Patient-Level Predictors and Clinical Correlates of Duration of Untreated Psychosis Among Hospitalized First-Episode Patients

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Objective: Duration of untreated psychosis (DUP) has been associated with poor early course outcomes of nonaffective psychotic disorders; however, less is known about predictors of DUP. This study examined patient-level predictors of DUP and clinical correlates of both DUP and duration of untreated illness (DUI), both of which have been implicated as prognostic indicators.

Method: Participants included 109 first-episode patients hospitalized in 3 public-sector inpatient psychiatric units serving an urban, socially disadvantaged, predominantly African American community. DUP, DUI, and a number of clinical and psychosocial variables were measured using standardized methods. Patients were diagnosed with schizophrenia and related psychotic disorders according to the Structured Clinical Interview for *DSM-IV* Axis I Disorders.

Results: The median DUP and DUI were 22.3 and 129.9 weeks, respectively. Survival analyses revealed that, at any given time point, patients not living with family members were, on average, about 1.5 times as likely to be hospitalized as those living with family when controlling for mode of onset of psychosis. Patients not living in poverty were, on average, about 1.6 times as likely to be hospitalized as those living in poverty when controlling for mode. A greater burden of negative symptoms was associated with longer DUP ($r = 0.23$, $P = .02$), and poorer insight was associated with longer DUI ($r = -0.24$, $P = .01$). Longer DUP and DUI were associated with diverse adverse clinical characteristics, such as greater impairment in global functioning, poorer social functioning, and more psychosocial problems.

Conclusions: There is a need for early intervention efforts to be directed to families (and their loved ones who live with them with emerging psychotic disorders or frank untreated psychotic syndromes), particularly families facing major socioeconomic challenges.

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The *duration of untreated psychosis* (DUP), generally defined as the interval from onset of psychotic symptoms to initiation of treatment,[1,2] is a critical variable in early psychosis research. Substantial evidence associates DUP with adverse early course outcomes.[3,4] It is thought that delay in receiving treatment either causally provokes poorer outcomes through biologic or psychosocial mechanisms[5] or serves as a marker of poorer outcomes.[6] Whether treatment delay is related to poorer outcomes causally or as an epiphenomenon, characterization of the causes/predictors of such delay is an important research goal given the burden imposed by untreated psychosis on individuals, families, and society. Knowledge of predictors of DUP is crucial in the implementation of clinical and community-wide interventions aimed at reducing treatment delay. Research from Scandinavia indicates that through general and targeted informational campaigns and dedicated early intervention services, DUP can be reduced on a community-wide level.[7]

Although numerous studies have examined the impact of DUP on clinical variables, remarkably little is known about determinants of DUP. Mode of onset of psychosis—how quickly psychotic symptoms develop—is one of the most robust predictors. Morgan and colleagues[8] found that chronic mode of onset was associated with longer DUP; Compton and colleagues[9] replicated this using a subset of the current sample (from an urban, low-income, predominantly African American population). The relationship between mode of onset and DUP also has been demonstrated in samples in Spain, Finland, and Hong Kong.[10,11] The link between mode of onset and DUP indicates that more abrupt changes in behavior lead to more expedient initiation of treatment. Gradually evolving symptoms may be more difficult for affected individuals and those around them to identify as symptoms of a major illness and may allow more time for the individuals and their families to adapt to the changes. Although the relation between mode of onset of psychosis and DUP may initially seem tautological in nature, the information used to determine mode of onset is very different from that used in estimating DUP. As we define it, mode of onset taps the rapidity of development of psychotic symptoms *up to the point of* frank psychotic symptoms, whereas DUP *begins* at that point of frank psychosis.

