Socio-Demographic Predictors of the Time Interval Between Successive Hospitalizations Among Patients with Borderline Personality Disorder

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Abstract

Background: Borderline personality disorder (BPD) affects 0.7% to 2.7% of the adult population and higher rates are reported in inpatient care. Hospitalizations of BPD patients are a complex and controversial challenge for mental health professionals. Recurrent hospitalizations are common and it is essential to identify risk factors that characterize patients who benefit from their hospitalization and those who return to the ward shortly after discharge.
Aim: To investigate the potential link between BPD patients' socio-demographic factors and the expected time interval between their successive hospitalizations.
Methods: A retrospective analysis of 1051 hospitalization records from 174 BPD patients. Through univariate, bivariate, and multivariate analyses, we investigated the possible relationship between patients' primary socio-demographic factors and the time between their successive hospitalizations.
Results: Patients' age, marital status, and living arrangement were found to be statistically connected with the time interval between successive hospitalizations. Specifically, being older, married and/or patients to live with one's spouse/partner seems to be linked with a longer time interval between successive hospitalizations compared to patients who are young, single/divorced and/or those who live with their parents.
Conclusions: The expected time interval between successive hospitalization of BPD patients can be partly explained by their socio-demographic characteristics.
Keywords: borderline personality disorder; time between successive hospitalizations; socio-demographic predictors; inpatient treatment

1 Introduction

Hospitalization rates of patients suffering from borderline personality disorder (BPD) are extremely high (Leichsenring et al., 2023) with prevalence rates reported to be around 22.5% (Ellison et al., 2018). In addition to their distinctively high service utilization rates, staff burnout rates among those who treat BPD patients are reported to be high compared to other psychiatric conditions (Comtois et al., 2003; Perseius et al., 2007; Finamore et al., 2020). From a socio-demographic standpoint, individuals of all backgrounds and ages can suffer from BPD (National Institute of Mental Health, 2023). Nonetheless, certain socio-demographic factors are known to be associated with BPD diagnosis. Most notably, BPD is commonly diagnosed in early adulthood and is more prevalent among females than males (American Psychiatric Association, 2013). Marital and employment statuses have also been found to be connected with BPD; only 16% of BPD patients are married or cohabiting with a partner, and only 35% have consistent employment or school performance (Zanarini et al., 2015).

The effectiveness of inpatient treatment of BPD patients is a significant point of contention among mental health clinicians and currently, *there is no universally accepted standard for assessing its efficacy* (A. W. Bateman, 2012). One key reason is the lack of an accepted standard for the duration and treatment provided in

hospitalization settings for BPD patients (A. Bateman and Fonagy, 2001, 1999). Hospitalization duration and treatment can vary significantly across mental healthcare centers and the needs and characteristics of specific patients; extent of self-harming behaviors, response to treatment, extent of support system, and the availability of community-based resources and aftercare (Woods et al., 2020). In addition, BPD is a highly heterogeneous condition in terms of symptoms, and many individuals with BPD also have comorbid conditions, such as mood disorders, substance abuse, or anxiety disorders. This heterogeneity and high prevalence of comorbidities complicates any potential assessment of effectiveness (Doering, 2019). Thus, developing reasonable assessment tools for the effectiveness of inpatient treatments and provided care is highly challenging for BPD. In a previous study (Yaniv-Rosenfeld et al., 2024), key socio-demographic factors, previously linked to BPD prevalence (Hörz et al., 2010), were also found to be related to the expected hospitalization duration of BPD patients at intake. These socio-demographics include patients' gender, age, educational level, marital status, parenthood status, employment status and living arrangement. Based on one's expected hospitalization duration at admission, mental health professionals can potentially devise more suitable treatment plans and goals. However, to the best of our knowledge, no prior work has examined the possible connection between these socio-demographic factors and the time interval between successive hospitalizations.

