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The RAISE Connection Program for Early Psychosis: Secondary Outcomes and Mediators and Moderators of Improvement

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Abstract

The aims of this study were to explore secondary outcomes of a coordinated specialty care program for persons with early psychosis, including quality of life and recovery, as well as to explore mediators and moderators of improvement in occupational and social functioning and symptoms. Sixty-five individuals across two sites were enrolled and received services for up to two years. Trajectories for individuals' outcomes, over time were examined using linear and quadratic mixed-effects models with repeated measures. In addition, baseline prognostic factors of participant improvement in social and occupational functioning were explored based on previous literature and expert opinion of the analytic team. Results demonstrate that the program was effective in improving quality of life and recovery, over time. Furthermore, processing speed was identified as a significant moderator of improvement in occupational GAF, and treatment fidelity, engagement, and family involvement were identified as mediators of improvement in social and occupational functioning.

Keywords

first episode psychosis; early intervention; recovery

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Conflicts of Interest
Authors LM, YW, JC and SE have no conflicts of interest to disclose. Authors LB, IN, SM, MB and KM may be part of training and consultation efforts helping others provide the type of services for individuals with first episode psychosis provided as part of the RAISE Connection Program described in this report. Author KN has received consulting fees for the RAISE Connection Program, as well as from Janssen Scientific Affairs, Otsuka and Genentech for consulting unrelated to the submitted work. Author KN has also received grant money from Janssen Scientific Affairs, Posit Science and Genentech for funding unrelated to submitted work.

Introduction

The RAISE (Recovery After an Initial Schizophrenia Episode) Connection Program is an example of a “Coordinated Specialty Care” (CSC) program, which is a team-based, multi-element intervention that includes evidence-based components for the care of individuals experiencing early non-affective psychosis (Heinssen et al., 2014). The RAISE Implementation Evaluation Study (RAISE-IES) was a two-site study, funded by NIMH in partnership with New York and Maryland. It intended to assess feasibility of implementation and evaluate the Raise Connection Program's impact on overall functioning, as well as to assess its capacity to promote engagement and adherence to treatment, foster recovery and reduce or prevent disability in persons experiencing a first episode of psychosis (FEP; Dixon et al., 2015). The positive impact of the intervention on primary outcomes including social and occupational functioning and symptom severity has been reported elsewhere (Dixon et al., 2015). Secondary aims focused on the effect of the intervention on quality of life and recovery as well as mediators and moderators of improvement in overall functioning and symptoms.

In addition to symptom reduction, early intervention services for individuals with FEP or early psychosis, defined as those who are in the first 2 years of illness, have placed great emphasis on quality of life and recovery. Persons with early psychosis often experience low subjective and objective levels of quality of life (Melle et al., 2010a). Furthermore, dissatisfaction with life has been shown to be a risk factor for suicide in early psychosis making quality of life an important outcome of study and area of intervention in this population (Melle et al., 2010b). The concept of recovery has been discussed extensively in the literature with significant heterogeneity in the specific constructs that determine recovery (Lieberman et al., 2008). SAMHSA's working definition of recovery is a “process of change through which individuals improve their health and wellness, live self-directed lives, and strive to reach their full potential” (SAMSHA 2012). Many states have included the construct of recovery as a performance indicator in the provision of mental health services, however indicators of recovery have been more extensively studied among populations of persons with more chronic mental disorders compared to those who are early in the illness (Windell et al., 2012).

Previous literature has generally established the effectiveness of early-intervention services for FEP in reducing symptoms and limiting disability (Srihari et al., 2012; Taylor et al., 2012; Rinaldi et al., 2010; Alvarez-Jimenez et al., 2011). While a significant amount of research has been dedicated to identifying predictors of remission and recovery such as demographics, baseline clinical symptoms, and cognitive functioning, less is known regarding individual characteristics that moderate the improvements demonstrated in FEP early intervention programs over time. Likewise, characteristics such as treatment fidelity, engagement, service utilization (including the use of antipsychotic medication) and family involvement may also mediate outcomes over time; little research has been conducted on these aspects of early intervention services for FEP. Treatment fidelity has been shown to mediate outcomes in other evidence-based practices in psychiatry, such as supported employment (Drake et al., 2006). Low rates of engagement have been associated with poorer outcomes for people with chronic mental illness (Kreyenbuhl et al., 2009), but less is known regarding whether different levels of individual engagement with early intervention programs mediate outcomes in FEP. Finally, research indicates that greater family involvement over the course of illness improves outcomes (Dixon et al., 2010), and so it is of great importance to explore how family involvement mediates individual outcomes in early interventions for psychosis.