Various indicators of premorbid functioning have been suggested as predictors of DUP; however, findings are mixed, with some suggesting that poorer premorbid functioning is associated with longer DUP,[10] while others have not

For Clinical Use

- A longer duration of treatment delay is associated with a number of adverse clinical characteristics at initial evaluation of patients with first-episode psychosis, such as more severe negative symptoms and poorer psychosocial functioning.
- Early intervention efforts should be directed to families, particularly those living near or below the federal poverty level.
- Because untreated psychosis is a serious personal, family, and public health problem, predictors of treatment delay should be elucidated so that early intervention efforts can be more successful.

substantiated that association.[11] Other variables proposed as potential determinants of DUP include lower educational attainment,[11,12] as well as unemployment.[8,13]

Longer DUP appears to be associated with greater negative symptoms and poorer insight. Several studies have demonstrated a link between negative symptoms—such as social isolation, avolition, poor social integration, and withdrawal—and DUP,[14,15] although some have not found the association.[13,16] Other investigations show a more general association between decreased social and global functioning and extended DUP.[10,12,17] Although greater negative symptoms have generally been considered a consequence of longer DUP, factors that reduce the frequency of social interactions could prolong DUP by decreasing the likelihood that others detect psychotic symptoms (thus, negative symptoms could be a determinant of DUP). Multiple studies have revealed a link between poor insight and longer DUP,[14,16] with few failing to demonstrate this association.[10,11]

Duration of untreated illness (DUI) represents the interval from emergence of any symptoms, including prodromal symptoms, to initiation of treatment for psychosis and has also been implicated as a prognostic indicator of early course outcomes.[18] Given limited focused, empirical research on DUP (especially predictors of DUP) and DUI, this study had a 2-fold objective. First, *predictors* of DUP (but not DUI) were assessed (ie, DUP was the dependent variable). Duration of untreated psychosis represents a potentially modifiable period of treatment delay, whereas DUI is this period of treatment delay *plus* the duration of the prodrome preceding it. Based on earlier preliminary reports and a priori hypotheses, it was expected that (1) poorer premorbid functioning, (2) not living with family members prior to hospitalization, and (3) being unemployed prior to hospitalization would predict longer DUP when controlling for mode of onset of psychosis. Additionally, 6 other patient-level variables were explored as potential predictors (eg, educational attainment, living below the federal poverty level). Because mode of onset is a relatively well-established predictor of DUP, independent effects of the hypothesized and exploratory predictors were examined while controlling for the effect of mode of onset. Family- and services-level predictors of DUP are described elsewhere.[19,20]

Regarding the second objective, cross-sectional *correlates* (not necessarily predictors) of both DUP and DUI were studied because prior literature suggests that DUI, in addition to DUP, may be associated with early course outcomes.[18] Thus, because some of the clinical variables (eg, negative symptoms, impaired insight) may be seen as either determinants of DUP or consequences of DUP/DUI, both of these durations were examined in relation to the second objective. Furthermore, this examination of clinical *correlates* (not necessarily predictors) is in keeping with recent suggestions that DUP may be a marker or epiphenomenon of disease course rather than a causative predictor or pathogenic process.[6] It was hypothesized that longer DUP and DUI would be associated with greater negative symptoms and poorer insight. Additionally, associations between DUP/DUI and 7 other clinical and social variables (eg, positive symptoms, social functioning) were explored.

METHOD

Setting and Sample

Participants were recruited from 3 inpatient psychiatric units providing services for patients with no insurance or only public-sector insurance (eg, Medicaid). The population served by these units is predominantly African American, low-income, and socially disadvantaged (eg, high rates of school dropout[21] and past incarceration[22]). Two hundred eighty-one patients were screened between July 2004 and June 2008. Among these, 89 were ineligible, primarily for (1) having had > 3 months of prior antipsychotic treatment or having been hospitalized > 3 months prior to index admission (n = 19, 21.3%), (2) being outside of the age range of 18–40 years (n = 13, 14.6%), (3) not having a primary nonaffective psychosis (n = 12, 13.5%), or (4) being referred from a site outside of the 3 aforementioned inpatient units (n = 11, 12.4%). Among the 192 eligible patients, 83 did not participate—52 (62.7%) declined participation and 31 (37.3%) were discharged before an assessment could be conducted. These 83 eligible but not enrolled patients did not differ from the 109 participating patients in terms of age, gender, or race/ethnicity.

Nearly all of the participants were completely treatment naive at the time of hospital admission; very few had received prior psychiatric evaluation for prodromal symptoms or psychiatric disorders. Although the local health care delivery system for the population of interest does provide alternative care pathways, such as initial assessment and management in outpatient settings, the research team's experience indicates that nearly all first-episode nonaffective psychosis patients enter the local psychiatric system through hospitalization

(symptoms are usually serious enough at the time of first presentation to warrant hospitalization).

