Brief Report: Marriage and Divorce Trajectories of Men and Women with Histories of Eating Disorders

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ABSTRACT

Eating disorders (ED) can have lasting effects on individual health and wellbeing. The aim of the current study was to determine the association between ED subtype and treatment on marital trajectories. The data was derived from the Utah Population Database, and the analytic sample comprised of 3196 persons previously diagnosed with an ED (between years 1995-2015) in the state of Utah, including 2,917 females and 279 males. We compared time to first marriage and time to first divorce by ED subtype (bulimia nervosa [BN], anorexia nervosa [AN], and ED not otherwise specified [EDNOS]), BMI category (underweight, normal weight, overweight, and obese), and ED-related treatment, using Cox-proportional hazard regression. Results suggested underweight BMI (relative to normal weight BMI) (Hazard Rate Ratio [HRR]=0.71, $p<0.01$), and having higher overall ED-related hospitalizations or outpatient visits was associated with later-age at first marriage (HRR=0.24 & HRR=0.25 respectively, $p<0.001$). Results indicated that BN (relative to AN) (HRR=2.16, $p<0.01$) and being underweight (relative to normal weight) (HRR=1.79, $p<0.05$) were associated with earlier-age at first divorce. Clinicians should consider relationship-based therapies for ED patients, particularly those with histories of BN.

KEYWORDS: *underweight, marriage, divorce, bulimia nervosa, divorce*

CLINICAL IMPLICATIONS

- Underweight ED patients may experience delayed marriage and elevated divorce
- Earlier ages at first ED diagnosis may delay age at first marriage

- Married persons with histories of BN may be at greater risk of divorce
- Higher general treatment volume likely delays first marriage
- Clinicians should consider relationship-based therapies for married ED patients

Marriage and Divorce Trajectories of Men and Women with Histories of Eating Disorders

Eating Disorders (ED) can affect anyone at any stage of the life course, but are more common among women (relative to men) and are most likely to emerge during adolescence/early adulthood, and decline through midlife (Brown et al., 2020; Stice, Marti, & Rhode, 2013). While EDs can be persistent across adolescence through adulthood, it is important to note that many young adults do experience recovery from adolescent onset EDs (Volpe et al., 2016). Anorexia nervosa (AN) has an onset in adolescence, but many individuals experience relapse across early adulthood, well into their mid-40s (Dobrescu et al., 2020). Bulimia nervosa (BN) has been found to have a slightly older age-at-onset, and relapse is also common for those seeking care (Volpe et al., 2016; Khalsa et al., 2017).

Much of ED symptomology occurs during emerging adulthood (ages 20-29) (Stice et al., 2013; Dobrescu et al., 2020), that is, when young people are entering into serious romantic partnerships, including marriage. While the age at first marriage has increased for men and women, marriage is still a primary aspiration of young people (Tillman, Brewster, & Holway, 2019). A person's ED symptoms likely shape, and are shaped by, romantic relationships (Arcelus, Yates, & Whiteley, 2012; Woodside et al., 1993). The *social selection hypothesis* posits that better adjusted, healthier individuals become and remained married (Blane, Smith, & Bartley, 1993). Research indicates that healthier individuals have more positive marital experiences than those in poor health (Horn et al. 2013; Stutzer & Frey, 2006).

There is preliminary evidence that ED patients who are married or living with a partner have higher motivation to change, which may translate to better treatment adherence (see Bussolotti et al., 2002). Marriage and childbearing has been found to reduce hospitalization

risk for individuals with histories of ED (Tabler & Utz, 2020). Conversely, preliminary evidence from a small clinical sample suggest that marital problems and divorce could potentially result in an ED event (Kiriike et al., 1998). In a study examining hospital readmission for psychiatric disorders, many readmitted patients were divorced (Bernardo & Forchuk, 2001; Stack & Scourfield, 2015).