The aims of this study were to explore secondary outcomes of the RAISE Connection Program including indicators of quality of life and recovery among participants, as well as to explore mediators and moderators of improvement in occupational and social functioning and symptoms. The moderators and mediators of outcomes measured in the RAISE-IES study are important as they may identify potentially modifiable characteristics of individuals and services that could generate greater improvement over time.

Methods

Description of the study

The RAISE-IES was a two-site study that aimed to implement an innovative team-based intervention designed to promote engagement and adherence to treatment, foster recovery, and reduce or prevent disability among individuals who recently had experienced a first episode of psychosis. The primary aim was to conduct an implementation study and observe outcomes over time for persons with FEP enrolled in an optimized intervention on primary measures of social and occupational functioning and on total symptom burden. Secondary aims included assessing the program's impact on illness severity, symptom remission, quality of life, work and employment status, and neurocognitive functioning, and also identifying mediators and moderators of improvement over time. The RAISE Connection Program involved services provided for up to 2 years by a multidisciplinary team based on a critical time intervention (CTI) framework (Dixon et al., 2009) that used shared decision-making strategies designed to assist clients and families in managing their illness through the use of evidence-based therapeutic interventions including: medication, supported employment and supported education, skills training, and family support and education. Teams served up to 25 individuals and included a full-time Team Leader, a full-time Individual Placement and Support (IPS) worker, a half-time Recovery Coach and a 20%-time psychiatrist.

Data Collection

A total of 65 individuals were recruited from the community and enrolled in the RAISE Connection Program at two sites, one in Baltimore, Maryland and the other in Manhattan, NY. Participants were individuals 15-35 years old (16 and older in NY) who met Structured Clinical Interview for DSM-IV (SCID) criteria for a diagnosis of schizophrenia, schizoaffective disorder, schizophreniform disorder, delusional disorder, or psychosis not otherwise specified (NOS). To be eligible for inclusion, individuals must have experienced psychotic symptoms of at least one week's duration with onset within the prior 2 years, be able to speak and understand English, and be available to participate in the intervention for at least 1 year. Individuals were ineligible if they met any of the following exclusion criteria: non-psychiatric medical condition impairing functioning, psychosis due solely to another condition, or mental retardation. Participant enrollment began in July 2011 and continued up to February 2013, and the research assessments ended in June 2013; hence participants had variable duration of follow-up for research purposes. Table 1 shows the follow up rates for each time point.

Service logs and other objective information extracted from charts provided measures of service utilization, engagement, and treatment fidelity (Essock et al., 2015). In order to evaluate engagement quantitatively, each participant's length of time in the study from the date of first clinical visit to either the study end date of 5/31/13 or the date of program discharge was computed. The treatment time was then divided into 3-month intervals (within-person quarters), with the starting point defined as the date of clinical intake. There were two types of engagement defined on the basis of service utilization within each quarter. The first type was based on treatment participation or service contacts. The second type was based on treatment participation with the team, which was specified as an encounter with three of the four providers of the RAISE Connection Program. For each of these types of engagement, a low threshold and a high threshold of engagement was specified. High threshold engagement required three or more visits within a quarter, while low threshold engagement required just one visit. On average, participants remained engaged with the teams for 91% of the total possible time they could have been receiving services given their time of enrollment. Participants met the standard of high engagement with the team for a total of 76% (248/327) of quarters over two years.