Procedures and Measures

Research assessments, typically lasting 3–4 hours, were conducted once psychotic symptoms were stabilized enough to allow for informed consent. Assessment of most participants (n = 87, 79.8%) was conducted between hospital day 3 and 10 (mean ± SD = 9.1 ± 6.7). Data from 44 patients (40.4%) were supplemented by collateral data collected from 1 or 2 informants/family members. As reported previously,[19,20] patients with and without informants did not differ on 24 of 26 sociodemographic and clinical variables; patients with a participating informant had a significantly earlier age at onset of psychosis and a longer hospital stay than those without a participating informant. Of note, having a participating informant/family member in the study was unrelated to whether the patient lived with family versus lived alone or with others.

The study was approved by all relevant institutional review boards, and all patients gave written informed consent. Although the majority of participants were initially admitted involuntarily, many transitioned to voluntary status during hospitalization. Even involuntarily hospitalized patients are commonly willing to participate in research assessments in this setting.

Using published federal guidelines (http://aspe.hhs.gov/poverty/index.shtml) for the year in which each patient was assessed, we determined whether patients were living above or below the federal poverty level based on their reports of annual household income and the number of people living in the household. Diagnoses of psychotic disorders and substance use disorders were made using the Structured Clinical Interview for *DSM-IV* Axis I Disorders.[23]

Duration of untreated psychosis was defined as the number of weeks from onset of positive psychotic symptoms to first hospital admission and *duration of untreated illness* as the number of weeks from onset of prodromal symptoms to first hospital admission. Both were measured in a systematic manner using patient and informant/family member data (when available) from the Symptom Onset in Schizophrenia (SOS) inventory,[24] as well as select items from the semistructured Course of Onset and Relapse Schedule/Topography of Psychotic Episode interview.[25] Date of onset of positive symptoms was operationalized as the date when hallucinations or delusions met the threshold for a Positive and Negative Syndrome Scale (PANSS)[26] score of ≥ 3. Onset of prodrome was operationalized as the date of first prodromal symptom(s), from among 14 provided in the SOS, contiguous (without clearly discernible periods of wellness intervening) with subsequent onset of psychosis.[18] Systematic methods were used to resolve ambiguities in obtaining exact dates for onset of symptoms. Cross-referencing with milestones and memorable events was used to enhance accuracy of dating. Consensus-based best estimates of DUP and DUI were derived based on all available information. For 33 patients with no retrospectively identifiable prodromal period, DUI was equivalent to DUP given that onset of symptoms represented onset of psychosis rather than prodrome.

Mode of onset of psychosis was categorized, based on all available information, using 5 subtypes from the World Health Organization's International Pilot Study of Schizophrenia[27]: (1) sudden—florid psychotic state developing within days (up to a week) in the absence of mild prodromal signs/symptoms; (2) precipitous—psychotic state developing within 1 week, but after a period of prodromal signs/symptoms; (3) subacute—symptoms developing into a clear-cut psychotic state over a period of up to 1 month; (4) gradual—slow, incremental development of psychotic symptoms over a period exceeding 1 month, and prodromal signs/symptoms (if any) cannot be clearly distinguished from overt psychotic symptoms with regard to their timing because of a gradual transition from one to the other; and (5) insidious—no clear demarcation between premorbid personality and mental illness. For this analysis, the first 2 modes (sudden and precipitous) were combined into an "acute" category, the subacute subtype was used as a middle category, and the last 2 (gradual and insidious) were combined into a "chronic" category.

