Cross-Functional Team Processes and Patient Functional Improvement

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Objective. To test the hypothesis that higher levels of participation and functioning in cross-functional psychiatric treatment teams will be related to improved patient outcomes.

Data Sources/Study Setting. Primary data were collected during the period 1992–1999. The study was conducted in 40 teams within units treating seriously mentally ill patients in 16 Veterans Affairs hospitals across the U.S.

Study Design. A longitudinal, multilevel analysis assessed the relationship between individual- and team-level variables and patients' ability to perform activities of daily living (ADL) over time. Team data were collected in 1992, 1994, and 1995. The number of times patient data were collected was dependent on the length of time the patient was treated and varied from 1 to 14 between 1992 and 1999. Key variables included: patients' ADL scores (the dependent variable); measures of team participation and team functioning; the number of days from baseline on which a patient's ADLs were assessed; and several control variables.

Data Collection Methods. Team data were obtained via self-administered questionnaires distributed to staff on the study teams. Additional team data were obtained via questionnaires completed by unit directors contemporaneously with the staff survey. Patient data were collected by trained clinicians at regular intervals using a standard assessment instrument.

Principal Findings. Results indicated that patients treated in teams with higher levels of staff participation experienced greater improvement in ADL over time. No differences in ADL change were noted for patients treated in teams with higher levels of team functioning.

Conclusions. Findings support our premise that team process has important implications for patient outcomes. The results suggest that the level of participation by the team as a whole may be a more important process attribute, in terms of patient improvements in ADLs, than the team's smooth functioning. These findings indicate the potential appropriateness of managerial interventions to encourage member investment in team processes.

Key Words. Cross-functional teams, mental health, activities of daily living, participation on teams, team functioning

Cross-functional teams (CFTs), also known as multidisciplinary teams, play an important role in the U.S. health care system (Fried, Topping, and Rundall 2000). Indeed, the IOM has recently identified improving the performance of CFTs as a major challenge for providers in the 21st century health system (IOM 2001). In mental health care, CFTs can help health providers effectively synthesize and apply knowledge from a variety of disciplines to the complex problems of treating the seriously mentally ill. By definition, CFTs are composed of individuals from different disciplines who have varied backgrounds and interpretive schemes for analyzing problems (Dougherty 1992). Relationships among CFT members are intended to be nonhierarchical, so that all members may contribute their knowledge according to situational demands rather than traditional organizational roles (Donellon 1993; Vinokur-Kaplan 1995).

Compared with more traditional forms of organization, CFTs are associated with more creative solutions, better quality decisions, increased organizational effectiveness, and lower turnover rates among treatment staff (Wagner 1994; Dean, LaVallee, and McLaughlin 1999; Fried, Topping, and Rundall 2000). Teams also provide members with greater opportunities for learning and professional growth, a greater sense of empowerment (Kanter 1977; Edmondson, Bohmer, and Pisano 2001), and greater job satisfaction (Bettenhausen 1991). However, in order for CFTs to realize these potential benefits, there must be a high degree of cooperation among the team members so that knowledge is truly synthesized.

Empirical research on the relationship between team process and team performance in health care settings is relatively scarce. Much of the research on health care teams has employed randomized control trials to assess team performance and effectiveness. Such research has treated teams as molar interventions and failed to address team processes specifically. Thus, it provides relatively limited understanding of what aspects of team process are responsible for positive or negative performance. On the other hand, quasi-exper-

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imental studies of health care CFT processes are cross-sectional and have largely failed to relate these processes to objective measures of team performance (Cohen and Bailey 1997).

Our study attempts to address these gaps by examining the relationship between team processes and change in patient functional status, as measured through activities of daily living (ADL), in a sample of 40 CFTs in the Veterans Affairs (VA) mental health system. The ADL scale reflects clinician assessments of patient functioning and daily living skills in six domains: eating, bathing, grooming, dressing, transferring, and toileting. ADLs are used extensively in psychiatric treatment to evaluate the type of care patients require and evaluate care processes and outcomes (Hawes et al. 1997; Hirdes et al. 2002).

