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RUNNING HEAD: Perfectionism and counterfactual thinking

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"If only I had done better": Perfectionism and the functionality of counterfactual thinking

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Abstract

Although a recent update on the functional theory of counterfactual thinking suggests that counterfactuals are important for behaviour regulation, there is some evidence that counterfactuals may not be functional for everyone. Across two studies we found differences between maladaptive and high personal standards perfectionism in the functionality of counterfactuals and variables relevant to behaviour regulation. Maladaptive but not personal standards perfectionism predicted making more upward counterfactuals after recalling a negative event, and was linked to a variety of negative markers of achievement. Maladaptive perfectionism was associated with making controllable, subtractive, and less specific counterfactuals. High personal standards perfectionism moderated the effects of maladaptive perfectionism on counterfactual controllability. Generating counterfactuals increased motivation for personal standards perfectionists relative to a non-counterfactual control group, but had no effect on motivation for maladaptive perfectionists. Our findings suggest a continuum of counterfactual functionality for perfectionists and highlight the importance of considering counterfactual specificity and structure.

KEYWRODS: perfectionism, counterfactual thinking, behaviour regulation, motivation

"If only I had done better": Perfectionism and counterfactual thinking

When faced with a negative outcome, such as a less than satisfactory performance on a test, it is not uncommon for people to mentally undo the outcome in favor of a better one by thinking "if only I had studied harder I might have done better". This type of mental simulation that focuses on better possible outcomes that could have been (upward counterfactuals) but did not transpire, as opposed to how things could have been worse (downward counterfactuals) but were not, is a common reaction to a negative event (Sanna, Turley Ames, & Meier, 1999). Upward counterfactuals are especially likely to be generated when the event is one that will occur again (Markman, Gavanski, Sherman, & McMullen, 1993), and when the focus is on performance or self improvement (Sanna, Chang, & Meier, 2001).

Despite the consistent finding that thoughts about what might have been can make us feel worse as we ponder what could have occurred to improve an outcome but did not (Roese, 1997), upward counterfactuals are generally viewed as being functional (Roese, 1994). Research supporting the functional perspective of counterfactuals has demonstrated that upward counterfactuals tend to focus on controllable rather than uncontrollable features of an event (Markman, Gavanski, Sherman, & McMullen, 1995) and subsequently can enhance perceptions of future (Tal-Or, Boninger, & Gleicher, 2004) and retrospective control (Nasco & Marsh, 1999).

A recent update on the functional theory of counterfactual thinking has reconciled the apparent conflict between the affective and behavioural consequences of counterfactuals by proposing that the functionality of such thoughts can best be understood from the perspective of behaviour regulation (Epstude & Roese, 2008). Drawing from the goal cognition literature, Epstude and Roese (2008) suggest that one way counterfactuals influence behaviour is via a content-specific pathway which serves as a regulatory feedback loop to manage and coordinate

behaviour. After the experience of a failed goal, the information from counterfactuals about what might have been activates a behavioural intention to take action towards reaching the goal. Several studies confirm that upward counterfactuals can increase intentions to perform the corrective behaviors identified by the counterfactuals (Page & Colby, 2003; Roese, 1994; Smallman & Roese, In press). Theory and research on how intentions are linked to behaviour further suggests that the specificity of intentions is key for bridging the intention-behaviour gap. For example, implementation intentions (Gollwitzer, 1993, 1999) – a specific behavioral intention that highlights the *how* and *when* of a behaviour – are known to have a stronger influence on the performance of behaviour than more general behaviour intentions (see Gollwitzer & Sheeran, 2006). Accordingly, Epstude and Roese (2008) posit that intentions (arising from counterfactuals) that are more specific will be more likely to lead to the performance of the corresponding behaviour.

The functional benefits of counterfactuals may also be understood with respect to their structure, that is whether they are *additive* (antecedent elements added to alter reality) or *subtractive* (antecedent elements removed to alter reality; Roese & Olson, 1993). For example, additive counterfactuals focus on new elements that may solve past problems and therefore increase the likelihood that such actions will be implemented in the future (Roese, 1994). Moreover, additive counterfactuals can inspire creative problem-solving (Markman, Lindberg, Kray, & Galinsky, 2007) that can highlight novel options that may increase the chances for improving future performance with respect to behaviour regulation (Epstude & Roese, 2008). In contrast, subtractive counterfactuals simply delete existing options that may have interfered with performance and therefore involve mental processes that may require more cognitive resources (Epstude & Roese, 2008). Thus, relative to additive counterfactuals, subtractive counterfactuals

have less potential to activate behavioural intentions that might lead to performance improvement (Epstude & Roese, 2008).

In addition to the content-specific pathway, Epstude and Roese propose (2008) a content-neutral pathway. Counterfactuals, regardless of their content, result in motivation to put forth effort to make changes and enhanced control perceptions by highlighting the links between actions and outcomes. Specifically, the negative affect arising from upward counterfactuals may motivate behaviour change because it signals a discrepancy between current and ideal states (Markman & McMullen, 2003). Together these pathways, which may operate synergistically or alone, are proposed to regulate behaviour in the service of goal pursuit (Epstude & Roese, 2008).

Despite the usefulness of this goal-directed conceptualization of counterfactual thinking for organizing counterfactual research, recent work has highlighted the importance of considering individual differences such as depressive symptoms (Markman & Miller, 2006; Quelhas, Power, Juhos, & Senos, 2008), procrastination (Sirois, 2004), and self-handicapping (McCrea, 2008) when assessing the functionality of counterfactual thoughts. Markman and Miller (2006) found that individuals with more severe depressive symptoms tended to generate upward counterfactuals that were less reasonable, more uncontrollable and characterlogical than less depressed individuals in response to a repeatable negative event. Those with more severe depressive symptoms who generated controllable counterfactuals actually experienced less post-counterfactual control rather than enhanced perceptions of control. Markman and Miller (2006) reasoned that for people with severe depressive symptoms, counterfactuals that highlighted failed control opportunities reinforced negative self-perceptions and low self-efficacy, therefore diminishing perceptions of control. In effect, the counterfactuals made were stripped of their functional quality because they failed to provide reasonable information from which behavioural

intentions and control cognitions could be generated. In addition, the excessive negative mood eroded the motivation necessary to fuel taking action towards self-improvement. Supporting this proposition is a study by Quelhas and colleagues (2008) which found that the counterfactuals generated by depressed but not non-depressed individuals failed to leave them feeling prepared to deal with or able to avoid similar future events, and did not fuel behavioral intentions to change nor contribute to actual behavior change in the following week.

Epstude and Roese (2008) account for this non-functionality by suggesting that an excess of counterfactuals may result in less than functional outcomes such as excessive problem-focused cognitions (worry) and concurrent increased distress (anxiety, depression). If, as Markman and Miller (2006) demonstrated, high negative affectivity interferes with the counterfactual pathways involved in successful behavior regulation, then a corollary to this is that individuals who experience high levels of negative affect and who are overly focused on improving outcomes will also be prone to making upward counterfactuals that lack functionality. One group of individuals for which this may be true is perfectionists.

Perfectionism can be broadly described as the tendency to experience frequent cognitions about the attainment of ideal standards (Flett, Hewitt, Blankstein, & Gray, 1998). Early conceptualizations portrayed perfectionism as a unidimensional construct primarily associated with negative consequences (Burns, 1980; Hollender, 1965). More nuanced views of perfectionism have emerged in recent years with research supporting multidimensional conceptualizations that suggest that perfectionism may be associated with a continuum of self-functioning that can include adaptive or healthy implications along with those that are maladaptive (Trumpeter & O'Leary, 2006). Although some researchers advocate the usefulness of an adaptive versus maladaptive perfectionism distinction (Bieling, Israeli, & Antony, 2004;

Stoeber & Otto, 2006), dichotomizing perfectionism this way can be problematic (Flett & Hewitt, 2005), and overlooks the potential for overlap among different dimensions of perfectionism along the self-functioning continuum (Trumpeter & O'Leary, 2006). The term "adaptive" perfectionism suggests that the potential achievement and self-esteem related benefits from pursuing high personal standards do not come at a cost. When, however, such striving becomes extreme and/or is associated with achievement related stress, then what may appear adaptive can become quite maladaptive (Hewitt & Flett, 1993). From this perspective it may be more prudent to use the neutral term *high personal standards perfectionism* (PSP) rather than adaptive perfectionism.