A prolonged time interval between successive hospitalizations is generally recognized as a measure of efficacy and positive outcome (Vigod et al., 2013). For many BPD inpatients, the key goals of their stay in the ward are to enhance emotional regulation, reduce suicidality and self-mutilation, and promote rehabilitation. Achieving these goals is expected, among others, to reduce the need for frequent hospitalizations. Thus, the time interval between successive hospitalizations can potentially play a role in assessing the benefits of inpatient treatment. The present study analyzes the possible relation of socio-demographic factors, previously linked with BPD incidence and hospitalization duration, with the time interval between successive hospitalizations. Our hypothesis is that these socio-demographic factors will prove useful in estimating the time interval until the next hospitalization at patient discharge.

2 Methods and Materials

In terms of methodology, our approach follows a four-phase process: Initially, we collect and pre-process relevant clinical data. Then, we perform a univariate analysis by examining the distribution of each characteristic in the acquired data by itself. Next, we perform a bivariate analysis targeted at the central measure of this study – the duration between successive hospitalizations of BPD patients. Finally, we perform a multivariate analysis, again targeted at the duration between successive hospitalizations of BPD patients, in order to provide a more comprehensive and robust perspective on the matter.

The study protocol was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Shalvata Mental Heath Care Center (approval 0003-22-SHA).

2.1 Data

We gathered and examined records from the Shalvata Mental Healthcare Centre in Israel, which serves a population of approximately 600,000 individuals and maintains four adult in-patient departments. These departments cater to a significant number of patients with BPD, as roughly one of every three hospitalized in-patients is diagnosed with BPD.

Our data collection phase starts with a random selection and retrospective analysis of the electronic health records of 200 adult patients primarily diagnosed with BPD who had been admitted to the hospital at least once between 2018 and 2021. Since we are interested in studying the time between successive hospitalizations, we omitted 26 patients for whom only a single hospitalization was present in the hospital records (not necessarily in the 2018-2021 time frame) from further consideration. For each of the remaining 174 patients, we manually extracted and examined all recorded hospitalizations, amounting to a total of 1,051 hospitalizations. During this process, day visits and scheduled hospitalizations, such as routine follow-up appointments, were excluded from our data.

2.2 Measures

Each hospitalization is defined by seven socio-demographic characteristics of the patient: gender (Male, Female, Other), age (in years), education level (No high-school diploma, Partial high-school diploma, High-school

diploma, Academic), employment status (Unemployed, Part-time, Full), marital status (Single, Married, Divorced, Widower), parental status (yes, no), and living arrangement (Alone, Spouse/Partner, Parents, Extended Family, Roommate(s)). Each hospitalization is further identified by its index, indicating the number of prior hospitalizations for that patient plus one (i.e., the ordinal number of the hospitalization), its duration in days, and most importantly, the time until the subsequent hospitalization in days. Clearly, for each patient, the last hospitalization in the data has no subsequent hospitalization and thus this hospitalization was not considered in our ensuing analysis. In summary, each hospitalization is characterized by a total of ten variables: seven relating to socio-demographic characteristics of the hospitalized patient, two relating to the hospitalization itself, and one, which is at the focus of our study, representing the time until the next hospitalization.

It is important to note that the first eight measures described above (i.e., the patient's socio-demographics and hospitalization index) are typically readily available during the patient's intake and/or discharge processes. Similarly, the ninth measure, hospitalization duration, is readily available upon the patient's discharge. Clearly, the time until the next hospitalization would only become evident at the patient's next admission (if such occurs). For our data collection purposes, half of the measures were automatically extracted from the hospital records: gender, age, hospitalization index, hospitalization duration, and time until the next hospitalization. Unfortunately, the remaining measures (i.e., education level, employment status, marital status, parental status, and living arrangement) were not explicitly registered in the patient's electronic health record. In order to acquire these measures, we manually reviewed the free-form text records provided at each admission and discharge and extracted these values one-by-one. These data annotations were subsequently reviewed and validated by two independent assessors before the data analysis commenced. Notably, all missing values were retrieved from the records and no discrepancies or disagreements arose, supporting the perceived accuracy of the annotations across the records in our study sample.

