

Reformulating and Testing the Perfectionism Model of Binge Eating Among Undergraduate Women: A Short-Term, Three-Wave Longitudinal Study

Sean P. Mackinnon, Simon B. Sherry,
Aislin R. Graham, and Sherry H. Stewart
Dalhousie University

Dayna L. Sherry
Queen Elizabeth II Health Sciences Centre

Stephanie L. Allen, Skye Fitzpatrick, and Daniel S. McGrath
Dalhousie University

The perfectionism model of binge eating (PMOBE) is an integrative model explaining why perfectionism is related to binge eating. This study reformulates and tests the PMOBE, with a focus on addressing limitations observed in the perfectionism and binge-eating literature. In the reformulated PMOBE, concern over mistakes is seen as a destructive aspect of perfectionism contributing to a cycle of binge eating via 4 binge-eating maintenance variables: interpersonal discrepancies, low interpersonal esteem, depressive affect, and dietary restraint. This test of the reformulated PMOBE involved 200 undergraduate women studied using a 3-wave longitudinal design. As hypothesized, concern over mistakes appears to represent a vulnerability factor for binge eating. Bootstrapped tests of mediation suggested concern over mistakes contributes to binge eating through binge-eating maintenance variables, and results supported the incremental validity of the reformulated PMOBE beyond perfectionistic strivings and neuroticism. The reformulated PMOBE also predicted binge eating, but not binge drinking, supporting the specificity of this model. The reformulated PMOBE offers a framework for understanding how key contributors to binge eating work together to generate and to maintain binge eating.

Keywords: perfectionism, social maladjustment, depressive affect, dietary restraint, binge eating

Psychological and interpersonal stressors abound in the university setting (e.g., achievement pressures, relationship stressors, unrealistic thinness ideals, and mood difficulties), leaving undergraduate women vulnerable to negative outcomes such as binge eating (i.e., rapidly and uncontrollably eating a large amount of

food in a short period of time; Cheng & Mallinckrodt, 2009; Tylka & Subich, 2004). Dimensional models of eating problems (Tylka & Subich, 2003) and binge eating (Fitzgibbon, Sánchez-Johnsen, & Martinovich, 2003) are supported by research. Drawing on such evidence, in the present study we conceptualize binge eating as lying along a continuum from mild to severe levels. This dimensional approach to binge eating parallels a foundational tenet of counseling psychology by attempting to understand the entire spectrum of functioning as opposed to just focusing on pathology (Gelso & Fretz, 2001). According to dimensional models, mild to moderate levels of binge eating negatively impact health, well-being, and functioning. In undergraduates, binge eating is linked to negative mood, cigarette smoking, and binge drinking (e.g., Rush, Becker, & Curry, 2009). Given that binge eating reaches its apex during the time when students are typically attending a university (Sherry & Hall, 2009) and that curbing subclinical binge eating may help prevent the occurrence of more severe binge eating and associated health complications, there is a clear need for explanatory models elucidating why undergraduate women binge eat. Research also indicates such models should include a key role for personality traits (e.g., perfectionism) in shaping binge eating (Sherry & Hall, 2009).

Perfectionism and Binge Eating

Perfectionism is a robust predictor of eating problems (Bardone-Cone et al., 2007). Ample research links perfectionism to anorexic and bulimic symptoms (e.g., Stice, 2002). In contrast, evidence on

This article was published Online First August 15, 2011.

Sean P. Mackinnon, Aislin R. Graham, Stephanie L. Allen, Skye Fitzpatrick, and Daniel S. McGrath, Department of Psychology, Dalhousie University, Halifax, Nova Scotia, Canada; Simon B. Sherry and Sherry H. Stewart, Departments of Psychology and Psychiatry, Dalhousie University; Dayna L. Sherry, Department of Psychology, Queen Elizabeth II Health Sciences Centre, Halifax, Nova Scotia, Canada.

This manuscript was funded by a grant awarded to Simon B. Sherry, Sherry H. Stewart, and Dayna L. Sherry from the Dalhousie University Department of Psychiatry Research Fund. Sean P. Mackinnon was supported by a Canada Graduate Scholarship from the Social Sciences and Humanities Research Council and an honorary Izaak Walton Killam Level II Scholarship. Sherry H. Stewart was supported by a Killam Research Professorship from Dalhousie University. This manuscript is based on data collected as part of a previously published longitudinal study (see Graham et al., 2010). Sean P. Mackinnon was supervised by Simon B. Sherry. Ellen Breen, Kristin Fossum, Nikola Hartling, Anna MacKinnon, and Jillian Tonet are thanked for their research assistance.

Correspondence concerning this article should be addressed to Simon B. Sherry, Department of Psychology, Dalhousie University, Life Sciences Centre, 1355 Oxford Street, Halifax, Nova Scotia, Canada, B3H 4J1. E-mail: simon.sherry@dal.ca

perfectionism and binge eating is still emerging (Pratt, Telch, Labouvie, Wilson, & Agras, 2001), and moderational and mediational models of perfectionism and binge eating are especially rare (Bardone-Cone et al., 2007). As a moderational model with strong empirical support, the three-factor interactive model of binge eating is an exception to this trend (Bardone-Cone et al., 2008). This model asserts women with high perfectionism, high body dissatisfaction, and low general self-efficacy are prone to binge eating (Bardone-Cone, Weishuhn, & Boyd, 2009). Perfectionism is thus proposed in this model to work along with other variables to explain when women are likely to binge eat. However, less is known about why perfectionism leads to binge eating. Indeed, mediational models clarifying mechanisms responsible for the perfectionism–binge eating link are scarce.

The Original Perfectionism Model of Binge Eating (PMOBE)

To address this gap, Sherry and Hall (2009) proposed the original PMOBE and tested this mediational model with 566 undergraduate women using a 7-day structured daily diary design. According to this model, socially prescribed perfectionism (i.e., perceiving that others are demanding perfection of oneself) confers vulnerability to binge eating through four putative triggers of binge eating: interpersonal discrepancies, low interpersonal esteem, depressive affect, and dietary restraint. Sherry and Hall termed these four variables “binge triggers,” as evidence suggests they come before and contribute to binge eating (e.g., Deaver, Miltenberger, Smyth, Meidinger, & Crosby, 2003; Heatherton & Baumeister, 1991; Herman & Polivy, 2004).

Women high in socially prescribed perfectionism experience chronic interpersonal problems (Hewitt, Flett, Sherry, & Caelian, 2006), frequently perceiving or encountering distressing difficulties with others. Evidence indicates women high in socially prescribed perfectionism are especially prone to interpersonal discrepancies (i.e., viewing oneself as falling short of others’ expectations) and to problems with interpersonal esteem (i.e., feeling accepted by, at ease around, and liked by others) in their social lives (Sherry & Hall, 2009). Women high in socially prescribed perfectionism often feel judged, disliked, and excluded by others and tend to feel a strong sense of deficiency as social beings (Rice, Leever, Christopher, & Porter, 2006). Such interpersonal problems may instigate periods of depressive affect (i.e., feeling miserable, cheerless, and sad) and attempts at dietary restraint (i.e., behaviors aimed at reduced intake of calories). Depressive affect is therefore conceptualized in the original PMOBE as a consequence of chronic interpersonal problems (Wei, Mallinckrodt, Russell, & Abraham, 2004), whereas dietary restraint is understood as an attempt by women to win others’ approval or avoid others’ criticism by obtaining a thinner body (Sherry & Hall, 2009).

In summary, socially prescribed perfectionism is proposed to generate binge triggers in the original PMOBE, setting conditions in which binge eating is likely to occur. Whether to escape an aversive sense of self-awareness as social beings (Heatherton & Baumeister, 1991), to reduce feelings of depressive affect (Deaver et al., 2003), or to compensate for hypocaloric states arising from strict dietary restraint (Herman & Polivy, 2004), Sherry and Hall (2009) found consistent evidence that women high in socially prescribed perfectionism are vulnerable to binge eating. Although

the original PMOBE received promising empirical support, areas for improvement remain in the original PMOBE and in the literature on perfectionism and binge eating as a whole.

Advancing the Literature on Perfectionism and Binge Eating

Bardone-Cone et al. (2007) reviewed 55 papers on perfectionism and eating problems published from 1990 to 2005 and found only 18% of these studies used longitudinal designs. These authors also noted most longitudinal studies in this area use only two measurement occasions, which represents a serious shortcoming. Longitudinal studies with three or more measurement occasions allow researchers to clarify directional or temporal relations and to make stronger inferences regarding mediational processes by reducing temporal confounding. Several key relationships in the PMOBE (e.g., depressive affect’s influence on binge eating) are also conceptualized as short term and dynamic (Sherry & Hall, 2009). Short-term, multiwave longitudinal studies (occurring over several weeks) are well suited to capture such relationships and may decrease recall bias by measuring events closer to their occurrence (Bolger, Davis, & Rafaeli, 2003). Little is also known about perfectionism and binge eating on a week-to-week basis. In summary, a three-wave, 3-week longitudinal investigation testing potential mediators of the perfectionism–binge eating link (our design in the present study) would represent a novel contribution to research on perfectionism and binge eating.

Including preexisting, baseline levels of binge eating in longitudinal studies also provides a more stringent test of perfectionism as a vulnerability factor for binge eating (Bolger et al., 2003). Sherry and Hall (2009) did not include baseline levels of binge eating in their original test of the PMOBE, reflecting a serious limitation observed in most studies of perfectionism and binge eating (e.g., Pearson & Gleaves, 2006). Consequently, little is known about perfectionism as a vulnerability factor predicting changes in binge eating. Binge eating may also represent a self-perpetuating problem, with binge eating itself predisposing future episodes of binge eating. For example, binge eating at Time A may contribute to conditions at Time B (e.g., postbinge dietary restraint) that are conducive to more binge eating at Time C. It is therefore also important to test whether there is a role for perfectionism in predicting binge-eating maintenance variables (e.g., dietary restraint) beyond baseline levels of binge eating.

The Reformulated PMOBE

The present investigation reformulates the original PMOBE (Sherry & Hall, 2009), accounting for the above-mentioned limitations, and we then test this reformulated model with 200 undergraduate women studied using a three-wave, 3-week longitudinal design. The reformulated PMOBE involves three main advances relative to the original PMOBE.

First, Sherry and Hall (2009) treated socially prescribed perfectionism (Hewitt & Flett, 1991) as the central perfectionism variable of interest in the original PMOBE. The socially prescribed perfectionism construct arises from an interpersonal-psychodynamic theoretical tradition and involves salient interpersonal content (Sherry, Hewitt, Flett, & Harvey, 2003). Items measuring socially prescribed perfectionism assess mental

representations of others as critical, unrealistic, and demanding (e.g., “Others expect me to be perfect”).

In the present study, we draw on an alternative model of perfectionism: namely, concern over mistakes. This construct arises from a cognitive-behavioral theoretical tradition (Frost, Marten, Lahart, & Rosenblate, 1990) and includes a place for both interpersonal and cognitive features of perfectionism (Sherry et al., 2003). Though some well-established models distinguish between interpersonal and intrapersonal (cognitive) features of perfectionism (e.g., Hewitt & Flett, 1991), these models are not demonstrably superior to models that combine interpersonal and cognitive features of perfectionism into a single construct (see Sherry et al., 2003). In fact, evidence suggests models that combine interpersonal and cognitive features of perfectionism are strong predictors of disordered eating (e.g., Dunkley, Blankstein, Masheb, & Grilo, 2006).

The concern-over-mistakes construct involves interpersonal problems (e.g., social-evaluative concerns and approval needs) with perfectionistic themes (e.g., “The fewer mistakes I make, the more others like me”). Several authors assert items measuring concern over mistakes include salient interpersonal content (e.g., Dunkley & Kyparissis, 2008). Consistent with these assertions, concern over mistakes is connected to dysfunction in the social domain, including hostility, social hassles, loneliness, social anx-

ety, and disagreeableness (e.g., Ashbaugh et al., 2007). Research has thus converged to suggest concern over mistakes involves interpersonal problems with perfectionistic themes and is associated with a chronic tendency to perceive and/or to encounter negative interactions with others (e.g., Sherry et al., 2003).

The concern-over-mistakes construct also includes rigid “if . . . then” contingencies for self-worth and dichotomous “all-or-nothing” thinking (e.g., “If I fail at work, then I am a failure as a person”). Indeed, such cognitive dysfunction is viewed as central to concern over mistakes (e.g., Brown & Beck, 2002; Frost et al., 1990). Evidence also suggests interpersonal problems and cognitive dysfunction with perfectionistic themes are both key contributors to eating problems (Bardone-Cone et al., 2007; Hewitt, Flett, & Ediger, 1995; Shafran, Cooper, & Fairburn, 2002). In focusing on concern over mistakes, the reformulated PMOBE asserts both interpersonal and cognitive features of perfectionism are centrally involved in binge eating.

