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Psychological Predictors of Functional Outcome in People with Schizophrenia

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Abstract

Background—There is increasing evidence that psychological factors (e.g., defeatist performance beliefs, trait negative affect) contribute to poor functional outcome in people with schizophrenia. In the current study, we evaluated whether multiple psychological factors predict poor functional outcome in individuals with schizophrenia, and whether associations between psychological variables and functional outcome persist even after accounting for neuropsychological impairment and negative symptoms.

Methods—100 patients meeting diagnostic criteria for schizophrenia or schizoaffective disorder and 78 demographically matched healthy control subjects completed self-report psychological measures, neuropsychological testing, and clinical rating scales.

Results—Self-report scales assessing negative affectivity, defeatist performance beliefs, anhedonia, and behavioral inhibition were significantly correlated with functional outcome in people with schizophrenia. Neuropsychological impairment was associated with vocational outcome, whereas most of the self-report measures related to social outcome. Defeatist performance attitudes were not correlated with neuropsychological performance.

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Contributors

James Gold designed the study and wrote the protocol. Greg Strauss contributed to the study design and conceptualization of this manuscript. Jacqueline Kiwanuka managed the literature searches and analyses and wrote the first draft of the manuscript. Authors Robert McMahon and Jacqueline Kiwanuka undertook the statistical analysis. All authors contributed to, and have approved the final manuscript.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The study was approved by the University of Maryland Institutional Review Board, and is in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki).

Conclusions—Self-report measures predict variance in functional outcome beyond measures of clinical symptomatology and neuropsychological impairment. Findings indicate that psychological factors may be meaningful targets for psychosocial interventions aimed at improving functional outcome in schizophrenia.

Keywords

schizophrenia; negative affectivity; defeatist performance beliefs; anhedonia; behavioral inhibition; functional outcome

1 Introduction

Recent schizophrenia literature has increasingly focused on predictors of functional outcome (Vita et al., 2013; Holhausen et al. 2013). There is well-replicated evidence that cognitive performance is related to a range of functional outcomes, including residential independence and vocational status (Green, 2004; Bowie and Harvey, 2006). Impairments in social cognition are related to poor functional outcomes and may mediate the relationship between cognitive impairment and outcome (Schmidt et al., 2011; Grant and Beck, 2009; Horan et al., 2010). However, cognitive deficits are not the only predictors of poor functional outcome. There is growing evidence for the role of dysfunctional attitudes and beliefs in poor functional outcome. In one model, Grant & Beck (2009) have proposed that cognitive deficits are a proximal cause for the experience of failure in the pursuit of instrumental or social goals. These failure experiences then lead to the development of a set of defeatist attitudes (e.g., “If you cannot do something well, there is little point in doing it at all.”), which undermine motivation and engagement in social and vocational activities. Grant & Beck (2009) found that defeatist beliefs were mediators in the relationship between cognitive impairment and both functional outcome and negative symptoms. Using structural equation modeling, Horan et al. (2010) found support for the role of psychological factors in functional outcome as evidenced by a significant pathway from functional capacity → dysfunctional attitudes→ negative symptoms→ real world functioning.

One question that arises from the work on defeatist performance beliefs (DPB) is whether similar relationships to functional outcome might occur with other psychological factors. For example, high negative affectivity is associated with poor functional outcome, reduced quality of life, and heightened stress reactivity (Horan et al. 2008). Self-reported anhedonia is also associated with impaired social and vocational outcome (Kirkpatrick et al., 1990; Horan et al., 2003; Strauss & Herbener, 2011).

Given the associations between multiple psychological factors and functional outcome, the current study aims to build on the model proposed by Grant and Beck (2009) by determining which psychological factors (e.g., DPB, negative affectivity, etc.) are most predictive of poor social and vocational functioning in people with schizophrenia. We also evaluate whether the contribution of psychological factors to poor functional outcome persist after accounting for other predictors of poor functioning, including neuropsychological impairment and clinical ratings of negative symptoms.