2.3 Statistical Approaches

For the univariate analysis, we report the descriptive statistics in a conventional format, where continuous measures are expressed as mean $\pm$ standard deviation (SD) and categorical measures are represented as percentages. For the bivariate analysis, we perform two types of analyses: First, we perform between-group comparisons using either a Student's T-test or ANOVA (Analysis of Variance), supplemented with post-hoc T-tests and Bonferroni correction, for each socio-demographic measure separately. Then, using univariate linear regression models and the mean least squares method (Shami and Lazebnik, 2023; Cook, 1977), we assess the effects associated with the hospitalization index and hospitalization duration, each by itself, on the central measure of interest – the duration until the next hospitalization. Finally, for the multivariate analysis, we use a linear regression model and the mean least squares method with the entire set of measures as independent variables and the duration until the next hospitalization as the dependent variable. Our data analysis was carried out using SPSS (version 24), with a significance threshold set at $p \leq 0.05$.

3 Results

3.1 Univariate Analysis

Overall, 1051 hospitalization records are present in our sample, originating from 174 BPD-diagnosed patients, resulting in an average of 6.06 ± 6.38 hospitalization per patient. The sample includes 83.3% (145) females, and 16.7% (29) males (0 classified as other). The average patient age at the time of admission is 37.6 ± 9.28. Considering the patients' education, 32% (56) did not have any high-school accreditation, 18% (32) had partially completed a high-school diploma, 33% (57) successfully graduated from high-school, and 17% (29) acquired an academic degree. At the time of admission, 61.38% of the hospitalizations (645) were of single patients while the remaining 13.89% (146) and 24.67% (260) were of married and divorced patients, respectively (none of widowers). Moreover, 56.45% of the hospitalizations (595) are of patients who have children. In addition, 70.96% of the hospitalizations (748) are of unemployed patients, 3.32% (35) of part-time employed patients, and 25.72% (271) of full-time employed patients. Considering living arrangements, 29.50% of the hospitalizations (311) were of patients who live alone, 7.78% (82) of patients living with a spouse or partner, 1.23% (13) with their parents, 54.45% (574) with their extended family and 7.02% (74) with a roommate(s). The number of hospitalizations per patient varied significantly between 1 and 40 (with an average of 5.36 ± 7.20). Most patients in our sample had less than five hospitalizations ($\sim$ 65%) while very few had more than 20 hospitalizations

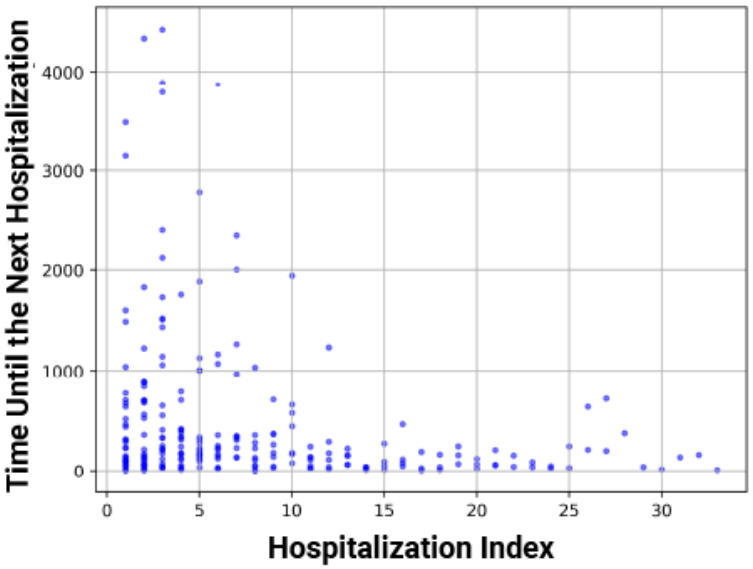

Figure 1: Hospitalization index and the time until the next hospitalization. Color intensity denotes the number of samples (the more samples the darker the point).

($\sim 5\%$). The hospitalization duration varied significantly as well between 1 and 448 days (with an average of 26.27 ± 52.97). Finally, the duration between hospitalization varied between 4 and 4420 days, with an average of 439.35 ± 787.45). The results are summarized in Table 1.