Although both maladaptive perfectionism (MP) and PSP dimensions feature a striving for ideal of performance, a key distinction between them involves characteristic responses to poor performance. A growing body of research indicates that each differ in their cognitive and affective responses to failure, with MP linked to more reactive, emotional-focused responses, and PSP tending towards more behavioural, problem-focused responses (e.g., Burns & Fedewa, 2005). When faced with the discrepancy between their actual and ideal standards of performance maladaptive perfectionists tend to respond with a variety of dysfunctional cognitive and affective responses including self-blame (Dunkley, Zuroff, & Blankstein, 2003), self-criticism (Stoeber, Hutchfield, & Wood, 2008), rumination (Flett, Madorsky, Hewitt, & Heisel, 2002; Hewitt & Flett, 2002), avoidant coping (Dunkley & Blankstein, 2000; Dunkley, et al., 2003), and less constructive thinking (Burns & Fedewa, 2005). Personal standards perfectionists demonstrate a greater use of problem-focused coping (Burns & Fedewa, 2005; Rheaume, et al., 2000), less use of dysfunctional coping (Rice & Lapsely, 2001), and greater pride in their efforts even after failure (Stoeber, Harris, & Moon, 2007). This can leave them feeling more prepared than

maladaptive perfectionists prior to an important achievement task (Bieling, Israeli, Smith, & Antony, 2003). PSP is also associated with effortful goal pursuit and satisfaction with goal progress (Campbell & Di Paula, 2002), although such satisfaction may be short lived and only serve to fuel the quest for achieving even higher personal standards (Koboria, Hayakawa, & Yoshihiko, 2009).

From the perspective of behavior regulation this evidence indicates that PSP and MP are differentially associated with tendencies known to facilitate the successful regulation of behavior. It is possible then that the functionality of counterfactual thoughts associated with these two dimensions of perfectionism may also differ. Although perfectionistic cognitions are a defining feature of both PSP and MP, the extent to which these two dimensions differ in making such cognitions (i.e., upward counterfactuals) may reflect corresponding differences in the functionality of counterfactuals for each. Indeed, Flett et al., (1998) posited that maladaptive perfectionists should be prone to experiencing counterfactual thoughts about what might have been as they reflect upon their failure to attain perfection. The tendency of maladaptive perfectionists to focus on the discrepancy between actual and ideal performance can reduce feelings of control and generating counterfactuals, perhaps to an excessive degree, may be one way to reassert control. Although discrepancy between current and desired states is the impetus for counterfactual generation and the basis of their functionality with respect to behavior change (Epstude & Roese, 2008), we would argue that the pitfalls of excessive counterfactuals would override the benefits of their control enhancing functions for maladaptive perfectionists and result in counterfactuals that lack the expected motivating and behavior regulating qualities. Moreover, individuals who are high on both MP (and hence feel less control) and PSP may be particularly prone to engaging in non-functional counterfactuals. For example, Mor, Day, Flett

and Hewitt (1995) found that although self-oriented perfectionism (i.e., high personal standards) was associated with a desire for control among professional artists, it was the interaction of low perceived control with self-oriented perfectionism that predicted higher levels of debilitating anxiety.

Given the evidence for differential responses to negative events and subsequent differences in behavior regulation, we expected that MP but not PSP would be linked to a tendency to make relatively more upward counterfactuals, and that these counterfactuals would lack the functional qualities needed to regulate behavior in a way that supports self-improvement. In particular we expected that the counterfactuals generated by each dimension of perfectionism would differ with respect to their specificity, structure, controllability, and corresponding perceptions of control and motivation, with MP being linked to generating more controllable and subtractive, and less specific counterfactuals. Because MP and PSP can be present in the same individual to a greater or lesser extent the relations of each while controlling for the effects of the other, as well as their interaction, were of particular interest for understanding the counterfactual functionality of those high on both perfectionism dimensions. Consistent with new perspectives on the functionality of counterfactual thoughts (Epstude & Roese, 2008; Markman & Miller, 2006), and the mood-repairing function of downward counterfactuals (Sanna, 2000), we examined the number of upward counterfactuals relative to the number of downward counterfactuals made to obtain a more complete picture of the affective and motivating function of the counterfactuals generated.

We also examined the potential role of several other affective and cognitive factors to better understand the proposed links between MP and counterfactuals. Maladaptive perfectionists are unable to derive satisfaction from performance (Cox, Enns, & Clara, 2002), and they report

lower satisfaction with school in general (Gilman, Ashby, Sverko, Florell, & Varjas, 2005) and with their grade point average (Grzegorek, Slaney, Franze, & Rice, 2004). We would argue, however, that any link between MP and counterfactuals cannot be explained by dissatisfaction alone. Rather the tendency to engage in upward counterfactuals reflects the excessive perfectionistic cognitions that characterize this form of perfectionism.

There is evidence that both counterfactual thinking (Epstude & Roese, 2008) and perfectionism (Blankstein & Hillis Lumley, 2008; Flett, et al., 2002) are linked to rumination, a method for coping with negative mood that involves self-focused attention (Lyubomirsky & Nolen-Hoeksema, 1993). Although the association between rumination and depressive symptoms are well established, there is debate regarding whether rumination is always maladaptive (see Treynor, Gonzalez, & Nolen-Hoeksema, 2003 for an overview). Recent conceptual refinements of this construct reconcile this debate by proposing a two-factor model of rumination. Brooding reflects a passive comparison of current circumstances with an unachieved standard, whereas reflection indicates a turning inward to engage in problem-solving (Treynor, et al., 2003). There is some evidence linking MP to rumination (Burns & Fedewa, 2005), and ruminative brooding in particular (Blankstein & Hillis Lumley, 2008). Yet whether each perfectionism dimension is associated with ruminative reflection, or how both forms of rumination may be linked to counterfactuals, have not been examined. Thus, we expected differential associations between the dimensions of perfectionism and rumination, and expected that these distinctions would provide insight into the functionality of counterfactuals for each form of perfectionism.

Overview of the Present Research

We conducted two studies to examine the functionality of counterfactuals for

maladaptive and high personal standards perfectionists, and to extend the nomological network of these perfectionism dimensions with respect to behavior regulation. Study 1 examined whether MP and PSP were differentially and uniquely associated with upward counterfactual generation in response to the recall of a negative event, and whether the content of the counterfactuals associated with each perfectionism dimension differed with respect to their controllability, specificity, and structure (content-specific pathway). For each analysis we examined whether the interaction of both dimensions might confer vulnerability for making counterfactuals that were less functional. We also tested the proposition that academic satisfaction would not fully explain the link between perfectionism and upward counterfactual generation. Study 2 directly tested the functionality of upward counterfactuals for maladaptive and high personal standards perfectionists by examining the cognitive and affective reactions to an autobiographical event with and without the effects of generating counterfactuals (content-neutral pathway), and examined the possible role of rumination for explaining the functionality of counterfactuals for each perfectionism dimension. In both studies students were asked to recall and write about a negative academic event and the effects of this task on mood for maladaptive and personal standards perfectionists were examined. In both studies we examined the pattern of associations of the perfectionism dimensions and their interaction with a variety of affective and behavioural indicators of self-regulation to further elucidate the distinctions and similarities between MP and PSP.