Second, binge eating is reconceptualized in the reformulated PMOBE as a cyclical process that starts and ends with binge eating (see Figure 1). In this way, the reformulated PMOBE takes into account evidence that binge eating is highly stable (Sherry & Hall, 2009) and provides a stricter test of model predictions by including baseline levels of binge eating.

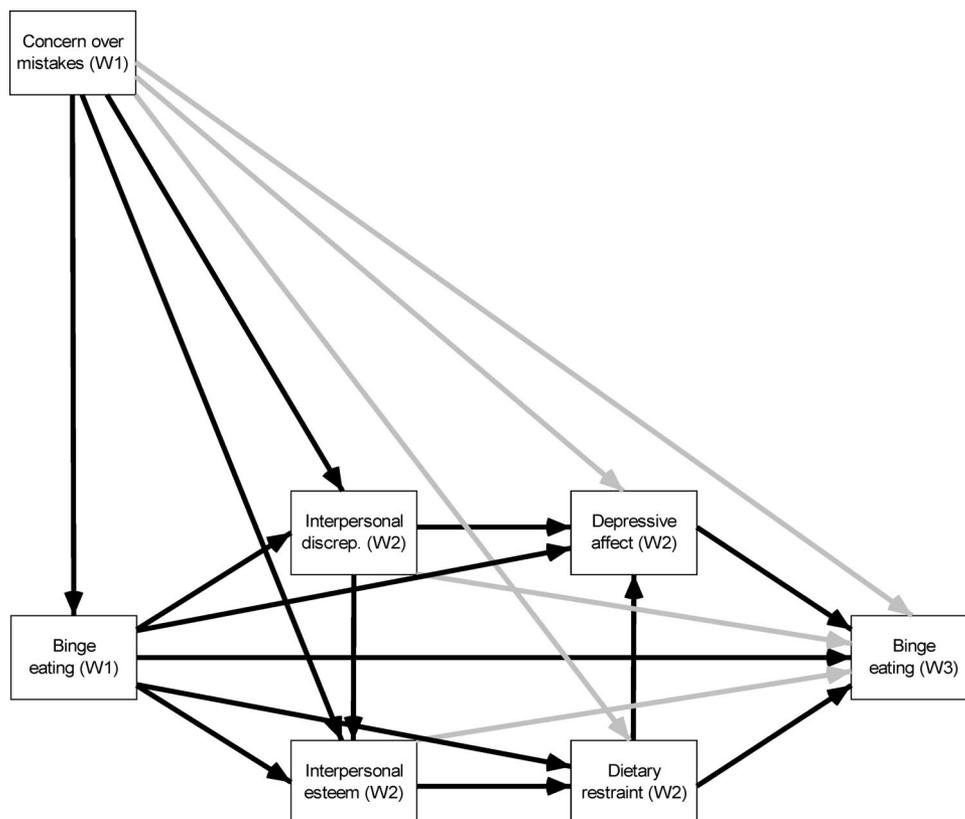


Figure 1. The path model for the reformulated perfectionism model of binge eating. Rectangles represent variables measured via questionnaire. Black arrows represent hypothesized direct effects; gray arrows represent hypothesized nonsignificant direct effects. In the interest of clarity, error terms are not displayed. Interpersonal discrep. = interpersonal discrepancies; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3.

Third, in the original PMOBE, interpersonal discrepancies, low interpersonal esteem, depressive affect, and dietary restraint were seen only as “binge triggers” that precede and predispose binge eating. That is, the original PMOBE assumed relations between these four variables and binge eating were simply unidirectional (binge triggers → binge eating). This conceptualization is incongruent with research indicating these four variables represent both antecedents and consequences of binge eating (Deaver et al., 2003; Stein et al., 2007). The reformulated PMOBE reconceptualizes these four variables as “binge eating maintenance variables,” which represent both prebinge antecedents and postbinge consequences that predispose further binge eating (see Figure 1).

To elaborate, a tendency to relate to others in an acrimonious fashion makes depressive affect a frequent occurrence for people high in concern over mistakes, and such depressive affect predisposes binge eating (Frost et al., 1990; Sherry & Hall, 2009). The reformulated PMOBE is thus in line with prior theory suggesting social maladjustment (e.g., interpersonal discrepancies or low interpersonal esteem) contributes to depressive affect, which, in turn, leads to binge eating (e.g., Wilfley, Pike, & Striegel-Moore, 1997). Considered from this perspective, binge eating is a maladaptive coping response to depressive affect brought on by disrupted or by disturbed social functioning (see also Wilfley et al., 1997). Building on studies suggesting depressive affect is also a consequence of binge eating (Deaver et al., 2003), the reformulated PMOBE takes a wider view of the depressive affect–binge eating link, with depressive affect understood as reemerging as part of a cascade of postbinge emotionality. The reformulated PMOBE thus maintains depressive affect and binge eating are involved in a vicious cycle, where binge eating contributes to depressive affect, which in turn contributes to more binge eating.

In the reformulated PMOBE, dietary restraint is also viewed as both a precursor of binge eating (with dietary restraint generating a state of caloric deprivation that is conducive to binge eating) and a sequela of binge eating (with women high in concern over mistakes recommitting to a pattern of unrealistic, hard-to-maintain dietary restraint after they binge eat). An anxious overconcern about others’ expectations for thinness and a penchant to pursue lofty appearance ideals in an effort to gain others’ acceptance or to escape others’ censure are also characteristic of women high in concern over mistakes (Sherry & Hall, 2009). We believe these characteristics encourage women high in concern over mistakes to make frequent—but ultimately unsuccessful—attempts at dietary restraint, both before and after binge eating. In this manner, the reformulated PMOBE aims to better capture the cyclical, self-perpetuating nature of binge eating in which binge eating and its maintenance variables (e.g., dietary restraint) contribute to one another over time.

Hypotheses Derived From the Reformulated PMOBE

Primary Hypotheses

As noted above (see The Reformulated PMOBE section), there are differences between socially prescribed perfectionism and concern over mistakes; however, these constructs may ultimately be more similar than different. Socially prescribed perfectionism and concern over mistakes are strongly correlated, and load onto the same latent variable (Dunkley, Blankstein, Halsall, Williams, &

Winkworth, 2000). Thus, there are strong empirical reasons to believe concern over mistakes (as measured in the present study) will have predictive properties similar to socially prescribed perfectionism (as measured in Sherry & Hall, 2009).

As Figure 1 illustrates, we hypothesized the following in the reformulated PMOBE:

(a) Building on Sherry and Hall (2009), who predicted and observed a similar set of findings, we hypothesized concern over mistakes at Wave 1 is related to binge eating at Wave 1, interpersonal discrepancies at Wave 2, and interpersonal esteem at Wave 2. As in past research (Sherry & Hall, 2009), we also hypothesized concern over mistakes at Wave 1 is not directly related to depressive affect at Wave 2, dietary restraint at Wave 2, or binge eating at Wave 3. Rather, we understand concern over mistakes as conferring vulnerability to depressive affect, dietary restraint, and binge eating indirectly through variables (e.g., interpersonal discrepancies) and processes articulated in our mediational hypotheses below (see also Sherry & Hall, 2009).

(b) Studies not only indicate binge eating is a cyclical, recurrent, and self-perpetuating behavior but also suggest binge eating is an antecedent of binge-eating maintenance variables (e.g., Deaver et al., 2003; Stein et al., 2007). Therefore, we hypothesized binge eating at Wave 1 is related to binge-eating maintenance variables at Wave 2 and binge eating at Wave 3.

(c) Sherry and Hall (2009) found interpersonal discrepancies are strongly related to lower interpersonal esteem and to higher depressive affect. Building on this research, we hypothesized interpersonal discrepancies at Wave 2 is linked to interpersonal esteem at Wave 2 and depressive affect at Wave 2. Given theory and evidence suggesting depressive affect fully mediates the link between interpersonal discrepancies and binge eating (e.g., Heatherton & Baumeister, 1991), we also hypothesized interpersonal discrepancies at Wave 2 is unrelated to binge eating at Wave 3.

(d) Consistent with prior work (e.g., Wilfley et al., 1997), Sherry and Hall (2009) found interpersonal esteem was related to dietary restraint and that dietary restraint fully mediated the relationship between interpersonal esteem and binge eating. Thus, we hypothesized interpersonal esteem at Wave 2 is related to dietary restraint at Wave 2, but not to binge eating at Wave 3.

(e) Both theory and research converge to suggest women binge eat as a means of coping with or escaping from depressive affect (Deaver et al., 2003; Sherry & Hall, 2009). Drawing on this work, we hypothesized depressive affect at Wave 2 is related to binge eating at Wave 3.

(f) Dietary restraint also tends to precede and to trigger binge eating (Herman & Polivy, 2004), and is frequently tied to depressive affect (Sherry & Hall, 2009). Thus, we hypothesized dietary restraint at Wave 2 is related to depressive affect at Wave 2 and binge eating at Wave 3.

(h) Finally, in testing the original PMOBE, Sherry and Hall (2009) found paths specified between interpersonal discrepancies and dietary restraint and between interpersonal esteem and depressive affect were nonsignificant. Following this research, these paths are not specified in the reformulated PMOBE.

Stability and Vulnerability Hypotheses

Binge eating was hypothesized to exhibit high stability over a 3-week period (see also Rice & Dellwo, 2001; Sherry & Hall,

2009). Concern over mistakes was also hypothesized to represent a vulnerability factor for binge eating. That is, concern over mistakes at Wave 1 was hypothesized to predict binge eating at Wave 3 over and above baseline levels of binge eating at Wave 1. Because this vulnerability effect may be fully mediated in the context of the path model for the reformulated PMOBE (see Figure 1 and our mediational hypotheses below), we tested for this vulnerability effect using a separate path model, which included only concern over mistakes at Wave 1 and binge eating at Waves 1 and 3.

Mediational Hypotheses

As in Sherry and Hall (2009), five mediational hypotheses are proposed in the reformulated PMOBE (see Figure 1). Our main mediational hypothesis proposes (a) concern over mistakes at Wave 1 will indirectly affect binge eating at Wave 3 through all binge-eating maintenance variables at Wave 2. Binge-eating maintenance variables are thus seen as explanatory mechanisms that clarify why concern over mistakes lead to binge eating.

Four other mediational hypotheses appear in the reformulated PMOBE (see Figure 1). Sherry and Hall (2009) tested, and found support for, a similar set of hypotheses. In the present study, we hypothesize (b) concern over mistakes at Wave 1 will indirectly affect depressive affect at Wave 2 through interpersonal discrepancies at Wave 2; (c) concern over mistakes at Wave 1 will indirectly affect dietary restraint at Wave 2 through interpersonal discrepancies at Wave 2 and interpersonal esteem at Wave 2; (d) interpersonal discrepancies at Wave 2 will indirectly affect binge eating at Wave 3 through depressive affect at Wave 2; and (e) interpersonal esteem at Wave 2 will indirectly affect binge eating at Wave 3 through dietary restraint at Wave 2. Taken together, these five mediational hypotheses test the reformulated PMOBE's assertion that concern over mistakes contribute to interpersonal problems, and these interpersonal problems bring about periods of depressive affect and attempts at dietary restraint that are conducive to binge eating.

Incremental Validity Hypotheses

Building on results from Sherry and Hall (2009), paths predicted in the reformulated PMOBE are also hypothesized to remain significant and largely unaltered when controlling for perfectionistic strivings or neuroticism. Perfectionistic strivings (i.e., rigidly and ceaselessly demanding perfection of oneself) is conceptualized as one key dimension of the perfectionism construct (Frost et al., 1990; Hewitt & Flett, 1991; Slaney, Rice, Mobley, Trippi, & Ashby, 2001). This dimension is correlated with both concern over mistakes (Frost et al., 1990) and eating problems (Bardone-Cone, 2007), making perfectionistic strivings a useful covariate to assist in identifying whether concern over mistakes uniquely contributes to the reformulated PMOBE. Although Sherry and Hall found perfectionistic strivings was largely unimportant to the variables of the original PMOBE, more research is needed to support this conclusion, as other studies point toward a role for perfectionistic strivings in eating problems (Bardone-Cone, 2007; Sherry, Hewitt, Besser, McGee, & Flett, 2004). In addition, neuroticism (i.e., a tendency to experience negative emotions) is correlated with concern over mistakes, binge-eating maintenance variables, and binge

eating (Sherry & Hall, 2009). It is therefore important to test whether the variables of the reformulated PMOBE add incrementally to our understanding of binge eating or are redundant with the higher order domain of neuroticism.