Feature	**Statistics**
Gender	Female: 83.3%, Male: 16.7%, Other: 0%
Age	37.6 ± 9.28
Education level	No high-school diploma: 32%, Partial high-school diploma: 18%, High-school diploma: 33%, Academic: 17%
Marital status	Single: 61.38%, Married: 13.89%, Divorced: 24.67%
Parent	Yes: 56.45%, No: 43.55%
Employment status	Unemployed: 70.96%, Part-time: 3.32%, Full-time: 25.72%
Living Arrangement	Alone: 29.50%, Spouse/Partner: 7.78%, Parents: 1.23%, Extend family: 54.45%, Roommate(s): 7.02%
Hospitalization index	5.37 ± 7.20
Hospitalization duration	26.27 ± 52.97 days
Time until next hospitalization	439.35 ± 787.45 days

Table 1: Univariate analysis of the examined measures in the sample.

The number of hospitalizations per patient varied significantly between 1 and 40 (with an average of 5.36 ± 7.20). As can be observed from Figure 1, most patients in our sample had less than five hospitalizations ($\sim 65\%$) while very few had more than 20 hospitalizations ($\sim 5\%$).

3.2 Bivariate Analysis

We start by considering each of the examined socio-demographic features separately and perform a between-groups statistical comparison. As shown in Table 2, three of the examined socio-demographics point to statistically significant differences: age, marital status, and living arrangement.

Considering age, we find that the two younger age groups, 18-20 and 21-30, are associated with the shortest average time between successive hospitalizations, averaging 290.0 ± 384 days and 275.94 ± 405.18 days,

respectively. While no statistically significant difference was found between these two age groups, both preset statically significant shorter average time between successive hospitalizations compared to the 31-40 age group (379.16 ± 757.61 days), 41-50 age group (528.04 ± 846.35), 51-60 age group (931.85 ± 1186.20), and the 61+ age group (640.00 ± 629.00), all at $p < 0.05$. Turning to marital status, we see that single patients are associated with the shortest average time between successive hospitalizations (349.80 ± 608.64 days) followed by divorced patients (485.19 ± 914.19 days), and married patients (1112.23 ± 1278.42 days). Statistically, single patients present a significantly shorter average time between successive hospitalizations compared to both divorced and married patients, while divorced patients present a similar significant difference compared to married patients alone, all at $p < 0.05$. Last, considering patients' living arrangements, we see that patients who live with a spouse or partner present the longest average time between successive hospitalizations (1445.00 ± 1557.89 days), compared to those who live alone (429.99 ± 818.68 days), those who live with their parents (983.37 ± 1104.31 days), those who live with their extended families (673.29 ± 805.09 days), and those who live with roommates (405.19 ± 695.85 days), all at $p < 0.05$. The remaining socio-demographics examined in this study (i.e., gender, education level, parental status, and employment status) do not point to any significant difference in the average time between successive hospitalizations. Nevertheless, the average time between successive hospitalizations of female patients is slightly elevated compared to that of male patients, 471.51 ± 839.87 days compared to 347.00 ± 603.06 days, at $p = 0.285$. In addition, more educated patients (those with a high-school diploma or an academic degree) tend to present a relatively longer average time between successive hospitalizations (623.74 ± 955.64 days and 464.19 ± 968.31 days, respectively) compared to those with no or partial high-school diploma (334.71 ± 602.73 days and 360.17619.90 days, respectively) at $p = 0.129$. Moreover, patients with children are associated with a longer average time between hospitalizations compared to those who do not have children (554.60 ± 981.67 days compared to 383.85 ± 667.21 days, respectively) at $p = 0.116$. Finally, the time between hospitalizations of fully and partially employed patients is somewhat longer (511.19 ± 944.76 days and patients (545.08 ± 1185.47 days, respectively), compared to unemployed patients (403.57 ± 672.44 days), at $p = 0.584$.

