**Supplemental Materials**

**Interpersonal Stressors and Negative Affect in Individuals With Borderline Personality Disorder and Community Adults in Daily Life: A Replication and Extension**

**by J. Hepp et al., 2018, *Journal of Abnormal Psychology***

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**Method Details**

*Power analysis*

Based on power analyses conducted before the current data collection, which were themselves based on published findings from the data reported in Hepp and colleagues (2017), a priori power to detect small interaction effects (β = .10) between the groups, specifically at the momentary level, were >90% for the current sample size and multiple assessment protocol (i.e. ~126 assessments per person). Power was >80% for day level interaction effects, and was >50% for person level interaction effects (though these were not of primary interest in the current investigation).

*Model equations*

To test the association between reports of rejection and disagreement and affective ratings of hostility, sadness, and fear simultaneously, we used the multivariate approach described by Raudenbush and Bryk (2002). The concurrent analysis model is described in Equation 1.

(1)

In this equation *Moodijk* is the mood rating for participant *i*, on day *j*, for prompt *k*, andmood type ***H****ostile*,***S****ad*, or***F****ear*. Each mood type is fit with random person and day level random intercepts (*bH0i*, *bS0i*, *bF0i*, and *bH0j*, *bS0j*, *bF0j*, respectively). Of primary interest are the *m*omentary-, *d*ay-, and *p*erson-level measures of rejection (*Rej*) and disagreement (*Dis*), and the main effect and interactions with BPD status. Also included are the lagged criterion, covariates, and residuals specific to each mood type. *Hijk* is an indicator that takes a value of 1 for participants’ hostility reports and 0 for sadness and fear reports. Similarly, *Sijk* takes a value of 1 for participants’ sadness reports and 0 for hostility and fear reports, and *Fijk* takes a value of 1 for participants’ fear reports and 0 for hostility and sadness reports. This allows each sub-equation to be estimated simultaneously. The lagged analysis model is described in Equation 2.

(2)

This equation is largely the same as Equation 1, except we now include measures for lagged rejection and disagreement at the momentary level (*k*-1) where they were previously concurrent. In addition, we include measures for the change in rejection and disagreement from times *k*-1 to *k*, as indexed by Δ, as well as their interactions with BPD.

**Additional results for the current study**

*Discussion of Day and Person-level effects*

Due to the brief report format of the main manuscript, we did not discuss the day and person-level effects in depth but focused on the momentary associations as these depict the affective dynamics in BPD at the most fine-grained level. Here we discuss the day- and person-level effects reported in the main manuscript in Table 1, and relate them to the findings reported in Hepp et al. (2017).

The original study (Hepp et al., 2017) reported stronger day-level associations for disagreement-hostility and for rejection-sadness, which were both replicated in the current study and which corroborate findings at the momentary level. Momentary and daily rejection showed the strongest associations with sadness, whereas momentary and daily disagreement was most strongly associated with hostility. This is interesting insofar as most previous studies have heavily focused on relating rejection in BPD to anger-like constructs (e.g., Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011; Chapman, Dixon-Gordon, Butler, & Walters, 2015; Miskewicz et al., 2015; Renneberg et al., 2012), whereas the dominant affect associated with rejection in the moment seems to be sadness in our two studies. Disagreement, as an exemplary event representing interpersonal conflict, was associated most closely with hostility at the momentary and day-level, which is well in line with BPD individuals being theorized to have highly reactive and difficult to control anger (American Psychiatric Association, 2013).

One day-level effect that we observed as stronger in the BPD group in the present study but that was not significantly different between the groups in the original study is the rejection-fear association. This is somewhat in line with studies on rejection sensitivity in BPD, which suggest that part of BPD individual’s tendency to react to rejection is also with a fearful expectation of future rejection. The only effect in the present analyses that was contrary to the original study was the association between person-level rejection and hostility, which was significantly larger in the COM group. This effect was unexpected and not otherwise consistent with predictions we would make under the theoretical framework of our other hypotheses. In light of the less than ideal power of the person-level effects, we hesitate to interpret this effect as a meaningful contrast to the other person-level associations and believe further investigation with substantially larger samples of individuals is warranted. The other person-level associations did not differ in the original study or the current one, potentially owing to a similar lack of power, again suggesting a need for additional large-sample studies.