Study 1

In Study 1, we first examined how MP and PSP were linked to counterfactual generation and expected that maladaptive but not personal standards perfectionists would make relatively more upward counterfactuals and that these counterfactuals would be less functional. Given that

counterfactual thinking is proposed to activate behavioural intentions (Epstude & Roese, 2008), we posited that counterfactuals that were more specific in content would be akin to implementation intentions and could therefore be viewed as more functional with respect to behavior regulation. And following the suggestions of Roese and Olson (1993), and Epstude and Roese (2008) additive but not subtractive counterfactuals were viewed as being more functionally potent for behavior regulation. All participants were asked to recall and write about a recent academic event that involved an outcome that was disappointing, but was not a final exam (i.e., likely to occur again), and then generate counterfactuals. We tested the role of academic satisfaction as a possible mediator of the proposed link between perfectionism and counterfactuals, although we expected that it would not fully account for this association. To provide a more complete profile of the possible distinctions between the perfectionism dimensions in relation to self-regulation, we examined the relations of both dimensions with several indicators of adjustment. These included both affective (depressive affect, state anxiety, academic satisfaction) and behavioral (positive and negative study habits) indicators. We expected that the profile for MP would be characterized by higher negative affect, lower academic satisfaction and poor study habits in comparison to that for PSP.

Method

Participants

Participants were 178 undergraduate psychology students recruited from a psychology experiment participant pool and who received extra course credit for their participation. Data from one student were discarded because the event chosen for the counterfactual task was of a personal not an academic nature. This left a final sample of 177 (83 % female) students, with the majority in first (41.2%) or second (20.9%) year, and Caucasian (78.4%).

Procedure

Prior to the mood induction task, participants completed a self-report questionnaire package that included a baseline assessment of state anxiety and demographic questions. Next, participants were instructed to recall and write about a recent exam or paper/assignment for which they did not perform as well as they had expected. Five minutes were allotted for participants to complete this writing task and they were instructed to re-read the situation while vividly imagining it until the full time had elapsed. This task served the dual purpose of inducing a change in mood using a real life negative experience and as a personally relevant event for the generation of counterfactuals. The experimenter then collected the writing task and state anxiety was assessed again to evaluate the efficacy of the mood induction.

The written response to the task was then returned to the participants and they were instructed to generate counterfactuals for the event. The instructions provided for the generation of counterfactuals was similar to that used in other counterfactual research (Sanna, et al., 1999). This task was timed for 5 minutes, at which point the experimenter returned and instructed the participants to code the direction of the counterfactuals they had generated by placing a plus sign next to thoughts about things that might have made led to better outcomes (upward counterfactuals) and a minus sign next to thoughts about things that might have led to worse outcomes (downward counterfactuals).[1] This method of counterfactual coding has been used successfully in other counterfactual research (Sanna, et al., 1999). Consistent with research on individual differences and counterfactual thinking (Markman & Miller, 2006; Sirois, 2004), an index of counterfactual direction was created by calculating the difference between the upward relative to the number of downward counterfactuals made. Higher values indicate a tendency to make more upward relative to downward counterfactuals.

To ensure that the writing task focused on a disappointing academic, participants rated their satisfaction with the grade they wrote about on a 6-point scale ranging from 1 (*very dissatisfied)* to 6 (*very satisfied).* A brief mood neutralization task was then administered to compensate for the task-induced anxiety. Participants were instructed to recall and briefly write about a time when they had received a grade that they were very satisfied with and then rate their current mood on a 10-point scale ranging from 1 (*extremely unhappy)* to 10 (*extremely happy).* Following this, participants completed a set of personality, mood, and academic satisfaction questionnaires.

Measures

The means and Cronbach alphas for all scales appear in Table 1.

State anxiety. Baseline and post mood induction levels of state anxiety were assessed with the 20 item State-trait anxiety inventory, form Y-1 (STAI-S; Spielberger, 1983), a widely used sensitive self-report measure of changes in experimentally induced anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Current feelings of apprehension, nervousness and worry (e.g., I am tense) are rated on a 4-point scale ranging from 1 (*not at all)* to 4 (*very much so)*. Ten items are reverse scored before summing all items to get a total state anxiety score.

Study habits. Positive study habits were assessed with one question about the extent to which course related readings were completed, rated on a 4-point scale ranging from 1 (*I never complete the reading*s) to 4 *(I always complete the readings before class)*. Negative study habits were assessed with one question about how often sleep and regular meals were sacrificed to complete one's studying rated on a 5-point scale ranging from 1 (*never)* to 5 (*always)*.

Perfectionism. The 23-item Revised Almost Perfect Scale (APS-R) assessed high personal standards and maladaptive dimensions of perfectionism (Slaney, Rice, Mobley, Trippi,

& Ashby, 2001b). Items are rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). High personal standards perfectionism (PSP) was measured by the Standards subscale (7 items, e.g., "I have high expectations for myself."), and maladaptive perfectionism (MP) was measured with the Discrepancy subscale (12 items, e..g., "My best just never seems to be good enough for me."), which assesses the perceived discrepancy between one's standards and actual performance. Both subscales have demonstrated good internal consistency in previous work with alpha coefficients of .87 (Standards), and .92 (Discrepancy) (Rice & Slaney, 2002).

Depressive affect. A 10-item version of the Center for Epidemiological Studies Depression (CES-D) scale (Radloff, 1977) assessed depressive mood. Participants are asked how frequently in the past two weeks they have felt or behaved in the listed way (e.g., you were bothered by things that don't usually bother you), with response options on a 4-point scale ranging from 0 (less than 2 days) to 3 (9-14 days).

Academic satisfaction and performance. The Academic Performance Scale (Sirois & Pychyl, 2002) consists of 5 items that assess satisfaction with one's performance at University/college. Items such as "I am happy with my performance at University" are rated on a 6-point Likert-type with response options ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) and . An additional item asks for current average grade with response options from 1 (*A, 80% or higher*) to 5 (*E, 0 to 49%)* which are reverse keyed with higher values reflecting higher average grade.

Controllability and Specificity Coding

Two independent judges who were blind to the participants' APS-R scores coded the counterfactual statements for controllability using the general guidelines suggested by Markman and Miller (2006). Counterfactuals that focused on an aspect of the event that was judged to be

controllable by the actor at the time were categorized as controllable, whereas counterfactuals that were judged to focus on aspects that could not be controlled by the actor were categorized as uncontrollable. For example, counterfactuals such as "If only I would have studied more" were coded as controllable, whereas "If only I had the option to spread out my exams" was coded as uncontrollable. Counterfactuals that were coded as controllable were then coded for specificity. If a counterfactual included actions that were stated in very specific terms - that answered one or more of when, where, what or with who – then it was coded as specific. For example, counterfactuals such as "If only I reviewed my notes on a daily basis" and "If only I had used the study guide and the textbook cd-rom to help me study" were categorized as specific because they described concrete details about what should have been done. If, however, the counterfactual described actions that lacked detail and were stated in very general or vague terms that would be difficult to verify, then it was coded as non-specific. Counterfactuals such as "If only I had started studying earlier" and "If only I made better notes" were coded as non-specific because it would be difficult to track if and when the behaviors described were performed. The inter-rater agreement was 92.2% for the controllability dimension, and 86.2% for the specificity dimension. All disagreements were resolved through discussion. Separate indices of controllability and specificity direction were then calculated by taking the difference between the number of controllable and uncontrollable counterfactuals and the number of specific and non-specific counterfactuals, respectively. Higher scores for each index indicated a tendency to make more specific and controllable counterfactuals, respectively.

Counterfactual Structure Coding

The counterfactuals statements were coded for their structure (additive versus subtractive) by two independent judges according to the guidelines suggested by Markman and

colleagues (2007) and Roese and Olson (1993). Counterfactuals such as "if only I had more time" and "if only I remembered everything" with antecedent elements added to alter reality were coded as additive, whereas counterfactuals such as "if only I had not been so lazy" and "if only it were not a multiple choice exam" that removed antecedent elements to alter reality were coded as subtractive. Inter-rater agreement was 98.5% and disagreements were resolved through discussion.

Results

Preliminary analyses

Baseline scores on the STAI (see Table 1) were comparable to the norms reported for college student samples (males, $M = 36.47$, $SD = 10.02$; females, $M = 38.76$, $SD = 11.95$; (Spielberger, et al., 1983). Satisfaction with the grade they received in the recalled academic event was rated as low suggesting that the event chosen for the writing task was indeed a negative one. The effectiveness of the autobiographical recall task for inducing negative affect was assessed with a paired sample *t*-test on the change in STAI scores from baseline ($M = 35.96$, $SD = 10.01$) to post recall task ($M = 43.82$, $SD = 12.56$). There was a significant increase in negative affect after the recall task, $t(175) = -12.1$, $p < .0001$, $d = -.69$. After writing about a positive academic event for the mood neutralization task, students rated their mood as generally positive ($M = 7.56$, $SD = 1.44$) on the 10-point scale, suggesting that this task was effective.