Premorbid functioning was measured with the Premorbid Adjustment Scale (PAS).[28] Both academic and social functioning were assessed across 3 age periods: childhood (≤ 11 years), early adolescence (12–15 years), and late adolescence (16–18 years); yielding 6 premorbid functioning scores. To conservatively safeguard against inadvertently assessing prodromal functioning during the rating of premorbid functioning, the PAS was not scored for any age period that included the year before onset of prodromal symptoms.[29]

Positive and negative symptoms were assessed with the PANSS.[26] First-rank symptoms were rated as described previously,[30] using an inventory of 11 hallucinatory and delusional experiences based on detailed definitions provided by Mellor.[31] Depressive symptoms were rated using the Calgary Depression Scale for Schizophrenia (CDSS),[32] which is composed of 9 items rated on a 4-point scale ranging from 0 = absent to 3 = severe. The Cronbach internal consistency coefficient of CDSS items was α = .76. Insight was measured using the Birchwood Insight Scale (BIS)[33] in addition to the lack of judgment and insight item of the PANSS.[34,35] The BIS is a self-report measure with 8 items to which the participant responds "agree," "disagree," or "unsure." Higher BIS scores indicate greater insight. The internal consistency coefficient for the BIS was α = .82. Scores on the PANSS lack of judgment and insight item range from 1 to 7, with lower scores indicating greater insight.

Global functioning was measured using the Global Assessment of Functioning (GAF) scale[36] and the Social and Occupational Functioning Assessment Scale (SOFAS),[37] both of which rely on a 100-point continuum divided into 10-point intervals with descriptive anchors. Social functioning prior to hospitalization was rated using the Social Functioning Scale (SFS),[38] which assesses abilities and

performance in 7 domains, with higher scores indicating greater social competence. The total number of Axis IV psychosocial problems was also recorded.

Data Analyses

To examine patient-level predictors of DUP, we employed survival analyses in which onset of psychosis was the entry point and hospital admission was the endpoint. All analyses controlled for the one relatively well-established patient-level predictor of DUP, mode of onset of psychosis.[8,9] Kaplan-Meier survival curves were constructed to represent the cumulative probability of hospitalization over time in different groups. Log-rank tests assessed whether the probability of first hospitalization over time differed between defined groups, and Cox regression (which predicts survival time from covariates) quantified associations in terms of hazard ratios (HRs). As such, hazard ratios < 1 indicated longer DUP on average, and hazard ratios > 1 indicated shorter DUP.

Regarding the second objective, an assessment of clinical correlates of DUP and DUI, associations between the clinical variables and DUP/DUI were assessed using independent samples Student *t* tests and Pearson correlations. Whereas survival analyses relied on the untransformed DUP value, these parametric analyses used transformed DUP and DUI variables, $\log_{10}(\text{DUP}+1)$ and $\log_{10}(\text{DUI}+1)$, given the expected highly positively skewed distribution of duration measures.

RESULTS

Sample Characteristics and Distributions of DUP and DUI

Sociodemographic, diagnostic, and clinical characteristics of the 109 first-episode patients are shown in Table 1. Mean PANSS, GAF, and SOFAS scores indicated a moderate to severe level of psychopathology and impairment. The median, mean ± SD, and range of DUP in this sample were 22.3, 67.5 ± 126.1, and 0.0–839.3 weeks, respectively. As shown in Table 2, these DUP estimates are similar to those from other first-episode cohorts.[15,18,39–42] The median, mean ± SD, and range of DUI in this sample were 129.9, 186.1 ± 208.4, and 0.0–1,271.7 weeks, respectively. These values are quite similar to the median and mean ± SD DUI of 104 and 188.9 ± 248.1 weeks reported by Barnes and colleagues[41] in the United Kingdom.

Table 1. Sociodemographic, Diagnostic, and Clinical Characteristics of the Study Sample (n = 109)

