A prosocial manipulation produces increases in positive affect and prosocial behavior, including those high in borderline traits

By: Shannon J. Adcock, Rosemary O. Nelson-Gray, & Scott Richter

Adcock, S.J., Nelson-Gray, R.O., & Richter, S.J. (2022). A prosocial manipulation produces increases in positive affect and prosocial behavior, including those high in borderline traits. *Personality and Individual Differences*, 181. (DOI: https://doi.org//10.1016/j.paid.2021.111019)

Abstract:
This study examined the effects—on mood and subsequent prosocial behavior—of a prosocial behavioral manipulation in individuals who varied in levels of borderline personality disorder traits. Female undergraduate participants (n = 230) were randomly assigned to either write an encouraging letter to a person experiencing hardship ("prosocial" condition) or to write a letter describing their typical day (control condition). Baseline measurements of mood were taken and compared with those obtained postmanipulation. Subsequent prosocial behavior was measured in two laboratory tasks. As expected, participants in the prosocial condition experienced more positive mood and more prosocial behavior after the manipulation, compared to the control manipulation, regardless of their level of borderline traits.

Keywords: Prosocial behavior | positive affect | borderline personality disorder | dialectical behavior therapy

Article:

1. Introduction

Prosocial behavior facilitates happiness in healthy individuals (Dunn et al., 2008), as well as depressed (Schacter and Margolin, 2018; Van Willigen, 2000) or socially anxious individuals (Alden and Trew, 2013). Prosocial behavior produces activation in the brain's reward center, causing people to feel what has been described as a "warm glow" (Moll et al., 2006). Behaving in a prosocial manner elicits positive mood and, possibly, even more prosocial behavior (Thomaes et al., 2012). The phenomenon of prosocial behavior begetting further prosocial behavior has been described as "an upward spiral of compassion" (Thomaes et al., 2012). This study predicted that a prosocial manipulation would cause mood improvement, as defined by greater positive affect and/or less negative affect, as well as additional prosocial behavior, as compared to the control condition.

While prosocial behavior has been shown to be beneficial to healthy individuals and those who are depressed or socially anxious, the current study queried if prosocial behavior could be beneficial for those high in traits associated with Borderline Personality Disorder (BPD) [which is characterized by intense dysphoria and unstable mood (APA, 2013)]. Dialectical Behavioral

Therapy (DBT), an empirically substantiated treatment for BPD, focuses on providing skills and strategies to manage difficult emotions (Linehan, 2015). "Contributing" is suggested as one of the strategies in the Distress Tolerance module of the DBT skills training; two examples of "contributing" are volunteer work or simply doing something nice for someone else (Linehan, 2015). It would be helpful to know, for further development of treatment protocols, whether prosocial behavior improves mood in those high in BPD traits.

Research suggests that individuals with BPD may be less likely to engage in prosocial behavior despite its mood-enhancing benefits. A meta-analysis (Samuel and Widiger, 2008) examining facets of the Five Factor model of personality reveals that BPD is negatively correlated with altruism ($r = -0.19$). Additionally, research concerning economic/trust games using BPD and high-BPD trait samples reveals that these individuals have different cooperation styles than typical individuals. This population has marked difficulty with cooperation after there has been a perceived slight (King-Casas et al., 2008; Thielmann et al., 2014; Unoka et al., 2009). This "reactive" failure to cooperate is referred to as a lack of "reactive cooperation" (Hepp et al., 2014; Thielmann et al., 2014). Conversely, individuals high in BPD traits generally do not take advantage of others unless they have been slighted (Thielmann et al., 2014). This tendency to refrain from exploiting others has been called "active cooperation" (Hepp et al., 2014).

