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Perseveration moderates the relationship between perfectionism and binge eating: A multi-method daily diary study

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ABSTRACT

Theory and evidence suggest perfectionism is associated with binge eating. Few studies test conditions under which this association is particularly strong. To better understand the perfectionism–binge eating connection, the present study introduced perseveration as a moderator. A sample of 317 undergraduates completed a computerized Stroop task, baseline self-report measures of perfectionism (i.e., doubts about actions) and binge eating, and self-report daily diary measures of binge eating. Perseveration was defined in terms of reaction time difficulties when consecutive trials required a change of response relative to consecutive trials not requiring a change. Results indicated high levels of doubts about actions were especially related to high levels of binge eating for participants high (versus low) in perseveration. Findings suggest perfectionistic, nagging self-doubts, combined with a tendency to get stuck on thoughts or behaviors, may contribute to increased binge eating—a habitual behavior linked with difficulties in self-regulation.

1. Introduction

Binge eating involves rapidly and uncontrollably eating a large amount of food in a short time period (American Psychiatric Association, 2000). Research indicates perfectionism is common among individuals who binge eat (Bardone-Cone et al., 2007). However, gaps still exist in our knowledge of the perfectionism–binge eating connection.

Perfectionism is conceptualized as a multidimensional personality trait Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991). Doubts about actions (i.e., nagging self-doubts with perfectionistic themes) is one dimension of perfectionism linked to disordered eating (Shafran & Mansell, 2001). Perfectionists characterized by doubts about actions have compulsive propensities and experience repetitive, negative cognitions involving a chronic sense that things are not "right" (Flaxman, Ménard, Bond, & Kinman, 2012). Given these findings, it is not surprising that doubts about actions and perseverative tendencies (e.g., rumination) are associated (Flaxman et al., 2012).

Perseveration is viewed as cognitive or behavioral inertia or a "bias toward repeating prior, activated response tendencies" (Robinson, Wilkowski, Kirkeby, & Meier, 2006, p. 89). Theory and evidence suggest perseveration exacerbates personality-linked negative outcomes and may clarify conditions under which personality traits contribute to these negative outcomes (Robinson et al., 2006). Perseveration is implicated in disordered eating (Waller et al., 2012). For example, research indicates perseveration moderates the relationship between impulsivity and symptoms of bulimia (Robinson, Pearce, Engel, & Wonderlich, 2009).

Few studies have tested the conditions under which the perfectionism–binge eating connection is particularly strong (for an exception, see Bardone-Cone et al., 2008). Existing research on binge eating also relies heavily on cross-sectional designs. Daily diary studies offer an improvement by assessing behavior many times over short intervals in participants' natural environments, thereby improving ecological validity and reducing recall bias. Most research on perfectionism and disordered eating is mono-method, relying mainly on self-reported traits and behaviors. This approach is limited as participants may have poor recall and/or lack insight (Paulhus & Vazire, 2007). Multi-method designs, such as those involving self-reported traits and behaviors as well as performance-based tasks, are needed to address this limitation. The present study addresses the aforementioned limitations and gaps in knowledge by testing the moderating role of perseveration in the doubts about actions-binge eating connection using a multi-method daily diary design.

We hypothesized perseveration would exacerbate the relationship between doubts about actions and binge eating. Specifically, we predicted the doubts about actions-binge eating connection would be stronger for individuals high (versus low) in perseveration.

2. Material and methods

2.1. Participants

A sample of 317 undergraduates (247 women; 70 men) was recruited from the Department of Psychology participant pool at

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Dalhousie University. Participants averaged 20.32 years of age ($SD = 4.34$) and 1.72 years of university education ($SD = 0.91$). Most participants were Caucasian (82.3%) and born in Canada (84.5%). Our sample is consistent with other samples from Dalhousie University (Graham et al., 2010).

2.2. Instruments

2.2.1. Doubts about actions

Doubts about actions was measured with the 4-item doubts about actions subscale of Frost et al.'s (1990) Multidimensional Perfectionism Scale. Items (e.g., "I tend to get behind in my work because I repeat things over and over") are rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Evidence suggests this subscale has acceptable psychometric properties (Dunkley, Zuroff, & Blankstein, 2003). In the present study, Cronbach's alpha was .85.

2.2.2. Perseveration

Following Robinson et al. (2009, 2006)), we used a Stroop task to assess perseveration. On a computer screen, 252 letter strings (*green*, *red*, and *xxx*) were randomly displayed in either green or red. Participants were instructed to classify the color of each letter string as green (by pressing the *1* key) or red (by pressing the *9* key). Following a correct response, a 500-ms blank screen was displayed; following an incorrect response, a 2,000-ms visual error message was displayed.