Specificity Hypotheses

Testing the predictive specificity of a proposed explanatory model is also important (Garber & Hollon, 1991). Is the reformulated PMOBE specifically predictive of just binge eating? Or are other bingeing behaviors (e.g., binge drinking) also well predicted by the variables of this model? There is small to moderate correlation between binge eating and binge drinking (Gadalla & Piran, 2007), and these two bingeing behaviors often co-occur in undergraduates (Rush et al., 2009), making binge drinking a suitable variable to use in testing the specificity of the reformulated PMOBE. Despite this overlap (Gadalla & Piran, 2007), binge eating and binge drinking are not seen as equivalent and do not necessarily have identical antecedents or consequences (Birch, Stewart, & Brown, 2007). For example, whereas concern over mistakes is positively related to binge eating (Cassin & von Ranson, 2005), research suggests concern over mistakes and binge drinking are unrelated (Flett et al., 2008). Building on such evidence, we hypothesized the variables of the reformulated PMOBE will be effective in predicting binge eating, but not binge drinking.

Method

Participants. Two hundred undergraduate women taking psychology courses at a Canadian university were recruited. Women averaged 19.86 years of age ($SD = 3.02$). Participants self-identified as Caucasian (88.0%), Asian (3.0%), Black (2.5%), multiracial (3.5%), or "other" (3.0%). These women averaged 15.01 years of formal education ($SD = 1.43$) and 2.10 years of education in the university setting ($SD = 1.16$); 25.6% of participants reported their major was undeclared, 25.5% majored in psychology, 10.0% reported double majors (e.g., history and English), 10.0% majored in nursing, 7.5% majored in neuroscience, 5.5% majored in kinesiology, and 15.9% reported other majors. Most women were either single (47.0%) or dating (40.5%), with 8.5% cohabitating and 4.0% married. The present sample is similar to other undergraduate samples recruited at this Canadian university (e.g., Grant, Stewart, & Mohr, 2009). In Canada, the median age for women attending a university is 22.70 years, and 9.0% of these women are of a visible minority (Statistics Canada, 2006, 2011). Moreover, about 4.8% of women in this age demographic are married, and 9.2% are cohabiting. The present sample is thus comparable to Canadian population norms.

Instruments. Participants were directed to respond to each measure's items with a time frame in mind—either a long-term time frame (i.e., during the past several years) or a short-term time frame (i.e., during the past 7 days). A long-term time frame was used for personality measures of concern over mistakes, perfectionistic strivings, and neuroticism. This is consistent with evidence indicating these four variables are highly stable (e.g., Rice & Aldea, 2006). A 7-day time frame was used for measures of interpersonal discrepancies, interpersonal esteem, depressive affect, dietary restraint, binge eating, and binge drinking. This was done to be consistent with the three-wave, 3-week design. Our use

of a 7-day time frame is also congruent with theory and research suggesting these five variables change meaningfully over short time periods (see Sherry & Hall, 2009). As in other repeated measures designs (Sherry & Hall, 2009), several measures in our study were slightly modified to suit a 7-day time frame and/or shortened to decrease participant burden. These measures are referred to as *modified* in the Instruments section.¹ All measures in the present study were scored such that higher scores indicate higher levels of the construct measured. All items for each measure were summed to create total scores.

Concern over mistakes. Cox, Enns, and Clara (2002) adapted the original nine-item Concern Over Mistakes subscale of the Multidimensional Perfectionism Scale (Frost et al., 1990) into a five-item modified short form, thereby improving the psychometric properties of this subscale. Cox et al. shortened the Concern Over Mistakes subscale from nine items to five items by conducting a factor analysis and then selected the five highest loading items (see p. 368 of Cox et al., 2002, for additional details). A sample item from the five-item modified short form includes: "If I fail partly, it is as bad as being a total failure." Women responded to each item on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Alpha reliabilities for the five-item modified short form are high ($>.85$) in undergraduate samples (Sherry, Mackinnon, & Stewart, 2010), and this modified short form also correlates strongly (r s from .87 to .96) with Frost et al.'s (1990) original nine-item subscale (Cox et al., 2002; Graham et al., 2010; Sherry et al., 2010).

Perfectionistic strivings. Perfectionistic strivings were measured with a four-item modified short form of the original seven-item Personal Standards subscale of the Multidimensional Perfectionism Scale (Frost et al., 1990). By performing a factor analysis and by selecting the four highest loading items, Cox et al. (2002) adapted the original seven-item Personal Standards subscale (Frost et al., 1990) into a four-item modified short form (see p. 368 of Cox et al., 2002, for more details). Adapting the original seven-item subscale in this manner does not appear to diminish its strong psychometric properties (Cox et al., 2002). A sample item from the four-item modified short form includes: "I set much higher goals than most people." Participants responded to each item on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Alpha reliabilities for the four-item modified short form are high ($>.85$) in undergraduate samples (Sherry et al., 2010), and this modified short form correlates strongly (r s from .77 to .96) with Frost et al.'s (1990) original seven-item subscale (Cox et al., 2002; Sherry et al., 2010).

Neuroticism. Neuroticism was measured with the eight-item Neuroticism subscale of the Big Five Inventory (BFI-N; Benet-Martínez & John, 1998). The BFI-N was unmodified. A sample BFI-N item includes: "I see myself as someone who is depressed." Women responded using a 5-point scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). Alpha reliabilities for the BFI-N are high (.79 to .88) in undergraduate samples (Sherry & Hall, 2009; Sherry et al., 2010), and the BFI-N correlates strongly ($r = .83$) with neuroticism as measured by Costa and McCrae's (1992) NEO Five-Factor Inventory (Benet-Martínez & John, 1998).

Interpersonal discrepancies. The original nine-item Self-Criticism subscale of the Reconstructed Depressive Experiences Questionnaire (Bagby, Parker, Joffe, & Buis, 1994) was adapted into a five-item modified short form. This modified short form is

composed of the five highest factor loadings from the original nine-item subscale (see p. 63 of Bagby et al., 1994, for additional details). The five-item modified short form was also changed from the original nine-item subscale such that items no longer represent falling short of self-imposed standards (e.g. "I often find that I don't live up to my own standards or expectations") and instead represent perceptions of falling short of others' standards (e.g. "I often found that I didn't live up to others' standards or expectations for me"; "I felt that I had disappointed others"; and "Others were not satisfied with what I had accomplished"). Participants responded to each item on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Sherry et al. (2010) found the five-item modified short form has adequate alpha reliability (.77) and correlates strongly ($r = .57$) with Bagby et al.'s (1994) original nine-item subscale.

Interpersonal esteem. The original seven-item Social Self-Esteem subscale of the State Self-Esteem Scale (Heatherton & Polivy, 1991) was adapted into a four-item modified short form by Sherry and Hall (2009) based on the four highest factor loadings from the original seven-item subscale (see p. 898 of Heatherton & Polivy, 1991, for additional details). A sample (reverse-coded) item from the four-item modified short form is as follows: "I was worried about looking like a fool." Women responded using a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). Alpha reliabilities for the four-item modified short form are high (.88 to .95) in undergraduates (Sherry & Hall, 2009; Sherry et al., 2010), and this modified short form correlates strongly ($r = .77$) with Heatherton and Polivy's (1991) original seven-item subscale (Sherry et al., 2010).

Depressive affect. The original 15-item Depression subscale of the Profile of Mood States (McNair, Lorr, & Droppleman, 1992) was adapted into a four-item modified short form by Bolger, Zuckerman, and Kessler (2000) based on the four highest factor loadings from the original 15-item subscale (see p. 955 of Bolger et al., 2000, for additional details). Participants indicated how accurately four words representing depressive affect (e.g., *sad*) described their feelings. Participants responded to each item on a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). Alpha reliabilities for the four-item modified short form are high (.80 to .95) in undergraduate samples, and this modified short form correlates strongly ($r = .97$) with McNair et al.'s (1992) original 15-item subscale (Sherry & Hall, 2009; Sherry et al., 2010).

Dietary restraint. The original three-item Abstaining from Eating subscale of the Dietary Intent Scale (Stice, 1998) was adapted to suit a 7-day time frame, and this three-item modified subscale was used to measure dietary restraint. Following recommendations from Stice, Fisher, and Lowe (2004), items from the

¹ Because each measure in the present study (except for neuroticism) was slightly modified from its original format, a supplementary cross-sectional study was conducted to assess the psychometric properties of these modified measures. Both the modified versions and the original, unmodified versions of the measures were included in this study. Using the same recruitment methods as our primary sample, we recruited 99 undergraduates from the same Canadian university. Participants in this supplementary cross-sectional study averaged 20.56 years of age ($SD = 4.08$) and 2.11 years of university education ($SD = 1.18$), and were mostly women (79.8%). Results from this study are referenced as Sherry, Mackinnon, and Stewart (2010).

three-item modified subscale measured specific and concrete behaviors used to restrict caloric intake (e.g., “I skipped meals in an attempt to control my weight”). Participants responded using a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Alpha reliabilities for the three-item modified subscale are high (.90 to .94) in undergraduate samples, and this three-item modified subscale correlates strongly ($r = .82$) with Stice’s (1998) original three-item subscale (Sherry & Hall, 2009; Sherry et al., 2010).

Binge eating. Negative affect and binge eating are confounded in several measures of binge eating (see Sherry & Hall, 2009, for a discussion). However, in the present study, we focused only on specific and concrete behaviors representing binge eating per se (e.g., rapidly consuming a large amount of food). This operationalization excludes emotional eating (e.g., eating when feeling sad), postbinge emotionality (feeling depressed after bingeing), and compensatory behavior (e.g., purging or excessive exercise). Consistent with recommendations for operationalizing binge eating (see Sherry & Hall, 2009), women were informed: “‘Eating binges,’ ‘an eating binge,’ ‘bingeing,’ etc. refer to the rapid and uncontrollable consumption of a large amount of food in a short period of time, usually less than two hours.’”

On the basis of the above operationalization of binge eating, the original Binge Eating subscale of the Eating Disorder Diagnostic Scale (EDDS-BE; Stice, Telch, & Rizvi, 2000) was adapted to suit a 7-day time frame. Two EDDS-BE items were dropped because they mentioned postbinge emotionality (e.g., feeling depressed after bingeing). The modified EDDS-BE included seven items (e.g., “There were times when I ate much more rapidly than normal”). Participants responded to each item using a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Alpha reliabilities for the modified EDDS-BE are high (.89 to .95) in undergraduate samples (Sherry et al., 2010), and the modified EDDS-BE correlates strongly ($r = .75$) with Stice et al.’s (2000) original Binge Eating subscale (Sherry & Hall, 2009; Sherry et al., 2010).

Binge drinking. Binge drinking was assessed on the basis of recommendations from the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2003). NIAAA’s original, single-item Binge Drinking scale was adapted to match a 7-day time frame. This modified Binge Drinking scale asked women: “During the past 7 days, how often did you have 4 or more drinks containing any kind of alcohol within a 2-hour period?” Participants responded using a 12-point scale ranging from 0 *times* to 10 *or more times*. A single drink was defined as half an ounce of absolute alcohol (e.g., one 12-ounce can or glass or bottle of beer or cooler, one 5-ounce glass of wine, or one drink containing one shot of liquor or spirits). The modified Binge Drinking scale correlates strongly ($r = .62$) with NIAAA’s (2003) original Binge Drinking scale (Sherry et al., 2010).

Procedure. The present study was approved by a Research Ethics Board. Women were recruited through the participant pool in the Department of Psychology. Data were collected in three waves. Participants completed scales in a lab once a week for three consecutive weeks. Demographics were collected only in Wave 1; otherwise, questionnaires were identical across all waves. All women were sent an e-mail reminder to complete their assessments as scheduled. As an incentive, participants were also given

\$10 as well as a 3.0% bonus credit for one of their psychology courses. All participants were debriefed.

Compliance with the study protocol was high: All 200 participants (100.0%) completed Wave 1; 198 participants (99.0%) completed Wave 2; and 189 participants (94.5%) completed Wave 3. Wave 2 occurred an average of 7.02 ($SD = 0.41$) days after Wave 1, and Wave 3 occurred an average of 14.13 ($SD = 0.67$) days after Wave 1. Only weekly reports provided up to 2 days before or up to 2 days after a scheduled assessment were retained for analyses. In total, 587 weekly reports were included in the final sample.