The present study sought to address novel issues: whether a one-time prosocial behavior manipulation would be associated with more prosocial behavior and more positive affect (compared to the control condition) in participants, differentially impacting individuals according to their level of borderline traits. It was posited that individuals higher in BPD traits would have a greater receptivity to the mood-enhancing effects of prosocial behavior compared to typical individuals. Research in other clinical populations suggests that prosocial behavior is particularly effective with regard to mood improvement (Alden and Trew, 2013; Schacter and Margolin, 2018). Our hypotheses for the study were: (a) those receiving the prosocial manipulation will have greater positive affect and/or less negative affect (simple or main effect) between the premanipulation (Time 1) and postmanipulation (Time 2) administrations of the PANAS compared to the participants in the control condition; (b) those receiving the prosocial manipulation will exhibit increased prosocial behavior on two subsequent tasks when compared to those receiving the control task; (c) borderline traits will be negatively correlated with prosocial behavior, regardless of condition, as measured by the fishing game and charitable donations; and (d) borderline traits will be positively correlated with negative affect and negatively correlated with positive affect in premanipulation PANAS measures.

2. Method

2.1. Participants

The study sample included 230 female participants ($M_{age} = 19.12$, $SD = 2.10$) of diverse ethnicity (Table 1). Approximately 75% of people with a diagnosis of BPD are female, and this university undergraduate population is predominantly female. Participants were required to be at least 18 years of age, as personality does not crystallize until this time (APA, 2013). To oversample for borderline traits, some participants were recruited, via email, if they scored at least 0.5 standard deviations above the mean on the Wisconsin Personality Inventory–Borderline

(WISPI-BOR), which was given to a large group of undergraduates during a process known as "mass screening." During mass screening, participants in the student participant pool can volunteer for questionnaires of interest to various laboratories in the Psychology Department in exchange for partial course credit. Other participants volunteered for the study to receive partial course credit, but were not recruited by email.

Table 1. Participant demographic characteristics

Characteristic	Sample			Prosocial			Control		
	n	**%**	***M* (*SD*)**	***n***	**%**	***M* (*SD*)**	***n***	**%**	***M* (*SD*)**
Sex									
Female	230	100.0		117	100.0		113	100.0	
Age (years)			19.12 (2.10)			19.34 (2.54)			18.89 (1.48)
Race									
African American	101	43.9		46	39.3		55	48.7	
White/Caucasian	81	35.2		48	41.0		33	29.2	
Latina	24	10.4		11	9.4		13	11.5	
Asian/Pacific Islander	14	6.1		6	5.1		8	7.1	
Native American	2	0.9		2	1.7		0	0.0	
Other	8	3.5		4	3.4		4	3.5	

Note. N=230. M=mean; SD= standard deviation.

Per random assignment, 117 participants were in the prosocial condition (see Fig. 1), and 113 participants were in the control condition. Oversampling for participants high in borderline traits was successful, as the sample's Personality Assessment Inventory-Borderline (PAI-BOR) mean score was 29.02, which is higher than the college sample norm (n = 1051; M = 22.93, SD = 10.33; Morey, 1991). Trull (1995) suggests using a score of 38 as a cut-off on the PAI-BOR to indicate a high level of borderline features. The sample included a sizable number of those high in borderline traits, as 25.65% of the sample scored 38 or above on the PAI-BOR.