Characteristic	Value
Age at hospitalization, mean ± SD (range), y	23.1 ± 4.7 (18–39)
Male gender, n (%)	83 (76.1)
Race, n (%)	
Black/African American	98 (89.9)
White	7 (6.4)
Other	4 (3.6)
Relationship status, n (%)	
Single and never married	100 (91.7)
Married or living with a partner	5 (4.6)
Separated or divorced	4 (3.7)
Education, mean ± SD (range), y	11.6 ± 2.4 (6–16)
Who the patient lived with in the month prior to hospitalization, n (%)	
Parents, siblings, or other family members	76 (69.7)
Alone	10 (9.2)
Friends or roommate	8 (7.3)
Boyfriend, girlfriend, spouse, or partner	5 (4.6)
Other	10 (9.2)
Unemployed prior to hospitalization, n (%)	67 (61.5)
Religious affiliation (n = 107), n (%)	
Baptist	25 (23.4)
Other Christian	49 (45.8)
Other	13 (12.2)
None	20 (18.7)
Ever incarcerated, n (%)	63 (57.8)
Living below the federal poverty level (n = 95), n (%)	62 (65.3)
SCID nonaffective psychotic disorder diagnosis, n (%)	
Schizophreniform disorder	22 (20.2)
Schizophrenia, paranoid type	48 (44.0)
Schizophrenia, disorganized type	10 (9.2)
Schizophrenia, residual type	2 (1.8)
Schizophrenia, undifferentiated type	2 (1.8)
Schizoaffective disorder, bipolar type	5 (4.6)
Schizoaffective disorder, depressive type	3 (2.8)
Brief psychotic disorder	4 (3.7)
Delusional disorder	1 (0.9)
Psychotic disorder not otherwise specified	12 (11.0)
SCID alcohol abuse or dependence diagnosis, n (%)	30 (27.5)
SCID cannabis abuse or dependence diagnosis, n (%)	63 (57.8)
Mode of onset of psychosis (n = 105), n (%)	
Sudden	16 (15.2)
Precipitous	16 (15.2)
Subacute	37 (35.2)
Gradual	32 (30.5)
Insidious	4 (3.8)
PANSS positive subscale score, mean ± SD (range)	24.2 ± 5.0 (13–36)
PANSS negative subscale score, mean ± SD (range)	21.4 ± 6.7 (9–39)
GAF score, mean ± SD (range)	31.9 ± 9.8 (10–65)
SOFAS score, mean ± SD (range)	37.9 ± 12.3 (10–65)
Involuntary legal status at hospital admission, n (%)	91 (83.5)
Hospital length of stay, mean ± SD (range), d	12.6 ± 7.1 (2–50)

Abbreviations: GAF = Global Assessment of Functioning, PANSS = Positive and Negative Syndrome Scale, SCID = Structured Clinical Interview for *DSM-IV* Axis I Disorders, SOFAS = Social and Occupational Functioning Assessment Scale.

Predictors of DUP

Survival analyses examined the 3 hypothesized predictors—(1) poorer premorbid functioning (continuous variables), (2) living with family members prior to hospitalization versus living alone or with nonrelatives, and (3) being employed prior to hospitalization versus being unemployed—while controlling for mode of onset of psychosis. Academic and social premorbid functioning scores, in childhood, early adolescence, and late adolescence, were not associated with DUP. Living with family members prior to hospitalization was significantly associated with a *longer*, not shorter, DUP ($\chi^2 = 4.17$, $P = .04$, HR=0.64) when controlling for mode of onset. This indicates that at any given point in time, patients not living with family members were, on average, about 1.5 times as likely (1.00/0.64 = 1.56) to be hospitalized as those living with family members (see survival curves in Figure 1). The median (mean ± SD) DUP for participants living with family members was 28 (77.0 ± 135.5) weeks compared to 14 (44.6 ± 99.8) weeks for those living alone or with others. Of note, living with family members prior to hospitalization versus living alone or with

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Table 2. Comparison of Sample Characteristics and DUP Estimates in the Present Sample and Other Studies From the United States, Canada, and Europe

Setting	n	Male Gender, %	White, %	Nonaffective Psychosis, %	DUP, Median (mean ± SD), Wk
Dublin, Ireland[15]	166	58	99[a]	79	20 (71.6 ± 128.4)
Pittsburgh, Pennsylvania[18]	104	62	70	85	34 (95.7 ± 163.4)
Iowa City, Iowa[39]	156	62	90[a]	96	13 (74.3 ± 145.1)
London, Ontario, Canada[40]	116	77	61	100	26 (71 ± 113)
London, United Kingdom[41]	152	72	NA	100	24[a]
Calgary, Alberta, Canada[42]	200	68	77	96	28 (84.2 ± 139)[a]
Atlanta, Georgia (present study)	109	76	6	100	22 (67.5 ± 126.1)

[a]Data based on personal communication with study authors.
Abbreviations: DUP = duration of untreated psychosis, NA = not available

Figure 1. Survival Curves for Duration of Untreated Psychosis (DUP) Stratified by Whom the Patient Lived With Prior to Hospitalization