Building on this prior research, this study represents a preliminary assessment of the influence of ED-type and treatment volume on marital trajectories. Additional research on the influence of EDs on marital trajectories could help inform clinicians seeking to support persons with histories of EDs; prior research has encouraged clinicians to consider their ED patients' interpersonal romantic relationships, and consider the potential value of relationship or couples therapy to the broader wellbeing of their patients (Arcelus, Yates, & Whiteley, 2012). Assessing the relationship between EDs and marriage is important because successful marriage is known to have beneficial mental and physical health outcomes (Horn et al. 2013; Wade & Pevalin, 2004).

Method

Data

This study utilizes data from the Utah Population Database (UPDB), a data source that contains Utah state population-level information, and includes records for over 11 million individuals (Smith & Fraser, 2018). UPDB staff link vital records to medical records provided by the University of Utah Hospitals and Clinics (UUHC), statewide hospitalization records provided by the Utah Department of Health (UDOH), and height, weight, and residence information provided by the Driver's License Division (DLD) using a master subject index. Medical,

hospitalization, and DLD records are available from 1995-present. Studies using UPDB data were approved by the IRB.

Measures

Dependent Variables

Age in months at first marriage calculated using birth month/year and first marriage month/year (failure=first marriage event).

Time to first divorce, from first marriage, measured in months (failure=first divorce event).

Health Covariates

Eating Disorder is a three-category measure constructed using inpatient and outpatient medical records (UUHC and UDOH). The measure compares those with records indicating previous primary diagnosis of AN (ICD-9 code 307.1) “1”, BN (ICD-9 Code 307.51) “2”, or EDNOS (ICD-9 307.50) “3”. This measure is restricted to those with first known diagnosis at age 12 or older.

Count of known *hospitalizations for an eating disorder* (based on UDOH). This is a time-varying covariate, with counts increasing until marriage or divorce event. We also adjust for the individual’s average number of hospitalizations (personal mean) during the study period to disentangle the influence of having a higher rate of hospitalizations in general versus the unique effect of additional hospitalizations. Specific ED diagnostic procedures employed by statewide hospitals are unknown. All inpatient information was linked from UDOH statewide hospitalization records.

We adjust for whether individuals were known to received ED-related *outpatient treatment* (ongoing count of events). This is a time-varying, with counts increasing until

marriage or divorce event. We also adjust for the individual's average number of treatment events (personal mean).

Body Mass Index (BMI): we adjust for BMI category across observation period (underweight <18.5, normal weight 18.5-25, overweight 25-30, obese 30+). BMI information was collected primarily using outpatient and inpatient height and weight data (UDOH or UUHC) (90% of BMI data), and subsequently using proximate driver's license data for missing BMI information (10% of data). Using driver's license data as an approximation of BMI has been validated elsewhere (Chernenko et al., 2019).

Sociodemographic Covariates

We adjust for *sex* (male vs. female), *race/ethnicity* (compares non-Hispanic whites, Hispanics, non-Hispanic blacks and non-Hispanic other), *birth year*, *number of children* (time-varying ongoing count, as well as personal mean number of children), and *median household income* (estimated at the 2000 census-block level).

Analytic Approach

We first present the longitudinal descriptive statistics at the person-level of the full sample (Table 1) ($n=3,196$), stratified by ED subtype. We then model age/time (in months) to first marriage and time from first marriage to divorce using Cox proportional hazard regression (Table 2). All models are stratified by birth year to adjust for potential cohort effects, present robust standard errors and hazard rate ratios, and are clustered by person identifier.

Results

After list-wise deletion, our analytic sample was comprised of 3196 individuals previously diagnosed with an ED (91.27% women and 8.73% men) in the state of Utah (Table

1). Each individual had an average of 4.56 observations during the study frame. The average age at first known ED diagnosis was 23.29 years (standard deviation [*sd*]=8.63), and nearly 20% of the sample was married at least once. Of those who were previously married, approximately 20% experienced divorce within the study frame. Additional descriptive statistics are presented in Table 1.