Incorrect trials were removed and reaction times for remaining trials were log-transformed to reduce positive skew (Robinson et al., 2009). To reduce the impact of very fast or very slow responses, we replaced any log-transformed reactions times larger than 2.5 *SD*s above (or below) the group mean with the value equal to the group mean +/− 2.5 *SD*s. Perseveration was defined in terms of slower reaction times when consecutive trials required a change (or switch) of response (e.g., *1* key followed by *9* key) relative to when consecutive trials did not require a change (e.g., *1* key followed by *1* key). Response times were averaged for all switched trials and all repeated trials. Perseveration scores were calculated by subtracting each participant's repeated log-latency average from the switched log-latency average (Robinson et al., 2006).

2.2.3. Binge eating

We assessed binge eating with a 7-item version of the binge eating subscale from Stice, Telch, and Rizvi's (2000) Eating Disorder Diagnostic Scale (see also Sherry & Hall, 2009). Participants respond to items (e.g., "There were times when I ate much more rapidly than normal") on a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). During phase 1, participants were instructed to answer based on their experiences over the previous 7 days; during phase 2, participants were instructed to answer based on their experiences since their last daily diary entry. Research supports the reliability and validity of our binge eating measure (Mackinnon et al., 2011). In the present study, Cronbach's alphas were acceptable (i.e., .86 [phase 1], .93 [phase 2]).

2.3. Procedure

Dalhousie University's Ethics Board approved this study. In phase 1, participants visited our lab and provided consent. Participants first completed the Stroop task followed by demographics and phase 1 measures (i.e., doubts about actions and binge eating). Phase 2 began the day after phase 1 and involved completing online measures of binge eating twice per day for 7 days. Upon completion of phase 2, participants were debriefed and awarded $10 and 3 credit points.

3. Results

All phase 1 participants partook in phase 2. On average, participants completed 11.67 (of a possible 14) daily diaries ($SD = 2.59$). We calculated an aggregated phase 2 binge eating score for each participant based on available diary data. Means for phase 1 measures were consistent with past studies (see Table 1; Graham et al., 2010; Mackinnon et al., 2011). Comparison means for phase 2 binge eating are not available.

Doubts about actions were correlated with phase 1 and 2 binge eating (see Table 1). Phase 1 and 2 binge eating were also correlated. Perseveration was not correlated with doubts about actions and binge eating. With the exception of gender, demographics did not correlate with study variables. Gender (0 = men; 1 = women) was positively correlated with perseveration and thus added as a covariate in regression analyses.

To test the moderating effect of perseveration, we centered doubts about actions and perseveration and calculated an interaction term by multiplying these centered scores. Then, we conducted a hierarchical multiple regression predicting phase 2 binge eating while entering gender, phase 1 binge eating, doubts about actions, perseveration, and the doubts about actions × perseveration interaction as simultaneous predictors (Aiken & West, 1991). Results showed significant main effects of phase 1 binge eating, $t = 8.16$, $p < .001$, $\beta = .43$, and doubts about actions, $t = 3.94$, $p < .001$, $\beta = .21$; no significant main effects of gender, $t = -.06$, $p > .05$, $\beta = -0.00$, or perseveration, $t = -0.39$, $p > .05$, $\beta = -0.02$; and a significant doubts about actions × perseveration interaction, $t = 1.98$, $p < .05$, $\beta = .10$; $F(5, 294) = 24.27$, $p < .001$, $R^2 = .29$, for the full model (Fig. 1).

We performed simple slopes analyses for individuals with low (−1 *SD*) versus high (+1 *SD*) levels of perseveration. The slope for the low level of perseveration was nonsignificant, $t = 1.60$, $p > .05$, $\beta = .15$, whereas the slope for the high level of perseveration was significant, $t = 4.13$, $p < .001$, $\beta = .41$. Thus, as predicted, doubts about actions was a more robust predictor of binge eating for highly perseverative individuals.

4. Discussion

We examined perseveration in relation to the doubts about actions-binge eating connection. As hypothesized, higher levels of perfectionistic, nagging self-doubts were associated with higher levels of binge eating for people with high (versus low) levels of perseveration. Interestingly and unexpectedly, highly perseverative individuals engage in less binge eating if they exhibit low levels of doubts about actions. These results are consistent with the notion of Robinson et al. (2006) that perseveration itself is neither adaptive nor maladaptive since high perseveration combined with low levels of doubts about actions may be protective against binge eating.

Perseverative individuals tend to have less cognitive control, be less flexible in their cognitive operations, and have difficulties with self-regulation (Robinson, 2007; Robinson et al., 2006). Individuals who are highly perseverative and exhibit frequent doubts about their actions are likely to engage in more binge eating—a habitual behavior associated with failures regulating affect and cravings (Heatherton & Wagner, 2011). Similarly, other studies suggest

Table 1
Means, standard deviations, and bivariate correlations.