[Insert Table 1 about here]

Bivariate relations of perfectionism dimensions

Bivariate correlations among the main study variables are presented in Table 1. As expected maladaptive perfectionism (MP) was associated with various indicators of self-regulation difficulties, whereas the pattern of association for the high personal standards

perfectionism subscale (PSP) suggested better overall behavioral regulation. MP was associated with depressive affect, negative study habits, lower academic satisfaction, and self-reported grade point average (GPA). PSP was associated with positive study habits and higher academic satisfaction and self-reported GPA, but unrelated to depressive affect or negative study habits.

Perfectionism and recall of negative events

To examine whether mood change (pre and post event recall) differed as a function of personal standards or maladaptive perfectionism, or their interaction, a hierarchical regression was conducted on the STAI post task score after controlling for baseline STAI scores. Following the recommendations of Aiken and West (1991), the PSP and MP scores were first centered and then an interaction term was created from their product. MP and PSP were entered first, so that the unique contributions of each controlling for the effects of the other could be examined prior to entering the interaction term to assess associations of those high in both MP and PSP (see Table 2). MP was significantly associated with the post task STAI scores after controlling for baseline mood and the effects of PSP, indicating that those higher in MP experienced greater increases in anxiety as result of the recall task. Neither PSP nor the MP-PSP interaction were significant.

[Insert Table 2 about here]

Perfectionism and counterfactual production

We tested the proposition that maladaptive and high personal standards perfectionism would be differentially associated with counterfactuals using bivariate correlations. As expected, MP was related to making relatively more upward counterfactuals, whereas PSP was not significantly related to the counterfactual index (see Table 1). To test whether individuals high in both PSP and MP may be prone to making more upward counterfactuals a regression was

conducted examining the contribution of both MP and PSP and their interaction to counterfactual generation (see Table 2). MP remained significantly associated with the counterfactual index after controlling for the effects of PSP, and the interaction of MP and PSP was also significant. As Figure 1 shows, those scoring high on MP and low on PSP were most likely to make a greater number of upward counterfactuals.

[Insert Figure 1 about here]

We then tested whether MP and the MP-PSP interaction explained variance in counterfactual production after controlling for the effects of academic satisfaction (see Table 2). Although academic satisfaction significantly predicted making fewer upward counterfactuals, it was no longer significant after adding MP into the equation. MP and the MP-PSP interaction, however, remained significant predictors of making more upward counterfactuals after controlling for academic satisfaction.

[Insert Table 3 about here]

Perfectionism and counterfactual content

Paired sample *t*-tests revealed that overall participants made more controllable ($M = 3.17$, $SD = 2.38$) than uncontrollable ($M = 1.12$, $SD = 1.47$) upward counterfactuals $t(176) = 8.74$, $p < .0001$, $d = 1.04$, and among the controllable counterfactuals, more were non-specific ($M = 2.12$, $SD = 1.66$) than specific ($M = 1.30$, $SD = 1.46$), $t(162) = -4.95$, $p < .0001$, $d = .52$. The relationships between perfectionism dimensions and the controllability of the counterfactuals generated were examined with a series of a hierarchical regressions including MP, PSP, and their interaction (see Table 3). MP was significantly associated with making more controllable counterfactuals, whereas PSP was associated with making fewer controllable counterfactuals. The interaction of MP and PSP was also significant. Neither MP, PSP, nor the interaction term

was significantly associated with the number of uncontrollable counterfactuals. The regression predicting controllability direction found that MP was associated with a tendency to make more controllable than uncontrollable counterfactuals, whereas the opposite pattern was found for PSP. The interaction term also reached significance, and again those with high MP and low PSP made a greater number of controllable counterfactuals (see Figure 2).

[Insert Figure 2 about here]

With respect to specificity, MP was significantly related to making fewer specific counterfactuals, and a greater number of non-specific counterfactuals after controlling for the total number of counterfactuals and the effects of PSP (see Table 4). Neither PSP, nor the MP-PSP interaction was significantly associated with the number of specific or non-specific counterfactuals. For specificity direction, only MP was significant indicating that those scoring high on MP controlling for PSP were more likely to make non-specific relative to specific counterfactuals.

[Insert Table 4 about here]

Perfectionism and counterfactual structure

Overall participants made more additive (M = 3.36, SD = 2.17) than subtractive (M = 0.84, SD = 1.10) counterfactuals, $t(173) = 13.69$, $p < .0001$, $d = 1.46$. Regression analyses revealed that MP was significantly associated with making fewer additive and a greater number of subtractive counterfactuals after controlling for the effects of PSP and the total number of counterfactuals generated (see Table 5). MP was also significantly related to the structure index. Neither PSP nor the interaction term was significant.

[Insert Table 5 about here]

Discussion

In Study 1 those with the highest scores on MP reported the greatest increase in anxiety after recalling and writing about a negative academic event, and maladaptive and PSP were differentially and uniquely associated with counterfactual generation. As predicted, MP was associated with making relatively more upward counterfactuals after controlling for the effects of PSP. Although the expected interaction of MP and PSP was found, it was not in the expected direction. Instead, low PSP was found to be vulnerability factor for making relatively more upward counterfactuals among those high in MP. The lower academic satisfaction reported by maladaptive perfectionists, however, did not explain this tendency.

The findings also highlighted some striking differences between the two perfectionism dimensions with respect to the content-specific regulatory pathway of counterfactuals proposed by Epstude and Roese (2008). The counterfactuals generated by maladaptive perfectionists focused on controllable actions, and tended to be less specific and therefore less likely to result in the formation of implementation intentions that may facilitate successful behavior regulation. Moreover, because their counterfactuals tended to be subtractive rather than additive they did not enahnce opportunities for creative solutions that could be implemented to prevent future failures. Generating a greater number of controllable counterfactuals may therefore be one means by which maladaptive perfectionists try to regain a sense of control over disappointing outcomes. However, maladaptive perfectionists may put themselves in a double bind whereby their counterfactuals enhance perceptions that things can be done to improve their performance but at the same time focus on limited possibilities for improvement, and lack the needed specificity and creative problem-solving qualities that would result in the formation of clear implementation intentions and corrective actions.

This short-circuiting of the behavior regulation loop may lead to repeatedly poorer than

expected performance. Indeed, the distinctions between the perfectionism dimensions on variables relevant to self-regulation echo these findings. PSP was linked to positive but not negative study habits, higher GPA, and higher academic satisfaction, whereas the reverse was found for MP. Thus, maladaptive perfectionists in this study were more prone to engaging in behaviours, such as missing meals and sleep to study, that interfere with academic performance rather than simply neglecting good study habits; personal standards perfectionists focused more on study habits that support their academic success.

Study 2

In Study 2 we aimed to address some of the important methodological limitations from Study 1 as well as compare the perfectionism dimensions with respect to the content-neutral regulatory pathway of counterfactuals. Study 1 found evidence for the differences between MP and PSP with respect to upward counterfactuals and variables relevant to self-regulation. The functionality of upward counterfactuals for each form of perfectionism was, however, indirectly assessed via the counterfactual content rather than the directly assessing the impact of the counterfactuals on perceived control and motivation. In Study 2 we took two steps to address this issue. First, we examined changes in mood, control perceptions, and motivation directly following counterfactual generation for each of the two perfectionism dimensions and their interaction to assess the functionality of the counterfactuals made via the content-neutral pathway. Second, we compared changes in these functionality indicators to those from a control group that was instructed to recall and write about a negative academic event, but not generate counterfactuals. If, as we expected, there were differences in the functionality of counterfactuals for the perfectionism dimensions then, relative to the non-counterfactual control group, positive changes in control and motivation would be noted for high personal standards perfectionists,

whereas negative or no changes would be found for maladaptive perfectionists. These differences would indicate that the counterfactuals generated lacked functionality for maladaptive, but not high personal standards perfectionists.