Fidelity measures were created and obtained for various intervention domains including team structure and functioning, psychopharmacology, recovery coach, family intervention and Individual Placement and Support (IPS). For each domain, research staff met with the clinical leaders to identify performance expectations that could be extracted from readily available data. In addition to chart extraction, participant self-reports also informed fidelity measures for shared decision-making and confirmed measures extracted from secondary data. Program fidelity was maintained by ongoing supervision and consultation with the Connection Program team members. Fidelity was computed over the duration of the implementation study and for the study's final complete quarter, as well as changes over time when applicable. Fidelity targets typically were met or exceeded by both the Maryland and New York teams and client interviews also endorsed high-fidelity to the treatment model (Essock et al., 2015).

In-person assessments provided most of the information on participant outcomes, experience of treatment, and history, as well as use of services that were not part of the RAISE Connection Program (e.g. hospitalizations, ER visits). A trained research assistant conducted all assessments in person at baseline, 3 months and semi-annually thereafter. Mental Illness Research, Education, and Clinical Center (MIRECC) Global Assessment of Function (GAF) ratings were scored by trained raters using data obtained from interviews with participants and clinicians (Niv, 2007). Chart extraction provided detailed information on the use of RAISE Connection services. Encounter records also informed measures of treatment fidelity and engagement in treatment.

Client interviews collected data on age, gender, race, ethnicity, marital status, highest level of education completed, health insurance status and living situation. Participants were also queried regarding four widely used indicators of objective community adjustment, including living arrangements at the time of interview and number of days homeless, incarcerated, or in psychiatric hospitals over the past 6 months.

A brief Structured Clinical Interview for DSM IV Research Version (SCID-RV) interview, to determine if the individual met criteria for any of the qualifying diagnoses, was conducted to establish eligibility at the time of enrollment (First et al., 2011). A comprehensive SCID-RV was done at three months and repeated at 1 year in order to determine the psychotic disorder diagnosis, as well as other relevant diagnoses, such as anxiety disorders and substance use disorders. The Positive and Negative Syndrome Scale (PANSS) for Schizophrenia was used to assess positive, negative, and general symptoms (Kay et al., 1987). The PANSS scores were also used to assess remission. Individuals who scored less than 4 on all of the following PANSS items were considered to be in remission: delusions, conceptual disorganization, hallucinations, mannerisms and posturing, and unusual thought content. The Clinical Global Impression scale was used to measure overall severity of illness (Guy, 1976) and the Calgary Depression Scale was used to assess depressive symptoms (Addington et al., 1990). History, frequency, and consequences of alcohol and drug use were assessed using the Addiction Severity Index-Lite (Leonhard et al., 2000). The Dartmouth Traumatic Life Events Scale was added to the SCID-RV. This scale is an abbreviated version of the Traumatic Life Events Questionnaire (TLEQ; Kubany et al., 2000) which was designed to assess exposure to several types of behaviorally-descriptive potentially traumatic events. This scale has been well-validated, and is considered to be a gold standard of traumatic event assessments (Gray et al., 2004).

Premorbid functioning was assessed using the Cannon-Spoor Premorbid Adjustment Scale (PAS; Cannon-Spoor et al., 1982). Work history and source of income were assessed using the Dartmouth expansion of the Employment and Income Review (EIR; Center for Psychiatric Rehabilitation, 1989). Body Mass Index (BMI) was calculated from height and weight measurements.

Overall subjective quality of life as well as the objective and subjective items measuring the quality of social and family interactions were measured on the Modified Lehman Quality of Life Inventory (QOLI-M) (Lehman, 1988). The QOLI-M is a structured interview with the consumer that assesses objective functional status and subjective quality of life in several areas. The subjective and objective scales were combined and standardized with equal weight given to objective and subjective dimensions to create standardized measures of social and family functioning from the participant's perspective. Both scales range from a low rating of 1 and the highest rating of 7. Health status was assessed using the widely used self-report health survey, the SF-12 (Ware et al., 1996). Select items measuring the outcome of care were selected from the consumer self-report survey developed by the Mental Health Statistics Improvement Program (MHSIP) Policy Group to assess patients' recovery (Jerrell, 2006). These items are also supplemented by three items extracted from the Maryland Assessment of Recovery Scale (MARS), a validated scale based on SAMHSA recovery domains for persons diagnosed with serious mental illness (Drapalski et al., 2012). The

Consumer Satisfaction Questionnaire (CSQ) is a brief, three-item questionnaire used to measure patient satisfaction with a treatment program and services received (i.e., scaled items measuring extent to which needs were met, satisfaction with services received, and whether or not one would return to program if the need arose) (Larsen et al., 1979).