2 Methods

2.1 Participants

One hundred patients meeting Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV; American Psychiatric Association, 1994) criteria for schizophrenia (N=86) or schizoaffective disorder (N=14), and 78 demographically matched healthy control subjects participated in this study. Patients were recruited from outpatient clinics at the Maryland Psychiatric Research Center and from community mental health centers. Patient diagnosis was established using a best estimate approach in which information from a Structured Clinical Interview for DSM-IV (SCID) (First et al., 1997) was combined with a review of patient medical records at a consensus diagnosis meeting chaired by one of the authors. All patients were clinically stable as determined by their clinician. Additionally, patients were assessed while receiving stable medication regimens (no changes in type or dose of psychotropic medication within 4 weeks prior to study).

Healthy controls were recruited via a combination of random digit dialing and posted advertisements. Controls had no self-reported family history of psychosis, were not taking psychotropic medications, and were free from Axis I and Axis II diagnoses as determined by the SCID (First et al., 1997) and the Structured Interview for DSM-III-R Personality Disorders (SIDP-R) (Pfohl et al., 1989).

Demographic information is summarized in Table 1. Patient and Control groups did not significantly differ in age, parental education, sex, or ethnicity. Patients had significantly fewer years of education than controls ($p<0.001$).

2.2 Clinical and Cognitive Assessments

Participants completed the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), the Wide Range Achievement Test Reading (WRAT; Wilkinson and Robertson, 2006), the Wechsler Test of Adult Reading (WTAR; Wechsler, 2001), and the MATRICS Consensus Cognitive Battery (MCCB; Nuechterlein and Green, 2006). The Brief Psychiatric Rating Scale (BPRS; Overall and Gorham, 1962) and Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1983) were administered to assess global psychiatric and negative symptoms, respectively. Because the SANS Avolition and Anhedonia scales query similar behaviors to the Level of Function scale, our primary correlational analyses utilized the sum of the Affective Blunting and Alogia global items. The Level of Function scale (LOF; Hawk et al., 1975), a seven-item scale, was used to assess functional outcome. Three scores were calculated from the LOF: 1) a total score (sum of five items, excluding items pertaining to symptom severity), 2) a social outcome score (sum of two items reflecting frequency and quality of social interactions), 3) a vocational outcome score (sum of two items reflecting work status and work quality).

2.3 Self-report measures

The Positive and Negative Affect Schedule-Version X (PANAS-X; Watson and Clark, 1994) was used to assess trait positive and negative emotional experience. The Behavioral Inhibition System and Behavioral Activation System Scales (BIS/BAS Scales; Carver and

White, 1994) were used to assess BIS and BAS sensitivities. Scales for and Physical and Social Anhedonia (Chapman et al., 1976) were used to assess beliefs about pleasure that can be experience during social and physical activities. The Defeatist Performance Belief Scale (DPB scale: Grant and Beck, 2009) evaluated the degree to which patients endorsed dysfunctional attitudes..

2.4. Data Analysis

Bivariate Pearson correlations were calculated to explore the association between the psychological factors assessed via self-report questionnaires and functional outcome measured on the LOF. To address the question of whether these self-report measures make independent contributions to functional outcome, multiple regression using backward elimination was performed. In this approach, variables that do not make an independent contribution are sequentially eliminated, whereas each of the variables retained make a significant, independent contribution to the prediction of functional outcome. Two backward stepwise regression analyses were conducted. First, we included only the self-report measures in the model. Second, we included the MCCB composite score along with the self-report measures to determine which self-report measures contributed to functional outcome while taking neurocognition into account.

3 Results

3.1 Group comparisons on clinical characteristics and psychological performance

As seen in Table 1, individuals with schizophrenia evidenced greater psychological dysfunction on self-report measures, with the exception of the BAS subscale of the BIS/BAS which did not differ between patients and controls.

3.2 Functional outcome correlations with self-report measures

As shown in Table 2, significant correlations with functional outcome were observed with all of the self–report measures, with the exception of the BAS. More measures were significantly associated with LOF Total and LOF Social scores than with LOF Work. Despite the differing magnitudes of correlations across social and work function, only two correlations were statistically different between the two functional domains - the Chapman Social Anhedonia and the MCCB correlations with LOF Work and LOF Social ($z=-3.12$, $p=.002$; $z=-3.44$, $p<.001$ respectively). Interestingly, the MCCB correlated with only one self-report measure, the Chapman Physical Anhedonia scale, and with the LOF Total, and LOF Work scores. Descriptively, the MCCB has minimal overlap with self-report measures, no correlation with LOF Social Function, but a significant relationship with work performance. In contrast, most of the self-report measures show a robust relationship with social, rather than work function. Indeed, the Chapman Social Anhedonia correlation with LOF Social function exceeds Cohen's criteria for a large effect size. Note that in Table 2, we do not replicate the findings of Grant and Beck regarding the relationship between the DPB and poor cognitive performance. Thus, these correlations do not support the Grant and Beck (2009) model proposing that impaired cognition leads to defeatist beliefs, which then lead to negative symptoms and poor functional outcome.