The design of the current study made several advances possible. First, it employed a large sample of patients and evaluated how these patients changed in functional status over a protracted period. This avoided problems common in cross-sectional or short-term studies of team effectiveness, whereby patients of different functional abilities systematically select into different types of teams, or the period of observation is not sufficiently long to detect meaningful changes. Second, the study used multilevel methods to assess how team-level processes affected change in patient-level functional status. This approach permits the identification of differential effects of team care across categories of patients and avoids aggregation bias caused by summing or averaging outcome measures to the team level. Finally, the study controlled for individual patient characteristics that may have been associated with ADL scores and might otherwise have confounded the team process-ADL relationship.

THEORY AND HYPOTHESES

Interdisciplinary teams have been a mainstay of psychiatric care for seriously mentally ill patients for several decades (Brown 1982; Shaw 1990). Psychiatric treatment teams in the VA meet regularly (every morning in inpatient settings and weekly in outpatient units) to make decisions about patient care. Typically, the team reviews each patient's case history, discusses recent behavior, and considers what adjustments in medications and routine may be appropriate. Thus, the function of these teams is coordinative, making decisions about how members should treat patients in subsequent, frequently one-on-one, interactions. The decisions are both repetitive, in that the same types of issues arise repeatedly, and unique, in that each decision occurs in the context of an individual patient's current clinical and functional status.

Core team members include physicians, nurses (registered nurses [RNs] and licensed practical nurses [LPNs]), and, when present in a unit, social workers, psychologists, and pharmacists. Therapists (occupational, recreational), dieticians, and chaplains participate on CFTs on a more selective basis. Psychiatrists and psychologists, who spend relatively little time with each individual patient, rely heavily on nurses to make appropriate treatment decisions. Similarly, social workers and chaplains, who often meet separately with patients, may report circumstances such as changes in a patient's family situation to other clinicians. Finally, the team enables experts in specific areas, like pharmacists or occupational therapists, to provide consultation about technical issues involved in treatment.

Based on the description above, it stands to reason that teams must function in an integrated fashion to translate members' disparate knowledge into optimal patient care. In turn, seriously mentally ill patients treated by teams with effective processes are likely to benefit from better staff coordination and are thus likely to achieve improved functional status over time. Specifically, we argue that effective team process will affect patient outcomes through two dimensions: participation and team functioning.

Participation is defined as the extent to which staff members "engage jointly with others" (Katz and Kahn 1978, p. 766) in making patient care decisions. Promoting communication between members has been called the "essential function" of the psychiatric team (Caudill 1958, p. 236) since this is the mechanism through which members develop shared understanding of complex patient issues and coordinate care (Robbins 1992). Through open discussion, treatment plans are developed and refined (Toseland et al. 1986, p. 46). From a theoretical perspective, Homans (1950) argues "The more frequently persons interact with one another, the more alike both their activities and their sentiments tend to become. Therefore, a decrease in the frequency of interaction between the members of a group and in the number of activities in which they participate together entails a decline in the extent to which norms are common and clear" (pp. 119–120). Teams with higher average levels of participation should become more synchronized in their activities, potentially both more efficient and more affectively harmonious, because team members become more alike each other and because they share clearer norms. Thus

H1: The higher the level of participation on the team, the greater the improvement in ADL by patients treated by the team.

Another aspect of team dynamics is team functioning, which refers to how well team members work together in discharging the team's

responsibilities. Thus, team functioning characterizes the quality of the team's work rather than the level of member investment in the team process. The concept of team functioning implies that inputs from interdependent members are jointly integrated so that the work of the team flows seamlessly. Much of team functioning is driven by interdependence, whereby group members must interact with one another to accomplish their tasks (Campion, Medsker, and Higgs 1993, p. 827; Gully et al. 2002). This often involves group members working together without duplication, using mature problem solving and clear norms (Cohen, Ledford, and Spreitzer 1996; Guzzo and Dickson 1996). Thus

H2: The higher the level of team functioning, the greater the improvement in ADL by patients treated by the team.

Although team processes represented our primary analytic focus, we included in our model a number of other team and individual patient-level variables that might account for observed relationships between team process and change in ADL. At the team level we included measures of team size and functional status of the patient cohort for which they were responsible. At the individual patient level, we included age, primary diagnosis, and number of days as an inpatient in the previous year. Finally we incorporated a time-level variable indicating the amount of time elapsed (in days) since program entry, at which point initial ADL was assessed.