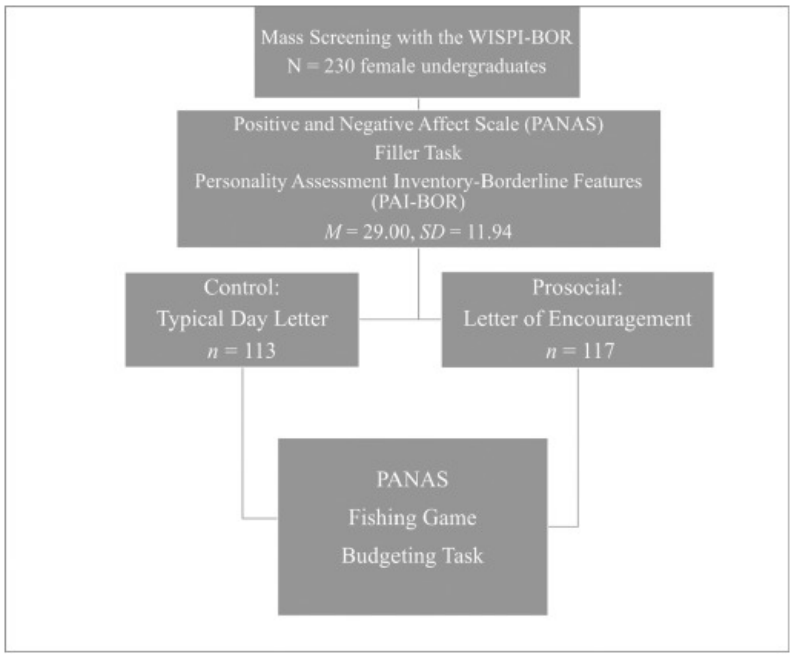

Fig. 1. Method flow chart

2.2. Materials

2.2.1. Wisconsin Personality Disorders Inventory-Borderline Features (WISPI-BOR)

The WISPI-BOR (Klein et al., 1993), used during "mass screening," contains 18 self-report items measuring borderline traits.

2.2.2. Personality Assessment Inventory-Borderline Features (PAI-BOR)

The PAI-BOR (Morey, 1991) is a 24-item self-report measure of borderline traits. To ensure that participants were purposefully answering all questions, three questions designed to detect inattentive answering (Infrequency Scale, Chapman & Chapman, unpublished) were embedded into the PAI-BOR. Fortunately, no participants responded inattentively to all three questions, so no data was excluded on this basis.

2.2.3. Positive and Negative Affect Schedule (PANAS)

The PANAS (Watson et al., 1988) is a 20-item self-report measure of positive and negative affect. The PANAS was administered as a pre- and post-measure of mood. The item responses to the Basic Positive Emotion Scale and the Basic Negative Emotion Scale were summed and averaged to create a mean positive and negative score for each participant. Due to a researcher error, one item was omitted from the positive affect scale of the PANAS.

2.2.4. Prosocial manipulation versus control task

Participants in the prosocial condition typed a prosocial letter, spending 10 min (and at least 300 characters) on the letter. The prosocial letter was a letter of encouragement to a choice of three individuals facing a difficult situation. These stories were excerpted from a website soliciting letters of encouragement for people in need of hope (http://www.moreloveletters.com/the-letter-requests/). In the prosocial condition, participants

were instructed to write a helpful and encouraging letter. Participants were accurately informed that their letters would be sent to the recipients. Thus, this was a standardized laboratory manipulation using prosocial behavior in the form of an encouragement letter.

Participants in the control condition also completed a letter; their letter was addressed to the Dean of Students, describing their typical day, and was, purportedly, to be used by that office for informational purposes. These "control condition" letters were not actually sent, and this deception was disclosed in debriefing. (The use of deceptive techniques in this study is justified by its significant prospective scientific value; nondeceptive, alternative procedures were not feasible to examine the hypotheses) (APA, 2017). Each participant, in both the experimental and control groups, was instructed to spend 10 min (and at least 300 characters) on her letter.

2.2.5 Budgeting task

Based upon Lindsay and Creswell (2014) and Piff et al. (2010), this measure used a spending survey allocating 100% of a participant's imaginary income ($100,000) to nine spending categories: bills, food, clothing, luxury items, recreation, charity, travel, gifts, and housing. The category of charitable giving was a covert measure of prosocial behavior.

2.2.6. Fishing game

A modified version of the task used by Osgood and Muraven (2015), the "fishing game," is a computerized game in which participants were told that they are fishing with other participants (in different rooms) from a communal pond. The game measures prosocial behavior in that participants can choose to keep fish so that they can finish the study early (30 s earlier per fish) or they can choose to release fish to allow other players to leave early. In actuality, this had no effect on the amount of time spent completing the study. Participants received a debriefing regarding this deception at the conclusion of the experiment. This measure tapped into a slightly different construct than the budgeting task because it measured prosocial behavior in the form of participants' willingness to work cooperatively with others. Cooperative skills are particularly problematic for individuals with BPD (Hepp et al., 2014; King-Casas et al., 2008).