Six of the 10 tests in the MATRICS Consensus Cognitive Battery (MCCB) were used to assess neurocognitive functioning (Nuechterlein et al., 2008). The MCCB is comprised of ten tests that assess seven cognitive domains (speed of processing, attention/vigilance, working memory, verbal learning, visual learning, reasoning and problem solving, and social cognition) and included the following subtests from the MCCB: Category Fluency (animal naming), BACS Symbol Coding, Trailmaking A, NAB Mazes, MSCEIT Managing Emotions, and Letter-Number Span. The BACS Verbal Memory Test from the BACS was used to assess this domain instead of the Hopkins Verbal Learning Test – Revised from the MCCB. Thus, 5 of the 7 MCCB cognitive domains were assessed: speed of processing, working memory, verbal learning, reasoning and problem solving, and social cognition.

Description of the sample

The average age of participants was 22.2 (4.2) years old with a range of 16-33. A total of 41 (63%) service recipients were male and 25 (37%) were female. With respect to race, 28 (43%) individuals described themselves as African American, 25 (39%) described themselves as Caucasian, 3 (5%) as Asian, 1 as Multi-race, 1 as American India/Alaskan Native, and 1 as Native Hawaiian/Pacific Islander. An additional 6 individuals described themselves as other. A total of 16 (25%) described themselves as Hispanic. Only 2 (3%) individuals were married or ever married. At the time of enrollment, 42 (65%) individuals lived with their parents and 7 (11%) were living with other relatives. The vast majority of participants, 50/65 (77%), reported having some kind of health insurance. A total of 10 people (15%) were uninsured, and 5 people (8%) did not know or did not report. Of the 50 who reported having health insurance, 8 reported being covered by Medicare and 15 by Medicaid. A total of 60/65 (93%) of those enrolled were found still to have a qualifying diagnosis of schizophrenia, schizophreniform, schizoaffective disorder, brief psychotic disorder, or psychosis NOS at the three-month time point. The average duration of time between onset of psychotic symptoms and entry into treatment with RAISE Connection was 10.2 (SD: 7.8) months (N=65) (Dixon et al., 2015).

Statistical Analysis

Secondary analyses first examined the impact of the RAISE Connection Program focusing on the outcomes of overall and family subjective quality of life and recovery. A multi-level model (e.g., mixed effects models) with repeated measures nested within individuals, with random intercept and random slope was used to examine the outcome trajectories over time.

In addition to the length of time in the program, other baseline prognostic factors of participant improvement in social and occupational functioning were explored (see Table 2). The candidate pool of predictors included: PANSS negative score, duration of untreated psychosis, cognitive battery scores, lifetime experience of a traumatic event, premorbid adjustment scale early adolescence score, CDRS sum scale, BMI, remission status at baseline, work/education status, and SCID qualified diagnosis. Additionally, the standardized family interaction measure and the standardized social interaction measure were included as candidates to predict the MIRECC GAF occupational functioning scale. The PANSS negative symptom score was excluded as a predictor from the candidate pool for the PANSS total score model. Demographic variables (gender, ethnicity, race) and site were fixed predictors. These variables were chosen based on previous literature and expert opinion of the analytic team. Stepwise selection was used to identify predictors to be included in the final model by minimizing the prediction error estimated by leave-one-out cross validation. Selected predictors were also treated as potential moderators - the interaction of each selected predictor by length of time in the program was tested to identify moderation effects.