Study 2 also used an expanded set of questions to obtain a more fine-grained view of perfectionism dimension differences with respect to self-regulation. These included an expanded set of study habits questions, a stress rating, and a multidimensional measure of rumination. We added this latter measure to examine the possible role of different rumination dimensions, brooding and refection, in counterfactual generation. Finally, although personality constructs such as perfectionism are generally viewed as being relatively stable, the completion of the perfectionism scales after and not before the counterfactual task in Study 1 is a potential concern. It is possible that the negative event recall and counterfactual task influenced the responses on the perfectionism scale by drawing attention to participants' perfectionist tendencies via the generation of upward counterfactuals, a type of perfectionist cognition. In Study 2 the perfectionism scale was completed before the writing/counterfactual task.

Methods

Participants and procedure

Participants were 208 undergraduate students (83 % female, 80 % Caucasian) recruited from a psychology experiment participant pool who received extra course credit for participation. Similar to Study 1, this study was comprised of three parts: pre-task measures, experimental writing procedure, and post-task measures. Students were randomly assigned to either a *control* (n = 108) or *counterfactual generation* condition (n = 100) for the writing procedure. All completed the pre-task questionnaire package which included measures of perfectionism (APS-R; Slaney, Rice, Mobley, Trippi, & Ashby, 2001a), depressive affect (CES-

D), rumination, academic satisfaction and performance, and study habits. Baseline mood was rated on a 9-point direct response scale ranging from 1 (*extremely unhappy*) to 9 (*extremely happy*).

Participants were given five minutes to write about a recent disappointing academic event, and then rated their mood on a 9-point direct response scale. Participants also rated the degree of control they felt over the event on a 9-point scale ranging from 1 (*Not at all in control*) to 9 (*Extremely in control*). Those in the counterfactual group were instructed to re-read their written task and generate counterfactuals using the same instructions from Study 1. Again, this task was timed for five minutes, after which participants rated their mood, degree of control over the event, and satisfaction with the grade they received (6-point scale ranging from 1 for *very dissatisfied* to 6 for *very satisfied*). The effect of counterfactuals on motivation was assessed with a question about the extent to which they felt motivated to put effort to prepare for exams and assignments in the future rated on a 9-point scale ranging from 1 (*Not at all motivated*) to 9 (*Extremely motivated*). Following the post task ratings participants were provided instructions to code their counterfactuals as upward or downward. Individuals in the control group were given five minutes to re-read and reflect on the written event. They next completed the mood, control, satisfaction, and motivation ratings. Participants in both conditions completed the same mood neutralization task used in Study 1, and rated their mood on a 10-point scale. Participants completed demographic questions and reported their stress levels with two questions about how stressful their life had been in the past 3 months and 2 weeks, rated on a 9-point scale ranging from 1 (not stressful at all) to 9 (extremely stressful). A stress index was created by averaging these two items.

Measures

The means and Cronbach alphas for all scales appear in Table 6.

Study habits. Positive and negative study habits were assessed with an expanded set of questions from those used in Study 1. In addition to the question on the extent to which course readings were completed there were two questions about how far in advance they planned to study for midterm and final exams. Each question was rated on a 7-point scale ranging from 1 (do not plan to study in advance) to 7 (three weeks in advance). These two items were averaged into a single index reflecting study preparation. Negative study habits were assessed with four questions about how frequently sleep and regular meals were sacrificed to complete studying for exams and assignments, rated on a 5-point scale ranging from 1 (*Always*) to 5 (*Never*). Study habits for exams and assignments were assessed by combining the two questions on missing meals and sleep into single indices for each.

Rumination. Ruminative response style was assessed with the short form of the Ruminative Response Scale (Treynor, et al., 2003), a 10-item measure of what people do when they are feeling sad that assesses two distinction dimensions of rumination unconfounded with depression. The 5-item Reflection subscale reflects an inward focus to engage in purposeful problem-solving (e.g., write down what you are thinking and analyze it) indicating that it may be an adaptive form of rumination. The 5-item Brooding subscale reflects turning inward and perseverating on the gap between current and desired states (e.g., think "Why can't I handle things better?"), and is thought to reflect a maladaptive form of rumination (Treynor, et al., 2003). Because Treynor and colleagues (2003) identified the two 5-item subscales from the longer Response Style Questionnaire (Nolen-Hoeksema & Morrow, 1991), we performed a principal components analysis with a varimax rotation to verify the factor structure. Similar to the psychometric analysis conducted by Treynor et al., the scree plot revealed two factors that

explained 56.3% of the variance, with eigenvalues of 36.7 and 17.6 for the reflection and brooding factors respectively. Subscales included items that were identical to those previously identified and had alphas consistent with those found in the study by Treynor et al. (2003).

Results

Perfectionism dimensions and adjustment indicators

Similar to Study 1, satisfaction with the grade received in the academic event written about was low (M = 1.90, SD = 1.23). Bivariate correlations among perfectionism dimensions and an expanded set of adjustment indicators were examined to replicate and extend the distinctions between high personal standards (PSP) and maladaptive perfectionism (MP) demonstrated in Study 1 (see Table 6). The results from Study 2 were generally consistent with those from Study 1: MP was associated with depressive affect, negative study habits for assignments, lower academic satisfaction and self-reported grade point average (GPA), and with less satisfaction with the grade from the recalled event, but was unrelated to positive study preparation habits. MP was positively correlated with the stress index, and the brooding and reflection dimensions of rumination. A test of the difference in the size of the correlations between MP and each of the two rumination dimensions was conducted using the method outlined by Meng, Rosenthal, and Rubin (1992) for comparing correlated correlations. The two correlations were significantly different, z = 6.54, $p < .01$, with MP more strongly associated with brooding than reflection. PSP was associated with higher academic satisfaction and self-reported GPA, and both positive study habits, but unrelated to negative study habits or depressive affect. PSP was also associated with the reflection but not the brooding dimension of rumination.

[Insert Tables 6 and 7 about here]

To examine the relative contributions of MP and PSP to the rumination dimensions, a regression analysis was conducted including both MP and PSP and their interaction (see Table 7). As predicted, only MP was a significant predictor of brooding, and the interaction of MP and PSP was marginally significant (p = .058; see Figure 3), with those scoring high on both perfectionism dimensions reporting higher levels of brooding. Both MP and PSP were unique predictors of reflection but the interaction of MP and PSP was not.

[Insert Figure 3 about here]

Perfectionism and the recall of negative events

T-tests were conducted to test the efficacy of the autobiographical event recall for inducing negative mood (pre and post recall), to ensure that there were similar increases in negative mood across both the control and counterfactual conditions. The results indicated that the task was effective, as positive mood significantly decreased from baseline (M = 6.35, SD = 1.35), to post recall (M= 5.65, SD = 1.57), $t(206) = 8.30$, $p < .001$, d = 1.21, and that the mood change was similar for both the counterfactual (M = -.56, SD = 1.27) and control groups (M = -.82, SD = 1.13), $t(205) = 1.57$, *ns.*

A regression analysis controlling for baseline mood and collapsing across conditions was conducted to examine if the task-related mood changed as a function of PSP, MP or their interaction (see Table 7). Only MP was significantly associated with task-related mood change indicating that those high in MP experienced a greater shift from positive to negative mood as a result of the recall task. Neither PSP nor the MP-PSP interaction were significant.

Perfectionism and the effect of counterfactual production

Overall, participants made relatively more upward than downward counterfactuals as the mean for the counterfactual index was positive (M = 1.34, SD = 2.28). Similar to Study 1, MP

was significantly correlated with making relatively more upward rather than downward counterfactuals (r = .28, p < .01), whereas PSP was not (r = .17, *ns*) among those in the counterfactual condition (n = 99). A regression analysis controlling for the effects of each perfectionism dimension and testing their interaction revealed that only MP uniquely explained variance in counterfactual direction (see Table 7). The counterfactual index was in turn associated with negative mood changes from pre to post counterfactual generation (r = -.24, p < .05), and with the brooding (r = .22, p < .05), but not the reflection (r = -.05, *ns*) dimension of rumination. To test the relative contributions of perfectionism and rumination dimensions to counterfactual generation, we conducted a hierarchical regression predicting counterfactual direction from ruminative brooding, MP, PSP and the MP-PSP interaction (see Table 7).When all variables were entered into the regression model, none reached significance although MP was marginally significant in explaining unique variance in counterfactual direction.