-Table 1-

Cox proportional hazard models suggested that later ages at first ED diagnosis (in month) were associated with lower “hazard” of first marriage, meaning, later-ages of first ED diagnosis were associated with delayed first marriage (HRR=0.99, $p<0.001$). Having higher overall ED hospitalizations or outpatient visits (e.g., higher personal means) were also associated with delayed age at first marriage (HRR=0.24, $p<0.001$ & HRR=0.25, $p<0.001$, respectively). However, when controlling for one’s own personal means, results suggested that increased counts of either outpatient visits (HRR=2.06) or hospitalizations (HRR=2.04) were actually associated with increased hazard of first marriage ($p<0.001$). Being in the underweight BMI category was also associated with a 29% reduced hazard of first marriage (HRR=0.71, $p<0.01$), and women were more likely to experience earlier first marriage than were their male counterparts (HRR=3.20, $p<0.001$) (Table 2, Model 1).

-Table 2-

Limiting results to those previously married ($n=599$), models suggested that persons with histories of BN experienced 118% greater hazard of divorce (HRR=2.16, $p<0.01$). Notably, those with an underweight BMI had higher hazard of divorce (HRR=1.79, $p<0.05$) relative to those with a normal BMI.

Discussion

This study makes important contributions to our understandings of how clinical interventions can shape the marital trajectories of persons with histories of ED. While being negatively selected for marriage and at risk of divorce seems less consequential relative to potential host of negative health outcomes associated with EDs, marriage has been found to have a generally positive influence on human health and wellbeing (Umberson & Montez, 2010; Horn et al., 2013). We anticipated that there would be a *social selection effect*, where persons with more severe ED histories would be negatively selected for marriage, and at greater risk of divorce. We found that increased hospitalizations and outpatient visits, as well as more severe symptoms, in this case, an underweight BMI, was associated with delayed marriage or remaining unmarried through the observation frame. BMI was also predictive of subsequent divorce. Being underweight (BMI<18.5) was significantly predictive of divorce relative to those with a normal BMI (18.5-25).

We also found that women with histories of ED are experiencing earlier first marriage, and increased risk of divorce, relative to male peers. In addition, persons with histories of BN were at increased risk of divorce relative to those with histories of AN. Experiencing divorce could potentially trigger ED symptomology or negatively influence the recovery trajectories, and clinicians could more intensely promote relationship therapies and interventions for women or persons with histories of BN whose ED experiences may be disproportionately disrupting or straining their marriages and/or interpersonal relationships.

There is clearly complexity in how treatment timing and volume might influence marital trajectories. While we found that younger ages at first ED diagnosis was associated with delayed first marriage, and delayed first marriage was protective against subsequent divorce, outpatient visit and hospitalization volume was not associated with divorce trajectories. And while higher

volume of outpatient visits and hospitalizations were associated with elevated delay of first marriage, controlling for one's own personal treatment volume, additional counts of outpatient visits or hospitalizations were actually associated with increased likelihood of first marriage. While this would indicate that additional treatment could be beneficial to future relationship forming, these conflicting findings indicate that there is underlying complexity in terms of how the timing and volume of outpatient treatment might shape marital trajectories.

Limitations

Due to the longitudinal nature of this study, we were not able to assess more recent diagnostic categories reflected in ICD-10 and delineated by DSM-5, most importantly, binge eating disorder. This study also cannot speak to outpatient or inpatient treatment approaches or duration, particularly length of stay in the hospitals, which is a known predictor of readmission risk for persons with histories of ED (Kagabo et al., 2017).

In addition, we examined persons with histories of ED with an age at first diagnosis that occurred prior to age at first marriage. Many individuals are likely receiving a diagnosis or seeking treatment preceding first marriage. Additional research should examine how marriage can shape one's ED or comorbid health trajectory, and whether marriage is beneficial to the health and wellbeing of persons with histories of ED or sub-clinical ED symptomology. For example, while delayed first marriage to the point of remaining unmarried can have certain negative impacts on wellbeing, there are potential educational or economic benefits to a delayed first marriage for women (Goldstein & Kenney, 2001).