Mediator analyses were performed in two steps. We first examined whether a candidate mediator significantly changed over time. Next, we examined whether change in a candidate mediator significantly predicted change in the outcome using a linear mixed effects regression model. Specifically, we used the change in a mediator between two adjacent visits to predict an outcome at the current visit (e.g., visit J) while adjusting for the outcome measure at the prior visit (e.g., visit J-1) and the length of time between adjacent visits. For categorical mediators, we also controlled for the mediator status at the prior visit. For mediators that did not change linearly over time, we included an additional higher order effect. Candidate mediators included the number of unduplicated staff encounters, participant engagement (low and high threshold, individual and team-based, as described above), intervention components received (ever received psychotropic medication in a month, ever had a visit with IPS worker in a month, ever participated in recovery coach-led group meetings in a month, ever participated in family meetings in a month), treatment fidelity (shared decision making, shared decision making with RAISE Connection team psychiatrist, IPS treatment fidelity, treatment fidelity about family involvement, treatment fidelity about recovery coach), and consumer satisfaction. Table 2 shows the moderators and mediators examined for each outcome.

Results

A detailed analysis of primary outcomes and some secondary outcomes have been published elsewhere (Dixon et al., 2015). The primary outcomes of MIRECC GAF occupational and social functioning significantly increased over the course of a subject's participation in the program and symptoms and overall illness severity, as demonstrated by the total PANSS score significantly decreased over time (Dixon et al., 2015).

Secondary Outcomes

The ratings on the Overall Subjective Quality of Life Scale increased by 0.01867 points (CI:-0.0032, 0.041, p=0.09) every month, but the trend was not significant. The mean score at baseline was 4.8 (N=65, SD=1.53) and increased to 5.4 (N=15, SD=0.99) at 24 months, with the anchor at five representing “mostly satisfied” and a range from one (“terrible”) to seven (“delighted”). The Subjective Family Quality of Life Scale increased significantly by 0.030 points (CI: 0.011, 0.050, p<0.01) for every month in follow up. The mean score at baseline was 4.93 (N=63, SD=1.39) and 5.8 (N=15, SD=1.08) at 24 months with the same range as the Overall Subjective Quality of Life Scale. On average, the Recovery and Stigma-MHSIP score increased significantly by 0.018 points (CI: 0.0075, 0.029, p<0.01) for every month in follow up with a mean baseline score of 3.5 (N=63, SD=0.66) and a mean of 3.73 (N=15, SD=0.64) at 24 months. The Recovery and Stigma-MARS scores increased significantly by 0.017 points (CI: 0.0022, 0.032, p<0.05) for every month in follow up. The mean score at baseline was 3.76 (N=63, SD=0.91) and 4.09 (N=15, SD=0.79) at 24 months. Higher scores on the recovery and stigma scales which range one to five are interpreted as the consumer experiencing a greater sense of recovery and less stigmatization.

Moderators and Mediators

Table 2 shows the prognostic factors included in the final model for each outcome. In addition to the fixed factors (site, gender, ethnicity, race), the PANSS negative score, verbal fluency test, and work and education status were included in the final model predicting MIRECC GAF occupational functioning scale. Overall, with every month in study, participants improved on average by 1 point (CI: 0.64, 1.37; p<0.001). Category Fluency (Animal Naming) score was found to also have a significant moderating effect. For each 1-point increase in the Category Fluency (Animal Naming) scale, the MIRECC GAF occupational functioning scale increased by 0.05 points (CI: 0.0030, 0.090; p<0.05) per month. On average, individuals with higher fluency scores improved faster than those with lower fluency scores. No significant mediators were identified.

Similarly, the final model for the MIRECC GAF Social functioning scale included the PANSS negative score, work and education status, and social cognition. When adding these prognostic predictors to the model, on average the MIRECC GAF social functioning scale significantly increased by 0.38 points (CI: 0.19, 0.56; p<0.001) every month. No significant moderation was observed. Mediator analysis identified family meetings as a significant mediator of improvement in social functioning scores. Individuals who switched to participating in at least 1 family meeting from never participating in the past month had on average, 5.18 (CI: 0.62, 9.74; p=0.0265) points more improvement in social functioning scores than those who did not participate. Higher ratings of treatment fidelity regarding the recovery coach (b = 1.94, CI: −0.013, 3.89; p=0.05) approached significance as a mediator of improvement.