METHODS

Sample and Data

The patient sample for the study consisted of 1,638 seriously mentally ill patients who received treatment in the VA mental health system between 1992 and 1999. Care was provided in 40 units that cared exclusively for the mentally ill within 16 VA hospitals. To be included in the sample, 50 percent of a unit's patients had to have a diagnosis of psychosis and a cumulative length of stay in all VA medical centers of at least 150 days in the previous year, or five or more admissions to any VA medical center in that year. In addition, units had to have at least three patient care providers. Each unit operated with one CFT, whose membership was typically composed of a subset of personnel assigned to those units in addition to specialized staff (such as dieticians) from other departments within the hospital.

An appendix available online-only presents structural and staffing characteristics of the sample of CFTs. The average team had 9.5 members, with a

range from 2 to 38. The modal core staff in a team was comprised of one physician, one social worker, three RNs, one LPN, two nurses' aides, and one recreational therapist. In addition, a psychologist, physical and/or occupational therapist, dietician, and/or chaplain might participate on an ad hoc basis. The average team member was 46 years old; 62 percent were female. The average number of years that team members had been in their respective professions was 17, 12 of which had been in the VA system, and just under 5 in their current position.

The first data source for the study was a self-administered survey distributed to direct patient care providers in the sample units in 1992, 1994, and 1995. The survey was completed by all members on the unit who worked on the day or evening shifts on a full- or part-time basis. Team members were a subset of these respondents, as not all unit members served on the CFT. The survey assessed provider demographics and a broad range of attitudes regarding job satisfaction, patient expectations, professional relations, and team functioning. The surveys received overall response rates of 94–97 percent and a useable response rate of 94 percent. This high response rate made it possible to develop valid aggregated measures of team processes because such measures depend on having data on all (or nearly all) group members. Empirical examination indicates that this response rate did not differ between CFT and non-CFT members.

A second, shorter survey of unit directors was used to collect data on unit-level characteristics. The survey provided data on the average functional ability of patients on the unit. These patients are those treated by the unit's CFT. Patient data were collected by trained clinicians at regular intervals using a standard instrument. Patients were treated for varying lengths of time during the study period because they entered treatment at different points between 1992 and 1999 and remained in treatment for varying lengths of time. Thus, the number of ADL assessments for patients in our sample ranged from 1 to 14. Descriptive statistics for all study variables are presented in Table 1.

Team-Level Variables

Team Participation. Team-level participation was based on an aggregation of individual team members' participation on the CFT. Individual participation was measured using a scale composed of seven items adapted from previous work by Davis-Sacks (1991) relating self-reported participation in team meetings (for instance, "I frequently contribute information."). Each item in

Table 1: Descriptive Statistics of Variables Used in Analyses

	<i>Mean</i>	<i>SD</i>
Individual-Level Variables ($n = 1,638$)		
ADL	0.35	0.52
Patients' age	60.59	12.75
Number of days in VAMC in past year	263.56	107.27
Time	617.69	521.98
Primary diagnosis		
Dementia and alcohol-related	3.41	
Schizoaffect. and schizophrenia	82.46	
Bipolar and major depression	14.13	
Team-Level Variables ($n = 40$)		
GAF score	39.58	12.96
Team size	9.50	7.51
Team functioning	5.22	0.65
Team participation	5.64	0.53

ADL, activities of daily living; GAF, Global Assessment of Functioning.

the scale allowed responses along a seven-point disagree (1) to agree (7) continuum. Principal components and maximum likelihood factor analyses supported inclusion of all seven factors in a single scale ($\alpha = 0.90$).

Team Functioning. This team-level measure was also aggregated from individual assessments, in this case of how well the treatment team was functioning in coordination, cohesion, and perceived performance (a sample item in this scale was: "Overall, our team has done its work well this last month") (Hackman and Morris 1983; Moos 1986; Price and Mueller 1989). Principal components and maximum likelihood factor analyses resulted in an eight-item scale (α coefficient 0.91).

