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The longitudinal course of interpersonal problems in women in treatment for Binge Eating  
Disorder

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## ABSTRACT

**Objective:** The goal of this study was to evaluate longitudinal associations of binge eating symptoms with both the severity and style of interpersonal problems in a sample of women ( $N=107$ ) receiving a 36-week treatment for Binge Eating Disorder (BED). **Method:** Severity and style of interpersonal problems, general distress and binge eating symptoms were measured at baseline, 12-week, 24-week and 36-week follow-up. Data were fit to linear and quadratic latent growth models to examine parallel processes between the severity/style of interpersonal problems and binge eating symptoms/general distress. **Results:** Baseline data indicated heterogeneity in interpersonal styles among patients with BED. The severity of interpersonal symptoms decreased with time linearly, whereas interpersonal style was stable for both dominance and warmth. General distress and binge eating symptoms decreased quadratically over time. Decreases in the severity of interpersonal problems were significantly related to decreases in general distress and marginally significantly related with decreases in binge eating symptoms. Interpersonal styles did not track with changes in general distress or binge eating. **Conclusions:** The study showed that the severity of interpersonal problems changed over time and in association with the changes in general distress among BED patients in treatment, whereas interpersonal styles were heterogeneous and remained unchanged over time. The results highlight the importance of distinguishing the severity of interpersonal problems from the specific style of interpersonal behavior in considering interpersonal functioning in BED patients.

Keywords: Binge eating disorder, interpersonal problems, longitudinal, treatment

Whereas substantial evidence supports the association between eating disorders and interpersonal dysfunction (Arcelus et al., 2013), the association between eating disorders (EDs) and interpersonal styles remains unclear (Blomquist et al., 2012; Hartmann et al., 2010). Some studies suggest a link between EDs and particular styles of interpersonal behavior (Troop et al., whereas other studies have emphasized the heterogeneity in interpersonal styles among individuals with EDs ( Hopwood et al., 2007). The *Inventory of Interpersonal Problems-Circumplex* (Alden, Wiggins, & Pincus, 1990) provides a useful means for examining this issue because it can parse the general severity and specific style of interpersonal problems into orthogonal dimensions. In this system, style is conceptualized in terms of dominance/submissiveness and warmth/coldness. Any particular maladaptive interpersonal behavior (e.g., dependency, withdrawal) is understood as a blend of these dimensions. Results using this model suggest that individuals with eating disorders tend to experience elevated interpersonal dysfunction but they do not tend to be well-characterized by any specific style.

These results, which have also been found for depression (Cain et al., 2012), generalized anxiety (Kachin, Newman, & Pincus, 2001), and PTSD (Thomas et al., 2014) contrast with models that view EDs as a function or expression of a particular style of interpersonal adaptation (e.g., Arcelus et al., 2013) by suggesting that interpersonal style is an important source of heterogeneity in ED patients, and that clinicians should not assume that all patients with a given ED are likely to approach relationships in a particular way (e.g., that individuals with binge eating disorder will tend to be helpless and dependent). Interpersonal heterogeneity in among individuals with EDs implies the importance of assessing these features in individual cases, and tailoring treatment approaches to individual styles. However, only two prior studies have examined this issue with respect to Binge Eating Disorder (BED). Eldredge et al. (1998) found

that patients with BED reported fewer problems with being too vindictive than psychiatric norms, and Blomquist et al. (2012) found that dominance problems portend earlier onset of binge eating, whereas warm problems are associated with earlier dieting. However, neither of these studies parsed general interpersonal distress from interpersonal style in relation to BED symptoms.

Furthermore, no research has examined this issue longitudinally. If BED is associated with a specific style, then individuals should specifically show changes in that style as a function of improvement in BED symptoms. In contrast, if interpersonal style is not specifically associated with BED, then there should *not* be a longitudinal relationship between BED and changes in interpersonal style over time, independent of general reductions in interpersonal problems. Essentially, warm people would still be warm once their BED symptoms remitted, even if there would be fewer problems associated with their warmth. This latter pattern was observed in a treatment sample of patients with Anorexia Nervosa or Bulimia Nervosa (Hartmann et al., 2010), in which ED symptoms reduction was associated with a corresponding reduction in the severity of interpersonal problems, whereas the style of interpersonal problems was unassociated with clinical improvement. However, this issue has not been examined longitudinally in a sample of individuals with BED.