Furthermore, we only examine marriage trajectories, and preliminary evidence suggests that EDs and weight-related concerns shape broader romantic and/or interpersonal relationships (Arcelus, Yates, & Whiteley, 2012). Finally, this study speaks largely to opposite-sex marriages,

and future research should examine the potentially unique associations between EDs and marital trajectories of those identifying as sexual minorities (e.g., gay, lesbian, bisexual or queer identities).

Conclusion

Our study provides preliminary evidence that being underweight, female, and experiencing elevated outpatient visits or hospitalizations related to ED may result in delayed or foregone first marriage for persons with histories of ED. Furthermore, being underweight or having a history of BN may place married persons with histories of ED at greater risk of divorce. The potential long-term impacts of persons with histories of ED being negatively selected for marriage or at risk of divorce should be more extensively examined; those who experience more severe ED symptoms or who need more intensive care could potentially reap greater benefit from the financial and social supports associated with marriage. Clinicians should be aware of the romantic relationships of ED patients, and consider relationship-based therapies for ED patients who are married or in committed partnerships, particularly those with histories of BN.

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Table 1: Descriptive Statistics

	Full sample (<i>n</i> =3,196) % or Mean(sd)	Anorexia nervosa (<i>n</i> =779) % or Mean(sd)	Bulimia nervosa (<i>n</i> =828) % or Mean(sd)	EDNOS (<i>n</i> =2,000) % or Mean(sd)
<i>Married at least once</i>	19.87%	17.97%	20.05%	16.30%
<i>Divorced at least once</i>	19.71% ^a	18.24% ^a	24.00% ^a	17.37% ^a
<u>Health covariates</u>				
<i>ED diagnosis^{b†}</i>				
Anorexia nervosa	24.37%	100%	0%	0%
Bulimia nervosa	25.91%	0%	100%	0%
EDNOS	62.58%	0%	0%	100%
<i>BMI category[†]</i>				
Underweight	22.18%	39.28%	14.86%	20.25%
Normal weight	71.28%	68.42%	73.79%	69.75%
Overweight	17.05%	7.57%	17.27%	18.40%
Obese	10.92%	4.36%	10.63%	12.50%
<i>ED outpatient visits[†]</i>	5.67(3.24)	11.81(5.61)	3.42(3.64)	3.22(3.11)
<i>Number of ED hospitalizations[†]</i>	1.40(1.05)	2.78(1.77)	1.20(1.39)	0.73(0.99)
<i>Age at first known ED diagnosis</i>	23.29(8.63)	22.61(8.91)	23.85(7.98)	23.42(8.56)
<u>Sociodemographic covariates</u>				
<i>Male</i>	8.73%	7.83%	5.31%	9.75%
<i>Female</i>	91.27%	92.17%	94.69%	90.25%
<i>Race-ethnicity</i>				
Non-Hispanic white	85.64%	89.22%	85.99%	84.90%
Hispanic	9.36%	7.19%	9.90%	9.70%
Non-Hispanic black	1.13%	0.26%	0.97%	1.45%
Non-Hispanic other	3.88%	3.34%	3.14%	3.95%
<i>Median household income</i>	51,783(20,260)	50,993(20,147)	52,460(19,990)	52,492(20,241)

<i>Number of children[†]</i>	0.35 (0.72)	0.29(0.76)	0.39(0.70)	0.37(0.71)
<i>Avg Number of Observations (t-bar)</i>	4.56	5.25	3.70	3.71

Data is derived from the Utah Population Database linkages between state-wide hospitalization records (Utah Department of Health[UDOH]), outpatient records from University of Utah Hospitals and Clinics [UUHC) vital records, and driver's license division (DLD) (1994-2015).

^aOf those who were previously married

^bEating disorder diagnosis based on ICD-9 codes 307.1, 307.50, 307.51

[†]Denotes “time varying” covariates with possible values that can change across data points. For categorical variables, this represents individuals “ever” occupying a category over a study period, which means percent can be greater than 100%.