*Analyses adjusting for current anxiety disorders*

Beyond the models comparing individuals with BPD to individuals with depression, Hepp et al. (2017) presented additional models that statistically adjusted for any depression in the BPD group and were able to demonstrate the stability of their main findings. For the current study, we repeated all analyses adjusting for any current anxiety disorder in both groups. This was done to account for the fact that the COM group did not represent a classic “healthy” control group. The way this group was recruited allowed for some psychopathology to be present and current anxiety disorders were the most prevalent diagnoses, endorsed by thirteen COM participants (21.7%). Tables S1 and S2 present the concurrent and the lagged model including a dummy variable that was 1 if the participants fulfilled a current anxiety disorder diagnosis and 0 if they did not. The results for both the concurrent and the lagged model, which are reported in the main manuscript, remained essentially unchanged when including this additional anxiety disorder diagnosis predictor.

*Analyses adjusting for alcohol consumption*

The sample we reported was collected based on the inclusion criterion of alcohol consumption at least once a week, since the dataset was originally collected for a study on affect and alcohol use in BPD. To ensure that the results we observed were not influenced by potential effects of alcohol consumption, we repeated both the concurrent and lagged models adjusting for alcohol consumption reported during the random prompts (dichotomous variable that was 1 if any alcohol was consumed and 0 if no alcohol was consumed). For each person, the momentary variable was aggregated by day to obtain a variable indicating the proportion of prompts where alcohol was consumed. Lastly, these day means were aggregated by person to obtain a variable indicating the proportion of days on which alcohol was consumed. The momentary variable was centered on the participant’s day mean, the day-level variable on the person mean, and the person-level variable on the sample mean. We added these three variables as predictors to the model to adjust for alcohol consumption. The results are presented in Table S3 and Table S4. All results that we report in the main manuscript replicated when adjusting for alcohol consumption.

**Additional Analyses – Hepp and colleagues (2017) replication**

*Person-level bivariate correlations*

The original study by Hepp et al. (2017) provided bivariate correlations between the negative affects and interpersonal stressors. Table S5 presents these for the current dataset, showing bivariate correlations between hostility, sadness, fear, rejection and disagreement at the within-person and between-person level. In contrast to the multivariate multilevel models presented in the main manuscript, these are not adjusted for the influence of the other predictors and covariates that the models included.

Table S1. Estimates, standard errors, and p-values for group, current anxiety disorder diagnosis, rejection, and disagreement predicting hostility, sadness, and fear in a multivariate multilevel model.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Hostility | | | | | | |  | Sadness | | | | | | |  | Fear | | | | | | |
|  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |
| Predictors | *Est.* | *SE* | *P* |  | *Est* | *SE* | *P* |  | *Est.* | *SE* | *p* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |
| Mom rej | **0.24** | **0.03** | **<.001** |  | **0.12** | **0.04** | **.004** |  | **0.55** | **0.03** | **<.001** |  | **0.34** | **0.04** | **<.001** |  | 0.06 | 0.03 | .019 |  | 0.08 | 0.04 | .067 |
| Day rej | 0.41 | 0.06 | <.001 |  | 0.35 | 0.10 | <.001 |  | **1.25** | **0.07** | **<.001** |  | **0.80** | **0.13** | **<.001** |  | **0.46** | **0.06** | **<.001** |  | **0.20** | **0.10** | **.037** |
| Person rej | **0.38** | **0.69** | **.578** |  | **3.63** | **1.40** | **.011** |  | 2.20 | 0.86 | .011 |  | 3.03 | 1.74 | .084 |  | 0.08 | 0.75 | .250 |  | 3.04 | 1.52 | .049 |
| Mom dis | **0.50** | **0.02** | **<.001** |  | **0.33** | **0.03** | **<.001** |  | 0.21 | 0.03 | <.001 |  | 0.15 | 0.03 | <.001 |  | 0.07 | 0.02 | .003 |  | 0.04 | 0.03 | .259 |
| Day dis | **0.84** | **0.06** | **<.001** |  | **0.45** | **0.08** | **<.001** |  | 0.30 | 0.08 | <.001 |  | 0.30 | 0.11 | .006 |  | 0.26 | 0.06 | <.001 |  | 0.10 | 0.08 | .226 |
| Person dis | 0.79 | 0.73 | .282 |  | -0.45 | 1.18 | .702 |  | -0.41 | 0.91 | .649 |  | -0.11 | 1.28 | .590 |  | 0.80 | 0.80 | .320 |  | -0.69 | 1.28 | .590 |
| group | 0.18 | 0.07 | .010 |  |  |  |  |  | 0.30 | 0.09 | <.001 |  |  |  |  |  | 0.25 | 0.08 | .001 |  |  |  |  |
| anxiety | 0.04 | 0.06 | .542 |  |  |  |  |  | 0.06 | 0.08 | .445 |  |  |  |  |  | 0.02 | 0.07 | .787 |  |  |  |  |