Thus, the purpose of this study was to evaluate the longitudinal associations of BED symptoms, as well as general psychiatric impairment, with both the severity and style of interpersonal problems in a sample of women receiving treatment for BED. We expected that BED symptoms, general psychopathology, and the severity of interpersonal problems would reduce over time and track together. We also expected patients with BED to vary in interpersonal

style at baseline, and for style to remain relatively stable and be uncorrelated with changes in BED symptoms, general psychopathology, or the severity of interpersonal problems.

### METHOD

Participants were 107 women aged 22-65 years old (Mean=45.0, SD=10) in treatment for BED (see Agras et al., 1994). Participants were 90.9% white, 3.4% black 3.4%, 3.4% Hispanic, and 2.3% other ethnicities. Treatment included either 36 weeks of weight loss only treatment, 12 weeks of cognitive-behavioral treatment followed by weight loss treatment for 24 weeks, or the latter treatment with desipramine added for the final 24 weeks<sup>1</sup>. Baseline Body Mass Index ranged from 26.53 to 55.76 (Mean = 37.85, SD=6.38). The attrition rate was low, with 88 participants (82%) completing all assessments for four measurement waves.

BED symptoms were measured using the *Binge Eating Scale* (BES; Gormally et al., 1982), a 16 item measure of bingeing behaviors and associated symptoms. We used the Global Severity Index of the *Symptom Checklist-90-R* (SCL-90-R; Derogatis & Unger, 2010) to measure general symptom severity. We used the *Inventory of Interpersonal Problems-Circumplex* (IIP-C; Alden et al., 1990) to measure interpersonal problems. The IIP-C total score represents the overall severity of interpersonal dysfunction and distress, and composite scores are calculated to derive orthogonal dominance and warmth dimensions (Gurtman & Balakrishnan, 1998).

Primary analyses were conducted in Mplus 5.1 (Muthén & Muthén, 2012). Maximum likelihood estimation was used to handle missing data. We used latent growth modeling (LGM) to estimate the trajectories of binge eating symptoms, general distress, severity of interpersonal problems, dominance and warmth. We first fit linear LGMs to four measurement waves of each variable. The linear LGM provides estimates of means and variances for two primary parameters: the intercept (i), which reflects the initial level of the trajectory at baseline

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<sup>1</sup> Treatment condition data are no longer available.

assessment (T0), and the slope(s), which represents the average rate of change over the course of the study. The variance in the slope factor indicates the level of individual differences in the change rates. The regression weights for the intercepts were set to be 1.0 for all measurement waves, as the intercept indicated the initial level of a variable. For the linear models, slope regression weights were set to 0.0, 1.0, 2.0, and 3.0 for Wave 1 to 4 (i.e., T0-T3) to indicate equal time between each measurement wave. We also fit quadratic LGMs to the five variables in which a quadratic factor (q) was estimated in addition to the linear slope and intercept. Regression weights for the quadratic factor were set to 0.0, 1.0, 4.0 and 9.0 for each wave.

Having established the trajectory of change for each variable, we fit parallel process LGMs to evaluate whether changes in the severity and style of interpersonal problems were associated with changes in symptoms. In these models, we estimated the associations between the two intercepts, between the two slope factors, and between the intercepts in one variable and the slopes in the other. The correlation between two intercepts indicates the associations between the initial levels of two variables. The correlation between two slope factors represents the degree to which changes in the two processes are associated with each other. Associations between intercepts and slopes across variables indicate the extent to which changes in one variable are due to the initial level of the other variable. Overall, we estimated six parallel process LGMs between the three variables of interpersonal problems (severity, dominance, and warmth) with BED symptoms or general symptom severity. We evaluated model fit with four indices, including chi-square ( $\chi^2$ ), comparative fit index (CFI, values  $> .95$  indicate acceptable fit), the root mean square error of approximation (RMSEA,  $< .05$ ), and standardized root mean square residual (RMSR,  $< .80$ ) (Hooper, Coughlan, & Mullen, 2008).