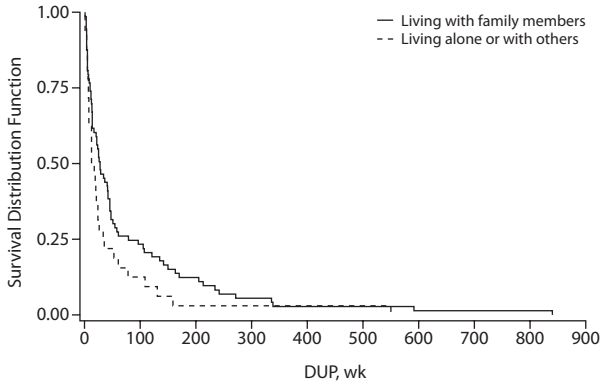
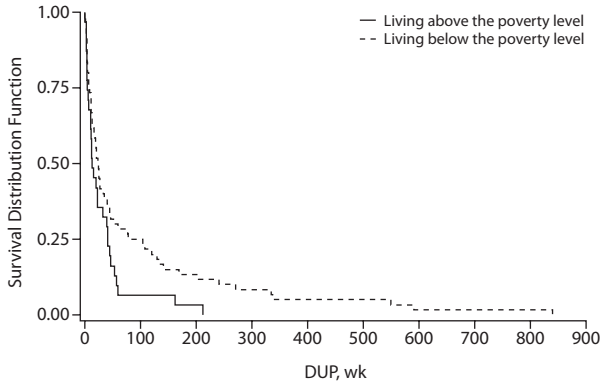


Figure 2. Survival Curves for Duration of Untreated Psychosis (DUP) Stratified by Federal Poverty Level Income Status



nonrelatives was unrelated to mode of onset of psychosis, PANSS positive symptom score, PANSS negative symptom score, BIS insight score, SOFAS score, and SFS social functioning total score but was associated with GAF scale score; those living with family members had a lower mean ± SD GAF score (30.3 ± 8.2) than those living alone or with others (35.4 ± 11.9, $t_{103} = 2.54$, $P = .03$). Employment status prior to hospitalization was not associated with DUP when controlling for mode of onset.

Six other patient-level factors were explored as potential predictors of DUP: gender, educational attainment, living above or below the federal poverty level, family history of psychosis, comorbid alcohol abuse/dependence, and comorbid cannabis abuse/dependence. Only 1 was a significant predictor—living below the federal poverty level was associated with a longer DUP ($\chi^2 = 3.83$, $P = .05$, HR=0.62) when controlling for mode of onset. Thus, at any given point in time, patients not living in poverty were, on average, about 1.6 times as likely to be hospitalized as those living in poverty (see survival curves in Figure 2). The median (mean ± SD) DUP for participants living below the federal poverty level was 24 (85.5 ± 157.1) weeks compared to 14 (31.1 ± 45.9) weeks for patients not living in federally defined poverty. Of note, the 2 significant predictors—living with family members prior to hospitalization versus living alone or with nonrelatives and living below versus above the federal poverty level—were not associated ($\chi^2_1 = 0.25$, $P = .62$), suggesting that associations were not confounded by the other variable.

Clinical Correlates of DUP and DUI

Both of the hypothesized clinical correlates were associated with 1, but not both, of the duration measures (Table 3). Specifically, a greater level of PANSS negative symptoms was associated with longer DUP ($r = 0.23$, $P = .02$) but not DUI. Regarding insight, the PANSS lack of judgment and insight item score was correlated with DUI ($r = –0.24$, $P = .01$) but not DUP. The correlation between DUI and the other indicator of insight (BIS) did not reach statistical significance.