To examine whether self-report and cognition independently relate to outcome, partial correlations were calculated between the self-report and functional outcome measures, controlling for the MCCB composite score (see supplementary Table 1). Nearly all correlations (11 of the 14 that were initially significant) remained significant after controlling for the MCCB, with the exception of Chapman social and physical anhedonia with LOF Work and PANAS Positive Affect with LOF Total. Given that anhedonia and negative affectivity might be the result of defeatist performance beliefs that undermine motivation to pursue potentially rewarding activities, we performed another set of partial correlations where we controlled for both the MCCB and the DPB. Somewhat surprisingly, all 11 of the self-report and retained significance after controlling for DPB and the MCCB (supplementary Table 2). Thus, anhedonia, negative affectivity, and behavioral inhibition were significantly correlated with functional outcome independent of the influence of cognitive impairment and defeatist performance beliefs.

The results from the backward elimination regression analyses are shown in Table 3. Self-report measures account for approximately one third of the variance in the LOF Total and LOF Social measure, but only 12.8% of the variance in the LOF Work measure. When the MCCB is included in the backward regression analysis (Table 3), multiple self-report measures remain significant predictors of functional outcome with little change in the amount of variance accounted for in the LOF Total and Social measure. In contrast, the inclusion of the MCCB accounts for about 10% more of the variance in LOF Work. When the significant predictors from the regression analysis - DPB, Chapman Social Anhedonia, and PANAS Negative Affect, were controlled for in a partial correlation of the remaining self-report measures with the LOF Total, LOF Work and LOF Social, no significant correlations were observed.

3.3 The relationship between functional outcome, clinical ratings, and self-report measures

Given that self-report scales can assess similar factors to clinician ratings (Lindstrom et al. 2009, Weiss, 2005), are the former simply providing redundant information as available from clinician symptom ratings? To explore this, we examined correlations between the self-report measures and clinical ratings (supplementary Table 7). SANS Alogia and Affective Blunting were not correlated with the self-report outcome measures (DPB an exception) while SANS Anhedonia/Asociality and BPRS Total are significantly correlated with multiple self-report measures.

We then did partial correlations between self-report measures and functional outcome, controlling for SANS Affective Blunting and Alogia and BPRS Total scores. When the BPRS Total score was used as a covariate, 9 of the 14 originally significant correlations remained significant. When the SANS Affective Blunting and Alogia score was used as a covariate, 11 of the 14 originally significant correlations remained significant. Thus, self-report measures do explain variance in functional outcome beyond clinical measures of psychopathology (supplementary Table 3 and 4).

To determine whether self-report measures and clinician ratings of similar constructs might alter the conclusions drawn from the summary scores above, we examined BPRS depression

and anxiety scores, expecting that they might overlap with scores from the DPB, PANAS and BIS. We also focused on the SANS ratings of Anhedonia Asociality, reasoning that they might overlap with the Chapman scales.

Co-varying the BPRS depression/anxiety scores had the following impact: 12 of the total 14 significant correlations remained significant, (PANAS Positive Affect with LOF Total and PANAS Negative Affect with LOF Social became insignificant). Thus, clinician rated negative affect does not explain the variance captured by the DPB, the Chapman Scales, the BIS and the PANAS negative affect scale (supplementary Tables 3 and 6). The results were quite different when we co-varied the SANS Anhedonia/Asociality subscale (supplementary Tables 5). Here, we found that only 3 of the original 14 correlations remained significant; PANAS Negative Affect with LOF Total and Work and Chapman Social Anhedonia with LOF Social. This suggests that clinician anhedonia ratings overlap substantially with the functional outcome variance associated with the DPB, Chapman Physical Anhedonia, PANAS Positive Affect and the BIS. Note, this conclusion needs to be tempered by the very high correlations between SANS Anhedonia and functional outcome: these were −0.76, −0.52, and −0.77 for LOF Total, Work, and Social respectively. Given the strength of these correlations, it is very difficult for another measure to capture additional variance.