Data analytic strategy. Descriptive statistics, bivariate correlations, tests of multivariate normality, and confirmatory factor analyses were conducted for the variables of the reformulated PMOBE. Path analysis was used to test the path model for the reformulated PMOBE (see Figure 1), including stability and vulnerability effects. Mediation hypotheses were tested using bootstrapping. Incremental validity analyses tested whether paths in the path model remained significant and relatively unchanged after controlling for covariates (i.e., perfectionistic strivings or neuroticism). Each covariate was added separately to the path model, as including both covariates at once would result in an unduly complicated model. The specificity of the reformulated PMOBE was also tested by replacing binge eating with binge drinking and then reevaluating the fit indices for and the path coefficients in the path model.

Results

Missing data analysis. Only 2.8% of our data were missing, and covariance coverage (i.e., the proportion of participants for which we have data on any given scale) ranged from 0.94 to 1.00. A nonsignificant Little’s Missing Completely at Random test, $\chi^2(1216, N = 200) = 1238.13, p = .32$, indicated our missing data were missing completely at random (Little, 1988). When data are missing completely at random and only a very small portion of data are missing (i.e., less than 5.0%), a single imputation using the expectation maximization algorithm provides unbiased parameter estimates and improves the statistical power of analyses (Scheffer, 2002). Missing data were therefore imputed using an expectation maximization algorithm in SPSS 17.0.

Descriptive statistics and alpha reliabilities. We computed means by aggregating means across 3 weeks, and we computed standard deviations by aggregating standard deviations across 3 weeks (see Table 1). All means fell within one standard deviation of means from past studies of undergraduate women (e.g., Sherry & Hall, 2009; Sherry et al., 2010). This suggests means from our study are generally consistent with means from comparable samples. We also compared our sample with a sample of 125 community-dwelling women who averaged 49.59 years of age ($SD = 4.77$; Graham & Sherry, 2011). More specifically, we compared means on the EDDS-BE from our study (see Table 1) with means on the EDDS-BE from community-dwelling women ($M = 11.15, SD = 8.50$). We found women in our sample reported significantly higher levels of binge eating, $t(323) = 2.96, p < .01, d = 0.33$. We also calculated alpha reliabilities for each scale during each week, and ranges appear in Table 1. These alphas were acceptable ($\geq .77$) for all three waves and congruent with other studies involving the scales we used (e.g., Sherry & Hall, 2009; Sherry et al., 2010).

Table 1
Means, Standard Deviations, and Alpha Reliabilities

Variable	<i>M</i>	<i>SD</i>	α	Potential range	Actual range
Concern over mistakes	10.30	4.89	.87-.89	5-25	5.0-25.0
Perfectionistic strivings	12.91	4.17	.86-.89	4-20	4.0-20.0
Neuroticism	22.13	5.76	.80-.82	8-40	9.0-39.0
Interpersonal discrep.	12.62	6.77	.86-.88	5-35	5.0-35.0
Interpersonal esteem	13.78	4.50	.90-.91	4-20	4.0-20.0
Depressive affect	3.39	3.04	.77-.78	0-16	0.0-16.0
Dietary restraint	5.09	3.31	.89-.92	3-15	3.0-15.0
Binge eating	14.03	9.27	.91-.92	7-49	7.0-49.0
Binge drinking	0.65	0.96	—	0-10	0.0-8.0

Note. Alpha reliabilities are reported for all measures except binge drinking, which was measured with a single item. Thus, because the alpha reliability cannot be calculated for binge drinking, it is represented by a dash. Interpersonal discrep. = interpersonal discrepancies.

Bivariate correlations. Across all waves, concern over mistakes correlated with interpersonal discrepancies, interpersonal esteem, depressive affect, dietary restraint, and binge eating (see Table 2). Binge-eating maintenance variables also correlated with one another and with binge eating in the expected manner. In addition, perfectionistic strivings correlated with concern over mistakes across all waves, but was less consistently correlated with the other variables of the reformulated PMOBE. Neuroticism correlated with concern over mistakes and all the other variables of the reformulated PMOBE across all waves. Overall, these results suggest perfectionistic strivings and neuroticism are generally suitable covariates in the present study.

Binge drinking was weakly and inconsistently related to most of the variables of the reformulated PMOBE, suggesting the variables of this model are more than nonspecific variables tied to both binge eating and drinking. Furthermore, the variables of the reformulated PMOBE were not significantly correlated with demographics (i.e., age, ethnicity, year of study, major, and relationship status). Demographics were thus not used as covariates.

Across all waves, test-retest correlations were consistently moderate to high: concern over mistakes (.80-.90), perfectionistic strivings (.85-.89), neuroticism (.87-.90), interpersonal discrepancies (.60-.74), interpersonal esteem (.77-.80), depressive affect (.53-.68), dietary restraint (.67-.79), binge eating (.74-.80), and binge drinking (.33-.59). These results support the reliability of the scales used in our study and suggest most of these scales are highly stable.

In summary, our overall pattern of correlations resembles previous research (Sherry & Hall, 2009) and suggests merit in testing the reformulated PMOBE with these data.

Multivariate normality. We tested for multivariate normality in relation to the path model for the reformulated PMOBE and all associated analyses (i.e., confirmatory factor analyses and tests of stability and vulnerability, mediation, incremental validity, and specificity). To elaborate, multivariate normality was tested for using Small's omnibus test, which combines multivariate measures of kurtosis and skewness (see DeCarlo, 1997). If chi-square values exceeded critical values associated with each analysis, data were considered multivariate nonnormal ($p < .05$). These diagnostics revealed the path model for the reformulated PMOBE, and all associated analyses were multivariate nonnormal. Under conditions of multivariate nonnormality, nonrobust estimation methods tend to result in poorer indices of overall model fit (heightened Type II error) and

smaller standard errors for individual path coefficients (heightened Type I error; Nevitt & Hancock, 2001). So as to account for such possibilities, we calculated the Bollen-Stine bootstrap measure of model fit for each analysis. We also calculated all parameter estimates and standard errors using bias-corrected bootstraps with 20,000 ($N = 200$) bootstrap samples. Both of these procedures are robust to multivariate nonnormality (Nevitt & Hancock, 2001).

Model fit. We conducted confirmatory factor analysis and path analysis using Arbuckle's (2006) AMOS 7.0. We assessed model fit using multiple fit indices. A well-fitting model is suggested by a nonsignificant Bollen-Stine bootstrap ($p > .05$), a χ^2/df ratio around 2, a comparative fit index (CFI) and an incremental fit index (IFI) around .95, and a root-mean-square error of approximation (RMSEA) no higher than .10 (Browne & Cudeck, 1993). RMSEA values are reported with 90% confidence intervals (90% CI). Because our data are multivariate nonnormal, the Bollen-Stine bootstrap represents the most accurate and unbiased index of model fit (Nevitt & Hancock, 2001). In path analysis, a standardized path coefficient around .10 signifies a small effect size; .30 signifies a medium effect size; and .50 signifies a large effect size.

Confirmatory factor analyses. Before testing the path model for the reformulated PMOBE, we conducted a series of one-factor confirmatory factor analyses on the variables of this model. This was done to test whether each item on a given scale (e.g., the EDDS-BE) loaded appropriately on its respective factor. Fit indices seen in Table 3 converged to suggest all seven one-factor confirmatory factor models fit the data reasonably well. In deciding whether an item loaded appropriately on its respective factor, we used a cut-off of .40 or higher for standardized factor loadings (Tabachnick & Fidell, 2001). Standardized factor loadings ranged from .60 to .96 in all but one case (see Table 3). A single reverse-coded item on the Interpersonal Discrepancies subscale had a standardized factor loading of .40 (i.e., "Others were very satisfied with me and my accomplishments."). Because it is relatively common for reverse-coded items to have somewhat lower factor loadings (Marsh, 1996), and because the observed standardized factor loading of .40 still met our predetermined cut-off value, we decided to retain this item in our analyses.

The path model for the reformulated PMOBE.

Stability and vulnerability effects. Before testing the path model for the reformulated PMOBE, we used path analysis to test a simple vulnerability model in which concern over mistakes at

Table 2
Bivariate Correlations

Variable	Wave 1									Wave 2									Wave 3									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Wave 1																												
1. Concern over mistakes	—	.43	.53	.51	-.60	.44	.33	.38	-.09	.83	.46	.55	.46	-.56	.36	.30	.37	.09	.80	.49	.51	.52	-.55	.31	.32	.39	.03	
2. Perfectionistic strivings		—	.14	.16	-.27	.16	.15	.06	-.17	.40	.85	.17	.16	-.24	.15	.12	.13	-.11	.38	.85	.09	.22	-.18	.01	.23	.16	-.16	
3. Neuroticism			—	.45	-.48	.45	.23	.28	.05	.50	.17	.88	.40	-.44	.45	.20	.27	.01	.48	.21	.87	.40	-.39	.35	.24	.30	.09	
4. Interpersonal discrep.				—	-.57	.59	.26	.42	.11	.49	.20	.49	.60	-.50	.53	.24	.33	.08	.47	.20	.47	.61	-.41	.37	.27	.39	.03	
5. Interpersonal esteem					—	-.47	-.35	-.41	-.04	-.53	-.31	-.47	-.53	.77	-.42	-.33	-.40	-.12	-.51	-.35	-.45	-.54	.74	-.37	-.38	-.41	-.13	
6. Depressive affect						—	.32	.39	.10	.40	.23	.47	.44	-.42	.63	.31	.33	.10	.36	.24	.47	.48	-.40	.53	.36	.35	.15	
7. Dietary restraint							—	.41	.05	.32	.16	.26	.24	-.39	.36	.79	.37	.20	.35	.17	.21	.28	-.36	.37	.67	.36	.18	
8. Binge eating								—	.18	.37	.11	.30	.40	-.42	.43	.30	.78	.34	.36	.12	.30	.36	-.39	.41	.36	.74	.19	
9. Binge drinking									—	-.04	-.20	.05	.02	-.02	.11	.00	.17	.39	-.06	-.23	.04	-.02	-.03	.13	.02	.15	.33	
Wave 2																												
10. Concern over mistakes										—	.50	.58	.51	-.54	.39	.27	.35	.11	.90	.50	.51	.52	-.56	.31	.28	.37	.08	
11. Perfectionistic strivings											—	.22	.21	-.30	.18	.15	.18	-.10	.46	.89	.15	.25	-.24	.05	.25	.21	-.15	
12. Neuroticism												—	.49	-.49	.53	.23	.26	.00	.53	.28	.90	.44	-.45	.40	.26	.32	.05	
13. Interpersonal discrep.													—	-.57	.61	.19	.38	.10	.45	.26	.47	.74	-.50	.39	.29	.42	.10	
14. Interpersonal esteem														—	-.48	-.36	-.43	-.09	-.54	-.32	.45	-.53	.80	-.41	-.38	-.40	-.09	
15. Depressive affect															—	.32	.50	.17	.39	.23	.49	.50	-.40	.68	.36	.48	.16	
16. Dietary restraint																—	.23	.13	.30	.17	.18	.19	-.28	.28	.76	.27	.11	
17. Binge eating																	—	.35	.37	.17	.23	.36	-.41	.41	.35	.80	.17	
18. Binge drinking																		—	.12	-.07	-.03	.10	-.16	.23	.11	.30	.59	
Wave 3																												
19. Concern over mistakes																												
20. Perfectionistic strivings																												
21. Neuroticism																												
22. Interpersonal discrep.																												
23. Interpersonal esteem																												
24. Depressive affect																												
25. Dietary restraint																												
26. Binge eating																												
27. Binge drinking																												

Note. A bivariate correlation in the range of .10 signifies a small effect size; a bivariate correlation in the range of .30 signifies a medium effect size; a bivariate correlation in the range of .50 signifies a large effect size. In Table 2, bivariate correlations with absolute values greater than or equal to .15 are significant at $p < .05$; bivariate correlations greater than or equal to .19 are significant at $p < .01$; and bivariate correlations greater than or equal to .22 are significant at $p < .001$. Interpersonal discrep. = interpersonal discrepancies. Test-retest correlations appear in bold.