A number of significant associations were observed regarding the other clinical and social variables explored (Table 3). Both positive and first-rank symptoms were significantly associated with DUI. Regarding the latter, patients with past or current first-rank symptoms had a median (mean ± SD) DUI of 162 (216.5 ± 215.9) weeks, whereas those with no history of first-rank symptoms had a median (mean ± SD) DUI of 72 (149.4 ± 207.0) weeks. Global Assessment of Functioning scores were inversely correlated with both DUP and DUI ($r = –0.29$, $P = .003$, and $r = –0.33$, $P = .001$, respectively), as were SOFAS scores ($r = –0.24$, $P = .02$, and $r = –0.26$, $P = .009$, respectively). Regarding SFS domains, social engagement and interpersonal communication were associated with a shorter DUI and DUP. The number of Axis IV psychosocial problems was significantly positively correlated with both DUI and DUP. Patients admitted involuntarily had a shorter median (mean ± SD) DUP (19.5 [48.2 ± 84.9] weeks) than those admitted voluntarily (77 [165.1 ± 228.0] weeks; $t_{103} = 2.76$, $P = .01$).

Table 3. Cross-Sectional Clinical Correlates of DUI and DUP at Initial Hospitalization (n = 109)

Variable	Association With $\log_{10}$(DUI + 1) Statistic	*P*	Association With $\log_{10}$(DUP + 1) Statistic	*P*
Hypothesized variables				
PANSS negative symptoms	$r = 0.05$	.63	$r = 0.23$	.02
PANSS lack of judgment and insight item	$r = -0.24$	.01	$r = -0.12$	.23
BIS total score	$r = 0.18$	.07	$r = 0.11$	.26
Exploratory clinical and social variables				
PANSS positive symptoms	$r = 0.20$	.04	$r = 0.17$	.09
First-rank symptoms				
Ever present (n = 58 [56.3%]) Never present (n = 45 [43.7%])	$t_{98} = -2.32$	.02	$t_{97} = -1.29$	.20
CDSS total score	$r = 0.09$	.38	$r = -0.10$	.32
Global functioning				
GAF	$r = -0.33$	.001	$r = -0.29$	.003
SOFAS	$r = -0.26$	.009	$r = -0.24$	.02
SFS subscale scores				
Social engagement	$r = -0.25$	.01	$r = -0.21$	.04
Interpersonal communication	$r = -0.29$	.004	$r = -0.27$	.006
Independence–performance	$r = -0.10$	.32	$r = -0.01$	.89
Recreation	$r = -0.11$	.28	$r = .051$	.60
Prosocial	$r = -0.14$	.17	$r = 0.08$	.42
Independence–competence	$r = 0.14$	.16	$r = 0.15$	.13
Employment/occupation	$r = -0.18$	.08	$r = -0.06$	.57
Total Axis IV psychosocial problems	$r = 0.37$	< .001	$r = 0.21$	.04
Legal status				
Involuntary (n = 91 [83.5%]) Voluntary (n = 18 [16.5%])	$t_{104} = 1.87$	.07	$t_{103} = 2.76$	.01

Abbreviations: BIS = Birchwood Insight Scale, CDSS = Calgary Depression Scale for Schizophrenia, DUI = duration of untreated illness, DUP = duration of untreated psychosis, GAF = Global Assessment of Functioning, PANSS = Positive and Negative Syndrome Scale, SFS = Social Functioning Scale, SOFAS = Social and Occupational Functioning Assessment Scale.

DISCUSSION

Several key findings emerged from this analysis of patient-level predictors of DUP and clinical correlates of DUP and DUI. First, contrary to the hypothesized relation, poorer premorbid academic and social functioning did not predict longer DUP when controlling for mode of onset of psychosis. Second, living with family members prior to hospitalization was associated with a *longer* DUP, opposite the hypothesized relation. Third, living below the federal poverty level was associated with longer DUP, though unemployment was not. Fourth, a greater burden of negative symptoms was associated with longer DUP (but not DUI), and insight was associated with longer DUI (but not DUP). Fifth, longer DUP and DUI were associated with several other adverse clinical characteristics, such as greater impairment in global functioning, poorer social functioning, and more psychosocial problems.

Regarding predictors of DUP, it was hypothesized that *not* living with family members prior to hospitalization would be predictive of longer DUP because relatives would presumably readily observe evolving psychotic symptoms and expedite treatment seeking. However, living with family members was associated with a *longer* DUP. At least 2 explanations seem plausible. First, individuals ≥ 18 years of age with an emerging psychotic disorder still living with relatives may be more likely to have a disease type characterized by greater need for dependence, perhaps driven by more prominent negative symptoms, cognitive impairments, and social maladjustment. On the other hand, patients living alone or with others (eg, roommates) may have a disease type characterized by less impairment and greater ability to live independently. Thus, the association uncovered here may suggest that living with family members is a *marker* of a disease manifestation associated with greater treatment delay. However, although living with family members prior to hospitalization was associated with poorer global functioning (as measured by the GAF scale score), it was unrelated to mode of onset of psychosis, positive symptoms, negative symptoms, insight, and social functioning.