Feature		**Duration**	**p**
Gender	Male	347.00 ± 603.06	$= 0.285$
	Female	471.51 ± 839.87	
Age	18-20	290.00 ± 384.00	< 0.05
	21-30	275.94 ± 405.18	
	31-40	379.16 ± 757.61	
	41-50	528.04 ± 846.35	
	51-60	931.85 ± 1186.20	
	61+	640.00 ± 629.00	
Education level	No high-school diploma	334.71 ± 602.73	0.129
	Partial high-school diploma	360.17 ± 619.90	
	High-school diploma	623.74 ± 955.64	
	Academic	464.19 ± 968.31	
Marital status	Single	349.80 ± 608.64	< 0.001
	Married	1112.23 ± 1278.42	
	Divorced	485.19 ± 914.19	
Parent	Yes	554.60 ± 981.67	0.116
	No	383.85 ± 667.21	
Employment status	Unemployed	403.57 ± 672.44	0.584
	Part-time	545.08 ± 1185.47	
	Full-time	511.19 ± 944.76	
Living Arrangement	Alone	429.99 ± 818.68	< 0.01
	Spouse/Partner	1445.00 ± 1557.89	
	Parents	983.37 ± 1104.31	
	Extended family	673.29 ± 805.09	
	Roommate(s)	405.19 ± 695.85	

Table 2: Time between successive hospitalizations based on the examined socio-demographic features.

Next, we consider the hospitalization's index and duration and their possible connection with the time until

the following hospitalization. Considering the hospitalization index, as shown in Fig 1, there seems to be a weak to moderate, yet statistically significant, positive connection $\alpha = 0.254, p < 0.05$ with a coefficient of determination of $R^2 = 0.108$. However, considering the hospitalization duration, there seems to be no apparent connection with the time between successive hospitalizations with $\alpha = 0.001, p = 0.99$ and a coefficient of determination of $R^2 < 0.01$.

3.3 Multivariate Analysis

We implemented the following linear regression model on the data: We considered the duration between hospitalizations to be the dependent variable and the socio-demographic features and the hospitalization index as the independent variables as outlined below.

$$\begin{aligned}
&\text{Duration} = \alpha_0 + \alpha_1 \text{ Female} + \alpha_2 \text{ Age}+ \\
&\alpha_3 \text{ No diploma} + \alpha_4 \text{ Partial diploma} + \alpha_5 \text{ Diploma} + \alpha_6 \text{ Academic}+ \\
&\alpha_7 \text{ Single} + \alpha_8 \text{ Married} + \alpha_9 \text{ Divorced} + \alpha_{10} \text{ Parent}+ \\
&\alpha_{11} \text{ Unemployed} + \alpha_{12} \text{ Partially employed} + \alpha_{13} \text{ Employed}+ \\
&\alpha_{14} \text{ Alone} + \alpha_{15} \text{ Spouse/Partner} + \alpha_{16} \text{ Parents} + \alpha_{17} \text{ Extended family} + \alpha_{18} \text{ Roomate(s)}+ \\
&\alpha_{19} \text{ Hospitalization index} + \alpha_{20} \text{ Hospitalization duration}
\end{aligned} \tag{1}$$

The obtained coefficients and their significance are reported in Table 3. Overall, approximately 19% of variance in the time between successive hospitalizations can be explained by the patient's socio-demographics and the hospitalization's index and duration ($R^2 = 0.192$). The statistically significant coefficients are those linked with a "Married" marital status ($\alpha_8 = 364.51, p = 0.014$), a "Spouse/Partner" living arrangement ($\alpha_{15} = 19.837, p = 0.002$), a "Parents" living arrangement ($\alpha_{16} = -28.59, p = 0.011$) and the hospitalization index ($\alpha_{19} = -28.82, p = 0.002$).

4 Discussion

Early readmission often represents an adverse clinical outcome for patients with mental health conditions (Rumball-Smith and Hider, 2009). In order to mitigate this concern and improve the overall quality of care, extending our understanding of the factors underlying the time between successive hospitalizations is crucial (Vigod et al., 2013). Arguably, this enhanced understanding is especially desired for BPD patients who struggle to remain stable in their everyday lives and are typically associated with high rates of inpatient service utilization and staff burnout. Our results suggest that the expected time between successive hospitalizations of BPD patients can be estimated, in part, based on their socio-demographics.