2.2.7. Filler task

To help prevent participants from guessing the true purpose of the study, one filler task from Inquisit 4.0 was used—the Tower of London, which is a measure of executive functioning in children (Viterbori et al., 2015).

2.3. Procedure

A trained undergraduate research assistant ushered each participant separately into a small room where she completed the study alone, using a Dell personal computer. The study was described in the written consent form and in the orally presented script as examining "writing, personality, and cognition" to disguise its true purpose. Research assistants also clearly stated that the study data were anonymous. The study included a question at the conclusion: "What do you think this study was about?" to assess for suspicion. The data of any participant who correctly named the purposes of the study—whether the prosocial manipulation(s) elicit(s) further prosocial behavior and/or improve(s) participants' mood—were excluded from analysis. These determinations were made by two independent undergraduate raters who used a written coding protocol. No data were excluded on the basis of a participant fully guessing the study purposes. The raters had excellent agreement with regard to the manipulation check

(kappa = 0.98), that is, whether participants wrote about the assigned topic (prosocial letter or typical day).

During the study, the participants completed a series of computerized questionnaires using Qualtrics and Inquisit 4 software. A flow chart showing the measures and order of the study is contained in Fig. 1.

3. Statistical analysis

All predictor variables other than condition were centered to reduce multicollinearity (Shieh, 2011). For all analyses, the "prosocial" manipulation was coded as "1" to represent the prosocial condition and "0" representing the control/"typical day" condition. Separate repeated measures ANOVA models were fit with positive affect and negative affect, respectively, as response variables, and condition, time, and PAI-BOR score as effects. In each case, a full factorial model was fit. Nonsignificant interaction terms were dropped and the model refit. Condition by time interaction was assessed to determine if the manipulation was associated with differential change over time.

To measure prosocial behavior, a MANOVA was conducted with charitable contributions and fish released as dependent variables. Condition (prosocial or control) was a factor and BPD traits was a covariate. First, the interaction between condition and BPD traits was examined, and since not statistically significant, dropped and the model refit without interaction. Separate univariate ANOVAs were conducted to explore the nature of the effects on the individual response variables.

3.1. Results

Descriptive statistics for each measure are reported in Table 2. Qualtrics was programmed to assign an equal number of participants higher in borderline traits (defined as scoring above 28 on the PAI-BOR, approximately 0.5 of a standard deviation above the mean of 22.93 for college students; Morey, 1991) to each condition—"prosocial" and control. Qualtrics was also programmed to assign an equal number of participants with lower PAI-BOR scores (defined as below 18, which is approximately 0.5 of a standard deviation below the mean for college students) to each condition. The two conditions showed no statistically significant differences in PAI-BOR scores ($t(228) = -0.23$, $p = .818$), premanipulation negative affect ($t(228) = 1.12$, $p = .352$), or premanipulation positive affect ($t(228) = 0.93$, $p = .262$). Similarly, no statistical differences were observed between conditions for age ($t(187.57) = -1.64$, $p = .1026$) and race (χ^2 (5, $N = 230$) = 5.9644, $p = .3097$). Thus, no covariates were included in the analyses.

Table 2. *t*-Tests and descriptive statistics for study variables in sample: PANAS subscales and prosocial measure.

Variable	Sample (*N* = 230)	Prosocial (*n* = 117)	Control (*n* = 113)	95% CI for mean difference	*t*	*df*
	M (SD)	*M* (SD)	*M* (SD)			
PAI-BOR	29.02 (12.01)	29.20 (12.20)	28.83 (11.86)	[-3.49, 2.76]	-0.23/ns	228