A second potential explanation is that family members may consciously or subconsciously shelter, seclude, or protect their increasingly ill loved one, which may unintentionally be associated with longer treatment delay. Framed differently, relatives may help to manage them by supporting their functioning and structuring their lives in a way that would not happen if they were not at home. Being with family may help stabilize these individuals so they need less restrictive environments (eg, hospitalization). On the other hand, those living outside the family home (who may, therefore, be more likely to exhibit symptomatic behavior to a broader group of observers) may more readily come to the attention of others who initiate care. This potential explanation may be supported by the finding of Morgan and colleagues[43] that first-episode patients who live alone are more likely to be admitted through the police or criminal justice system than those living with family.

Although unemployment was not significantly associated with DUP, living in poverty was predictive of longer DUP. This indicates the gravity of the problem of poverty, evident even within a sample of socially disadvantaged, low-income participants. The association between poverty and treatment delay, combined with extensive research suggesting that poverty is associated with diverse adverse mental health outcomes and disparities in use of mental health care services,[44] underscores the importance of policy measures that effectively address access to health care services among the most socioeconomically vulnerable families.

Regarding clinical correlates of DUP/DUI, the finding that greater negative symptoms were associated with longer DUP is consistent with prior research.[4,15] Interestingly, however, a greater burden of negative symptoms was not associated with longer DUI. This may be related to the potential underlying reasons for the relationship between negative symptoms and DUP. For example, the relation between negative symptoms and longer DUP may be mediated by social factors (eg, unemployment, single marital status), given that social isolation would limit the likelihood of others detecting illness-related changes and aiding treatment seeking. However, these factors would not be expected to impact the duration of the prodrome.

Current findings regarding a relationship between DUP/DUI and poorer clinical characteristics (impairments in global functioning, social maladjustment, and psychosocial problems) are consistent with previous studies.[10,12,17] Overall, these investigations advance the argument that a delay in help seeking is associated with clinical factors that may impede intervention and/or lead to poorer outcomes. Moreover, these findings highlight the fact that different factors may be risk factors for, or consequences of, DUP. Although the value of early intervention for psychotic disorders is increasingly accepted, deciphering the specific domains for which early intervention is most beneficial is critical.

These findings must be interpreted in light of several methodological challenges. First, an inherent limitation of studies designed to examine causes and consequences of DUP is that the retrospective DUP construct is difficult to measure.[2] The present study, designed specifically to address DUP/DUI, relied on 2 previously developed instruments and used rigorous measurement standards. Second, caution is warranted in generalizing the present findings to dissimilar populations, though this population is no more unique than any other and generalizability is always an issue for a geographically defined sample. Third, given that only 109 of the 192 patients approached agreed to take part in the study, selection bias cannot be excluded. However, the eligible but not enrolled patients did not differ from the participating patients in terms of the 3 variables that were available from nonparticipants: age, gender, and race/ethnicity.

This study—conducted specifically to empirically address a number of potential predictors and correlates of treatment delay—revealed associations between longer DUP/DUI and poorer clinical and social functioning across a broad array of measures. Correlates of DUP/DUI include greater negative symptoms, insight, greater positive symptoms, more impairments in global functioning, poorer social functioning, and more psychosocial problems. Although this cross-sectional study cannot determine whether DUP is a cause or marker of poorer course,[6] DUP is clearly associated with a number of adverse early course characteristics. Because untreated psychosis is a serious personal, family, and public health problem aside from its effects on long-term course, predictors of DUP should be elucidated and programmatic implications explored. The findings on predictors of DUP suggest a need for early intervention efforts directed to families (and their loved ones with emerging psychotic disorders or frank untreated psychotic syndromes who live with them), particularly families facing major socioeconomic challenges.

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