ED=eating disorder; BMI=body mass index; EDNOS=ED not otherwise specified

Table 2: Cox Proportional Hazard Regression Results

	First Marriage Model 1		Time to Divorce from First Marriage Model 2	
	HRR[95% CI](robust SE)	p-value	HRR[95% CI](robust SE)	p-value
<i>Health covariates</i>				
ED diagnosis ^a				
Bulimia nervosa	1.00[0.76-1.30](0.14)	0.984	2.16[1.24-3.77](0.61)	0.006
EDNOS	0.93[0.74-1.17](0.11)	0.912	1.00[0.63-1.59](0.24)	0.994
Age in months at first known ED diagnosis	0.99[0.98-0.99](0.00)	<0.001	1.00[0.98-1.01](0.00)	0.784
BMI Category ^b				
Underweight (<18.5)	0.71[0.56-0.90](0.08)	0.004	1.79[1.14-2.78](0.40)	0.012
Overweight (+25)	0.90[0.68-1.19](0.13)	0.463	0.63[0.31-1.30](0.23)	0.212
Obese (+30)	0.83[0.57-1.19](0.15)	0.305	1.05[0.44-2.49](0.46)	0.915
ED-related outpatient visits (count)	2.06[1.79-2.37](0.15)	<0.001	0.71[0.49-1.04](0.41)	0.082
Personal mean outpatient visits ^c	0.25[0.20-0.32](0.03)	<0.001	1.32[0.91-1.90](0.25)	0.142
ED-related hospitalizations (count)	2.04[1.58-2.63](0.26)	<0.001	1.13[0.38-3.33](0.62)	0.828
Personal mean hospitalizations ^c	0.24[0.19-0.32](0.05)	<0.001	0.99[0.99-1.00](0.55)	0.979
<i>Sociodemographic covariates</i>				
Sex (female)	3.20[2.09-4.89](0.69)	<0.001	2.44[0.95-6.24](1.17)	0.062
Race-Ethnicity ^d				
Hispanic	1.33[1.02-1.73](0.18)	0.035	0.92[0.49-1.71](0.29)	0.786
Non-Hispanic Black	1.57[0.75-3.32](0.60)	0.177	1.15 [0.20-6.68](1.03)	0.879
Non-Hispanic other	0.71[0.45-1.11](0.23)	0.927	1.04[0.36-3.01](0.56)	0.946
Median Household Income	1.00[1.00-1.00](0.00)	0.135	1.00[1.00-1.00](0.00)	0.660
Children (count)	3.35[2.39-4.67](0.58)	<0.001	0.40[0.30-0.54](0.06)	<0.001
Personal mean children ^c	0.07[0.04-0.11](0.02)	<0.001	1.19[0.84-1.68](0.21)	0.337
Age in months first marriage	--	--	0.99[0.98-0.99](0.00)	0.002
<i>Number of subjects</i>	3,196		599	
<i>Number experiencing event (e.g., marriage or divorce)</i>	634		127	

<i>Pseudo R-squared</i>	0.12	0.11
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Data is from Utah Population Database linkages between statewide hospitalization records (Utah Department of Health [UDOH]), outpatient records from University of Utah Hospitals and Clinics [UUHC] vital records, and driver's license division records (DLD) (1994-2015). Analyses are conducted at month-level intervals. All analyses were stratified by Birth Year, and cluster by person-identifier. Hazard rate ratios presented, with robust standard errors.

^aReference is Anorexia nervosa

^bReference is normal weight (BMI=18.5-25)

^cCalculated using observation frame (*model 1*: entry to first marriage or age 55 for those who remained unmarried; *model 2*: time from first marriage to divorce or age 55 for those who remained married)

^dReference is Non-Hispanic white

CI=Confidence interval, SE=standard error, EDNOS=eating disorder not otherwise specified, BMI=body mass index