4 Discussion

These results suggest that self-report scales assessing negative affectivity, defeatist performance beliefs, anhedonia, and behavioral inhibition demonstrate significant relationships with functional outcome in people with schizophrenia. These scales appear to be assessing discrete constructs, with each accounting for non-redundant variance in functional outcome, as demonstrated in the backward regression results. These relationships appear to be independent of the contribution of cognitive performance as seen in the partial correlations results that controlled for the MCCB composite score. Self-report measures appear to have a more robust association with social function than with work function, whereas cognitive performance is correlated with work function, but not social function. Thus, self-report scales measuring a range of psychological factors offer important information related to community-based functional outcome beyond that available from cognitive performance or clinician ratings of overall symptom severity.

Our results have implications for understanding the relationship between cognition, defeatist performance beliefs, and functional outcome. In contrast to the results of Grant and Beck, (2009) and Horan et al., (2010), we failed to find any relationship between DPB and cognition as assessed by the MCCB. Of note, in our sample the DPB correlated with the SANS Total score ($r = 0.34$, $p = 0.001$), approximately in the middle of the levels reported by Grant and Beck, 2009, $r = 0.49$; and Horan et al., 2010, $r = 0.29$. Thus, our DPB –SANS correlations are consistent with the literature, but we clearly failed to observe a relationship between the DPB and cognition. This failure is problematic for the causal pathways suggested by Grant and Beck and Horan and colleagues (Grant and Beck, 2009, Horan et al., 2010), whereby impaired cognition leads to the experience of failure resulting in negative expectations about the value of volitional effort to achieve valued goals. We did find that the

DPB related to LOF Total and Social ratings, but this occurred in the absence of a relationship with cognition (supplementary Tables 1–2).

These results have implications for the assessment and treatment of people with schizophrenia. Regarding assessment, self-report measures appear to provide robust functional outcome-relevant signals that are largely independent of cognition. Further, many of the correlations shown in Table 2 survive co-varying for either the SANS Affective Blunting and Alogia score or the BPRS Total score. Surprisingly, clinician ratings of anxiety and depression minimally overlap with self-report measures that one might suspect would be highly related, including the DPB, PANAS Negative Affect, BIS, and the Chapman Anhedonia scales. The most notable exceptions occur after controlling for the SANS Anhedonia Asociality subscale, suggesting substantial overlapping - functional outcome relevant variance is shared between these measures. As noted above, the high correlation between SANS Anhedonia and functional outcome measures may reduce the possibility of observing a relationship. In essence, partialling out SANS Anhedonia is nearly equivalent to partialling out functional outcome itself.

Self-report psychological measures may be useful in a variety of contexts ranging from initial evaluations to develop treatment plans and monitoring progress over the course of treatment. Left unanswered by our results is why self-report measures seem to add as much as they do to functional outcome prediction above clinician ratings (with the exception of the SANS Anhedonia scale). Speculatively, several possibilities are plausible. First, these questionnaires query, in detail, aspects of experience and belief that are not typically assessed in depth in SANS and BPRS ratings. The scales may be addressing additional "content" that accounts for variance in functional outcome. Second, patients may respond to interviews and questionnaires differently, revealing more about themselves when faced with a questionnaire privately versus an interview where social desirability may be more salient. For example, while BPRS interviews cover anxiety and depression, self-report from the PANAS, Chapman Scales, and the BIS appear to offer information beyond clinical ratings of similar symptoms and experiences. Thus, these scales seem to offer added value in the context of assessment.

Consistent with the work of Grant and Beck, defeatist attitudes appear to be important for functional outcome and are a logical treatment target. Treatments targeting these attitudes appear to have efficacy for functional outcome (Grant et al., 2012), adding incentive to include this scale in assessment batteries. Negative affectivity also emerged as an important predictor of functional outcome. This suggests that negative affectivity is an important, but rarely discussed treatment target in people with schizophrenia. Social Anhedonia appears to be an important predictor of functional outcome, and a particularly challenging treatment target.