The effect of counterfactual production (counterfactual versus control condition) on mood (post recall to post counterfactual generation) was further examined as a function of PSP and MP, and their interaction with hierarchical regression analyses controlling for post recall mood. The dummy-coded condition variable was entered in the first block, the two centered continuous perfectionism variables in the second block, the three two-way interaction terms (the products of each of the two perfectionism dimensions with the two conditions and each other) in the third block, and the three-way interaction term in the final block. As expected the effect of condition (counterfactual versus control) on mood was significant (see Table 8). Neither MP, PSP, nor any of the interaction terms were significant.

[Insert Tables 8 and 9 about here]

There was also evidence suggesting that the functionality of counterfactuals differed across the perfectionism dimensions. Separate regression analyses for each condition group controlling for the effects of each dimension found that MP was negatively associated with motivation to put effort to improve outcomes in the future in both the counterfactual and the control conditions, suggesting that counterfactuals were not functional with respect to increasing preparative motivations for those high in MP (see Table 9). PSP was positively associated with motivation to put effort to improve outcomes in the future in the counterfactual but not the control condition, suggesting that counterfactuals served a preparative function for individuals high in PSP. The interaction of MP and PSP was not significant in either condition.

We next examined the relations of the perfectionism dimensions to perceptions of control pre-task, and the effect of counterfactual thoughts (counterfactual generation versus control condition) on perceptions of control over the recalled event (pre and post counterfactual generation) as a function of PSP and MP and their interaction. MP was negatively associated with baseline levels of control over the recalled event (r = -.13, p = .06), and PSP was unrelated to baseline perceived control (r = -.04, *ns*). The t-test results confirmed that the baseline levels of perceived control were not significantly different between the counterfactual (M = 5.38, SD = 2.02) and the control groups, (M = 5.53, SD = 1.87) $F(1,206)$ = .01, *ns*. Perceived control post task between condition groups was, however, significantly different, with those in the counterfactual group reporting greater perceived control over the recalled event than those in the non-counterfactual group after controlling for baseline levels of control (see Table 10). The changes in perceptions of control were unrelated to MP, PSP or their interaction in either the control or counterfactual conditions.

[Insert Table 10 about here]

General Discussion

Across two studies we found evidence indicating differences between high personal standards and maladaptive perfectionists in the generation and functionality of counterfactual thoughts, and for several variables relevant to behavioural regulation. In both Study 1 and Study 2, maladaptive perfectionists made more upward relative to downward counterfactuals, whereas personal standards perfectionists did not. Moreover, maladaptive perfectionism (MP) accounted for counterfactual direction above and beyond the effects of academic dissatisfaction in Study 1 and brooding-rumination in Study 2. Study 1 also provided evidence that personal standards perfectionism (PSP) buffered the effects of maladaptive perfectionism on counterfactual generation. In Study 2 PSP was associated with greater motivation for future efforts in the counterfactual but not the control condition, whereas MP was associated with lower motivation across both conditions. In essence, generating counterfactuals did not serve to increase the low motivation experienced by maladaptive perfectionists. Control perceptions increased overall for those in the counterfactual group relative to the control group; however, MP did not contribute to lower perceived control as expected.

Our findings with respect to the functionality of counterfactuals parallel those found by Markman and Miller (2006), and by Quelhas and colleagues (2008), yet provide additional explanations as to why generating controllable counterfactuals may not always be functional for certain individuals. Quelhas and colleagues (2008) found that compared to non-depressed individuals, those who were depressed did not derive any cognitive benefits from the counterfactual they generated in response to a negative academic event in that they did not feel better prepared for dealing with similar future events. Similarly, those high in MP in Study 2 reported low motivation to put effort towards changing future similar outcomes after generating

counterfactuals. Markman and Miller (2006) found that those with severe depressive symptoms who generated controllable counterfactuals experienced less rather than more post-counterfactual perceptions of control and reasoned that this was a result of focusing on failed control opportunities. Taken together, the findings from the present studies suggest that maladaptive perfectionists make a greater number of counterfactuals and controllable counterfactuals in particular perhaps as means to deal with their low perceived control over outcomes, and that counterfactuals may serve to enhance their perceived control over disappointing outcomes at least temporarily.

The findings from Study 1 suggest that the specificity and structure as well as the controllability of counterfactuals are important considerations when assessing whether upward counterfactuals are beneficial. Consistent with the behavior regulating function of the content-specific counterfactual pathway proposed by Epstude and Roese (2008), lack of specificity in the counterfactuals generated may render even controllable counterfactuals essentially ineffectual with respect to activating potent behavioural intentions. Rather than serving a preparative function, such counterfactuals contribute to the "spinning [of] one's wheels" suggested by Markman and Miller (2006) by transferring information via a causal insight that is incomplete regarding the how or when of corrective action. This lack of specificity can mean the difference between the formation of a goal intention versus a behavioural or implementation intention, with the latter posited to have a greater likelihood of resulting in the necessary behavioural consequences to improve outcomes (Epstude & Roese, 2008). Similarly, the tendency of maladaptive perfectionists to make subtractive rather than additive counterfactuals can lower the likelihood that of improving performance or taking action (Roese, 1994). Indeed, Quelhas et al. (2008) found that the depressed participants who generated counterfactuals not only felt less

prepared but also demonstrated a lack of intention to change and less actual behavior change in the week that followed.

Our findings address the debate regarding whether some forms of perfectionism can be healthy or functional (Stoeber & Otto, 2006), or whether perfectionism is necessarily dysfunctional by providing evidence that the counterfactual thoughts of high personal standards but not maladaptive perfectionists may be functional. Contrary to what we expected, high PSP in combination with MP did not contribute to making dysfunctional counterfactuals. Instead, PSP buffered the negative effects of MP with respect to the number of upward and controllable counterfactuals generated. To the extent that upward counterfactual thoughts motivate and direct efforts to improve one's future performance then high PSP may be beneficial in certain situations. This assertion is consistent with that of other researchers who have argued that perfectionistic strivings are not in and of themselves maladaptive but that it is perfectionistic cognitions that are excessively self-critical which interfere with healthy self-regulation (Dunkley, Zuroff, & Blankstein, 2006). In addition, differences between the two perfectionism dimensions on variables relevant to self-regulation across the two studies, and with respect to the content-specific pathway in Study 1 present a portrait of maladaptive but not high personal standards perfectionists as having behaviour regulation problems.

Further support for the distinction between MP and PSP with respect to healthy self-regulation comes from the differential associations of the perfectionism dimensions with the two facets of rumination. Although both perfectionism dimensions were associated with ruminative reflection, only MP was significantly and uniquely associated with ruminative brooding. Moreover, it was the interaction of high MP and PSP that was particularly dysfunctional with respect to ruminative brooding. MP was also more strongly related to brooding than to reflection,

although MP accounted for variance in counterfactual direction beyond that associated with ruminative brooding. Together these findings indicate that the tendency to engage in ruminative brooding may distinguish MP from PSP, but may also be especially problematic when both are present. Unlike ruminative reflection which is proposed to facilitate problem-focused coping (Martin & Tesser, 1996; Treynor, et al., 2003), ruminative brooding is an emotion-focused response that can short-circuit problem solving and active coping by trapping the brooder in a pattern of preservative thought. This type of thought can contribute to a self-defeating cycle whereby rumination engenders greater distress and more counterfactuals following a negative event (Davis & Lehman, 1995).