Pre-PA	21.78 (7.52)	21.23 (7.50)	22.35 (7.52)	[-0.84, 3.07]	1.12/ns	228
Pre-NA	14.19 (5.28)	13.87 (5.04)	14.52 (5.53)	[-0.72,2.02]	0.93/ns	228
Post-PA	22.86 (8.27)	24.28 (8.17)	21.39 (8.15)			
Post-NA	12.71 (4.59)	12.08 (3.43)	13.35 (5.49)			
Charitable donations	4.65 (6.01)	5.57 (7.34)	3.79 (4.10)			
Fish released	72.93 (33.65)	77.36 (35.22)	68.34 (31.45)			

Note. $N = 230$. PAI-BOR = Personality Assessment Inventory–Borderline Features; Pre-NA = premanipulation negative affect; Pre-PA = premanipulation positive affect; Post-NA = postmanipulation negative affect; Post-PA = postmanipulation positive affect; ns = non-significant

3.1.1. Mood

3.1.1.1. *Positive affect.* There was no evidence of condition by time by BPD trait interaction ($F(1, 226) = 0.00$, $p = .96$) or time by BPD trait interaction ($F(1, 227) = 0.74$), and thus these interactions were dropped from the model. The resulting model showed a statistically significant interaction between time and condition ($F(1, 228) = 7.58$, $p = .006$). Positive affect increased by an average of 3.05 for participants in the prosocial condition, while the control condition participants' positive affect decreased by an average of 0.96**.**

3.1.1.2. *Negative affect***.** There was no evidence of condition by time by BPD trait interaction ($F(1, 226) = 0.01$, $p = .93$) or time by BPD trait interaction ($F(1, 227) = 0.56$, $p = .46$), and thus these interactions were dropped from the model. The resulting model did not show a statistically significant interaction between time and condition ($F(1, 228) = 0.53$, $p = .47$). Negative affect decreased by an average of 1.79 for participants in the prosocial condition compared to 1.17 for the control.

As expected, borderline traits were positively correlated with both premanipulation ($r(228) = 0.37$, $p < .001$) and postmanipulation negative affect ($r(228) = 0.35$, $p < .001$) across conditions. However, contrary to predictions, borderline traits and positive affect were not negatively correlated either premanipulation ($r(228) = 0.01$, $p = .88$) or postmanipulation across conditions ($r(228) = -0.02$, $p = .75$).

3.2. Prosocial Behavior

There was no evidence of condition by BPD trait interaction ($F(2, 225) = 0.54$, $p = .58$), and thus this was dropped from the model. The resulting model showed statistical evidence of a condition difference on the mean vector ($F(2, 226) = 4.48$, $p = .012$). Follow-up univariate ANOVAs revealed contributions were higher in the prosocial condition than in the control condition ($M_{prosocial} = 0.83$; $M_{control} = -0.86$, $F(1, 227) = 4.60$, $p = .033$). Likewise, univariate analysis revealed that the number of fish released by participants in the prosocial condition was greater than those released by participants in the control condition ($M_{prosocial} = 4.46$; $M_{control}$ −4.61, $F(1, 227) = 4.18$, $p = .042$).
There was not a significant correlation between charitable contributions and fish released ($r(230) = 0.008$, $p = .904$). Contrary to expectations, there was not a significant inverse relationship between BPD traits and either measure of prosocial behavior: charitable giving or fish released.

4. Discussion

This study examined the effects of a novel laboratory manipulation of prosocial behavior on positive mood change, negative mood change, and subsequent prosocial behavior. Compared to participants in the control condition, participants in the prosocial condition experienced greater positive mood and increased prosocial behavior. These effects were obtained regardless of level of borderline traits.

4.1. Mood

As predicted, participants in the prosocial condition experienced significantly greater postmanipulation positive affect compared to participants in the control condition who actually experienced a decrease in positive affect. This result for the control condition could be explained by research suggesting that participants do not like the act of writing and typically experience a drop in positive affect after a writing task (Lyubomirsky et al., 2006). Thus, the increase in positive mood for participants in the prosocial condition is particularly salient.