## RESULTS

Compared to the norms provided in the IIP-C validation study (Alden et al., 1990), the average elevation z-score of .23 (SD = .74) suggested elevated interpersonal distress in this sample relative to community participants. **Figure 1** depicts variation in interpersonal style. The dominance z-score was -.20 and the warmth z-score was .29, indicating a tendency for individuals with BED to be warm-submissive. However, only 22% (N=23) of the sample fell into this octant. Overall, these results suggest that women in treatment for BED have elevated interpersonal distress, and while there is some tendency toward warmth and submissiveness, in general there is significant heterogeneity in interpersonal style.

Descriptive statistics for study variables at each measurement wave are presented in **Table 1**. Cross-sectional correlations between variables at baseline are presented in **Table 2**. Interpersonal distress, general distress, and binge eating symptoms were significantly correlated with each other at baseline. Consistent with the study hypotheses, problems related to dominance and warmth were not correlated with each other or with other variables, with the exception that dominance problems were modestly correlated with general distress ( $r = .20$ ).

In general, binge eating symptoms, general distress and the severity of interpersonal problems decreased over time, whereas changes in interpersonal style were relatively flat (**Table 1**). The model fit indices for univariate latent growth models are presented in **Table 3**. All of the model fit indices indicated a poor fit for the binge eating symptoms linear model. In contrast, the quadratic model resulted in an excellent fit to the data. This model indicated that the decrease of binge eating symptoms was sharper in the beginning than later on. Significant variance in the slope indicated meaningful individual differences in rates of changes. The linear model resulted in a poor fit for general distress. When we tried to fit a quadratic model, the small variance and negative residual variance in the quadratic factor suggested fixing the non-significant variance



for the quadratic factor to zero. After fixing this parameter, the model fit was acceptable. Similar to the quadratic model for binge eating symptoms, this model indicated a significant decrease in the general distress, a significant decrease in the rates of changes, and significant individual differences in the changing rates.

A linear growth model fit the data well for interpersonal problem severity, indicating a significant decrease in interpersonal dysfunction and distress over time. A quadratic model (after fixing the variance for the quadratic factor to zero due to negative variance) also resulted in an excellent fit and indicated similar significant decrease in the elevation. Both models suggested significant individual differences in rates of change across time. When fitting a linear growth model to interpersonal dominance, the estimation for the slope variance was negative, whereas the model fit was excellent after fixing the slope variance to zero. The model indicated a significant but modest increase in dominance with non-significant individual differences in the rate of changes. The quadratic growth model also fit the data well after fixing the slope variance to zero, and it suggested neither significant average changes in interpersonal dominance nor individual differences in rates of change. A linear growth model resulted in an excellent fit for interpersonal warmth, suggesting significant decreases and significant individual differences in the rates of changes. A quadratic growth model also fit the data well, indicating non-significant average changes across time and non-significant individual differences in the rates of changes.

We fit quadratic growth models to all the parallel processes, because quadratic models were a good fit to most variables whereas linear models did not fit the data well for binge eating and general distress. We set slope or quadratic factor variances to zero for models where the corresponding variance or residual variance was negative. The model fit indices are presented in **Table 4**. The quadratic model fit well to the parallel processes of generalized interpersonal

problems and binge eating. The intercepts were significantly associated, indicating an association between higher initial levels of interpersonal problems with higher initial levels of binge eating problems. The change rate of binge eating problems was significantly associated with the initial level of interpersonal problems, such that the more interpersonal problems, the faster the binge eating problems decreased. All the other paths were not significant, indicating that decreases in interpersonal problems were not related to decreases in binge eating problems.

For the parallel model of interpersonal problems with general distress, the quadratic model resulted in an acceptable fit except for RMSEA (.10). The higher initial levels of elevation in interpersonal problems were related with higher initial levels of general distress. In addition, higher initial levels of interpersonal problems/general distress predicted quicker decreases in general distress/elevation in interpersonal problems. The rate of change in interpersonal problems was significantly positively related to the rate of change in general distress, such that the quicker the interpersonal problems decreased, the quicker the general distress also decreased.