Variable	*M*	*SD*	1	2	3	4
1. Doubts about actions (Phase 1)	9.96	4.09	–	.34***	.05	.34***
2. Binge eating (Phase 1)	16.14	8.41		–	.02	.50***
3. Perseveration (Phase 1)	17.39	56.88			–	.05
4. Binge eating (Phase 2)	10.66	5.62				–

Note. Binge eating scores for Phase 1 based on the previous 7 days; binge eating scores for Phase 2 based on the time since participants last daily diary entry. Perseveration scores are reported in milliseconds.
*** $p < .001$.

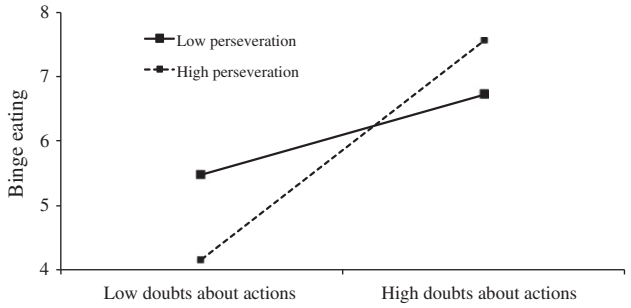

Fig. 1. Doubts about actions interacting with perseveration to predict change in binge eating.

perseverative cognitions (Brown, Parman, Rudat, & Craighead, 2012) and rigid goal setting about body shape and weight (Joyce, Watson, Egan, & Kane, 2012) contribute to dysregulated eating (e.g., binge eating) in perfectionistic individuals.

Our results clarify conditions under which high doubts about actions are associated with increased binge eating among undergraduates and thus point towards potential intervention targets. To decrease binge eating among undergraduates high in doubts about actions, clinicians might target perseverative tendencies by developing clients' self-regulatory skills (Robinson, 2007). Self-regulation may be improved by practicing exercises that promote self-control (e.g., monitoring and tracking mood and behavior; Muraven, Baumeister, & Tice, 1999). Furthermore, mindfulness training may increase awareness and self-monitoring—crucial components of self-regulation (Robinson, Schmeichel, & Inzlicht, 2010). Since perfectionistic traits are difficult to treat and resistant to change (Blatt & Zuroff, 2002), addressing factors such as perseveration that exacerbate the negative outcomes associated with doubts about actions (e.g., binge eating) may be beneficial. That said, we concede our discussion on treatment goes beyond our data and should be viewed with caution.

In the present study, we recruited a non-clinical, predominately female, sample of undergraduates, potentially raising concerns about the generalizability of our findings. We assessed perfectionism with one subscale. It would be beneficial to examine perseveration and binge eating in relation to other dimensions of perfectionism. Doubts about actions and perseveration were assessed contemporaneously. Future research should temporally separate the predictor, moderator, and outcome.

5. Conclusion

The present study clarified when doubts about actions are likely to result in binge eating. When personality traits involving nagging, perfectionistic self-doubts are combined with a tendency to get stuck on thoughts or behaviors, binge eating is more likely to occur.

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Contributions

In consultation with Simon B. Sherry, Aislin R. Mushquash designed the study, wrote the study protocol, and conducted statistical analyses. In consultation with Aislin R. Mushquash, Megan M. Short conducted literature searches and wrote a draft of the introduction and discussion. Aislin R. Mushquash wrote a draft of the method and results. Aislin R. Mushquash and Simon B. Sherry provided feedback on the entire manuscript. All authors approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, London: Sage.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.)Washington, DC: American Psychiatric Association (text rev.).

Bardone-Cone, A. M., Joiner, T., Crosby, R. D., Crow, S. J., Klein, M. H., le Grange, D. D., et al. (2008). Examining a psychosocial interactive model of binge eating and vomiting in women with bulimia nervosa and subthreshold bulimia nervosa. *Behaviour Research and Therapy*, *46*, 887–894. http://dx.doi.org/10.1016/j.brat.2008.04.003.

Bardone-Cone, A. M., Wonderlich, S. A., Frost, R. O., Bulik, C. M., Mitchell, J. E., Uppala, S., et al. (2007). Perfectionism and eating disorders: Current status and future directions. *Clinical Psychology Review*, *27*, 384–405. http://dx.doi.org/10.1016/j.cpr.2006.12.005.

Blatt, S. J., & Zuroff, D. C. (2002). Perfectionism in the therapeutic process. In G. L. Flett, & P. L. Hewitt (Eds.), *Perfectionism: Theory, research, and treatment* (pp. 393–406). Washington, DC: American Psychological Association.