These results support the use of prosocial behavior as a method of mood improvement, including those higher in borderline traits. It is striking that the present 10-minute prosocial task in a laboratory (writing a letter of encouragement) could elicit a measurable increase in positive emotion. This “mood-enhancing” effect of prosocial behavior could potentially be beneficial within a clinical setting. This improvement in mood following an act of prosocial behavior is consistent with prior research (e.g., Dunn et al., 2008). Contrary to predictions, the prosocial manipulation did not have a significant effect on negative affect, as measured before and after the manipulation. This could suggest that prosocial behavior is more effective at increasing positive affect as opposed to decreasing negative affect.

As predicted, BPD traits were positively correlated with premanipulation negative affect. However, BPD traits did not have the predicted inverse relationship with premanipulation positive affect. This result is likely explained by research indicating that the two scales of the PANAS measuring positive and negative affect are largely uncorrelated (Watson et al., 1988). Additionally, this result may suggest that BPD, which has an association with negative affect, does not necessarily have a predictive relationship with positive affect. BPD is inversely correlated with the positive emotion facet of Extraversion contained with the Five-Factor Model (Samuel and Widiger, 2008). Unlike the Samuel and Widiger (2008) meta-analysis, we did not use a clinical sample, which may explain, at least in part, different results.

4.2. Prosocial behavior

As predicted, prosocial manipulation did indeed have a significant effect in eliciting prosocial behavior with regard to both charitable donations and fish released. The increase in prosocial behavior in participants receiving the prosocial manipulation suggests that the "warm glow" of engaging in a prosocial act led to more prosocial behavior. Moreover, the positive effects of the prosocial condition occurred regardless of level of borderline traits.

It is noteworthy that both charitable donations and the number of fish released were greater in the prosocial condition because these two measures tap different types of prosocial behavior. Charitable donations are, presumably, motivated by altruism. In addition to altruism, the fishing game also taps into cooperative behavior. The income allocations to charity were hypothetical, which may have made participants more likely to endorse a donation higher than what their actual behavior would be, as these sorts of hypothetical manipulations typically result in higher rates of prosocial behavior than manipulations based upon actual money (Lönnqvist et al., 2011). In contrast to the budgeting task, participants were led to believe that the number of fish released would influence the amount of time they—and other participants—would spend completing the study. Despite this difference between the hypothetical nature of one outcome measure and the more immediate impact of another, participants in the prosocial condition demonstrated greater prosociality with regard to both outcome measures. Interestingly, the two measures were not significantly correlated with each other, again suggesting that they tap separate aspects of prosocial behavior.

Contrary to predictions, the study results revealed no significant inverse relationship between BPD traits and prosocial behavior. This prediction was predicated upon research demonstrating an association between BPD traits and reduced cooperative behavior, particularly in the event of a perceived slight (e.g., Jeung et al., 2016). Moreover, research indicates that borderline traits are negatively correlated with agreeableness and positively correlated with neuroticism (Samuel and Widiger, 2008). Higher levels of neuroticism and distress (both borderline traits) are associated with lower levels of both prosocial behavior and empathy (Ashton et al., 1998; Twenge et al., 2007; Wingenfeld et al., 2018). The unexpected result in this study is an area for further exploration with a sample more representative of the full array of adult ages and borderline scores.

5. Conclusions

This study demonstrated that a short 10-minute laboratory manipulation involving prosocial behavior produced increases in positive affect and further manifestations of prosocial behavior. These results held true, regardless of level of borderline traits. The study results indicate that prosocial behavior is a mood enhancer for all individuals, including those higher in BPD traits.

This study is unique in that it involved a one-time 10-minute prosocial task in a laboratory setting, suggesting that even time-limited manipulations have the ability to improve mood. Allowing participants to choose the recipient of their prosocial behavior (one of three persons to whom the letter of encouragement could be addressed) presumably strengthened the manipulation. Research suggests that voluntarism is more beneficial to the volunteer when she chooses to engage in it, as opposed to being required to do so through work or school (Van Willigen, 2000).

