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**How perfectionism and ineffectiveness influence growth of eating disorder risk in
young adolescent girls**

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Abstract

Objective: While perfectionism is widely considered to influence risk for eating disorders, results of longitudinal studies are mixed. The goal of the current study was to investigate a more complex model of how baseline perfectionism (both high personal standards and self-critical evaluative concerns) might influence change in risk status for eating disorders in young adolescent girls, through its influence on ineffectiveness. *Method:* The study was conducted with 926 girls (mean age of 13 years), and involved three waves of data (baseline, 6- and 12-month follow-up). Latent growth curve modeling, incorporating the average rate at which risk changed over time, the intercept (initial status) of ineffectiveness, and baseline perfectionism, was used to explore longitudinal mediation. *Results:* Personal standards was not supported as contributing to risk but results indicated that the higher mean scores on ineffectiveness over the three waves mediated the relationship between higher baseline self-critical evaluative concerns and both measures of eating disorder risk. The relationship between concern over mistakes and change in risk was small and negative. *Discussion:* These results suggest the usefulness of interventions related to self-criticism and ineffectiveness for decreasing risk for developing an eating disorder in young adolescent girls.

Key Words: importance of weight and shape concern, eating disorder risk, self-criticism, ineffectiveness, perfectionism

Systematic reviews suggest that perfectionism is a risk factor for eating disorders (Bardone-Cone et al., 2007; Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; Shafran & Mansell, 2001; Stice, 2002; Egan, Wade, & Shafran, 2011). Factor analysis of the most common multidimensional perfectionism measures, the Frost Multidimensional Perfectionism Scale (FMPS; Frost, Marten, Lahart, & Rosenbalate, 1990) and the Hewitt and Flett Multidimensional Perfectionism Scale (1991), distinguishes two higher-order factors: high personal standards, or the pursuit of high standards and goals; and self-critical evaluative concerns, involving critical self-evaluations and over-concern of others' expectations when high standards are not met (Bieling, Israeli, & Antony, 2004; Cox, Enns, & Clara, 2002). Both dimensions are considered to be of relevance to eating disorders (Bardone-Cone et al., 2007).

Currently the majority of the evidence for the relationship between perfectionism and disordered eating rests on cross-sectional studies. Correlational studies have demonstrated that individuals with bulimia nervosa (BN) have significantly higher levels of perfectionism than healthy controls (Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2004). Retrospective case control studies have also reported significantly higher rates of childhood perfectionism in both individuals with BN and anorexia nervosa (AN) compared to healthy controls (Fairburn, Cooper, Doll, & Welch, 1999; Fairburn, Welch, Doll, Davies, & O'Connor, 1997). Individuals with AN also have higher levels of childhood perfectionism compared to psychiatric controls (Machado, Gonçalves, Martins, Hoek, & Machado, 2014). Elevated concern over mistakes, a subscale of the FMPS that loads on the self-critical evaluative concerns construct, is associated with retrospectively reported AN and BN but not with other psychiatric disorders (Bulik et al., 2003). Individuals who have recovered from AN continue to evidence significantly higher levels of perfectionism than healthy controls (Bastiani, Rao, Weltzin, & Kaye, 1995; Srinivasagam, et al., 1995). Females with a self-reported lifetime history of fasting or purging (i.e., self-induced vomiting, or abuse of laxatives or diuretics) exhibit significantly higher levels of perfectionism than healthy controls (Forbush, Heatherton, & Keel, 2007), with fasting mediating the relationship between perfectionism and binge eating.