*Note.* The multivariate model included the three criteriahostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S2. *Estimates, standard errors, and p-values for group, current anxiety disorder diagnosis, lagged/change rejection and lagged/change disagreement predicting hostility, sadness, and fear in a multivariate multilevel model.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Hostility | | | | | | |  | Sadness | | | | | | |  | Fear | | | | | | |
|  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |
| Predictors | *Est.* | *SE* | *P* |  | *Est* | *SE* | *P* |  | *Est.* | *SE* | *p* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |
| Rej lag | **0.39** | **0.04** | **<.001** |  | **0.15** | **0.07** | **.030** |  | **0.79** | **0.04** | **<.001** |  | **0.47** | **0.07** | **<.001** |  | 0.07 | 0.04 | .088 |  | 0.07 | 0.07 | .315 |
| Dis lag | **0.63** | **0.04** | **<.001** |  | **0.42** | **0.06** | **<.001** |  | 0.33 | 0.04 | <.001 |  | 0.20 | 0.06 | <.001 |  | **0.13** | **0.04** | **.001** |  | **0.01** | **0.06** | **.910** |
| Rej diff | **0.26** | **0.03** | **<.001** |  | **0.12** | **0.04** | **.004** |  | **0.58** | **0.03** | **<.001** |  | **0.36** | **0.04** | **<.001** |  | 0.06 | 0.03 | .028 |  | 0.07 | 0.04 | .081 |
| Dis diff | **0.53** | **0.03** | **<.001** |  | **0.34** | **0.03** | **<.001** |  | 0.23 | 0.03 | <.001 |  | 0.16 | 0.04 | <.001 |  | 0.08 | 0.03 | <.001 |  | 0.03 | 0.03 | .430 |
| BPDgroup | 0.18 | 0.07 | .011 |  |  |  |  |  | 0.30 | 0.09 | <.001 |  |  |  |  |  | 0.25 | 0.08 | .002 |  |  |  |  |
| anxiety | 0.04 | 0.06 | .544 |  |  |  |  |  | 0.06 | 0.08 | .448 |  |  |  |  |  | 0.02 | 0.07 | .787 |  |  |  |  |

Note. The multivariate model included the three criteria hostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the day and person level scores of rejection and disagreement, the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. Results for all adjustment variables and the model equation are presented in the online supplement. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S3. Estimates, standard errors, and p-values for group, alcohol consumption, rejection, and disagreement predicting hostility, sadness, and fear in a multivariate multilevel model.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Hostility | | | | | | |  | Sadness | | | | | | |  | Fear | | | | | | |
|  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |
| Predictors | *Est.* | *SE* | *P* |  | *Est* | *SE* | *P* |  | *Est.* | *SE* | *p* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |
| Mom drink | 0.00 | 0.02 | .974 |  |  |  |  |  | -0.02 | 0.02 | .212 |  |  |  |  |  | 0.03 | 0.02 | .149 |  |  |  |  |
| Day drink | -0.06 | 0.05 | .259 |  |  |  |  |  | -0.09 | 0.07 | .175 |  |  |  |  |  | -0.08 | 0.05 | .117 |  |  |  |  |
| Person drink | -0.24 | 0.62 | .693 |  |  |  |  |  | -0.47 | 0.76 | .542 |  |  |  |  |  | -0.62 | 0.67 | .354 |  |  |  |  |
| Mom rej | **0.24** | **0.03** | **<.001** |  | **0.12** | **0.04** | **.004** |  | **0.55** | **0.03** | **<.001** |  | **0.34** | **0.04** | **<.001** |  | 0.06 | 0.03 | .021 |  | 0.08 | 0.04 | .065 |
| Day rej | 0.41 | 0.06 | <.001 |  | 0.35 | 0.10 | .001 |  | **1.25** | **0.07** | **<.001** |  | **0.80** | **0.13** | **<.001** |  | **0.46** | **0.06** | **<.001** |  | **0.20** | **0.10** | **.039** |
| Person rej | **0.34** | **0.71** | **.632** |  | **3.59** | **1.43** | **.014** |  | 2.11 | 0.88 | .018 |  | 2.92 | 1.78 | .103 |  | 0.72 | 0.77 | .350 |  | 2.76 | 1.55 | .078 |
| Mom dis | 0.49 | 0.03 | <.001 |  | 0.32 | 0.03 | <.001 |  | 0.21 | 0.03 | <.001 |  | 0.15 | 0.03 | <.001 |  | 0.07 | 0.02 | .003 |  | 0.04 | 0.04 | .280 |
| Day dis | **0.84** | **0.06** | **<.001** |  | **0.45** | **0.08** | **<.001** |  | 0.30 | 0.08 | <.001 |  | 0.30 | 0.11 | .005 |  | 0.26 | 0.06 | <.001 |  | 0.10 | 0.08 | .215 |
| Person dis | 0.87 | 0.78 | .265 |  | -0.34 | 1.20 | .774 |  | -0.25 | 0.96 | .792 |  | 0.09 | 1.49 | .950 |  | 1.03 | 0.83 | .221 |  | -0.48 | 1.30 | .708 |
| group | 0.19 | 0.07 | .004 |  |  |  |  |  | 0.32 | 0.08 | <.001 |  |  |  |  |  | 0.25 | 0.07 | <.001 |  |  |  |  |