Brown, A. J., Parman, K. M., Rudat, D. A., & Craighead, L. W. (2012). Disordered eating, perfectionism, and food rules. *Eating Behaviors*, *13*, 347–353. http://dx.doi.org/10.1016/j.eatbeh.2012.05.011.

Dunkley, D. M., Zuroff, D. C., & Blankstein, K. R. (2003). Self-critical perfectionism and daily affect: Dispositional and situational influences on stress and coping. *Journal of Personality and Social Psychology*, *84*, 234–253. http://dx.doi.org/10.1037/0022-3514.84.1.234.

Flaxman, P. E., Ménard, J., Bond, F. W., & Kinman, G. (2012). Academics' experiences of a respite from work: Effects of self-critical perfectionism and perseverative cognition on postrespite well-being. *Journal of Applied Psychology*, *97*, 854–865. http://dx.doi.org/10.1037/a0028055.

Frost, R. O., Marten, P. A., Lahart, C. M., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research*, *14*, 449–468. http://dx.doi.org/10.1007/BF01172967.

Graham, A. R., Sherry, S. B., Stewart, S. H., Sherry, D. L., McGrath, D. S., Fossum, K. M., et al. (2010). The existential model of perfectionism and depressive symptoms: A short-term, four-wave longitudinal study. *Journal of Counseling Psychology*, *57*, 423–438. http://dx.doi.org/10.1037/a0020667.

Heatherton, T. F., & Wagner, D. D. (2011). Cognitive neuroscience of self-regulation failure. *Trends in Cognitive Sciences*, *15*, 132–139. http://dx.doi.org/10.1016/j.tics.2010.12.005.

Hewitt, P. L., & Flett, G. L. (1991). Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *Journal of Personality and Social Psychology*, *60*, 456–470. http://dx.doi.org/10.1037/00223514.60.3.456.

Joyce, F., Watson, H. J., Egan, S. J., & Kane, R. T. (2012). Mediators between perfectionism and eating disorder psychopathology in a community sample. *Eating Behaviors*, *13*, 361–365. http://dx.doi.org/10.1016/j.eatbeh.2012.07.002.

Mackinnon, S. P., Sherry, S. B., Graham, A. R., Stewart, S. H., Sherry, D. L., Allen, S. L., et al. (2011). Reformulating and testing the perfectionism model of binge eating among undergraduate women: A short-term, three-wave longitudinal study. *Journal of Counseling Psychology*, *58*, 630–646. http://dx.doi.org/10.1037/a0025068.

Muraven, M., Baumeister, R. F., & Tice, D. M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *Journal of Social Psychology*, *139*, 446–457. http://dx.doi.org/10.1080/00224549909598404.

Paulhus, D. L., & Vazire, S. (2007). The self-report method. In R. W. Robins, R. Fraley, & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 224–239). New York, NY: Guilford.

Robinson, M. D. (2007). Lives lived in milliseconds: Using cognitive methods in personality research. In R. W. Robbins, R. C. Fraley, & R. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 345–359). New York, NY: Guilford.

Robinson, M. D., Pearce, E. A., Engel, S. G., & Wonderlich, S. A. (2009). Cognitive control moderates relations between impulsivity and bulimic symptoms. *Cognitive Therapy and Research*, *33*, 356–367. http://dx.doi.org/10.1007/s10608-008-9192-z.

Robinson, M. D., Schmeichel, B. J., & Inzlicht, M. (2010). A cognitive control perspective of self-control strength and its depletion. *Social and Personality Psychology Compass*, *4*, 189–200. http://dx.doi.org/10.1111/j.1751-9004.2009.00244.x.

Robinson, M. D., Wilkowski, B. M., Kirkeby, B. S., & Meier, B. P. (2006). Stuck in a rut: Perseverative response tendencies and the neuroticism–distress relationship. *Journal of Experimental Psychology. General*, *135*, 78–91. http://dx.doi.org/10.1037/0096-3445.135.1.78.

Shafran, R., & Mansell, W. (2001). Perfectionism and psychopathology: A review of research and treatment. *Clinical Psychology Review*, *21*, 879–906. http://dx.doi.org/10.1016/S0272-7358(00)00072-6.

Sherry, S. B., & Hall, P. A. (2009). The perfectionism model of binge eating: Tests of an integrative model. *Journal of Personality and Social Psychology*, *96*, 690–709. http://dx.doi.org/10.1037/a0014528.

Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the Eating Disorder Diagnostic Scale. *Psychological Assessment*, *12*, 123–131. http://dx.doi.org/10.1037//1040-3590.12.2.123.

Waller, G., Shaw, T., Meyer, C., Haslam, M., Lawson, R., & Serpell, L. (2012). Persistence, perseveration and perfectionism in the eating disorders. *Behavioural and Cognitive Psychotherapy*, *40*, 462–473. http://dx.doi.org/10.1017/S135246581200015X.