Table 3
Confirmatory Factor Analyses

Variable	Bollen-Stine bootstrap	χ^2	χ^2/df	CFI	IFI	RMSEA [90% CI]	Range of factor loadings
Concern over mistakes (W1)	$p = .44$	6.20, $p = .29$	1.24	1.00	1.00	.04 [.00, .11]	.61–.83
Binge eating (W1)	$p = .09$	26.34, $p = .003$	2.63	.99	.99	.09 [.05, .13]	.67–.87
Interpersonal discrep. (W2)	$p = .65$	4.61, $p = .47$	0.92	1.00	1.00	.00 [.00, .10]	.40–.91
Interpersonal esteem (W2)	$p = .49$	2.15, $p = .34$	1.08	1.00	1.00	.02 [.00, .14]	.67–.94
Depressive affect (W2)	$p = .22$	1.46, $p = .23$	1.46	1.00	1.00	.05 [.00, .20]	.60–.84
Dietary restraint (W2)	$p = .39$	2.91, $p = .23$	1.45	1.00	1.00	.05 [.00, .16]	.79–.96
Binge eating (W3)	$p = .35$	23.06, $p = .01$	2.31	.99	.99	.08 [.04, .13]	.65–.90

Note. Bootstrap analyses are based on 20,000 ($N = 200$) bootstrap samples. Factor loadings are standardized. CFI = comparative fit index; IFI = incremental fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; Interpersonal discrep. = interpersonal discrepancies.

Wave 1 and binge eating at Wave 1 predicted binge eating at Wave 3. This path model has zero degrees of freedom, thereby precluding estimation of fit indices. As hypothesized, binge eating was highly stable, with binge eating at Wave 1 predicting binge eating at Wave 3 ($\beta = .69$, $p < .001$). Congruent with hypotheses, concern over mistakes at Wave 1 also predicted binge eating at Wave 3 beyond prior levels of binge eating at Wave 1 ($\beta = .12$,

$p < .05$). This result indicates concern over mistakes may represent a vulnerability factor for binge eating.

Model testing. The path model for the reformulated PMOBE (see Figure 2) fit the data well: Bollen-Stine bootstrap $p = .25$, $\chi^2(2, N = 200) = 3.30$, $p = .19$; $\chi^2/df = 1.65$; CFI = .99; IFI = .99; RMSEA = .06 (90% CI [.00, .16]). As hypothesized, concern over mistakes at Wave 1 was tied to binge eating at Wave 1,

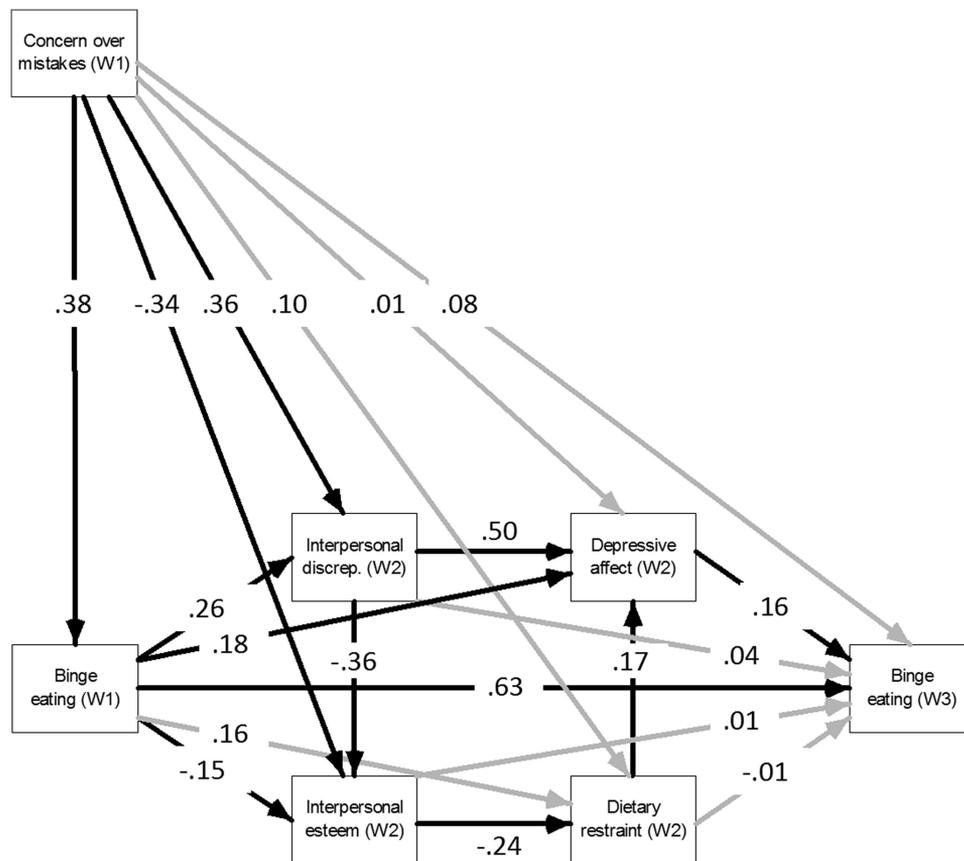


Figure 2. The path model for the reformulated perfectionism model of binge eating. Rectangles represent variables measured via questionnaire. Black arrows represent significant paths ($p < .05$); gray arrows represent nonsignificant paths ($p > .05$). Path coefficients are standardized. In the interest of clarity, error terms are not displayed. Bootstrap analyses are based on 20,000 ($N = 200$) bootstrap samples. Interpersonal discrep. = interpersonal discrepancies; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3.

interpersonal discrepancies at Wave 2, and interpersonal esteem at Wave 2, but not to depressive affect at Wave 2 or dietary restraint at Wave 2. Concern over mistakes at Wave 1 did not predict binge eating at Wave 3 in the context of the path model for the reformulated PMOBE (see Figure 2), suggesting the concern over mistakes–binge eating link may be fully mediated by binge-eating maintenance variables (see the Meditational analyses section below).

Consistent with hypotheses, as Figure 1 illustrates, (a) binge eating at Wave 1 was significantly related to all binge-eating maintenance variables (except dietary restraint at Wave 2); (b) interpersonal discrepancies at Wave 2 were significantly related to interpersonal esteem at Wave 2 and depressive affect at Wave 2; (c) interpersonal esteem at Wave 2 was significantly related to dietary restraint at Wave 2; (d) interpersonal discrepancies at Wave 2 and interpersonal esteem at Wave 2 were not significantly related to binge eating at Wave 3; (e) dietary restraint at Wave 2 was significantly related to depressive affect at Wave 2; (f) depressive affect at Wave 2 was significantly related to binge eating at Wave 3. Counter to hypotheses, dietary restraint at Wave 2 was not significantly related to binge eating at Wave 3. Overall, however, paths in Figure 2 were as hypothesized in the path model for the reformulated PMOBE. Finally, the percentage of variance explained for each outcome variable in Figure 2 was as follows: binge eating at Wave 1 ($R^2 = .14$), interpersonal discrepancies ($R^2 = .27$), interpersonal esteem ($R^2 = .45$), depressive affect ($R^2 = .44$), dietary restraint ($R^2 = .16$), and binge eating at Wave 3 ($R^2 = .59$).

Meditational analyses. According to Mallinckrodt, Abraham, Wei, and Russell (2006), a significant indirect effect indicates mediation has occurred. We calculated indirect effects by multiplying (a) path coefficients from predictor variables to mediator variables and (b) path coefficients from mediator variables to criterion variables. Bootstrap analyses were used to test the significance levels of hypothesized indirect effects in the path model for the reformulated PMOBE (see Figure 1). We used random sampling with replacement to create 20,000 ($N = 200$) bootstrap samples from the original data set. Using these bootstrapped samples, we estimated bias-corrected standard errors and 95% CIs for indirect effects. If zero is not included in the 95% CI for an indirect effect, then the indirect effect is significant at $p < .05$.

As Table 4 shows, four of five hypothesized indirect effects were significant: (a) the overall indirect effect of concern over mistakes at Wave 1 on binge eating at Wave 3 through all binge-eating maintenance variables, (b) the indirect effect of concern over mistakes at Wave 1 on depressive affect at Wave 2 through interpersonal discrepancies at Wave 2, (c) the indirect effect of concern over mistakes at Wave 1 on dietary restraint at Wave 2 through interpersonal discrepancies at Wave 2 and interpersonal esteem at Wave 2, and (d) the indirect effect of interpersonal discrepancies at Wave 2 on binge eating at Wave 3 through depressive affect at Wave 2 were all significant. However, (e) the indirect effect of interpersonal esteem at Wave 2 on binge eating at Wave 3 through dietary restraint at Wave 2 was nonsignificant. Overall, then, five indirect effects were hypothesized and four were supported.²

Incremental validity. A path model, identical to the one depicted in Figure 1, was also run with one change: Concern over mistakes at Wave 1 was replaced with perfectionistic strivings at

Wave 1. This model fit the data well: Bollen-Stine bootstrap $p = .35$, $\chi^2(2, N = 200) = 2.54$, $p = .28$; $\chi^2/df = 1.27$; CFI = .99; IFI = .99; RMSEA = .04 (90% CI: [.00, .15]), and perfectionistic strivings was significantly related to interpersonal discrepancies at Wave 2 and interpersonal esteem at Wave 2. When concern over mistakes at Wave 1 was added to this model as a covariate (i.e., correlated with all exogenous variables with a direct effect to all endogenous variables), this model also fit the data well: Bollen-Stine bootstrap $p = .26$, $\chi^2(2, N = 200) = 3.22$, $p = .20$; $\chi^2/df = 1.61$; CFI = .99; IFI = .99; RMSEA = .06 (90% CI: [.00, .16]). Moreover, all paths involving concern over mistakes and the other variables of the reformulated PMOBE were still significant ($p < .05$) in the hypothesized manner above and beyond perfectionistic strivings.

Another path model was run, identical to the one seen in Figure 1, with one difference: This time, we replaced concern over mistakes at Wave 1 with neuroticism at Wave 1. This model fit the data well: Bollen-Stine bootstrap $p = .57$, $\chi^2(2, N = 200) = 1.38$, $p = .50$; $\chi^2/df = 1.65$; CFI = .1.0; IFI = 1.0; RMSEA = .00 (90% CI: [.00, .13]), and neuroticism was significantly related to binge eating at Wave 1, interpersonal discrepancies at Wave 2, interpersonal esteem at Wave 2, and depressive affect at Wave 2. Once concern over mistakes at Wave 1 was added to this model as a covariate, this model also fit the data well: Bollen-Stine bootstrap $p = .37$, $\chi^2(2, N = 200) = 1.20$, $p = .30$; $\chi^2/df = 1.65$; CFI = .99; IFI = .99; RMSEA = .03 (90% CI: [.00, .15]). Of note, all paths involving concern over mistakes and the other variables of the reformulated PMOBE remained significant ($p < .05$) in the predicted manner over and above neuroticism. Altogether, these results support the incremental validity of concern over mistakes and the other variables of the reformulated PMOBE beyond perfectionistic strivings or neuroticism.³

Specificity. We tested the specificity of the variables of the reformulated PMOBE by substituting binge eating for binge drinking in Figure 1. Fit indices suggested the reformulated PMOBE involving binge drinking still fit the data reasonably well: Bollen-Stine bootstrap $p = .25$, $\chi^2(2, N = 200) = 3.37$, $p = .19$; $\chi^2/df = 1.68$; CFI = .99; IFI = .99; RMSEA = .06 (90% CI: [.00, .16]). However, binge drinking was inconsistently related to variables of the reformulated PMOBE. Most paths involving binge drinking were nonsignificant. Indeed, only two significant paths involving

² The PMOBE is focused on mediational processes as opposed to moderational processes. However, to be thorough, exploratory moderational analyses were also conducted. Four moderated regression analyses tested whether concern over mistakes and maintenance variables interacted to predict binge eating. No support was observed for any of these analyses. These results suggest the relationship between concern over mistakes and binge eating is not dependent on maintenance variables in the present study.

³ The incremental validity shown by the variables of the reformulated PMOBE is in some ways noteworthy. However, caution is also needed in interpreting these findings. Concern over mistakes, perfectionistic strivings, and neuroticism frequently co-occur, as suggested by their intercorrelation in Table 2. Extracting variance from concern over mistakes that is shared with perfectionistic strivings or neuroticism may lead to a form of concern over mistakes that is seldom seen in daily life and has unclear meaning. Tables and figures therefore do not show results where perfectionistic strivings or neuroticism is included as a covariate.

Table 4
Bootstrap Analyses of Indirect Effects

Hypothesized indirect effect	Unstandardized indirect effect	Standardized indirect effect (β)	Bootstrap estimates	
			<i>SE</i> for standardized indirect effect	95% confidence interval for standardized indirect effect (lower and upper)
Concern over mistakes (W1) to binge eating (W3) ^a	.552	.310	.068	.176, .443*
Concern over mistakes (W1) to depressive affect (W2)	.108	.180	.042	.097, .263*
Concern over mistakes (W1) to dietary restraint (W2)	.020	.031	.013	.005, .057*
Interpersonal discrep. (W2) to binge eating (W3)	.109	.081	.041	.002, .161*
Interpersonal esteem (W2) to binge eating (W3)	-.001	.001	.017	-.034, .033

Note. Bootstrap analyses are based on 20,000 ($N = 200$) bootstrap samples. *SE* = bias-corrected standard error; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; Interpersonal discrep. = interpersonal discrepancies.