*Note.* The multivariate model included the three criteriahostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S4. *Estimates, standard errors, and p-values for momentary alcohol consumption, group, lagged/change rejection and lagged/change disagreement predicting hostility, sadness, and fear in a multivariate multilevel model.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Hostility | | | | | | |  | Sadness | | | | | | |  | Fear | | | | | | |
|  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |  | BPD | | |  | COM | | |
| Predictors | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *p* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |  | *Est.* | *SE* | *P* |
| Alcohol | 0.00 | 0.02 | .890 |  | 0.00 | 0.02 | .890 |  | -0.02 | 0.02 | .305 |  | -0.02 | 0.02 | .305 |  | 0.03 | 0.02 | .137 |  | 0.03 | 0.02 | .137 |
| Rej lag | **0.39** | **0.04** | **<.001** |  | **0.15** | **0.07** | **.030** |  | **0.79** | **0.04** | **<.001** |  | **0.47** | **0.07** | **<.001** |  | 0.07 | 0.04 | .088 |  | 0.07 | 0.07 | .315 |
| Dis lag | **0.63** | **0.04** | **<.001** |  | **0.42** | **0.06** | **<.001** |  | 0.33 | 0.04 | <.001 |  | 0.20 | 0.06 | <.001 |  | **0.13** | **0.04** | **.001** |  | **-0.01** | **0.06** | **.875** |
| Rej diff | **0.26** | **0.03** | **<.001** |  | **0.12** | **0.04** | **.004** |  | **0.58** | **0.03** | **<.001** |  | **0.36** | **0.04** | **<.001** |  | 0.05 | 0.03 | .031 |  | 0.08 | 0.04 | .080 |
| Dis diff | **0.53** | **0.03** | **<.001** |  | **0.34** | **0.03** | **<.001** |  | 0.23 | 0.03 | <.001 |  | 0.16 | 0.04 | <.001 |  | 0.09 | 0.03 | <.001 |  | 0.03 | 0.03 | .462 |
| BPDgroup | 0.19 | 0.07 | .005 |  |  |  |  |  | 0.32 | 0.08 | <.001 |  |  |  |  |  | 0.25 | 0.07 | <.001 |  |  |  |  |

Note. The multivariate model included the three criteria hostility, sadness, and fear simultaneously. In addition to the presented predictors, the model adjusted for the day and person level scores of alcohol, rejection, and disagreement, the lagged criterion scores and the covariates weekday, weekend, study day, and time elapsed since the participant awoke. Results for all control variables and the model equation are presented in the online supplement. BPD = Borderline Personality Disorder, COM = Community Controls, Est. = estimate. Group was coded BPD = 0 for the BPD column and COM = 0 for the COM column. Significant group differences are highlighted in boldface.

Table S5. *Within-person correlations and between-person correlations (in brackets) between types of negative affect and interpersonal stressors, presented for the BPD group (above diagonal) and the COM group (below diagonal).*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | BPD |  |  |
|  |  | Hostility | Sadness | Fear | Disagreement | Rejection |
|  | Hostility |  | .45 (.61) | .39 (.77) | .37 (.29) | .29 (.27) |
|  | Sadness | .34 (.86) |  | .42 (.67) | .18 (.32) | .32 (.41) |
| COM | Fear | .21 (.84) | .20 (.80) |  | .12 (.34) | .12 (.31) |
|  | Disagreement | .35 (.33) | .24 (.42) | .07 (.25) |  | .32 (.74) |
|  | Rejection | .20 (.75) | .28 (.77) | .09 (.71) | .34 (.58) |  |