuminate how and when to intervene. Indeed, reducing DPB could be an important target in early interventions with the potential to have long-term impact on people's quality of life.

The question of why DPB come online is also unresolved. Beck and colleagues proposed that neurocognitive deficits lead to DPB, which mediate the relationship between neurocognitive deficits and negative symptoms, the latter of which may lead to poor functional outcome.^{11,12,46} However, other factors, such as social cognitive deficits, may also contribute to the development of DPB. Indeed, one study included in this meta-analysis found support for direct paths from social cognition to DPB, DPB to motivation/pleasure negative symptoms, and motivation/pleasure negative symptoms to

functional outcome.²¹ While distinct from one another,⁴⁷ deficits in neurocognition and social cognition are often present throughout the course of illness,^{48,49} in people at risk for developing schizophrenia,⁵⁰ and are predictive of conversion to psychosis in people at high-risk for schizophrenia.⁵¹ The emergence of neurocognitive and social cognitive deficits may lead people at risk for schizophrenia to have difficulties succeeding in goal-directed behavior and interacting with peers.¹² Over time these difficulties may lead to increasing DPB about goals and social relationships, and as a result decreased motivation for and pleasure from social and other goal-related behavior (ie, motivation/pleasure negative symptoms) and poor functional outcome. In particular, the typical ages of risk and onset of schizophrenia (early to late adolescence) coincides with a period when social cognitive skills are particularly important for navigating a progressively more complex social landscape where peer acceptance becomes increasingly salient.⁵²

It is important re-emphasize that DPB represent only one type of dysfunctional belief. In their model, Beck and colleagues¹¹ posit that unsuccessful goal attainment lead to dysfunctional attitudes more generally, which in turn give rise to negative symptoms in people with schizophrenia. Therefore, it may be the case that other dysfunctional attitudes, such as low self-efficacy, and negative expectancies more generally, asocial beliefs,⁵³ and the need for acceptance^{14,17} are also related to negative symptoms and functional outcome. For example, 1 study⁵⁴ investigated a range of dysfunctional attitudes about cognitive performance, social performance, and experiencing positive emotion finding that the reduction of these attitudes partially mediated the relationship between therapeutic intervention and symptom improvement. Supporting the importance of considering other dysfunctional attitudes in addition to DPB in schizophrenia, Couture and colleagues found that negative expectancies about success and cognitive capacity related to negative symptoms after controlling for DPB.¹⁷ Further, the relationship between DPB and negative symptoms was no longer significant controlling for these negative expectancies. Other research found that low self-efficacy (ie, the belief that one has the capacity to effectively influence events in one's life) predicts negative symptoms and poor coping.⁵⁵ It may be the case that a focus on broader dysfunctional attitudes presents a wider range of treatment targets and thus may ultimately bolster the effectiveness of treatments for negative symptoms and functional outcome.

Another important future direction is elucidating the role of depressive symptoms. Indeed, the foundation of the DPB model proposed by Beck and colleagues for people with schizophrenia was built from work in people with depression. However, the role of depression in the relationship between DPB and negative symptoms in people with schizophrenia has received little attention. Of the 10 studies included in the meta-analysis looking at

DPB and negative symptoms, only 2^{11,17} included a measure of depression and reported the relationships between depression, DPB, and negative symptoms. Neither study found a significant relationship between negative symptoms and depression, but one study did find a significant positive correlation between depression and DPB.¹¹ While several studies included in the meta-analysis excluded participants in a current depressive episode, it may be the case that DPB reflect elevations in comorbid depressive symptoms that are below diagnostic threshold for a current depressive episode. On the other hand and in line with recent paradigm shifts for conducting research,⁵⁶ DPB may represent a transdiagnostic treatment target for improving motivation and pleasure more generally. Future studies should continue to investigate the relationships between depressive symptoms, DPB, and negative symptoms so as to better understand for whom an intervention targeting DPB will be most efficacious.

In summary, this meta-analysis found modest associations between DPB and both negative symptoms and functional outcome in people with schizophrenia. The cumulative effect sizes of the relationships with DPB are similar to other proposed mechanisms underlying negative symptoms, such as effort computation.⁸ Importantly, whereas previous mechanisms have not yet resulted in effective treatments, interventions targeting DPB have already been shown to reduce negative symptoms and improve functional outcomes among people with schizophrenia.^{24,25} Given the current lack of effective pharmacological and psychosocial interventions for people with schizophrenia experiencing negative symptoms, future treatments that include a focus on DPB may have greater success in reducing negative symptoms and improving functional outcome. Indeed, as negative symptoms have historically been considered “intractable,” uncovering the role of DPB—a treatable mechanism—in negative symptoms provides new hope for consumers and providers.

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