Team functioning and participation present measurement challenges because they are shared properties collectively experienced by members of the team (Klein and Kozlowski 2000), but are typically measured through the attitudes and behaviors of individuals. To justify aggregation of individuals' responses to single, team-level variable, there needs to be "substantial" within-team agreement about those factors (James 1982; Klein, Dansereau, and Hall 1994). We calculated the ρ within-group (RWG) coefficient for this purpose, which estimates interrater reliability (on a scale of 0–1) across members within each team. The average value for teams in this sample was 0.88 for team functioning and 0.90 for team participation, indicating high levels of within-

team agreement. Only three of the 40 teams in the sample produced an RWG value less than the acceptable threshold of 0.70 for both team participation and team functioning measures (James, Demare, and Wolf 1984).

Patient Cohort Functioning. The patient functioning measure was based on the average psychosocial functioning of patients on a given unit. Unit heads were asked to provide the percentage of patients on their unit who fell into each score range of the Global Assessment of Functioning (GAF) Scale.¹ The patient functioning measure was then constructed as a weighted mean of the proportion of patients on each unit falling in each GAF score range. The higher the value on this measure, the higher is the average level of functioning of patients on the unit.

Team size. Team size equaled the number of patient care staff assigned to a treatment team.

Individual-Level Variables

Basic ADL Scale. The basic ADL scale was computed as an average of the six items, each of which ranged from 0, indicating ability to perform the activities independently, to 3, indicating inability to perform the activities without assistance. These items were assessed at program entry, every 6 months for 2 years, and every year thereafter for 2 additional years. Since the functions that comprise ADLs have been found to have Gutman Scale (hierarchical) properties (Katz and Akpom 1976), scales measuring ADL typically indicate the number of these basic functions that a person cannot perform independently. ADL is included as a time-varying dependent variable in each model.

Prior Inpatient Days. The number of days hospitalized for a mental health condition in year prior program entry served as a proxy for severity of illness at program entry.

Age. Measured as each patient's age in years.

Diagnosis. Each patient's primary diagnosis upon entering the program was categorized as: (1) dementia and alcohol-related disorders, (2) schizoaffective

disorders and schizophrenia, and (3) bipolar and major depression. Schizoaffective disorders and schizophrenia, as the largest category (82 percent of the patient sample), was used as the reference group.

Time. Patient time in program was measured as number of days from baseline (program entry) to each measurement point for ADL. This variable differs from prior inpatient days insofar as the latter is assessed once at program entry, whereas the former is a cumulative, repeated measure of elapsed time from program entry to each subsequent ADL assessment.

Team process measures were constructed with data taken from the 1992 Job Satisfaction Survey to model subsequent change in patient functioning over the 1992–1999 period. This design has been used extensively in multilevel education research, in which school covariates are used to predict change in individual student performance over time (Bryk and Raudenbush 1988; Willms and Jacobsen 1990; D’Agostino 2000; Zvoch and Stevens 2003). Based on the premise that cultures of treatment teams become institutionalized after an initial period of development (Tuckman and Jensen 1977; Fried, Topping, and Rundall 2000), it was assumed that team process characteristics remained stable for the period of study. We tested this assumption empirically for a panel of 93 teams, including the 40 in our study sample. We first assessed values of the two team process characteristics and team size for three measurement points during the study period. All team characteristics displayed, on average, little change over time. The greatest change was exhibited by the measure of team functioning that increased, on average, 0.25 on a seven-point scale between 1992 and 1995 (3.5 percent). Team participation increased only 0.05 on a seven-point scale on average (< 1 percent), and team size changed by less than one member over the study period.

Both ANOVA (with repeated measure) and paired *t*-tests were performed on the team process characteristics, using year as the predictor. Results suggests that differences in team participation and team size were non-significant as a function of time. However, there were statistically significant differences in team functioning across years. Specifically, level of team functioning increased from 1992 to 1995.

These results indicate general stability in team process despite substantial change in individual team membership over time. This might be explained partially by the age and stage of development of the CFTs in the study sample, which had been operational for an average of more than 5

years. Work groups that have progressed beyond early stages of “forming” and “storming” generally encounter less instability and operate thereafter on the basis of agreed shared norms and formalized structures (i.e., who has the decision-making authority in the group) (Tuckman and Jensen 1977).