Most notably, our results point to married patients and patients who live with their spouse/partner as being strongly linked with a longer time between successive hospitalizations compared to single/divorced patients and those who live with their parents. These results were consistent across both the bivariate and multivariate analyses performed in this work. One possible explanation for this outcome may be suited to the intricate interpersonal complexities of BPD patients and the initiation and maintenance of stable relationships with others; specifically a spouse (Connell, 1994) or a parent (Boucher et al., 2017). It is reasonable to expect BPD patients who are married or cohabiting with a partner to present higher functioning levels and have better symptom management and coping mechanisms compared to those who do not. In a complementary fashion, patients who are frequently hospitalized may also resort to this solution in order to avoid challenges linked to residing with their parents or families as well as to access support that may not be readily available when living independently or with roommates. Importantly, in addressing these results we align with the typical expectation that one's marital status and living arrangement are associated with one's daily functioning and overall well-being across various mental health conditions (Joung et al., 1994; Tamminen et al., 2019). Indeed, there is substantial literature showing the so-called "protective effect" of marriage (Horwitz et al., 1996; Gove et al.,

Parameter	Symbol	Value	p-value	Confidence interval
	α_0	798.53	0.165	-
Gender (female)	α_1	32.05	0.845	[-292.46, 356.55]
Age	α_2	-22.78	0.189	[-56.88, 11.32]
No diploma	α_3	90.07	0.097	[-45.86, 545.42]
Partial diploma	α_4	-162.49	0.982	[-259.62, 254.05]
Diploma	α_5	-162.49	0.051	[-2.17, 658.16]
Academic	α_6	-95.88	0.678	[-238.73, 366.39]
Single	α_7	-142.71	0.689	[-275.74, 416.19]
Married	α_8	364.56	0.014	[113.42, 1041.57]
Divorced	α_9	-221.84	0.959	[-350.20, 332.40]
Children	α_{10}	-32.13	0.887	[-478.39, 414.13]
Unemployed	α_{11}	36.81	0.125	[-69.96, 569.46]
Partially employed	α_{12}	-38.50	0.396	[-229.96, 578.85]
Employed	α_{13}	1.69	0.208	[-120.49, 549.75]
Alone	α_{14}	-315.44	0.603	[-491.32, 286.31]
Partner	α_{15}	19.837	0.002	[-275.46, 1313.78]
Parents	α_{16}	-28.59	0.011	[-314.11, 204.93]
Extended family	α_{17}	79.52	0.345	[-67.73, 418.16]
Roomate	α_{18}	-266.24	0.753	[-387.40, 280.80]
Hospitalization index	α_{19}	-28.82	0.002	[-47.47, -10.16]
Hospitalization duration	α_{20}	28.07	0.118	[-186.94, 594.64]

Table 3: Regression coefficients, their significance, and confidence intervals.

1983; Vaingankar et al., 2020) and cohabitation (Horwitz and White, 1998; Jacob et al., 2019; Joutsenniemi et al., 2006) on one's mental health.

Aligned with the above results, albeit not statistically significant at the $p < 0.05$ range, our results imply that level of education (high-school diploma or above), having children, and being fully/partially employed are also associated with longer time intervals between successive hospitalizations. That is, patients who are successful in completing high school (or more), form a family, or maintain steady employment, are expected to better regulate their emotions and avoid frequent hospitalizations. We speculate that with a larger and more diverse cohort, these differences would become statistically significant. Further evidence, primarily from the bivariate analysis, suggests that younger patients, particularly those aged 30 and under, often experience a shorter duration between successive hospitalizations compared to older patients (almost twice as short on average). Prior work has demonstrated that more pronounced or intense BPD symptoms are often experienced during one's late adolescence and early adulthood (Zimmerman and Becker, 2022). Clearly, severe symptoms may endanger the patient or impair his/her functioning and thus may necessitate more frequent hospitalizations (Zanarini et al., 2015).

Female patients' tendency to present longer time intervals between successive hospitalizations was recorded but was not found to be statistically significant. This result is aligned with prior studies that observed higher readmission rates for female patients at psychiatric wards under various circumstances (Han et al., 2020; Rieke et al., 2016). Historically, BPD has been associated more frequently with females (Wilkinson-Ryan and Westen, 2000), but is now recognized as affecting both genders more evenly than previously believed (Ryden et al., 2008; Gunderson and Kolb, 1978). Longer hospitalizations of female BPD patients were observed (Yaniv-Rosenfeld et al., 2024), however, further studies are necessary in order to better understand if and which possible gender-based differences might influence the time between successive hospitalizations of BPD patients.