This account of how counterfactuals may interfere with active coping for maladaptive perfectionists parallels Flett and associates (1998) explanation of the links between maladaptive perfectionism, rumination, and end state thinking. End state thinking occurs when the goal objects themselves and the associated feelings become the focus rather than ways to attain the goals (Martin & Tesser, 1989). Rumination and end state thinking emerge when one feels unable to initiate instrumental behaviours that will move them closer to their goals. The findings from Study 1 suggest that a tendency to generate non-specific counterfactuals that would be less likely to activate concrete implementation intentions for taking corrective actions in the future is one reason why maladaptive perfectionists may feel unable to engage in effective behaviour regulation. Combine this with a tendency to make less creative subtractive counterfactuals which can also take a toll on cognitive resources (Epstude & Roese, 2008), and the prospects for conceptualizing novel and concrete ways to improve performance becomes less likely. In this context, excessive ruminative brooding and upward counterfactual thinking about unattained goals and the negative feelings that follow may be conceptually similar to end state thinking, and

may explain why the counterfactuals of maladaptive perfectionists can be self-defeating rather than motivating.

Limitations and Future Directions

The findings from the two studies should be considered within the context of several limitations. We did not directly test whether the specificity of counterfactuals predicts a greater likelihood of performing the corresponding corrective behaviours as suggested by Epstude and Roese (2008). Given the empirical evidence on the potency of implementation intentions for behaviour performance (Gollwitzer & Sheeran, 2006) and the implied links with poor behaviour regulation among the maladaptive perfectionists in the two studies, this is a promising area for future investigation. If specificity is a key indicator of when counterfactuals are and are not functional, then it may also be possible to develop interventions to help improve the specificity of counterfactuals generated to transform them from goal intentions to implementation intentions. Similarly, identifying individual differences such as MP that may be linked to a tendency to generate less specific counterfactuals could have implications for understanding chronic behaviour regulation problems.

Our findings suggest that there are differences in the specificity and structure of the counterfactuals associated with the two perfectionism dimensions. Irrespective of these counterfactual qualities, it is possible that the counterfactuals generated by maladaptive perfectionists lack the necessary insight to identify the actual causes that contributed to their poor outcomes. Without accurately identifying the potential reasons for poor performance, generating a large number of controllable counterfactuals would simply create the illusion that more could have been done without providing useful or relevant information about how to change future circumstances. Examining the relevancy of counterfactuals for actual behaviour change might therefore be a fruitful area for future research on understanding the links between perfectionism and counterfactual

functionality and the implications for behaviour regulation.

In the two studies we assessed two dimensions of perfectionism – maladaptive and high personal standards. Other ways of assessing perfectionism include self-oriented, other-oriented, and socially prescribed perfectionism (Hewitt & Flett, 1991). Although our findings suggest differential functionality of counterfactuals for maladaptive and personal standards perfectionism, whether counterfactuals are functional for self-oriented and socially prescribed perfectionists is unknown and may be a fruitful area for future inquiry.

Summary and Conclusions

In sum, our findings indicate that rather than viewing counterfactuals dichotomously as either functional or dysfunctional, it may be useful to also consider when and for whom counterfactual thoughts may be non-functional. From a self-regulatory perspective, however, we would argue that because non-functional counterfactuals lack the benefits of more motivating functional counterfactuals they provide little benefit in terms of behavioural self-regulation and may be as problematic as the dysfunctional counterfactuals noted by other researchers (Markman & Miller, 2006; McCrea, 2008; Quelhas, et al., 2008; Sirois, 2004). Identifying individuals who generate counterfactuals to enhance low perceptions of control but that do not adequately identify the means by which control can be regained because they lack the necessary elements that can help initiate behaviour change is an important focus for future research.

In terms of perfectionism, we found evidence across the two studies that the two dimensions of perfectionism lie at different points along a continuum of counterfactual functionality, with high PSP lying closer to the functional end and MP located squarely within the non-functional range. These findings - along with the differential associations of the perfectionism dimensions to variables relevant for self-regulation – extend the nomological

network of PSP and MP. They also provide additional fodder for the perfectionism functionality debate by suggesting that PSP but not MP may hold some benefit with respect to behaviour regulation. Understanding how other circumstances and individual differences may be positioned along the counterfactual functionality continuum and how counterfactual specificity and structure may allow for shifts towards the functional end are potentially fruitful areas for future research.

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Notes

Early in the study it was noticed that some participants were confusing the affective states associated with the counterfactual thoughts with the possible outcomes and placed a minus sign next to the upward counterfactuals and a plus sign next to the downward counterfactuals. In cases where it appeared that there was some confusion the experimenter verified the coded direction for each participant by asking that he or she re-read the instructions and the ratings again to ensure that instructions were understood. The participants made corrections to their coding where necessary. To avoid this problem with subsequent participants the original codes were replaced with a triangle for the plus sign and a star for the minus sign and no further coding problems were noted.

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Table 1: *Study 1 Pearson Correlations Among Counterfactuals, Perfectionism, and Self-Regulation Indicators*.

Variable	1	2	3	4	5	6	7	8	9
1. Counterfactual index	---								
2. Maladaptive perfectionism (MP)	.33**	---							
3. Personal standards perfectionism (PSP)	.02	.04	---						
4. Baseline anxiety	.15 [a]	.35**	-.03	---					
5. Depressive affect	.22**	.58**	-.12	.44**	---				
6. Positive study habits - readings	-.15*	-.10	.25**	-.12	-.23**	---			
7. Negative study habits – miss meals and sleep	.07	.17*	-.04	.10	.26**	.07	---		
8. Satisfaction with grade from recalled event	-.17*	-.11	-.12	-.16*	-.23**	.10	15*	---	
9. Academic satisfaction	-.26**	-.52**	.23**	-.37**	-.42**	.19*	.07	.19*	---
10. Average grade	-.15*	-.22**	.34**	-.22*	-.21**	.27**	-.01	.13	.56**
Mean	2.43	4.06	5.76	36.01	13.40	2.32	2.12	1.87	4.20
Standard deviation	3.01	1.29	0.87	10.07	5.38	0.61	1.02	1.13	0.98
Cronbach's alpha (scales only)	---	0.93	0.86	0.93	0.82	---	---	---	0.82

Note: [a] $p = .06$, *$p < .05$, **$p < .01$

Table 2. *Study 1 Hierarchical Regression Analyses Testing the Relation of Perfectionism Dimensions to Post Task Mood and Counterfactual Direction.*

	Post task mood		Counterfactual index		Counterfactual index		
Predictor	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 3 β
Baseline anxiety	.63**	.63**	---	---	---	---	---
Academic satisfaction	---	---	---	---	-.27**	-.12	-.12
Maladaptive perfectionism (MP)	.28**	.28**	.35**	.37**	---	.29**	.30**
Personal standards perfectionism (PSP)	-.07	-.08	-.03	-.04	---	.00	-.01
MP X PSP	---	-.06	---	-.14*	---	---	-.14*
R^2	.60	.61	.13	.15	.07	.13	.16**
F	87.08**	65.72**	12.48**	9.77**	13.87**	13.64**	9.04**
ΔR^2	---	.00	---	.02		06	.02*
ΔF	---	1.26	---	3.92*		12.50**	3.91**

Note: The degrees of freedom (df) for the *F* value vary according to the number of predictors entered in each step: two predictors, df = (1, 174); three predictors, df = (1, 173); four predictors, df = (1, 172); $N = 177$, * $p < .05$, ** $p < .01$.

Table 3: *Study 1 Hierarchical Regression Analyses Testing the Relation of Perfectionism to Counterfactual Controllability*

	Controllable CFT		Uncontrollable CFT		Controllability Index	
Predictor	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β
Maladaptive perfectionism (MP)	.29**	.31**	.09	.08	.18*	.20**
Personal standards perfectionism (PSP)	-.21**	-.22**	.02	.03	-.17*	-.19*
MP X PSP	---	-.16*	---	.05	---	-.15*
R^2	.12	.15	.01	.01	.06	.08
F	11.73**	9.59**	.72	.63	5.22**	4.81**
ΔR^2	---	.02	---	.00	---	.02
ΔF	---	4.80*	---	.46	---	3.82*

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: two predictors, df = (1, 174); three predictors, df = (1, 173); $N = 177$, * $p < .05$, ** $p < .01$.