ANALYSIS STRATEGY

This study aimed to model individual ADL with three different levels of analysis: time (level 1), individual (level 2), and team (level 3). The data had a nested, multilevel structure, with time points nested within individual clients within treatment teams. Multilevel statistical methodology accounted for the nested structure of the data in determining statistical relationships, using Proc Mixed in SAS (Littell et al. 1996). At level 1, each patient’s development on ADL is represented by an individual growth trajectory that depends on a unique set of parameters. These individual growth parameters become the outcome variables in a Level-2 model, where they may depend on some set of patient-level characteristics. Formally, we view the multiple observations on each individual nested within the person. This treatment of multiple observations as nested allows us to proceed without difficulty when the number and spacing of time points vary across cases (Bryk and Raudenbush 1992; Singer 1998).¹

The Measurement Model

A multilevel longitudinal analysis takes account of the level of the outcome variable at program entry, change in outcome status over time, and nesting of clients within treatment teams. Addressing both the organizational and longitudinal aspects of the data made it possible to use organizational predictors to explain change in ADL status over time, while controlling for differential time trajectories by client and different client membership on teams.

In this instance, structuring the model as a multilevel longitudinal analysis made it possible to control for baseline ADL status at program entry and change in ADL because of the passage of time, thus accounting for time-level variation in the outcome variable. Multilevel methods allow unbalanced time series data including varying time in program and numbers of assessments throughout the course of program participation. That time-level variation is nested within individual clients.

The individual-level model made it possible to predict ADL at program entry and change in ADL over time with individual-level characteristics—

prior inpatient stay, age, and psychiatric diagnosis. If older clients (e.g., an individual characteristic) tended to start off with worse ADL levels, a multilevel longitudinal model would account for the nesting and the poor ADL status at program entry, thereby allowing comparison of change in ADL status over time across individuals with different characteristics and different entry status.

The team-level model predicted change in ADL over time with team-level characteristics—patient cohort functioning, team size, and team participation or team functioning and controlled for the effect of these variables on ADL at program entry. If patients treated by larger teams (e.g., a team characteristic) tended to start off with worse ADL levels, a multilevel longitudinal model would account for the nesting and the poor ADL status at program entry. Further, if some teams served more patients with longer prior inpatient stays at program entry (an individual characteristic), a multilevel longitudinal model would account for the nesting of those patients on the team, thereby allowing comparison of change in ADL status over time across teams serving different types of patients.

Three equations describe the statistical approach: a time-, an individual- and a team-level model. Each is described below along with their relationship to each other.

A Time-Level Model (Level 1)

$$Y_{tij} = \pi_{0ij} + \pi_{1ij}(\text{time})_{tij} + e_{tij}$$

where Y_{tij} is the outcome variable, ADL, at time t for individual i in team j , operationalized as days, π_{0ij} the expected ADL of individual i in team j at the time they entered the program when days was equal to 0, π_{1ij} the rate of change for individual i in team j over the data-collection period, $(\text{time})_{tij}$ the passage of time (number of days) since program entry at time t for individual i in team j , and e_{tij} is the residual within-individual variance in ADL and is assumed to be independently and normally distributed with a mean of zero and constant variance, σ .²

The unique feature of a multilevel model is the prediction of parameters at lower levels of analysis by predictors at higher levels of analysis. Thus, the individual- and team-level models described below use explanatory variables at the individual client and team levels of analysis to estimate mean growth trajectories in terms of both initial status and growth rate across individuals (individual-level model) and across teams (team-level model) (Zvoch and Stevens 2003).

Individual-Level Model (Level 2)

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(X)_{ij} + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(X)_{ij} + r_{1ij}$$

where β_{00j} is the mean ADL at program entry for clients in team j , β_{10j} the mean change in ADL for clients in team j , and β_{01j} and β_{11j} the mean effects of X on ADL at program entry and change in ADL over time, respectively, for clients in team j . There were three individual-level predictors in the individual-level models: prior inpatient stay, age, and psychiatric diagnosis. r_{0ij} and r_{1ij} are the residual within-team variances associated with π_{0ij} and π_{1ij} respectively. At level 2, β_{00j} , β_{01j} , β_{10j} and β_{11j} are the within-team intercepts and slopes estimated separately for each team. At level 3, the team level, these randomly varying parameters are modeled using team-level predictors.

