

Supplementary Material

Article Title: Psychological Pain as a Risk Factor for Suicidal Ideation: An Ecological Momentary Assessment Study on Inpatients With Depression With and Without Comorbid Borderline Personality Disorder

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Supplementary table 1. Means and standard deviations (SD) of the modified version of the Physical and Psychological Pain - Visual Analog Scale (PPP-VAS) items of 67 inpatients with Major Depressive Disorder at hospital admission depending on a history of suicidal behavior shortly before admission

	With a history of suicidal behavior before admission (n=25)	Without history of suicidal behavior before admission (n=42)	p
	Mean \pm SD	Mean \pm SD	
Physical pain (mm)			
Current ¹	26.7 \pm 29	29.1 \pm 22.6	ns
Mean of the last 15 days ¹	37.3 \pm 29.2	39.7 \pm 23.7	ns
Worst over the last 15 days ²	56 \pm 30.5	55 \pm 30.3	ns
Psychological pain (mm)			
Current ²	65.4 \pm 23.9	59.1 \pm 28.6	ns
Mean of the last 15 days ³	77.3 \pm 12.9	65 \pm 21	0.008
Worst over the last 15 days ³	93 \pm 7	82.3 \pm 22	0.032
Suicidal ideas (mm)			
Current ¹	49.5 \pm 33.3	43.3 \pm 27.9	ns
Mean of the last 15 days ¹	68.7 \pm 26	52.9 \pm 26.2	0.02
Worst over the last 15 days ¹	85.2 \pm 26	73 \pm 28	ns
Hopelessness (mm)			
Current ¹	65.9 \pm 22	65 \pm 24	ns
Mean of the last 15 days ¹	74.9 \pm 18	64.4 \pm 22.5	0.05
Worst over the last 15 days ¹	90.8 \pm 11	83 \pm 18	ns
Depression (mm)			
Current ¹	75 \pm 22	69.3 \pm 21.4	ns
Mean of the last 15 days ¹	71 \pm 19	72 \pm 17	ns
Worst over the last 15 days ¹	89 \pm 13	85 \pm 16	ns
Anxiety (mm)			
Current ¹	64 \pm 31.7	65 \pm 26	ns
Mean of the last 15 days ¹	76 \pm 23	67.4 \pm 23.3	ns
Worst over the last 15 days ¹	89 \pm 20.2	86 \pm 20.3	ns

Items are presented as the Likert Scale 0-100 mm.

mm – millimeters.

¹data missing for 1/67

²data missing for 3/67

³data missing for 4/67

Supplementary table 2. Fixed, random, and residual (variance-function) effects in the heterogeneous variance multilevel model of psychological pain.

	Estimate	95 % Confidence interval
Fixed-effect intercept	-1.255	(-1.7, -0.811)
Fixed-effect BPD	1.633	(0.948, 2.317)
Random-effect intercept	1.276	(1.047, 1.556)
Random-effect BPD	0	(0, 9.069×10 ⁻¹⁸)
Variance-function intercept	1	(1, 1)
Variance-function BPD	1.189	(1.065, 1.328)

Note: BPD = Borderline Personality Disorder. Random-effects capture the between-patient variability, whereas the variance-function effects capture the relative within-individual (residual) variance, given the fixed-effect covariates. The confidence intervals are approximate only.

Supplementary Appendix 1

A simulation test of the procedure for the hypothesis A:

The below R code verifies that our procedure does not falsely detect independence of PP (y) from other variables (x1 and x2) when no true independent between-patient variance exist in y (i.e., the procedure is not biased):

```
library(lme4)

# simulate data
n0 <- 10; nP <- 70 # Number of person observations and persons
# initialize random seed and data frame
set.seed(3729)
dsim <- data.frame(x1 = rep(0, n0*nP), x2 = rep(0, n0*nP),
                   y = rep(0, n0*nP), id = rep(1:n0, each = nP))
# simulate patient-specific means in covariates
x1 <- rnorm(nP)*sqrt(1/3); x2 <- rnorm(nP)*sqrt(1/3)
# simulate within-patient variations in covariates
for (ip in 1:nP){
  dsim$x1[(1+(ip-1)*n0):(ip*n0)] <- x1[ip] + rnorm(n0)*sqrt(1/3)
  dsim$x2[(1+(ip-1)*n0):(ip*n0)] <- x2[ip] + rnorm(n0)*sqrt(1/3)
}
# simulate measurement noise
dsim$y <- dsim$x1 + dsim$x2 + rnorm(n0*nP)*sqrt(1/3) # y is mainly x's
dsim$x1 <- dsim$x1 + rnorm(n0*nP)*sqrt(1/3) # measurement error in x1
dsim$x2 <- dsim$x2 + rnorm(n0*nP)*sqrt(1/3) # measurement error in x2

# Test whether y has a random effect before and after controlling x's
# An uncontrolled random effect (between-patient variability) exists:
mf1 <- lmer(y ~ 1 + (1|id), data = dsim)
confint(mf1)[".sig01",]

## Computing profile confidence intervals ...

##      2.5 %      97.5 %
## 0.2166574 0.6275432

# An adjusted random effect CI overlaps with zero (non-signif.)
mf2 <- lmer(y ~ 1 + x1 + x2 + (1|id), data = dsim)
confint(mf2)[".sig01",]

##Computing profile confidence intervals ...

##      2.5 %      97.5 %
## 0.0000000 0.2221984
```

```
# AIC/BIC model selection favors regression without a random effect
```

```
mf3 <- lm(y ~ 1 + x1 + x2, data = dsim)
```

```
AIC(mf1,mf2,mf3)
```

```
##      df      AIC
```

```
## mf1  3 2330.180
```

```
## mf2  5 1876.145
```

```
## mf3  4 1862.356
```

```
BIC(mf1,mf2,mf3)
```

```
##      df      BIC
```

```
## mf1  3 2343.833
```

```
## mf2  5 1898.901
```

```
## mf3  4 1880.561
```