^a The overall indirect effect of concern over mistakes at Wave 1 on binge eating at Wave 3 through all binge-eating maintenance variables.

* Confidence intervals excluding zero are significant at $p < .05$.

binge drinking were observed: Binge drinking at Wave 1 significantly predicted binge drinking at Wave 3 ($\beta = .32, p < .001$), and binge drinking at Wave 1 significantly predicted depressive affect at Wave 2 ($\beta = .10, p < .05$). The percentage of variance explained for each outcome variable in the reformulated PMOBE involving binge drinking was as follows: Binge drinking at Wave 1 ($R^2 = .01$), and interpersonal discrepancies ($R^2 = .22$), interpersonal esteem ($R^2 = .44$), depressive affect ($R^2 = .43$), dietary restraint ($R^2 = .14$), and binge drinking at Wave 3 ($R^2 = .13$). Overall, results suggest the variables of the reformulated PMOBE do not adequately predict binge drinking, whereas these variables do adequately predict binge eating.⁴

Discussion

Results from the present study indicated the reformulated PMOBE provided a good fit to the data and is generally consistent with the hypothesized pattern of (a) direct and indirect effects, (b) stability and vulnerability effects, (c) incremental validity, and (d) specificity. Below we discuss both support for and inconsistencies with the reformulated PMOBE.

The path model for the reformulated PMOBE. The reformulated PMOBE fit the data well with significant paths in the hypothesized direction. In total, 18 of 20 paths in the reformulated PMOBE were as predicted (see Figure 1 and 2), with two unexpected findings discussed below. The reformulated PMOBE integrates formerly disparate areas of research on binge eating into a single, coherent model in which concern over mistakes relates to binge eating through four binge-eating maintenance variables (i.e., interpersonal discrepancies, low interpersonal esteem, depressive affect, and dietary restraint).

As predicted by the reformulated PMOBE, results indicate concern over mistakes plays an intimate role in binge eating both directly by predicting changes in binge eating over time and indirectly by setting conditions in which binge eating is likely to occur. Whereas Sherry and Hall (2009) focused on just interpersonal features of perfectionism in the original PMOBE, our results suggest interpersonal and cognitive features of perfectionism are

central to binge eating. The present study is thus consistent with Rieger et al. (2010), who argued both interpersonal problems (e.g., concerns over others' elevations) and cognitive dysfunction with perfectionistic themes (e.g., dichotomous appraisals of outcomes) are key predictors of eating problems.

Though there are differences between socially prescribed perfectionism as measured in the original PMOBE (see Sherry & Hall, 2009) and concern over mistakes as measured in the present study (see The Reformulated PMOBE section in the introduction), our results, viewed in conjunction with other studies (e.g., Dunkley et al., 2000), point toward important similarities between concern over mistakes and socially prescribed perfectionism. These two perfectionism variables correlate strongly (Dunkley et al., 2000), load onto the same latent variable (Dunkley, Zuroff, & Blankstein, 2003), and appear to display similar predictive properties with respect to most of the variables of the PMOBE (Sherry & Hall, 2009).

Concern over mistakes directly affected interpersonal discrepancies and esteem. These results suggest women high in concern over mistakes live an unsatisfying social life involving negative interactions where they experience others as disappointed in them and disconnected from them (see also Hewitt et al., 2006). Concern over mistakes also indirectly affected (a) depressive affect through interpersonal discrepancies and (b) dietary restraint through interpersonal discrepancies and esteem. Living with such chronic in-

⁴ Across all waves of the present study, 17.5% of participants did not consume a single drink of alcohol. We questioned whether these abstainers may influence the fit indices for and the path coefficients in the path model for the reformulated PMOBE when binge drinking was substituted for binge eating. To test this possibility, we conducted a path analysis omitting these abstainers. This model fit the data reasonably well: Bollen-Stine bootstrap $p = .14, \chi^2(2, N = 165) = 4.61, p = .10; \chi^2/df = 2.32; CFI = .99; IFI = .99; RMSEA = .09$ (90% CI: [.00, .20]). When using the $p < .05$ criterion, we also found the significance of paths was the same for the path model without abstainers (as compared with the path model with abstainers).

terpersonal problems, women high in concern over mistakes are prone to periods of depressive affect (arising from their sense of disconnection from others) and attempts at dietary restraint (which may arise from their desire to win acceptance and to avoid rejection by achieving a thinner, “socially approved” body).

Without social supports to draw on, binge eating may offer women high in concern over mistakes a means of coping with or escaping from aversive self-awareness, hunger states, and depressive affect (see also Downey & Chang, 2007; Heatherton & Baumeister, 1991). Binge eating does not, however, provide lasting, effective relief. Rather, our results suggest binge eating itself contributes to interpersonal problems and depressive affect, with binge eating thereby predisposing future episodes of binge eating. Considered from this perspective, binge eating represents a short-term coping mechanism that ultimately becomes a long-term problem.

Two caveats to our generally supportive results were the non-significant paths between (a) binge eating at Wave 1 and dietary restraint at Wave 2 and (b) dietary restraint at Wave 2 and binge eating at Wave 3 (see Figure 2). Our findings suggest, in the context of the path model for the reformulated PMOBE, dietary restraint is neither a direct antecedent nor a direct consequence of binge eating. Although it is conceivable dietary restraint and binge eating are unrelated once the other variables of the reformulated PMOBE are included, it is premature to discount the role of dietary restraint in binge eating. For instance, research suggests dietary restraint prospectively predicts binge eating over a 9-month period (Stice, Akutagawa, Gaggan, & Agras, 2000), and binge eating prospectively predicts dietary restraint over a 9-month period (Stice, 1998). Binge eating may persist for weeks or months before dietary restraint occurs, particularly during times of stress for women (Sherry & Hall, 2009). The strong short-term stability of binge eating and our use of 1-week intervals between measurement occasions may account for this discrepancy in findings; a longer interval between measurement occasions might yield different results.

Stability and vulnerability effects. Concern over mistakes and binge eating are assumed to exhibit rank-order stability in the reformulated PMOBE. Rank-order stability represents the extent to which the relative ordering of individuals on a characteristic is maintained over time (Sherry & Hall, 2009). Test–retest correlations and path analysis in our study suggested concern over mistakes and binge eating maintain high rank-order stability. Our results are thus in accordance with evidence suggesting concern over mistakes and binge eating are strongly stable across longer time frames (e.g., Rice & Dellwo, 2001).

Given the stability of binge eating, it is notable that concern over mistakes predicts changes in binge eating beyond preexisting levels of binge eating. The present study offers (what we believe is to date) the most stringent direct test of concern over mistakes as a vulnerability factor for binge eating. In fact, we know of no other study showing concern over mistakes is a vulnerability factor for binge eating. This result not only supports the reformulated PMOBE but also adds to a wider literature already suggesting concern over mistakes represent a vulnerability factor for anorexic symptoms (Bulik et al., 2003) and bulimic symptoms (Stice, 2002).

Mediational hypotheses. In the present study, four of five indirect effects hypothesized in the reformulated PMOBE were

significant. Support for our central mediational hypothesis was observed, suggesting concern over mistakes at Wave 1 indirectly affected binge eating at Wave 3 through all four binge-eating maintenance variables at Wave 2. Binge-eating maintenance variables seem to represent mechanisms partly responsible for the concern over mistakes–binge eating link (see Sherry & Hall, 2009, for a similar finding). As predicted by the reformulated PMOBE, our results suggest women high in concern over mistakes are prone to binge eating because they encounter interpersonal problems, feel sad, and engage in harsh dietary restraint.

Congruent with Sherry and Hall (2009), we also found concern over mistakes at Wave 1 indirectly affected depressive affect at Wave 2 through interpersonal discrepancies at Wave 2. Given their exaggerated concern over others’ opinions and evaluations and their tendency to judge themselves in black-or-white terms, women high in concern over mistakes may often perceive they have fallen short of others’ expectations, and this perceived inability to satisfy others may contribute to periods of depressive affect (Hewitt et al., 2006). Concern over mistakes at Wave 1 also indirectly affected dietary restraint at Wave 2 through interpersonal discrepancies at Wave 2 and interpersonal esteem at Wave 2. Sherry and Hall found a similar mediational chain in their test of the original PMOBE. As the body is a public, visible aspect of the self, people high in concern over mistakes may be especially focused on presenting an image of bodily perfection to others (Hewitt et al., 1995). Thus, women may attempt to restrain their eating and to achieve socially prized, but hard-to-obtain, ideals of thinness in an effort to win acceptance or to avoid criticism from others (Sherry & Hall, 2009). Finally, the indirect effect of interpersonal discrepancies at Wave 2 on binge eating at Wave 3 through depressive affect at Wave 2 was also significant (see Sherry & Hall, 2009, for a similar finding). Viewing oneself as falling short of others’ expectations often feels depressing, and it appears women will go to great lengths to alleviate or to escape this feeling, including engaging in a self-destructive behaviour such as binge eating (Heatherton & Baumeister, 1991; Sherry & Hall, 2009).

Although four of five hypothesized indirect effects were supported in our study, the indirect effect of interpersonal esteem at Wave 2 on binge eating at Wave 3 through dietary restraint at Wave 2 was nonsignificant. This finding contrasts with Sherry and Hall (2009), who did find support for this mediational chain. Our results do not suggest interpersonal esteem is unimportant in the reformulated PMOBE, as bivariate correlations and path analysis both suggest an important role for this variable. Rather, this unexpected null result suggests other variables may be needed to explain why interpersonal esteem relates to binge eating. For example, instead of dietary restraint, social anxiety may mediate the interpersonal esteem–binge eating relation. Women may try to escape or to manage unpleasant social anxiety by binge eating.

Incremental validity. As hypothesized, concern over mistakes contributed uniquely to the variables of the reformulated PMOBE over and above perfectionistic strivings and neuroticism, thereby supporting the incremental validity of this model. These results, coupled with earlier research (Bulik et al., 2003), highlight the unique and the specific role concern over mistakes plays in binge eating. It appears an unrealistic prevention-focused style of perfectionism (i.e., trying to avoid mistakes or criticism) is more closely tied to binge eating than an unrealistic promotion-focused

style of perfectionism (i.e., striving relentlessly for impossibly high goals; Higgins, 1997). Even though our results more strongly implicate concern over mistakes (vs. perfectionistic strivings) in binge eating (see also Sherry & Hall, 2009), we note other research suggests a possible role for perfectionistic strivings in binge eating (Bardone-Cone, 2007; Sherry et al., 2004). With recent evidence strongly implicating self-criticism in binge eating (Dunkley et al., 2006), research is also needed to test whether concern over mistakes adds incrementally to our understanding of binge eating beyond self-criticism. Overall, then, there is still much to learn about the relative contribution of various dimensions of perfectionism to binge eating.

After controlling for neuroticism, we also found paths in the reformulated PMOBE were virtually unaltered. These results support our hypotheses and indicate the processes in the reformulated PMOBE are not better understood in terms of a general, dispositional tendency to experience negative emotions. Our results also help allay concerns that the lower order trait of perfectionism is redundant with the high-order domain of neuroticism (Enns, Cox, & Clara, 2005). The present study thus joins other research in suggesting interpersonal problems and eating problems are two areas in which perfectionism consistently predicts incremental variance beyond neuroticism (Dunkley, Sanislow, Grilo, & McGlashan, 2009; Sherry & Hall, 2009).

Specificity: Binge eating versus binge drinking. As in past research, we found binge drinking was unrelated to concern over mistakes (Flett et al., 2008) and largely unrelated to binge-eating maintenance variables. One exception was a positive link between binge drinking and depressive affect, a result observed in prior work (Grant et al., 2009). Our study and previous research also indicates perfectionistic strivings is negatively correlated with binge drinking (Flett et al., 2008).

Overall, the reformulated PMOBE appears specific to binge eating and not to binge drinking. Supporting this notion, the variables of the reformulated PMOBE explained 59% of the variance in binge eating, but only 13% of the variance in binge drinking. Why might this model be specific to binge eating as opposed to binge drinking? Binge eating is typically a hidden, solitary behavior (Stein et al., 2007), whereas on university campuses, binge drinking is frequently a behavior done along with others (Park, Sher, & Krull, 2009). Given their interpersonal problems (Hewitt et al., 2006), women high in concern over mistakes may find themselves more often in solitary situations conducive to binge eating and less often in social situations (e.g., parties) conducive to binge drinking. Avoiding failures—especially perceived failures in academic performance—is also a central preoccupation for people high in concern over mistakes (Cox et al., 2002). Because binge-drinking episodes generally last longer, impair cognitive processes to a greater degree, and may require longer periods of recovery (e.g., hangovers) compared with binge-eating episodes, we speculate binge drinking is less appealing to people high in concern over mistakes who are typically worried about academic performance.