Team-Level Model (Level 3)

$$\beta_{00j} = \gamma_{000} + \gamma_{001}(W)_j + \mu_{00j}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(W)_j + \mu_{10j}$$

$$\beta_{01j} = \gamma_{010} + \mu_{01j}$$

$$\beta_{11j} = \gamma_{110} + \mu_{11j}$$

where γ_{000} is the overall mean ADL at program entry across all clients across all teams, γ_{100} the overall mean change in ADL over time for all clients across all teams, γ_{001} and γ_{101} the mean effects of W on ADL at program entry and change in ADL over time, respectively, across all clients across all teams. Three team-level predictors are included in our team-level models: patient functioning, team size, and team participation or team functioning. μ_{00j} , μ_{10j} , μ_{01j} and μ_{11j} are the team-level residuals associated with β_{00j} , β_{10j} , β_{01j} and β_{11j} respectively. At level 3, γ_{000} through γ_{110} are the team-level intercepts and slopes estimated across teams. Specifically, γ_{001} and γ_{101} are the overall effects of (W) on ADL at program entry and change in ADL over time, respectively, across all clients across all teams.

ANALYTIC RESULTS

The intraclass correlation (ICC) identifies the amount of variance in the dependent variable attributable to each of the three levels of analysis incorporated in the model. The total variance in ADL was partitioned into

within-individual (*time-level*), between-individual (*individual-level*), and between-treatment team (*team-level*) components. When using time series data the ICC is computed with no predictors except time (e.g., days) in the model. Computation of the ICC revealed the following decomposition of variance in ADL by level: 37 percent time level, 42 percent individual level, 21 percent team level. Taken together, these results provide support for the decision to use multilevel methods to model the variance at each level of analysis. In addition to variation over time, there was significant variance in the dependent variable between individuals and between teams.³

Final Multilevel Model

Tables 2 and 3 summarize the results of the final full multilevel models of ADL. The two final models represent a common, saturated model for the purpose of comparing the association of the two team-level variables, team functioning and participation on the team, with patient functioning over time.

Effect of Control Variables on ADL. Tables 2 and 3 reveal similar relationships between the control variables and both ADL at program entry and change in ADL over time. Covariate effects on status at program entry are represented by the coefficients for the main effects terms. Covariate effects on change in ADL are represented by the interaction of covariates and time. All individual-level explanatory variables included in both models displayed significant associations with ADL at program entry and over time, with the exception of age over time.

Individual-Level Effects. The greater the number of days a client was in an inpatient setting prior to program enrollment the greater the impairment in ADL (Tables 2 and 3: *InptDays* = 0.001, $p < .01$) at program entry. The older the client, the greater the impairment in ADL (Tables 2 and 3: *Age* = 0.005, $p < .01$) at program entry. Clients with a psychiatric diagnosis of either dementia or bipolar disorder (Tables 2 and 3: *Dx* = 0.18, $p < .01$; *Dx* = 1.07, $p < .05$) were more impaired in ADL than those diagnosed as schizophrenic.

The same individual-level variables—prior inpatient stay, age, and psychiatric diagnosis—were also significant predictors of change in ADL over time. Age and dementia were positively associated with greater impairment in ADL over time. Interestingly, prior inpatient stay and bipolar disorder were associated with improvement in ADL over time. A diagnosis of schizophrenia had no association with change in ADL over time.

Table 2: Final Estimation of Fixed Effects of Team Participation on ADL

<i>Fixed Effect</i>	<i>Coefficient</i>	<i>SE</i>
INTRCEPT	0.946**	0.408
GAF	− 0.006**	0.003
Team SIZE	− 0.002 NS	0.003
Team participation	− 0.156**	0.063
InptDAYS	0.001***	0.0001
Age	0.005***	0.001
Dementia	0.176***	0.058
Bipolar	0.075**	0.027
Time	− 0.000 NS	0.0003
GAF × Time	− 2.80E − 6 NS	2.49E − 6
SIZE × Time	− 8.87E − 7 NS	2.71E − 6
Team Part. × Time	− 0.00012**	0.000059
InptDAYS × Time	− 1.55E − 7***	9.337E − 7
AGE × Time	9.17E − 6 NS	1.113E − 7
Dementia × Time	0.000015 NS	0.000066
Bipolar × Time	− 0.0001***	0.000031
<i>Final Estimation of Variance Components</i>		
<i>Random Effect</i>	<i>Variance Component</i>	
INTRCPT1	0.2851	
TIME slope	0.000262	
Level-1	0.07984	
INTRCPT1/INTRCPT2	0.1472	
TIME/INTRCPT2	0.000127	

** $p < .05$,*** $p < .01$; schizophrenia is the reference condition for dementia and bipolar.

GAF, Global Assessment of Functioning; ns, not significant; ADL, activities of daily living.