The final model for predicting the PANSS total score included the premorbid adjustment score and remission status. On average, PANSS total score decreased significantly by 0.56 points (CI: 0.36, 0.75; p<0.001) every month. No significant moderators were observed. Mediator analysis identified that more team engagement (high threshold; b=4.50, CI: −0.29, 9.28; p=0.065), more meetings with the IPS worker (b=3.10, CI: −0.24, 6.44; p=.0683) and more staff encounters (b=0.48; CI: −0.0057, 0.96, p=.0527) all approached significance as mediators of less improvement in PANSS scores.

Discussion

This analysis of secondary outcomes from a multidisciplinary team-based early intervention program for individuals with first episode psychosis demonstrated the intervention was associated with modest increases in the quality of life and the quality of social and family interactions for participants, as well as their sense of achieving recovery. Quality of life and recovery have become important outcomes of study and areas of focus for researchers, clinicians and policymakers (Lieberman et al., 2008). More recent research has begun to focus on quality of life among persons with schizophrenia, driven by consumer advocates as well as policy statements at the federal level, including the Surgeon General's report on mental health and the report of the President's New Freedom Commission on Mental Health. Numerous studies have tracked quality of life as an indicator of improvement in early intervention programs for individuals with (FEP) with positive results (Malla and Payne, 2008). Higher ratings on quality of life measures have been associated with improvements in global functioning, lower levels of overall symptoms, and remission while lower ratings on quality of life measures have been associated with the presence of depressive symptoms and worse premorbid adjustment scores (Browne et al., 2000; Malla et al., 2004; Sim et al., 2004; Addington et al., 2003). Lower quality of life scores have been negatively associated with duration of untreated psychosis, suggesting the importance of early intervention to improve both subjective and objective measures of recovery in individuals with early psychosis (McGorry et al., 1996; Browne et al., 2000). Little is known about how individuals with early psychosis conceptualize recovery. In a small study using semi-structured interviews of individuals three to five years after a FEP, the authors found significant heterogeneity of and emphasis on various constructs of recovery, but findings suggested that early intervention and patient-centered services could contribute to an overall positive outlook (Windell et al., 2012). Further research is needed regarding the applicability of recovery constructs over the course of illness as individuals at different developmental and illness stages may place varying significance on certain constructs of recovery.

Baseline cognitive function was the only individual-level characteristic found to moderate the effect of the intervention. The fact that individuals with early psychosis and better neuropsychological functioning improved more quickly is consistent with the literature (Allot et al., 2013; Nuechterlein et al., 2011). Individuals in this study with higher scores on the Category Fluency test, which assesses processing speed, had faster improvement in occupational functioning than those with lower scores. Other studies in the FEP population have found varying cognitive predictors of improvement, relapse and medication adherence. Vesterager et al. 2012, found that the strongest predictor of functional capacity at 4 months and 10 months in a sample of patients with FEP in Denmark was working memory, which explained 30% of the variance in functional capacity. In a Chinese cohort of FEP patients, the Wisconsin Card Sorting Test, a test of executive function, strongly predicted relapse with an adjusted odds ratio of 2.46 (95% CI=1.11-5.45) (Chen et al., 2005). Executive dysfunction was also found to be predictive of medication non-adherence during the first year of therapy in FEP patients (Robinson et al., 2002). Neurocognitive function as a predictor and moderator of outcomes is an important and growing area of research in the FEP population as it represents a potentially modifiable individual-level characteristic that can affect overall functioning.

The fact that participation in family meetings and treatment fidelity with respect to recovery coach activities (e.g. social skills training, family psychoeducation) mediated observed improvements in social functioning suggests further specificity of the delivery of the program model to outcomes. We observed a very high rate of inclusion of families in services, with over 90% of participants having at least one service that included families. Previous research suggests the importance of family support and family involvement in care for engagement in treatment (Stowkowy et al., 2012; Conus et al., 2010). It is notable that participants' ratings of family-related subjective quality of life were estimated to improve significantly over the study period. These results are consistent with previous research across the life span that consistently shows that including families in the care of persons with schizophrenia improves outcomes (Dixon et al., 2010; Lucksted et al., 2012). Study findings underscore the importance of the program's work with families and the role of families in outcomes. The model was designed to be consumer and family-centered and based on previous work shown to increase family involvement in care among persons with more chronic illness (Dixon et al., 2014) as opposed to specifying a specific family psychoeducation program. In addition, recovery coach activities consisted of behavioral skills training interventions and substance abuse treatment strategies with established efficacy in schizophrenia (Dixon et al., 2010). These findings highlight the utility of offering evidence-based behavioral interventions to young people with FEP as an important component of recovery-oriented care.