Limitations and future directions. Our study involved self-report questionnaires only. Such monomethod, self-report questionnaire research may artificially inflate observed relationships through method variance or may result in inaccurate reports through biased self-perceptions. Future research on the reformulated PMOBE using multiple sources (e.g., informants) and mul-

tiples methods (e.g., interviews) is indicated. Another limitation is our use of modified scales. Although alpha and test-retest reliabilities for our modified scales were acceptable, and we conducted a separate psychometrics study supporting these scales (see Footnote 2), ultimately less is known about the psychometrics of our modified scales. Using latent variables to measure constructs may also have provided more accurate estimates of model parameters. In addition, our questionnaires were not counterbalanced. This means we did not control for order effects, which is a limitation.

Though our three-wave, 3-week longitudinal design offers advantages, other measurement schedules are possible. Some authors (Smyth et al., 2001) suggest temporal dynamics related to binge eating are best captured when event sampling (i.e., collecting reports after binge episodes) is combined with random sampling. A more intensive measurement schedule may be useful in testing the reformulated PMOBE. Our data analytic strategy also excluded some variables at some waves. To offer an example, as Figure 1 shows, dietary restraint was included at only Wave 2. Future tests of the reformulated PMOBE might include baseline levels of dietary restraint or other binge-eating maintenance variables, thereby testing whether changes in these maintenance variables mediate the link between concern over mistakes and binge eating.

Another potential limitation is our use of a young, advantaged sample of undergraduate women. This sample raises questions about both the representativeness and the generalizability of our results. For example, it remains to be seen whether results from our study generalize to men. With a female-to-male ratio of roughly 3:2 (American Psychiatric Association, 2000), binge eating is the least gender-specific form of disordered eating. However, it cannot be assumed the reformulated PMOBE generalizes across gender, as vulnerability factors for and maintenance variables in binge eating may differ across women and men (Barry, Grilo, & Masheb, 2002).

To better understand the clinical utility of the reformulated PMOBE, future research might also test this model using a clinical sample of patients with more severe, diagnosable levels of binge eating. Moreover, future investigations might use nondimensional models and measures of binge eating wherein participants are instructed to record only discrete episodes of binge eating that meet a specific, concrete operational definition of this phenomenon. We might also test the reformulated PMOBE in relation to other forms of dysfunctional eating, such as emotional eating or eating in the absence of hunger. As interpersonal problems are important to the reformulated PMOBE, future studies may provide a fuller account of perfectionism-linked interpersonal problems by investigating these problems amid the interpersonal contexts in which they occur (e.g., romantic relationships). Given past studies linking attachment dysfunction and perfectionism (Wei, Heppner, Russell, & Young, 2006), future studies might also consider a role for attachment anxiety and attachment avoidance in the reformulated PMOBE.

Implications for theory and clinical practice. In its extreme form, binge eating is now being recognized as an eating disorder in the *Diagnostic and statistical manual of mental disorders*, fifth edition. As an integrative model unifying several areas of research on binge eating into a single, coherent framework, the reformulated PMOBE provides a foundation for future theory, research, and practice in this emerging area. Our results, and the reformulated PMOBE, suggest a dispositional aspect to binge eating. Key

aspects of binge eating and its maintenance variables appear driven by concern over mistakes, a stable personality trait (Rice & Dellwo, 2001). Our study thus complements theory suggesting perfectionism is a core aspect of eating problems (Fairburn, Cooper, & Shafran, 2003). Some authors even argue personality traits and eating problems are better understood as a unified, interrelated syndrome with personality traits such as perfectionism providing a wider “characterological context” (Westen & Harnden-Fischer, 2001, p. 560) for understanding eating problems and associated difficulties (e.g., interpersonal problems). This viewpoint, which is generally consistent with our results, calls into question theoretical traditions in which psychologists are encouraged to segregate eating problems (binge eating) from personality problems (perfectionism) during case conceptualization (American Psychiatric Association, 2000). We believe our results instead point counselors toward a wider view of binge eating as a “complex syndrome [where] distinct symptom constellations . . . are enmeshed within a complex network of problematic personality traits” (Millon, 2002, p. 212). In fact, our results suggest concern over mistakes, binge-eating maintenance variables, and binge eating are all critical to conceptualizing the cycle of binge eating.

Beyond case conceptualization issues, we propose cognitive behavioral therapy is well suited to treating patients troubled by concern over mistakes, binge-eating maintenance variables, and binge eating. Guided self-help based on cognitive behavioral therapy (Wilson, Wilfley, Agras, & Bryson, 2010) is one promising recent frontline treatment for binge eating. However, we speculate enhanced cognitive behavioral therapy (Fairburn et al., 2003) is potentially more useful in treating binge eating accompanied by perfectionism (see also Wilson et al., 2010), as this therapy targets perfectionism, interpersonal problems, low self-esteem, mood difficulties, and dietary restraint. Given the key role of perfectionism in the reformulated PMOBE, our results point counselors toward perfectionism as a treatment target. A reduction in perfectionism may contribute to a corresponding reduction in binge eating and its maintenance variables (see also Fairburn et al., 2003). That said, we note our observations about the reformulated PMOBE in relation to cognitive behavioral therapy for eating problems are mostly conjectural and should thus be viewed with caution. Meaningful differences also exist between the reformulated PMOBE and the cognitive behavioral model, including differences in how perfectionism itself is conceptualized. In the reformulated PMOBE interpersonal and cognitive features of perfectionism receive emphasis, whereas perfectionism is seen as a strictly intrapersonal phenomenon in the cognitive behavioral model (Shafran et al., 2002).

Closing remarks. Binge eating is a cyclical, recurrent, and self-perpetuating behavior that negatively impacts health, well-being, and functioning. Despite the destructiveness of this behavior, calls for integrative models explaining binge eating have largely gone unanswered (Stice, 2002). We began to fill this void in the present study by proposing, testing, and supporting the reformulated PMOBE. Both this model and our results suggest concern over mistakes is a vulnerability factor for binge eating. We also found concern over mistakes is tied to binge eating via four binge-eating maintenance variables (i.e., interpersonal discrepancies, low interpersonal esteem, depressive affect, and dietary restraint). These maintenance variables appear to be both antecedents and consequences of binge eating, with binge eating and its

maintenance variables reciprocally influencing one another. Results also supported the reformulated PMOBE’s incremental validity (beyond either perfectionistic strivings or neuroticism) and specificity (in predicting binge eating, but not binge drinking). Key to breaking the cycle of binge eating is understanding how variables work in concert to generate and to maintain binge eating. The reformulated PMOBE brings us closer to achieving this goal.

References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- Arbuckle, J. L. (2006). *Amos 7.0 user's guide*. Chicago, IL: SPSS.
- Ashbaugh, A., Antony, M. M., Liss, A., Summerfeldt, L. J., McCabe, R. E., & Swinson, R. P. (2007). Changes in perfectionism following cognitive-behavioral treatment for social phobia. *Depression and Anxiety, 24*, 169–177. doi:10.1002/da.20219
- Bagby, R. M., Parker, J. D. A., Joffe, R. T., & Buis, T. (1994). Reconstruction and validation of the Depressive Experiences Questionnaire. *Assessment, 1*, 59–68. doi:10.1177/1073191194001001009
- Bardone-Cone, A. M. (2007). Self-oriented and socially prescribed perfectionism dimensions and their associations with disordered eating. *Behaviour Research and Therapy, 45*, 1977–1986. doi:10.1016/j.brat.2006.10.004
- Bardone-Cone, A. M., Joiner, T. E., Jr., Crosby, R. D., Crow, S. J., Klein, M. H., le Grange, D., . . . Wonderlich, S. A. (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. doi:10.1016/j.brat.2008.04.003
- Bardone-Cone, A. M., Weishuhn, A. S., & Boyd, C. A. (2009). Perfectionism and bulimic symptoms in African American college women: Dimensions of perfectionism and their interactions with perceived weight status. *Journal of Counseling Psychology, 56*, 266–275. doi:10.1037/a0015003
- Bardone-Cone, A. M., Wonderlich, S. A., Frost, R. O., Bulik, C. M., Mitchell, J. E., Uppala, S., & Simonich, H. (2007). Perfectionism and eating disorders: Current status and future directions. *Clinical Psychology Review, 27*, 384–405. doi:10.1016/j.cpr.2006.12.005
- Barry, D. T., Grilo, C. M., & Masheb, R. M. (2002). Gender differences in patients with binge eating disorder. *International Journal of Eating Disorders, 31*, 63–70. doi:10.1002/eat.1112
- Benet-Martínez, V., & John, O. P. (1998). *Los cinco grandes* across cultures and ethnic groups: Multitrait multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology, 75*, 729–750. doi:10.1037/0022-3514.75.3.729
- Birch, C. D., Stewart, S. H., & Brown, C. G. (2007). Exploring differential patterns of situational risk for binge eating and heavy drinking. *Addictive Behaviors, 32*, 433–448. doi:10.1016/j.addbeh.2006.05.014
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54*, 579–616. doi:10.1146/annurev.psych.54.101601.145030
- Bolger, N., Zuckerman, A., & Kessler, R. C. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology, 79*, 953–961. doi:10.1037/0022-3514.79.6.953
- Brown, G. P., & Beck, A. T. (2002). Dysfunctional attitudes, perfectionism, and models of vulnerability to depression. In G. L. Flett & P. L. Hewitt (Eds.), *Perfectionism: Theory, research, and treatment* (pp. 231–251). Washington, DC: American Psychological Association.
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.
- Bulik, C. M., Tozzi, F., Anderson, C., Mazzeo, S. E., Aggen, S., & Sullivan, P. F. (2003). The relation between eating disorders and com-