Team-level effects. There were two team-level control variables, average client functioning level and team size. In both models, the higher the level of average client functioning on the team (as indicated by the GAF score), the lower the level of impairment in ADL at program entry. Average client functioning was not, however, related to change in ADL over time. Team size was not significantly related to ADL either at program entry or over time.

Effect of Team Participation and Functioning Variables on ADL

As hypothesized, higher individual participation on the team was significantly related to less impairment in ADL at program entry (− 0.16, $p < .05$) and reduced impairment over time (− 0.00012, $p < .05$) for patients treated by the

Table 3: Final Estimation of Fixed Effects of Team Functioning on ADL

<i>Fixed Effect</i>	<i>Coefficient</i>	<i>SE</i>
INTERCEPT	0.692**	0.310
GAF	− 0.006**	0.003
Team SIZE	− 0.002 NS	0.003
Team Functioning	− 0.122**	0.049
InptDAYS	0.001***	0.0001
Age	0.005***	0.001
Dementia	0.178***	0.058
Bipolar	0.073**	0.027
Time	− 0.000 NS	0.0003
GAF × Time	− 1.67E − 6 NS	2.678E − 6
SIZE × Time	1.966E − 6 NS	3.008E − 6
Team Fct × Time	0.000016 NS	0.000051
InptDAYS × Time	− 1.59E − 7***	9.337E − 7
AGE × Time	9.122E − 6 NS	1.113E − 7
Dementia × Time	0.00000999 NS	0.000066
Bipolar × Time	− 0.0001***	0.000031
<i>Final Estimation of Variance Components</i>		
<i>Random Effect</i>	<i>Variance Component</i>	
INTRCPT1,	0.2851	
TIME slope	0.000262	
Level-1	0.07984	
INTRCPT1/INTRCPT2	0.1454	
TIME/INTRCPT2	0.000145	

Note: For graphical display purposes, ADL was predicted at three time points (0, 365, 1,825 days) and two team participation levels (1 = low and 7 = high). All other variables were held constant as follows: Days = 730 days, Age = 50, Diagnosis = 1, GAF-mean = 60, Size = 10.

** = $p < .05$,

*** = $p < .01$; schizophrenia is the reference condition for dementia and bipolar.

GAF, Global Assessment of Functioning; ns, not significant; ADL, activities of daily living.

team. In contrast, team functioning was not significantly associated with improvement in ADL, though higher team functioning was associated with higher ADL levels at program entry (-0.12 , $p < .05$).

Figure 1 illustrates the relationship between team participation and patients' ADL at program entry and over time. Teams with higher levels of participation have clients with lower levels of ADL impairment at program entry than teams with lower levels of participation. Additionally, teams with higher levels of participation are associated with improvements in ADL over time, whereas teams with lower levels of participation are associated with poorer ADLs over time. These results suggest that the level of participation on

Figure 1: Relationship of Team Participation on Change in Patient Activities of Daily Living (ADL)

a team may hinder client progress on ADL (if team participation is weak) or support client progress on ADL (if team participation is strong).

DISCUSSION

This study tested the relationship between two types of team process characteristics and changes in patients' functional status: (1) participation by members in team planning and decision making and (2) team functioning. These findings underscore the importance of the relationship between treatment team processes and patient functional status. Because significant changes in functional status among the seriously mentally ill are difficult to achieve, the fact that team effects were observed, even controlling for other patient- and team-level characteristics, demonstrates the critical importance of cultivating sustained team member participation.