The linkage of higher rates of team-based engagement with less improvement in total PANSS scores may reveal that the team focused more effort and attention on those participants who were struggling more with symptoms. A recent review article exploring service disengagement within the FEP population estimates that approximately 30% of individuals drop out of treatment (Doyle et al., 2014). Two studies in the review found that disengagement was significantly associated with a lower severity illness at baseline (Conus et al., 2010; Schimmelmann et al., 2006). Conus et al., postulates that this could be explained by the fact the individuals with more severe illness, along with their families, may be more motivated for treatment and, similarly to our assessment above, treatment teams may also focus their efforts on individuals with more severe symptoms (Conus et al., 2010). Participants in the RAISE Connection Program maintained high levels of engagement, on average 91% of the total possible time they could receive services.

Limitations in this study of the RAISE Connection Program include the absence of a concurrent control condition making it difficult to draw inferences about the specific impact of the program relative to an alternative. To address the possibility of regression to the mean, study researchers drew on comparisons to published samples that showed results that are comparable to other international specialized first episode programs. Furthermore, the RAISE-IES was designed as an implementation and evaluation study with a small sample size which may limit the generalizability and ability to detect statistically significant changes on some measures, though the strength of the impact of the intervention on overall functioning cannot be underestimated. In fact, the program has been implemented on a state-wide basis in both New York and Maryland, with continuing enrollment and data collection which will greatly contribute to the evidence base for early intervention in FEP.

Conclusions

The RAISE Connection Program demonstrated that a coordinated specialty care program for individuals with first episode psychosis was effective in improving quality of life and recovery over time. Furthermore, processing speed was identified as a significant moderator of improvement, and treatment fidelity, engagement, and family involvement were identified as mediators of improvement in social and occupational functioning. Exploring mediators and moderators of improvement in early intervention programs for first episode psychosis represents an important addition to the literature on program effectiveness as they represent modifiable factors that can further improve individual gains and movement towards recovery.

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Table 1

Completion Rates for Research Interviews

Months after Enrollment	Maximum Sample size	Number Completed	% Completed
0	65	65	100%
6	63	57	90%
12	57	44	77%
18	47	36	75%
24	20	15	75%

Table 2

Predictors of participant improvement in social and occupational functioning included in analytic models

	Outcome					
	MIRECC GAF Occupational functioning scale		MIRECC GAF Social functioning scale		Total PANSS score	
Baseline Prognostic Factors	**Full Model**	**Final Model**	**Full Model**	**Final Model**	**Full Model**	**Final Model**
Length of time in program *	x	x	x	x	x	x
Gender *	x	x	x	x	x	x
Ethnicity *	x	x	x	x	x	x
Race *	x	x	x	x	x	x
Site *	x	x	x	x	x	x
Age	x		x		x	
BMI	x		x		x	
Work/Education Status	x	x	x	x	x	
Prior Hospitalization	x		x		x	
Remission status	x		x		x	x
PANSS negative score	x	x	x	x		
DUP	x		x		x	
Standardized family interaction measure	x				x	
Standardized social interaction measure	x				x	
Cognitive Battery scores						
Trail Making Test	x		x		x	
BACS Symbol coding	x		x		x	
Letter Number Test Span	x		x		x	
NAB Mazes	x		x		x	
Category Fluency	x	x, m	x		x	
Social Cognition	x		x	x	x	
Lifetime experience of a trauma	x		x		x	
PAS early adolescence score	x		x		x	x
CDRS sum scale	x		x		x	
SCID qualified diagnosis	x		x		x	

*Fixed variables in the model; m – indicates significant moderator