This study's use of a laboratory setting for a manipulation eliciting prosocial behavior is particularly unique and compelling because prior studies largely involved daily diary entries and other forms of self-report (Nelson et al., 2016; Schacter and Margolin, 2018), which may be

unreliable, as there is no observation of the behavior being examined. In contrast, the letters prepared by participants in the laboratory provided an excellent manipulation check.

The main limitation of this study is the restricted sample of participants. Despite the fact that participants were successfully oversampled for high BPD traits, the sample was, nonetheless, comprised of female college students—presumably high functioning young adults. It is possible that individuals diagnosed with BPD in a more representative community sample would react differently after the prosocial manipulation. It is also possible that participant responses were motivated by social desirability despite precautions taken to disguise the purpose of the study.

In summary, the current study used a brief laboratory prosocial manipulation, compared to a control condition, to produce greater postmanipulation positive affect and greater prosocial behavior. These results were obtained across participants in the prosocial condition, regardless of level of borderline personality disorder traits. This finding is potentially useful in clinical settings as a method to increase positive emotion and prosocial behavior, regardless of borderline traits.

References

Alden, L. E., & Trew, J. L. (2013). If it makes you happy: Engaging in kind acts increases positive affect in socially anxious individuals. *Emotion, 13*(1), 64–75. https://doi.org/10.1037/a0027761.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Washington, DC: Author.

American Psychological Association. (2017). Ethical principles of psychologists and code of conduct. https://www.apa.org/ethics/code/ethics-code-2017.pdf.

Ashton, M. C., Paunonen, S. V., Helmes, E., & Jackson, D. N. (1998). Kin altruism, reciprocal altruism, and the Big Five personality factors. *Evolution and Human Behavior, 19*(4), 243–255. https://doi.org/10.1016/S1090-5138(98)00009-9.

Dunn, E. W., Aknin, L. B., & Norton, M. I. (2008). Spending money on others promotes happiness. *Science, 319*(5870), 1687–1688. https://doi.org/10.1126/science.1150952.

Hepp, J., Hilbig, B. E., Moshagen, M., Zettler, I., Schmahl, C., & Niedtfeld, I. (2014). Active versus reactive cooperativeness in borderline psychopathology: A dissection based on the HEXACO model of personality. *Personality and Individual Differences, 56*, 19–23. https://doi.org/10.1016/j.paid.2013.08.013.

Jeung, H., Schwieren, C., & Herpertz, S. C. (2016). Rationality and self-interest as economic-exchange strategy in borderline personality disorder: Game theory, social preferences, and interpersonal behavior. *Neuroscience & Biobehavioral Reviews, 71*, 849–864. https://doi.org/10.1016/j.neubiorev.2016.10.030.

King-Casas, B., Sharp, C., Lomax-Bream, L., Lohrenz, T., Fonagy, P., & Montague, P. R. (2008). The rupture and repair of cooperation in borderline personality disorder. *Science, 321*(5890), 806–810. https://doi.org/10.1126/science.1156902.

Klein, M. H., Benjamin, L. S., Rosenfeld, R., Treece, C., Husted, J., & Greist, J. H. (1993). The Wisconsin Personality Disorders Inventory: Development, reliability, and validity. *Journal of Personality Disorders, 7*(4), 285–303. https://doi.org/10.1521/pedi1993.7.4.285.

Lindsay, E. K., & Creswell, J. D. (2014). Helping the self help others: Self-affirmation increases self-compassion and pro-social behaviors. *Frontiers in Psychology, 5*, 421. https://doi.org/10.3389/fpsyg.2014.00421.

Linehan, M. M. (2015). *DBT® skills training manual* (2nd ed.). New York, NY: Guilford Press.

Lönnqvist, J.-E., Verkasalo, M., & Walkowitz, G. (2011). It pays to pay-Big Five personality influences on co-operative behaviour in an incentivized and hypothetical prisoner's dilemma game. *Personality and Individual Differences, 50*(2), 300–304. https://doi.org/10.1016/j.paid.2010.10.009.