While some longitudinal studies have found that perfectionism is related to increases in eating disorder symptoms over time (e.g., Boone, Soenens, & Braet, 2011; Mackinnon et al., 2011), other studies have failed to confirm these findings (e.g., Gustafsson, Edlund, Kjellin, & Norring, 2009; Vohs, Bardone, Joiner, Abramson, & Heatherton, 1999; Leon et al., 1999). It has been suggested that more complex multivariate models will be required to properly understand the postulated effect of perfectionism on risk for disordered eating (Stice, 2002; Bardone-Cone et al., 2007). For example, several models involving moderation of perfectionism and growth of disordered eating have received support. Perfectionism has been shown to predict the growth of bulimic symptoms (both binge eating and self-induced vomiting) through a three-way interaction with self-efficacy and weight and shape concern (Bardone-Cone, Abramson, Vohs, Heatherton, & Joiner, 2006). Young women showing the greatest increase in symptoms had higher levels of perfectionism and weight and shape concern accompanied by lower self-efficacy. Replication of this model using self-efficacy has been successful (Bardone-Cone et al., 2008) but attempts to replicate it using self-esteem in the place of self-efficacy have persistently failed (Steele, Corsini, and Wade, 2007; Shaw, Stice, & Springer, 2004; Watson, Steele, Bergin, Fursland, & Wade, 2011). More recently, in a sample of young adolescent girls, body dissatisfaction was found to moderate the effect of perfectionism on changes in importance of weight and shape (Boone, Soenens, & Luyten, 2014). Higher levels of both concern over mistakes and personal standards perfectionism interacted with higher levels of body dissatisfaction at baseline leading to significantly higher levels of importance of shape and weight at 12-month follow-up.

The weak longitudinal relationship between perfectionism and eating disorder risk may also be explained by a suppressor effect, where the addition of a mediator can strengthen the effect of perfectionism on eating disorder outcomes, or increase the overall variance explained in the outcome variable. One such model has previously been tested (Boone et al., 2014) but there was no support for a longitudinal mediational model where body dissatisfaction at 6-month follow-up was postulated to mediate the relationship between baseline perfectionism and over-evaluation of weight and shape at 12-month follow-up. One potentially important mediator of the relationship between perfectionism and disordered eating is suggested by the functional analysis

of AN and BN (Slade, 1982). This model describes how perfectionism, allied with life dissatisfaction (e.g., stress and failure experiences), impacts on an increased need to exert control over life situations, including control of nutritional intake. The role of perfectionism and life dissatisfaction in the context of early adolescent developmental challenges had previously been suggested as a pivotal trigger for eating disorders by Hilde Bruch (1974). Several other theoretical models also implicate both high levels of perfectionism and ineffectiveness (low self-efficacy or difficulties with managing life and strong emotion), as being critical to the development of eating disorders (Bardone-Cone, et al., 2006; Schmidt & Treasure, 2009; Fairburn, Cooper, & Shafran, 2003). Qualitative research (Serpell, Treasure, Teasdale, & Sullivan, 1999) suggests AN plays a powerful role in tackling a sense of ineffectiveness, making the person feel safe, helping them to communicate distress, and stifling emotions. The most endorsed worries of women with AN do not relate to aspects of eating or weight, but to issues that increase a sense of ineffectiveness: rejection and abandonment, negative perceptions of self, and experience of negative emotions (Sternheim et al., 2012). Ineffectiveness has previously been shown to predict the growth of importance of weight and shape (Wilksch & Wade, 2010).

When examining mediational relationships with disordered eating in adolescents, who have yet to express behavioural symptoms of an eating disorder, it is more useful to examine risk of developing disordered eating rather than disordered eating *per se*. Two empirically validated constructs of risk exist, both of which are adopted in the current investigation. The first is importance of weight and shape, used previously in studies of adolescents to indicate risk (Boone et al., 2014; Wilksch & Wade, 2010). Importance of shape and weight, which forms part of the diagnostic criteria for both AN and BN, has been described as the “core psychopathology” of eating disorders (Cooper & Fairburn, 1993) and has been found to predict the growth of disordered eating behaviours in young adolescent girls (Wilksch & Wade, 2010). A second “omnibus” construct of risk includes the presence of high levels of weight and shape concern in addition to either a history of depression and/or negative comments from others about eating, weight or shape (Jacobi et al., 2011). Where depression and/or negative comments were present at baseline in addition to weight and shape concern, the development of full or subthreshold

eating disorders was significantly increased in college women i.e., 35% compared to 4% where only elevated weight and shape concern was present.

Therefore, the aim of the current study was to longitudinally test the hypothesis that the intercept of ineffectiveness (modelled to allow change over time) mediates the relationship between baseline perfectionism (both high personal standards and self-critical evaluative concerns) and changes in the slope of eating disorder risk status in young adolescents. It was hypothesized that ineffectiveness would mediate the relationship between both types of perfectionism and eating disorder risk, with the latter indicated by both (i) importance of weight and shape, and (ii) higher levels of weight and shape concern, depression and negative comments about weight.