Table 4: *Study 1 Hierarchical Regression Analyses Testing the Relation of Perfectionism to Counterfactual Specificity*

	Specific CFT		Non-specific CFT		Specificity Index	
Predictor	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β
Number of CFT	.75**	.73**	.73**	.75**	-.06	-.08
Maladaptive perfectionism (MP)	-.16**	-.14*	.14*	.13*	-.22**	-.20*
Personal standards perfectionism (PSP)	.02	.01	-.03	-.01	.04	.02
MP X PSP	---	-.08	---	.07	---	-.11
R^2	.51	.52	.62	.63	.06	.07
F	54.95**	42.01**	87.09**	66.28**	3.32*	3.03*
ΔR^2	---	.01	---	.01	---	.01
ΔF	---	2.08	---	2.08	---	2.08

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: three predictors, df = (1, 173); four predictors, df = (1, 172); $N = 177$, * $p < .05$, ** $p < .01$.

Table 5: *Study 1 Hierarchical Regression Analyses Testing the Relation of Perfectionism to Counterfactual Structure*

	Additive CFT		Subtractive CFT		Structure Index	
Predictor	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β
Number of CFT	.92**	.92**	.42**	.42**	.63**	.63**
Maladaptive perfectionism (MP)	-.09*	-.09*	.18**	.18**	-.17**	-.17**
Personal standards perfectionism (PSP)	-.03	-.03	.07	.06	-.06	-.06
MP X PSP	---	.01	---	-.01	---	.01
R^2	.81	.81	.25	.25	.38	.38
F	236.72**	176.53**	19.12**	14.28**	34.44**	25.68**
ΔR^2	---	.00	---	.00	---	.00
ΔF	---	.03	---	.03	---	.03

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: three predictors, df = (1, 173); four predictors, df = (1, 172); N = 177, * $p < .05$, ** $p < .01$.

Table 6: *Study 2 Pearson Correlations Among Counterfactuals, Perfectionism, and Self-Regulation Indicators.*

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Maladaptive perfectionism (MP)	--											
2. Personal standards perfectionism (PSP)	.03	--										
3. Depressive affect	.55**	.03	--									
4. RRS, Brooding	60**	09	66**	--								
5. RRS, Reflection	16*	16*	37**	39**	--							
6. Stress	38**	.09	44**	44**	12	--						
7. Course readings	.13[a]	24**	.15*	.12	.15*	.04	--					
8. Study preparation	01	19**	.15*	.06	.14*	.11	51**	--				
9. Negative study habits – exams	12	.06	.24**	.19**	.13[a]	.22**	09	17*	--			
10. Negative study habits – assignments	15*	.01	.25**	.21**	.22**	.19**	04	14*	81**	--		
11. Satisfaction with grade	.16*	00	.17*	.05	.01	.10	.08	04	08	05	--	
12. Academic Satisfaction	.54**	36**	.40**	.30**	.08	.18	23**	10	08	10	10	--
13. Average grade	.24**	34**	03	01	.08	03	15*	03	05	04	13[a]	56**

Mean												
	.65	.88	.21	1.42	0.64	.43	.53	.05	.13	.67	.90	.24
Standard deviation												
	.29	.77	.46	.28	.81	.58	.69	.90	.88	.83	.23	.82
Cronbach's alpha (scales only)												
	.94	.85	.88	.87	.82	.75	--	.89	.66	.66	--	.74

Note: RRS = Ruminative Response Scale; [a] $p = .05$, *$p < .05$, **$p < .01$

Table 7. *Study 2 Hierarchical Regression Analyses Testing the Relations Among Perfectionism, Rumination, and Counterfactual Direction*

	Brooding		Reflection		Counterfactual index		Counterfactual index	
Predictor	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β
Ruminative brooding	---	---	---	---	---	---	.07	.06
Maladaptive perfectionism (MP)	.60**	.57**	.15*	.14 [a]	.27**	.25*	.22 [b]	.21
Personal standards perfectionism (PSP)	.07	.08	.16*	.16*	.16	.17	.16	.17
MP X PSP	---	.11[a]	---	.04	---	.11	---	.11
R^2	.37	.38	.05	.05	.11	.12	.11	.12
F	60.23**	41.88**	5.26**	3.57*	5.67**	4.21**	.3.89*	3.20*
Δ R^2	---	.01	---	.00	---	.01	---	.01
Δ *F*	---	3.63 [b]	---	.23	---	1.25	---	1.15

Note: The degrees of freedom (df) for the *F* value vary according to the number of predictors entered in each step: two predictors, df = (1, 204); three predictors, df = (1, 203); four predictors, df = (1, 202); $N = 207$, [b] $p = .06$, * $p < .05$, ** $p < .01$.

Table 8: *Study 2 Hierarchical Regression Analyses Testing the Relation of Perfectionism to Post Task Mood as a Function of Counterfactual Condition*

	Post Task Mood			
Predictor	Step 1 β	Step 2 β	Step 3 β	Step 4 β
Baseline mood	.85**	.84**	.84**	.84**
Condition (Control vs. counterfactual)	.10**	.10**	.10**	.10**
Maladaptive perfectionism (MP)	---	-.05	-.03	-.04
Personal standards perfectionism (PSP)	---	-.02	-.02	-.02
MP X PSP	---	---	-.07	-.06
MP X condition	---	---	-.01	-.01
PSP X condition	---	---	-.04	-.04
MP X PSP X condition	---	---	---	-.06
R^2	.73**	.74**	.74**	.75**
F	283.05**	94.42**	82.33**	72.67**
ΔR^2	---	.01*	.00	.00
ΔF	---	.77	3.31	2.05

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: two predictors, df = (1, 204); four predictors, df = (1, 202); seven predictors, df = (1, 199); eight predictors, df = (1, 198); $N = 207$, * $p < .05$, ** $p < .01$.

Table 9: *Study 2 Hierarchical Regression Analyses Testing the Relation of Perfectionism to Motivation in the Counterfactual and Control Conditions*

	Motivation			
	Counterfactual Condition (N = 100)		Control Condition (N= 106)	
Predictor	Step 1 β	Step 2 β	Step 1 β	Step 2 β
Maladaptive perfectionism (MP)	-.27**	-.27**	-.23*	-.22*
Personal standards perfectionism (PSP)	.21*	.22*	.11	.11
MP X PSP	---	.00	---	-.03
R^2	.11	.11	.07	.07
F	6.07**	4.00*	3.68*	2.46
Δ R^2	---	.00	---	.00
Δ F	---	.00	---	.09

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: two predictors, df = (1, 204); three predictors, df = (1, 203); N = 207, * p < .05, ** p <.01.

Table 10: *Study 2 Hierarchical Regression Analysis Testing the Relation of Perfectionism to Post Task Control as a Function of Counterfactual Condition*

	Post Task Control			
Predictor	Step 1 β	Step 2 β	Step 3 β	Step 4 β
Baseline control	.92**	.91**	.91**	.92**
Condition (Control vs. counterfactual)	.08**	.08**	.08**	.09**
Maladaptive perfectionism (MP)	---	.01	.02	.02
Personal standards perfectionism (PSP)	---	-.02	-.02	-.03
MP X PSP	---	---	-.05	-.04
MP X condition	---	---	.00	.01
PSP X condition	---	---	-.03	-.03
MP X PSP X condition	---	---	---	-.04
R^2	.84	.84	.84	.84
F	528.88**	262.93**	151.03**	132.50**
ΔR^2	---	.00	.00	.00
ΔF	---	.35	1.13	1.28

Note: The degrees of freedom (df) for the F value vary according to the number of predictors entered in each step: two predictors, df = (1, 204); four predictors, df = (1, 202); seven predictors, df = (1, 199); eight predictors, df = (1, 198); $N = 207$, * $p < .05$, ** $p < .01$.

Figure 1

Study 1: The association of maladaptive perfectionism to counterfactual direction as a function of high personal standards perfectionism

Figure 2

Study 1: The association of maladaptive perfectionism to counterfactual controllability as a function of high personal standards perfectionism

Figure 3

Study 2: The association of maladaptive perfectionism to ruminative brooding as a function of high personal standards perfectionism