Lyubomirsky, S., Sousa, L., & Dickerhoof, R. (2006). The costs and benefits of writing, talking, and thinking about life's triumphs and defeats. *Journal of Personality and Social Psychology, 90*(4), 692–708. https://doi.org/10.1037/0022-3514.90.4.692.

Moll, J., Krueger, F., Zahn, R., Pardini, M., de Oliveira-Souza, R., & Grafman, J. (2006). Human fronto-mesolimbic networks guide decisions about charitable donation. *Proceedings of the National Academy of Sciences of the United States of America, 103* (42), 15623–15628. https://doi.org/10.1073/pnas.0604475103.

Morey, L. C. (1991). Personality assessment inventory: Professional manual. Odessa, FL: Psychological Assessment Resources.

Nelson, S. K., Layous, K., Cole, S. W., & Lyubomirsky, S. (2016). Do unto others or treat yourself? The effects of prosocial and self-focused behavior on psychological flourishing. *Emotion, 16*(6), 850–861. https://doi.org/10.1037/emo0000178.

Piff, P. K., Kraus, M. W., Côté, S., Cheng, B. H., & Keltner, D. (2010). Having less, giving more: The influence of social class on prosocial behavior. *Journal of Personality and Social Psychology, 99*(5), 771–784. https://doi.org/10.1037/a0020092.

Samuel, D. B., & Widiger, T. A. (2008). A meta-analytic review of the relationships between the five-factor model and DSM-IV-TR personality disorders: A facet level analysis. *Clinical Psychology Review, 28*(8), 1326–1342. https://doi.org/10.1016/j.cpr.2008.07.

Schacter, H. L., & Margolin, G. (2018). When it feels good to give: Depressive symptoms, daily prosocial behavior, and adolescent mood. *Emotion, 19*(5), 923–927. https://doi.org/10.1037/emo0000494.supp.

Shieh, G. (2011). Clarifying the role of mean centering in multicollinearity of interaction effects. *British Journal of Mathematical and Statistical Psychology, 64*(3), 462–477. https://doi.org/10.1111/j.2044-8317.2010.02002.x.

Thielmann, I., Hilbig, B. E., & Niedtfeld, I. (2014, Dec). Willing to give but not to forgive: Borderline personality features and cooperative behavior. *Journal of Personality Disorders, 28*(6), 778–795. https://doi.org/10.1521/pedi_2014_28_135.

Thomaes, S., Bushman, B. J., de Castro, B. O., & Reijntjes, A. (2012). Arousing "gentle passions" in young adolescents: Sustained experimental effects of value affirmations on prosocial feelings and behaviors. *Developmental Psychology, 48*(1), 103–110. https://doi.org/10.1037/a0025677.

Twenge, J. M., Baumeister, R. F., DeWall, C. N., Ciarocco, N. J., & Bartels, J. M. (2007). Social exclusion decreases prosocial behavior. *Journal of Personality and Social Psychology, 92*(1), 56–66. https://doi.org/10.1037/0022-3514.92.1.56.

Unoka, Z., Seres, I., Aspan, N., Bodi, N., & Keri, S. (2009, Aug). Trust game reveals restricted interpersonal transactions in patients with borderline personality disorder. *Journal of Personality Disorders, 23*(4), 399–409. https://doi.org/10.1521/pedi.2009.23.4.

Viterbori, P., Usai, M. C., Traverso, L., & De Franchis, V. (2015). How preschool executive functioning predicts several aspects of math achievement in Grades 1 and 3: A longitudinal study. *Journal of Experimental Child Psychology, 140*, 38–55. https://doi.org/10.1016/j.jecp.2015.06.014.

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scale. Journal of Personality and Social Psychology, 54(6), 1063–1070. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/3397865.

Wingenfeld, K., Duesenberg, M., Fleischer, J., Roepke, S., Dziobek, I., Otte, C., & Wolf, O. T. (2018). Psychosocial stress differentially affects emotional empathy in women with borderline personality disorder and healthy controls. *Acta Psychiatrica Scandinavica, 137*(3), 206–215. https://doi.org/10.1111/acps.128.