4.1 Conclusion

Several caveats should be kept in mind concerning these results. Our battery of self-report measures was narrowly focused on traits that are associated with schizophrenia. A broader instrument, like the MMPI (Ben-Porath, 2008) could provide additional information. Further, the results of regression analyses are often sample specific, shaped by the collection

of measures administered. For this reason, the bivariate correlations shown in Table 2 are likely the most reliable signals to guide other investigations. Our sample is composed mostly of patients with long-established illness and a high degree of disability. Only 25% of our sample was employed more than half time, hence Work outcome is non-normally distributed; Shapiro-Wilk test of normality p = .000, skewness of .391 (SE = .241) and kurtosis of −1.340 (SE = .478). Additionally, residual values derived from each of the regression models discussed above demonstrated normal distributions. The one exception was residual data from the LOF Work model that did not include the MATRICS battery as a predictor.

Future work will determine if these results generalize to patients in the early phase of their illness. Outcome in schizophrenia is influenced by factors including availability of evidence-based rehabilitation practices, financial resources, environmental challenges, medication side effects and other variables that are not captured by common clinical measures. Our results suggest that the use of inexpensive self-report measures may offer valuable clinical information concerning functionally relevant treatment targets.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Appendix A. Supplementary data

Supplementary data to this article can be found online at:

Table 1

Demographics and Clinical Characteristics of Patients with Schizophrenia and Healthy Control Comparison Participants

	Schizophrenia (N = 100)		Healthy Control (N = 78)		
	Mean	**SD**	**Mean**	**SD**	**Group Comparison**
Demographics					
Age	41.14	10.58	40.68	10.42	F = 0.1; p = 0.77
Gender (%males)	68		70		X^2 (1, N = 178) = 0.1; p = 0.42
Race and Ethnicity (%Cauc:%AA:%Other:%His)	56:39:5:5		66:28:6:4		X^2 (6, N = 178) = 9.9; p = .13
Personal Education	12.76	2.22	15.01	2.00	F = 49.2; p < 0.001
Mother's Education	13.51	2.56	13.91	2.33	F = 1.1; p = 0.29
Father's Education	13.66	3.38	13.93	3.05	F = 0.3; p = 0.58
Neuropsychology Measures					
WASI	98.69	15.38	117.26	11.15	F = 80.6; p < 0.001
WRAT4	94.27	14.58	109.76	14.49	F = 49.7; p < 0.001
WTAR	69.03	17.07	111.51	11.88	F = 46.5; p < 0.001
MCCB	30.95	13.90	54.06	10.14	F = 152.2; p < 0.001
Clinical Ratings					
BPRS	33.60	8.70			
SANS Affective Blunting and Alogia	2.86	2.01			
Functioning					
LOF Total	15.05	6.01			
LOF Work	2.99	2.81			
LOF Social	4.48	2.49			
Self Report Measures					
Defeatist Performance Beliefs (Total Score)	47.23	15.58	34.08	12.06	F = 37.8; p < 0.001
Chapman Physical & Social Anhedonia Scales					
Physical Anhedonia	16.23	7.25	9.64	5.13	F = 46.2; p < 0.001
Social Anhedonia	12.29	7.10	7.37	5.31	F = 26.0; p < 0.001
PANAS					

	Schizophrenia (N = 100)		Healthy Control (N = 78)		
	Mean	**SD**	**Mean**	**SD**	**Group Comparison**
Positive Affect	27.51	7.01	32.35	4.82	F =27.1; p < 0.001
Negative Affect	19.90	7.16	14.69	4.62	F = 31.0; p < 0.001
BIS/BAS					
BIS subscale	21.51	3.50	18.87	3.50	F = 24.7; p < 0.001
BAS subscale	40.88	6.03	49.17	4.39	F = 0.8; p = .38

WASI - Wechsler Abbreviated Scale of Intelligence; WRAT - Wide Range Achievement Test Reading; WTAR - Wechsler Test of Adult Reading; MCCB- Matrics Consensus Cognitive Battery; BPRS-Brief Psychiatric Rating Scale; SANS - Scale for the Assessment of Negative Symptoms; LOF-Level of Function scale; PANAS-X - Positive and Negative Affect Schedule-Version X; BIS/BAS - Behavioral Inhibition System/Behavioral Activation System Scales.