The results of our study, coupled with past research, suggest that the level of participation by the team as a whole may have more effect on patient functioning than the functioning of the team. Team functioning pertains to the quality of collective processes. Some CFTs may appear to both outside observers and inside participants to be ineffective, fraught with conflict and inefficiency. However, the same qualities that create such discordance may create positive outcomes. For example, task-related conflict has been

associated with better quality decisions with more member acceptance (Amason 1996). In other words, although the process (functioning) may appear dysfunctional, the outcomes of this process may be positive. In other instances, contentious teams may be truly dysfunctional. Given the range of possible outcomes of low team functioning, then, there may be no overall relationship with performance.

The ambiguous connection between team functioning and performance implies that team design and evaluation must take into consideration the difference between team functioning and team performance. The two are not always positively related, as suggested by our results. Smooth interdependent team processes may not be necessary to help patients.

The importance of participation in teams suggests the relevance of managerial interventions to encourage member investment in team processes. CFTs must compete for their members' time with a variety of pressing obligations. As health care organizations continue to look for ways to cut costs, there may be pressure to reduce time devoted to team processes, and harried staff may feel less able to engage while in these meetings. The current study implies that such changes could occur at the cost of team's abilities to facilitate patient improvement. Leaders may consider rewarding staff explicitly for their participation in team meetings.

This study was able to track seriously ill patients for a protracted period, a critical factor in capturing potential change in functional status for this patient population. However, because of the practical difficulties of collecting organizational data over a comparable period with the same frequency, organizational assessments from the outset of the study period were used to evaluate subsequent changes in patient ADL. Although this is a common design in many multilevel, longitudinal studies (e.g., those examining schools and students) and both empirical tests and group theory indicate substantial stability in these organizational characteristics, the possibility exists that the inability to exactly match organizational with patient characteristics over time may have affected results. This should be considered a limitation inherent in the nature of the data structure. Inferences about causality should therefore be weighed in relation to the noncontiguous time structure of the data.

Future research should consider whether our findings hold when other outcomes or dimensions of team process are examined. Likely candidates for study include changes in clinical symptomatology or even other measures of individual functioning (e.g., instrumental ADL). Team process characteristics to investigate include conflict resolution and leadership. Additionally, future research should target the unique experience of some categories of patients

(e.g., older patients) compared with other types of patients receiving care in the same context. Finally, it must also be acknowledged that the population studied here, specialized mental health treatment staff in a government-run health care system, may limit the generality of the findings. Replication in other types of organizations is clearly warranted.

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NOTES

1. PROC MIXED deals with multilevel repeated measures data within a subject by allowing the investigator to specify the type of the error correlation structure. We assumed a first-order autoregressive correlation structure in our model, which is a natural assumption for repeated measure data. The clustering effects of subjects within the same team and teams within the same station are modeled by two RANDOM statements in PROC MIXED.
2. The GAF is an instrument developed by the American Psychiatric Association (1987 version) to measure the functional status of persons with serious mental illness. The highest GAF score range (81–90) indicates “absent or minimal symptoms, good functioning in all areas, interested and involved in a wide range of activities, socially effective, generally satisfied with life, not more than everyday problems or concerns”; and the lowest range (1–10) indicates “persistent danger of severely hurting self or others or persistent inability to maintain minimal personal hygiene or serious suicidal act with clear expectation of death.”
3. ADL change may be also attributable to the hospital (in addition to time, the team, or the individual patient). However, three factors mitigate against this in our case. First, all the hospitals in our system belong to one health care system—the VA. This common system membership imposes a level of uniformity on policies and practices at the hospital level that would be absent were we examining a sample of unrelated hospitals. This system commonality makes it unlikely that hospital-level factors would contribute to variation in patient ADL change. Second, the relationship between team process and patient outcomes over time is our primary theoretical focus. Hospital-level factors play little role in our theoretical formulation and thus were not included in the model. Finally, The ICC results at the facility (hospital–station) level, indicate that the hospital was not a significant source of

variation in explaining change in patient ADL, providing empirical support for our focus on time, patient, and team levels only.

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SUPPLEMENTARY MATERIAL

The following supplementary material is available for this article online:

TABLE S1. Scale items for measures of team participation and team functioning.

TABLE S2. Stability of team-level characteristics.

TABLE S3. ADL change by number of measurement points.

TABLE S4. Staffing and demographic characteristics of teams.