The parallel model resulted in an acceptable fit for dominance problems and binge eating. None of the parameters were significantly associated, indicating that neither the initial levels nor the rate of changes were related between the two trajectories. Similar results were found in the parallel processes for interpersonal dominance and general distress. The fit indices of the parallel model met the criteria of an acceptable fit except for RMSEA (.09). The initial level of interpersonal dominance was significantly negatively related with the rate of change in general distress, indicating that the higher the initial levels of interpersonal dominance, the faster the decreases in general distress. Neither the initial levels nor the rate of changes were related between the trajectories of interpersonal problems and general distress.

When fitting the parallel models to interpersonal warmth and binge eating/general distress, we set the variance for the warmth to zero at Wave 3 due to an estimation of negative variance for that variable. The parallel models fit less ideally for both models involving interpersonal warmth (e.g., CFI=0.94, RMSEA= 0.11 for both models) compared to the models mentioned above. There were no significant associations between model parameters in both models, indicating neither the intercepts nor the slope factors were related between the trajectory of interpersonal problems and the trajectory of binge eating or general distress.

## DISCUSSION

In this paper we evaluated longitudinal relations between symptoms severity and interpersonal problems over 3 months of treatment among individuals with BED. We expected symptom severity to correlate cross-sectionally and longitudinally with interpersonal problem severity. Data partially supported this hypothesis. There was a steep reduction in BED and general symptom severity, but a more shallow reduction in interpersonal dysfunction, and interpersonal severity only correlated longitudinally with general symptoms. This suggests perhaps that the intervention targeted psychiatric symptoms, and particular BED symptoms, more directly than interpersonal dysfunction, but that interpersonal functioning nevertheless improved after some lag. It is possible that it takes some time for individuals to reintegrate into their social worlds after symptom recovery, but interpersonal functioning does improve along with more general relief.

In contrast, we did not expect an association between symptom severity and interpersonal style. Although there was a modest tendency for individuals with BED to be relatively warm and submissive, individuals in this sample varied significantly with respect to interpersonal style. Furthermore, individuals' standings on interpersonal dominance and warmth were quite stable

over the course of the study, and changes that did occur on these variables were not correlated with changes in symptom severity.

These results suggest that psychiatric and BED symptoms are associated with interpersonal problems in general, but they are not strongly associated with any particular interpersonal style, either cross-sectionally or longitudinally. This pattern, which has also been identified for a number of other forms of psychopathology, speaks to the importance of interpersonal style for understanding the heterogeneity of presentations of these disorders. As an example, it is plausible that two patients with BED have dysfunctional developmental experiences that contributed to symptoms and interpersonal problems, and that, as symptomatic impairment increased, their interpersonal functioning worsens. However, one patient may have primarily warm problems, having been overly indulged as a child, and learned to use food to quell difficult emotions, and to pacify others. The second patient may have primarily cold problems, having learned to eat during moments of loneliness. While these patients may manifest the same level of symptom severity and interpersonal dysfunction, the specific inter-connection of social and eating behavior over time would have been quite different. Accordingly, the clinician may wish to approach these patients differently, and to develop treatment plans tailored to the specific interpersonal factors supporting their maladaptive eating behaviors.

Several study limitations suggest the need for further research. As this study used existing data, information about the nature of treatment and some other important variables was unavailable. The study also relied exclusively on self-reported data. The timing of the assessments was quite broad, and it is possible that important changes that happened at a narrower time band were missed. Conversely, follow-up was limited to 36 weeks, and it would be interesting to examine any changes that occurred across a more extended follow-up period.

Finally, a number of aspects of eating pathology beyond binge eating were not assessed, and it is possible that a more nuanced picture would emerge with a more comprehensive assessment.