Interestingly, our analysis of the hospitalization index provided inconsistent outcomes. Our bivariate analysis points to a significant negative connection with the more advanced hospitalizations being associated with a "prolonged" time-lag to the following hospitalization. On the other hand, our multivariate analysis points to the opposite trend where, given everything else being equal (i.e., socio-demographics and hospitalization duration), the more advanced hospitalizations are associated with a "shorter" time-lag to the following admission to the hospital. We are unaware of prior evidence to suggest any connection between the hospitalization index and the time lag to the following admission. However, our initial expectation was that treatment strategies would

be better tailored for patients who have already been treated in the same institute in the past, possibly by the same staff. As such, we expected the hospitalization index to be negatively connected to the time interval between successive hospitalizations.

In terms of hospitalization duration, no significant link was detected between hospitalization duration and the time lag until the next admission. Inpatient treatment of BPD patients in general, and its duration in particular, are major areas of contention among mental health clinicians (A. Bateman and Fonagy, 2001, 1999). Longer hospitalizations provide more treatment opportunities but may also lead to the regression of patients and hospitalism. Based on the observed data, it is hard to estimate what would have been the time to the next hospitalization given a longer or shorter hospitalization than the one experienced (also known as "counterfactual data"). In order to investigate this important correlation, finer-grained data is required; including the specific treatment and care provided to each patient in the ward, as well as the care and support provided out of the hospital setting. This type of analysis is beyond the scope of this study and is planned for future work.

The present study is not without its limitations. First, it is important to note that our sample is taken from a single mental healthcare center, which potentially limits the generalizability of the results. Nonetheless, official data from the Israeli Ministry of Health (Israeli Ministry of Health, 2019) indicates that the Shalvata mental health center is roughly representative of the Israeli mental healthcare system in almost every examined measure (e.g., patient characteristics, hospitalization outcome, etc.) for the last decade. In addition, the sample's socio-demographics distribution generally agrees with prior BPD studies with respect to gender (Sansone and Sansone, 2011; Links et al., 1988), age (Wilkinson-Ryan and Westen, 2000), marital status (Links and J., 2000), education level (Gunderson and Kolb, 1978), and living arrangement (Swartz et al., 2011). In a similar manner, for the female patient population, (Ryden et al., 2008) reported similar employment status distribution. As discussed before, we plan to extend our investigation outside of Israel in the future. In addition, specific diagnostic categories or comorbidity (e.g., substance use), and individual treatment plans were not considered as part of our analysis. Such an investigation, which presumably requires different levels of "grouping" by different diagnosis codes and treatment modalities could help reveal more fine-grained differences in BPD patients' time between successive hospitalizations. Finally, while our results do point to several socio-demographic features that are significantly associated with one's time between successive hospitalizations, these associations should be interpreted with caution when considering the elusive notion of "success" in the hospitalization context. Specifically, the time between successive hospitalizations is just one objective of a much more complex, multifaceted, and highly subjective set of objectives one should consider when assessing "success" (Perkins, 2001; Hermann et al., 2006).

Setting goals and a time framework to accomplish these goals, are acceptable elements in the treatment of BPD inpatients. In this respect, the results presented in this study can aid clinicians in setting more realistic expectations in terms of the time to the next admission. These, in turn, can assist in developing and implementing other treatment and support modalities (in the ward and after discharge) that might prolong the time lag between hospitalizations. Given the complexity of treating the BPD population and the adverse consequences associated with suboptimal treatment, it is fundamental to aid mental health professionals in making better decisions regarding hospitalization policies and post-discharge plans. Further studies are essential in order to improve the standard of BPD inpatient care and the means to assess its efficacy.

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Conflict of interest

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Data availability

The data is available upon written request from the authors.

Author Contributions

Amit Yaniv-Rosenfeld: Conceptualization, methodology, investigation, and writing - original draft.
Elizaveta Savchenko: Formal analysis, investigation, software, visualization, and writing - review & editing.
Amir Elalouf: Supervision.
Uri Nitzan: Conceptualization, supervision, and writing - review & editing.

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