- ponents of perfectionism. *The American Journal of Psychiatry*, *160*, 366–368. doi:10.1176/appi.ajp.160.2.366
- Cassin, S. E., & von Ranson, K. M. (2005). Personality and eating disorders: A decade in review. *Clinical Psychology Review*, *25*, 895–916. doi:10.1016/j.cpr.2005.04.012
- Cheng, H., & Mallinckrodt, B. (2009). Parental bonds, anxious attachment, media internalization, and body image dissatisfaction: Exploring a mediation model. *Journal of Counseling Psychology*, *56*, 365–375. doi:10.1037/a0015067
- Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice. *Psychological Assessment*, *4*, 5–13. doi:10.1037/1040-3590.4.1.5
- Cox, B. J., Enns, M. W., & Clara, I. P. (2002). The multidimensional structure of perfectionism in clinically distressed and college student samples. *Psychological Assessment*, *14*, 365–373. doi:10.1037/1040-3590.14.3.365
- Deaver, C. M., Miltenberger, R. G., Smyth, J., Meidinger, A., & Crosby, R. (2003). An evaluation of affect and binge eating. *Behavior Modification*, *27*, 578–599. doi:10.1177/0145445503255571
- DeCarlo, L. T. (1997). On the meaning and use of kurtosis. *Psychological Methods*, *2*, 292–307. doi:10.1037/1082-989X.2.3.292
- Downey, C. A., & Chang, E. C. (2007). Perfectionism and symptoms of eating disturbances in female college students: Considering the role of negative affect and body dissatisfaction. *Eating Behaviors*, *8*, 497–503. <http://dx.doi.org/10.1016/j.eatbeh.2007.02.002>
- Dunkley, D. M., Blankstein, K. R., Halsall, J., Williams, M., & Winkworth, G. (2000). The relation between perfectionism and distress: Hassles, coping, and perceived social support as mediators and moderators. *Journal of Counseling Psychology*, *47*, 437–453. doi:10.1037/0022-0167.47.4.437
- Dunkley, D. M., Blankstein, K. R., Masheb, R. M., & Grilo, C. M. (2006). Personal standards and evaluative concerns dimensions of “clinical” perfectionism: A reply to Shafran et al. (2002, 2003) and Hewitt et al. (2003). *Behaviour Research and Therapy*, *44*, 63–84. doi:10.1016/j.brat.2004.12.004
- Dunkley, D. M., & Kyparissis, A. (2008). What is DAS self-critical perfectionism really measuring? Relations with the five-factor model of personality and depressive symptoms. *Personality and Individual Differences*, *44*, 1295–1305. doi:10.1016/j.paid.2007.11.022
- Dunkley, D. M., Sanislow, C. A., Grilo, C. M., & McGlashan, T. H. (2009). Self-criticism versus neuroticism in predicting depression and psychosocial impairment for 4 years in a clinical sample. *Comprehensive Psychiatry*, *50*, 335–346. doi:10.1016/j.comppsy.2008.09.004
- 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*, 234–252.
- Enns, M. W., Cox, B. J., & Clara, I. P. (2005). Perfectionism and neuroticism: A longitudinal study of specific vulnerability and diathesis-stress models. *Cognitive Therapy and Research*, *29*, 463–478. doi:10.1007/s10608-005-2843-04
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behaviour Research and Therapy*, *41*, 509–528. doi:10.1016/S0005-7967(02)00088-8
- Fitzgibbon, M. L., Sánchez-Johnsen, L. A. P., & Martinovich, Z. (2003). A test of the continuity perspective across bulimic and binge eating pathology. *International Journal of Eating Disorders*, *34*, 83–97. doi:10.1002/eat.10160
- Flett, G. L., Goldstein, A., Wall, A.-M., Hewitt, P. L., Wekerle, C., & Azzi, N. (2008). Perfectionism and binge drinking in Canadian students making the transition to university. *Journal of American College Health*, *57*, 249–253. doi:10.3200/JACH.57.2.249-256
- Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research*, *14*, 449–468. doi:10.1007/BF01172967
- Gadalla, T., & Piran, N. (2007). Co-occurrence of eating disorders and alcohol use disorders in women: A meta-analysis. *Archives of Women's Mental Health*, *10*, 133–140. doi:10.1007/s00737-007-0184-x
- Garber, J., & Hollon, S. D. (1991). What can specificity designs say about causality in psychopathology research? *Psychological Bulletin*, *110*, 129–136. doi:10.1037/0033-2909.110.1.129
- Gelso, C., & Fretz, B. (2001). *Counseling psychology* (2nd ed.). Belmont, CA: Wadsworth/Thompson Learning.
- Graham, A. R., & Sherry, S. H. (2011). [Descriptive statistics for the measures used in the reformulated perfectionism model of binge eating]. Unpublished raw data.
- Graham, A. R., Sherry, S. B., Stewart, S. H., Sherry, D. L., McGrath, D., Fossum, K., & Allen, S. L. (2010). The existential model of perfectionism and depressive symptoms: A short-term, four-wave longitudinal study. *Journal of Counseling Psychology*, *57*, 423–438. doi:10.1037/a0020667
- Grant, V. V., Stewart, S. H., & Mohr, C. D. (2009). Coping-anxiety and coping-depression motives predict different daily mood-drinking relationships. *Psychology of Addictive Behaviors*, *23*, 226–237. doi:10.1037/a0015006
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin*, *110*, 86–108. doi:10.1037/0033-2909.110.1.86
- Heatherton, T. F., & Polivy, J. (1991). Development and validation of a scale for measuring state self-esteem. *Journal of Personality and Social Psychology*, *60*, 895–910. doi:10.1037/0022-3514.60.6.895
- Herman, C. P., & Polivy, J. (2004). The self-regulation of eating: Theoretical and practical problems. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 492–508). New York, NY: Guilford Press.
- 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. doi:10.1037/0022-3514.60.3.456
- Hewitt, P. L., Flett, G. L., & Ediger, E. (1995). Perfectionism traits and perfectionistic self-presentation in eating disorder attitudes, characteristics, and symptoms. *International Journal of Eating Disorders*, *18*, 317–326. doi:10.1002/1098-108X(199512)18:4<317::AID-EAT2260180404>3.0.CO;2-2
- Hewitt, P. L., Flett, G. L., Sherry, S. B., & Caelian, C. F. (2006). Trait perfectionism dimensions and suicide behavior. In T. E. Ellis (Ed.), *Cognition and suicide: Theory, research, and practice* (pp. 215–235). Washington, DC: American Psychological Association. doi:10.1037/11377-010
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280–1300. doi:10.1037/0003-066X.52.12.1280
- Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, *83*, 1198–1202.
- Mallinckrodt, B., Abraham, W. T., Wei, M., & Russell, D. W. (2006). Advances in testing the statistical significance of mediation effects. *Journal of Counseling Psychology*, *53*, 372–378. doi:10.1037/0022-0167.53.3.372
- Marsh, H. W. (1996). Positive and negative global self-esteem: A substantively meaningful distinction or artifactors? *Journal of Personality and Social Psychology*, *70*, 810–819. doi:10.1037/0022-3514.70.4.810
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1992). *Profile of Mood States manual*. San Diego, CA: Educational and Industrial Testing Service.
- Millon, T. (2002). Assessment is not enough. *Journal of Personality Assessment*, *78*, 209–218. doi:10.1207/S15327752JPA7802_02
- National Institute on Alcohol Abuse and Alcoholism. (2003). *Task Force*

- on Recommended Alcohol Questions-National Council on Alcohol Abuse and Alcoholism Recommended Sets of Alcohol Consumption Questions. Retrieved from <http://www.niaaa.nih.gov/Resources/ResearchResources/Pages/TaskForce.aspx>
- Nevitt, J., & Hancock, G. R. (2001). Performance of bootstrapping approaches to model test statistics and parameter standard error estimation in structural equation modeling. *Structural Equation Modeling, 8*, 353–377. doi:10.1207/S15328007SEM0803_2
- Park, A., Sher, K. J., & Krull, J. L. (2009). Selection and socialization of risky drinking during the college transition: The importance of microenvironments associated with specific living units. *Psychology of Addictive Behaviors, 23*, 404–414. doi:10.1037/a0016293
- Pearson, C. A., & Gleaves, D. H. (2006). The multiple dimensions of perfectionism and their relation with eating disorder features. *Personality and Individual Differences, 41*, 225–235. doi:10.1016/j.paid.2006.01.013
- Pratt, E. M., Telch, C. F., Labouvie, E. W., Wilson, G. T., & Agras, W. S. (2001). Perfectionism in women with binge eating disorder. *International Journal of Eating Disorders, 29*, 177–186. doi:10.1002/1098-108X(200103)29:2<177::AID-EAT1007>3.0.CO;2-X
- Rice, K. G., & Aldea, M. A. (2006). State dependence and trait stability of perfectionism study. *Journal of Counseling Psychology, 53*, 205–213. doi:10.1037/0022-0167.53.2.205
- Rice, K. G., & Dellwo, J. P. (2001). Within-semester stability and adjustment correlates of the Multidimensional Perfectionism Scale. *Measurement and Evaluation in Counseling and Development, 34*, 146–156.
- Rice, K. G., Leever, B. A., Christopher, J., & Porter, J. D. (2006). Perfectionism, stress, and social (dis)connection: A short-term study of hopelessness, depression, and academic adjustment among honors students. *Journal of Counseling Psychology, 53*, 524–534. doi:10.1037/0022-0167.53.4.524
- Rieger, E., Van Buren, D. J., Bishop, M., Tanofsky-Kraff, M., Welch, R., & Wilfley, D. E. (2010). An eating disorder-specific model of interpersonal psychotherapy (IPT-ED): Causal pathways and treatment implications. *Clinical Psychology Review, 30*, 400–410. doi:10.1016/j.cpr.2010.02.001
- Rush, C. C., Becker, S. J., & Curry, J. F. (2009). Personality factors and styles among college students who binge eat and drink. *Psychology of Addictive Behaviors, 23*, 140–145. doi:10.1037/a0013167
- Scheffer, J. (2002). Dealing with missing data. *Research Letters in the Information and Mathematical Sciences, 3*, 153–160. doi=10.1.1.18.3086
- Shafran, R., Cooper, Z., & Fairburn, C. G. (2002). Clinical perfectionism: A cognitive-behavioural analysis. *Behaviour Research and Therapy, 40*, 773–791. doi:10.1016/S0005-7967(01)00059-6
- 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. doi:10.1037/a0014528
- Sherry, S. B., Hewitt, P. L., Besser, A., McGee, B. J., & Flett, G. L. (2004). Self-oriented and socially prescribed perfectionism in the Eating Disorder Inventory perfectionism subscale. *International Journal of Eating Disorders, 35*, 69–79. doi:10.1002/eat.10237
- Sherry, S. B., Hewitt, P. L., Flett, G. L., & Harvey, M. (2003). Perfectionism dimensions, perfectionistic attitudes, dependent attitudes, and depression. *Journal of Counseling Psychology, 50*, 373–386. doi:10.1037/0022-0167.50.3.373
- Sherry, S. B., Mackinnon, S. P., & Stewart, S. H. (2010). [Psychometric data for the measures used in the reformulated perfectionism model of binge eating]. Unpublished raw data.
- Slaney, R. B., Rice, K. G., Mobley, M., Trippi, J., & Ashby, J. (2001). The Revised Almost Perfect Scale. *Measurement and Evaluation in Counseling and Development, 34*, 30–45.
- Smyth, J. M., Wonderlich, S. A., Crosby, R. D., Miltenberger, R., Mitchell, J. E., & Rorty, M. (2001). The use of ecological momentary assessment approaches in eating disorder research. *International Journal of Eating Disorders, 30*, 83–95. doi:10.1002/eat.1057
- Statistics Canada. (2006). *Women in Canada: A gender-based statistical report* (Catalogue No. 89–503-XIE). Retrieved from <http://www.statcan.gc.ca/pub/89-503-x/89-503-x2005001-eng.pdf>
- Statistics Canada. (2011). *Trends in the age composition of college and university students and graduates* (Catalogue No. 81–004-X). Retrieved from <http://www.statcan.gc.ca/pub/81-004-x/2010005/article/11386-eng.htm>
- Stein, R. I., Kenardy, J., Wiseman, C. V., Dounchis, J. Z., Arnow, B. A., & Wilfley, D. E. (2007). What's driving the binge in binge eating disorder? *International Journal of Eating Disorders, 40*, 195–203. doi:10.1002/eat.20352
- Stice, E. (1998). Relations of restraint and negative affect to bulimic pathology: A longitudinal test of three competing models. *International Journal of Eating Disorders, 23*, 243–260.
- Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin, 128*, 825–848. doi:10.1037/0033-2909.128.5.825
- Stice, E., Akutagawa, D., Gaggan, A., & Agras, W. (2000). Negative affect moderates the relation between dieting and binge eating. *International Journal of Eating Disorders, 27*, 21–29.
- Stice, E., Fisher, M., & Lowe, M. R. (2004). Are dietary restraint scales valid measures of acute dietary restriction? *Psychological Assessment, 16*, 51–59. doi:10.1037/1040-3590.16.1.51
- Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the Eating Disorder Diagnostic Scale: A brief self-report measure of anorexia, bulimia, and binge-eating disorder. *Psychological Assessment, 12*, 123–131. doi:10.1037/1040-3590.12.2.123
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Toronto, Canada: Allyn & Bacon.
- Tylka, T. L., & Subich, L. M. (2003). Revisiting the latent structure of eating disorders. *Journal of Counseling Psychology, 50*, 276–286. doi:10.1037/0022-0167.50.3.276
- Tylka, T. L., & Subich, L. M. (2004). Examining a multidimensional model of eating disorder symptomatology among college women. *Journal of Counseling Psychology, 51*, 314–328. doi:10.1037/0022-0167.51.3.314
- Wei, M., Heppner, P. P., Russell, D. W., & Young, S. K. (2006). Maladaptive perfectionism and ineffective coping as mediators between attachment and future depression: A prospective analysis. *Journal of Counseling Psychology, 53*, 67–79.
- Wei, M., Mallinckrodt, B., Russell, D. W., & Abraham, W. T. (2004). Maladaptive perfectionism as a mediator and moderator between adult attachment and depressive mood. *Journal of Counseling Psychology, 51*, 201–212. doi:10.1037/0022-0167.51.2.201
- Westen, D., & Harnden-Fischer, J. (2001). Personality profiles in eating disorders. *The American Journal of Psychiatry, 158*, 547–562. doi:10.1176/appi.ajp.158.4.547
- Wilfley, D. E., Pike, K. M., & Striegel-Moore, R. H. (1997). Toward an integrated model of binge eating disorder. *Gender, Culture, and Health, 2*, 1–32.
- Wilson, G. T., Wilfley, D. E., Agras, W. S., & Bryson, S. W. (2010). Psychological treatments of binge eating disorder. *Archives of General Psychiatry, 67*, 94–101. doi:10.1001/archgenpsychiatry.2009.170

Received November 24, 2010

Revision received June 29, 2011

Accepted July 14, 2011 ■