Table 2

Correlations of LOF Subscales with Self Report Measures

	MCCB	LOF Total	LOF Work	LOF Social
Defeatist Performance Beliefs (Total Score)	**−.043**	**−.327****	**−.159**	**−.304****
Chapman Physical & Social Anhedonia Scales				
Physical Anhedonia	−.285**	−.339**	−.226**	−.316**
Social Anhedonia	−.109	−.448**	−.223*	−.523**
PANAS				
Positive Affect	.183	.207*	.13	.186
Negative Affect	−.110	−.370**	−.370**	−.254*
BIS/BAS				
BIS subscale	−.005	−.246*	−.157	−.275**
BAS subscale	−.120	−.002	.007	.010
Clinical Ratings				
SANS Affective Blunting and Alogia	−0.343**	−.452**	−.338**	−.310**
BPRS Total	−.221*	−.473**	−.342**	−.337**
MCCB	-	.255*	.358**	.000

* $p < 0.05$;

** $p < 0.01$

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Table 3

Linear Regression Model

	LOF Total						LOF Work						LOF Social					
	Initial Model			Final Model			Initial Model			Final Model			Initial Model			Final Model		
Predictors of Functional Outcome	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**
Defeatist Performance Beliefs	−.090	.034	.01	−.095	.033	.00	−.018	.018	.32				−.032	.014	.02	−.032	.013	.02
Physical & Social Anhedonia																		
Physical Anhedonia	.028	.094	.76				−.011	.049	.82				.037	.038	.34			
Social Anhedonia	−.292	.095	.00	−.293	.073	.00	−.033	.050	.51				−.184	.039	.00	−.165	.029	.00
PANAS																		
Positive Affect	.067	.082	.42				.034	.043	.43				.002	.034	.94			
Negative Affect	−.210	.080	.01	−.221	.072	.00	−.132	.042	.00	−.145	.037	.00	−.028	.032	.39			
BIS/BAS																		
BIS subscale	−.107	.160	.51				.011	.084	.90				−.115	.065	.08	−.130	.059	.03
BAS subscale	−.045	.090	.61				−.010	.047	.83				−.016	.037	.65			
Model parameters																		
R^2	.344, SE = 5.05			.333, SE = 4.98			.174, SE = 2.65			.137, SE = 2.63			.367, SE = 2.05			.356, SE = 2.03		
Adjusted R^2	0.294			0.312			.111			.128			.307			.336		
Model F	6.88, p < 0.001			16.00, p < 0.001			2.77, p = 0.01			15.53; p < 0.001			7.63; p < 0.001			17.67, p < 0.001		

	LOF Total						LOF Work						LOF Social					
	Initial Model			Final Model			Initial Model			Final Model			Initial Model			Final Model		
Predictors of Functional Outcome	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**
MCCB Composite Score	.085	.039	.03	.078	.036	.03	.066	.020	.00	.065	.018	.00	−.011	.016	.51			
Defeatist Performance Beliefs	−.093	.034	.01	−.094	.032	.00	−.020	.017	.24				−.032	.014	.03	−.032	.013	.02
Physical & Social Anhedonia																		
Physical Anhedonia	.080	.095	.40				.029	.048	.55				.030	.040	.45			
Social Anhedonia	−.313	.093	.00	−.280	.072	.00	−.050	.048	.30				−.181	.039	.00	−.165	.029	.00

	LOF Total						LOF Work						LOF Social					
	Initial Model			Final Model			Initial Model			Final Model			Initial Model			Final Model		
Predictors of Functional Outcome	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**	**Beta**	**SE**	**p**
PANAS																		
Positive Affect	.037	.082	.66				.010	.042	.81				.006	.034	.86			
Negative Affect	−.196	.078	.01	−.207	.071	.00	−.121	.040	.00	−.132	.035	.00	−.030	.033	.36			
BIS/BAS																		
BIS subscale	−.141	.158	.38				−.015	.080	.85				−.111	.066	.09	−.130	.059	.03
BAS subscale	−.009	.090	.92				.018	.046	.69				−.021	.037	.57			
Model parameters																		
R^2	.377; SE = 4.95			.366; SE = 4.89			.266; SE = 2.52			.239; SE = 2.48			.370; SE = 2.06			.356; SE = 2.03		
Adjusted R^2	.322			.339			.202			.223			.315			.336		
Model F	6.89; p < 0.001			13.68; p < 0.001			4.13; p < 0.001			15.23; p < 0.001			6.69; p < 0.001			17.67, p < 0.001		

Beta - Unstardized Beta coefficients; SE - Standard Error