In conclusion, this study suggests that BED and general psychiatric symptoms are related to general interpersonal dysfunction but that symptomatic improvement is unrelated to individuals' specific interpersonal styles. These results support and extend previous studies suggesting the independence of many forms of psychopathology from interpersonal style, which provides a relatively novel and useful framework for understanding heterogeneity in BED and other forms of psychopathology for future research and clinical practice.

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Table 1 Descriptive statistics for variables at each measurement wave

	Baseline	1 year	2 year	3 year
Sample size	107	98	90	88
Binge Eating (SD)	30.13 (6.65)	22.23 (7.85)	17.77 (7.79)	16.69 (8.13)
General Distress (SD)	0.76 (0.45)	0.66 (0.50)	0.52 (0.38)	0.53 (0.45)
Z Score for Elevation (SD)	0.23 (0.74)	0.02 (0.72)	-0.12 (0.75)	-0.24 (0.76)
Z Score for Agentic Problems (SD)	-0.20 (0.58)	-0.17 (0.51)	-0.08 (0.54)	-0.08 (0.53)
Z Score for Communal Problems (SD)	0.29 (0.68)	0.28 (0.60)	0.20 (0.59)	0.16 (0.53)

Note. IIP-C scores are standardized based on Alden et al. (1990)

Table 2 Correlations between variables at baseline

	Binge Eating	General Distress	Elevation	Agentic Problems	Communal Problems
Binge Eating	1.00	0.32**	0.28**	0.11	0.02
General Distress	--	1.00	0.51**	0.20*	0.60
Elevation	--	--	1.00	-0.02	-0.00
Agentic Problems	--	--	--	1.00	0.11
Communal Problems	--	--	--	--	1.00

Note. \*indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ .

Table 3 Model parameters and model fit indices for latent growth models for each variable

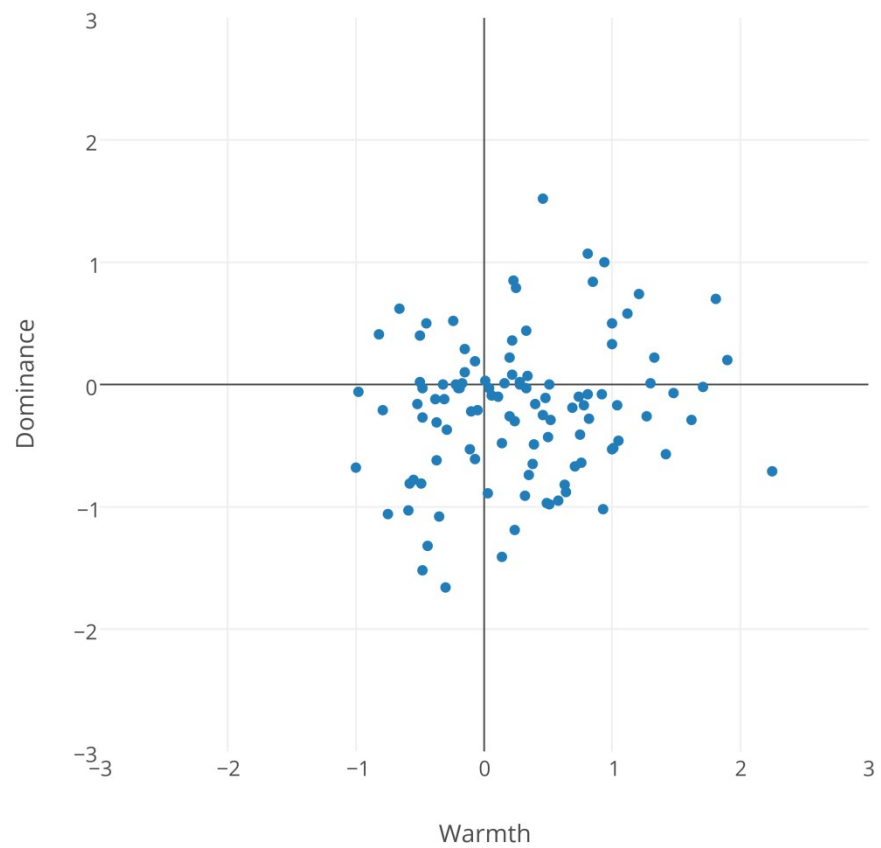
		Intercept		Slope		Quadratic Factor		Model Fit Indices			
		Mean	Variances	Mean	Variances	Mean	Variances	$\chi^2$	CFI	RMSEA	SRMR
Binge Eating	Linear	28.00***	20.37**	-5.21***	6.67**	--	--	66.56***	0.54	0.34	0.21
	Quadratic	29.86***	28.95	-11.60***	58.01*	2.07***	4.64*	0.003	1.00	0.00	0.00
General	Linear	0.73***	0.15***	-0.12***	0.02**	--	--	19.52**	0.90	0.17	0.09
Distress	Quadratic	0.77***	0.15***	-0.24***	0.02**	0.04**	0 <sup>2</sup>	9.61*	0.96	0.12	0.06
Elevation	Linear	-0.04	0.35***	-0.12***	0.02**	--	--	3.75	1.00	0.00	0.03
	Quadratic	-0.00	0.35***	-0.19***	0.02**	0.02	0 <sup>1</sup>	1.34	1.00	0.00	0.02
Agentic Problems	Linear	0.00	0.18***	0.04**	0 <sup>1</sup>	--	--	7.76	1.00	0.03	0.05
	Quadratic	-0.01	0.19***	0.07	0 <sup>1</sup>	-0.01	0.00	6.07	0.99	0.07	0.04
Communal Problems	Linear	0.02	0.27***	-0.03*	0.01***	--	--	2.78	1.00	0.00	0.02
	Quadratic	0.00	0.31***	-0.01	0.07	-0.00	0.00	1.06	1.00	0.03	0.01

Note. \*indicates p<0.05; \*\* indicates p<0.01; \*\*\* indicates p<0.001.

Table 4 Model parameters and model fit indices for parallel process models

Model	Intercept		Slope		Quadratic Factor		Parameter Associations			Model Fit Indices			
	Mean	Variances	Mean	Variances	Mean	Variances	I1 with I2	S2/1 on I1/2	S1 with S2	$\chi^2$	CFI	RMSEA	SRMR
<b><u>Elevation</u></b>													
Elevation +	-0.00	0.32***	-0.52	0.02	0.02	0.00	1.40**	-1.44*	0.07	27.21	0.98	0.06	0.06
Binge Eating	29.86 **	25.30***	-11.60 **	7.48***	2.07 **	0		0.01					
Elevation + General Distress	-0.00	0.36***	-0.24***	0.02**	0.02	0	0.17***	-0.12**	0.01***	45.23	0.95	0.10	0.05
	0.77***	0.13***	-0.05	0.01**	0.04**	0		-0.18**		**			
<b><u>Agentic Problems:</u></b>													
Agentic problems +	-0.01	0.19***	0.61	0	-0.01	0.00	0.23	-1.08	0	36.04	0.97	0.08	0.07
Binge Eating	29.86**	22.53***	-11.6***	7.16***	2.07**	0		-0.02		*			
					*								
Agentic problems +	-0.01	0.20***	0.14	0	-0.01	0.00	0.04	-0.08*	0	39.40	0.96	0.09	0.07
General Distress	0.77**	0.10***	-0.26***	0.01*	0.04**	0		-0.10		**			
<b><u>Communal Problems:</u></b>													
Communal	0.01	0.24***	-0.12	0	-0.00	0.00*	0.6	-0.89	0	52.20	0.94	0.11	0.06
problems+ Binge	29.86**	23.26***	-11.58	7.54***	2.07**	0		0.00		***			
Eating	*		***		*								
Communal problems	0.01	0.24***	0.05	0	-0.00	0.00***	0.03	-0.02	0	52.62	0.94	0.11	0.09
+ General Distress	0.77***	0.10***	-0.24***	0.01*	0.04**	0		-0.09		***			

Note. \*indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ ; \*\*\* indicates  $p < 0.001$ . I1 and S1 indicate the intercept and the slope for the first variable in the model; I2 and S2 indicate the intercept and the slope for the second variable in the model.



*Figure 1.* Scatterplot for individual dominance and warmth from IIP at baseline