Methods

Participants

All girls who had completed baseline observations as part of participation in a prevention study across three states of Australia were included in the current study ($n=926$). The girls were from Grades 7 and 8 across 12 schools; ten schools were co-educational, while two were girls-only. The schools were public ($n = 3$); private ($n = 4$) and Catholic ($n = 5$), and were composed typically of Caucasian students. An indicator of socioeconomic status was obtained from the Australian government's Index of Community Socio-Educational Advantage (ICSEA) whereby 1000 represents the mean, with a standard deviation of 100 (ACARA, 2011). The variables used in calculating a value on the ICSEA scale include student-level data on the occupation and education level of parents/carers, and/or socio-economic characteristics of the areas where students live, whether a school is in a metropolitan, regional or remote area, proportion of students from a language background other than English, as well as the proportion of Indigenous students enrolled at the school. The twelve participating schools from the present study had ICSEA ratings between 972 and 1183 with an average of 1104, indicating a slightly above average socio-economic advantage. The mean age of the girls was 13.00 years ($SD = .75$), with a

mean body mass index (BMI) of 20.43 ($SD = 3.82$) and a mean BMI percentile of 49.51 ($SD=29.23$). Approval for this research was received from a total of five Institutional Review Boards and school principals from each school.

Procedure

Schools were invited to participate (email or phone call) based on previously expressing an interest in body image and health promotion programs or where schools were geographically located within one hour of the participating university in that state. Upon agreeing to participate and principal's consent to administer the programs in the school, parental consent and adolescent assent was required to permit use of data in any published analyses. At baseline (Wave 1) students completed the battery of risk factor measures and had their height and weight measured by two research assistants. Students then received one of four randomly allocated prevention conditions (including control) over the next 4-week period (Wilksch et al., in press), at which time post-intervention assessment was conducted (Wave 2). The baseline was followed by 6- and 12-month follow-up assessments (Waves 3 and 4 respectively).

Design

We adopted the recommendations of Selig and Preacher (2009) in order to test a longitudinal relationship between perfectionism and growth in eating disorder risk that was mediated by ineffectiveness. The baseline (Wave 1) assessment of the independent variable, perfectionism, was used. In order to allow for assessment of change (slope) of our outcome variables from baseline, observations of eating disorder risk from Waves 1, 3 and 4 were used, ensuring equidistant measurement at every 6 month period. In order to avoid reverse or concurrent causation with respect to the mediator variable (Selig & Preacher, 2009), we were unable to use the baseline observation of ineffectiveness, and therefore selected these measures from Waves 2, 3 and 4.

Measures

Perfectionism. Perfectionism was assessed with the Frost Multidimensional Perfectionism Scale (Frost et al., 1990), with both the personal standards (7 items reflecting high

personal standards) and concern over mistakes (9 items reflecting self-critical evaluative concerns) sub-scales showing good internal reliability in the current study at baseline ($\alpha=0.81$ and $\alpha=0.89$ respectively). Items were rated on a 4-point Likert scale from strongly agree to strongly disagree and a mean item score was formulated for each measure. Convergent validity for the entire FMPS has been supported with the perfectionism scale of the EDI in a population with AN ($r = .59$; Garner, Olmstead, & Polivy, 1983).

Ineffectiveness. Ineffectiveness was assessed using the 10-item Ineffectiveness sub-scale of the Eating Disorder Inventory (EDI; Garner, et al., 1983), which is rated on a 6-point Likert scales ranging from 1 (always) to 6 (never). This subscale assesses feelings of inadequacy, insecurity, worthlessness and having no control over one's life. The mean item score was used. The internal reliability of the sub-scale at Waves 2, 3 and 4 was good, at 0.88, 0.89 and 0.90 respectively. The ineffectiveness subscale has been identified as one of eight subscales of the EDI using confirmatory factor analysis (Espelage et al., 2003), with moderate correlations with measures of personality and depression and an ability to discriminate between a clinical eating disorder and healthy college sample in a multivariate analysis of all 8 subscales.

Eating Disorder Risk. Risk for developing an eating disorder was measured in two different ways. The first combined two items from the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) to form a mean item score of importance of weight and shape e.g., *“Has your weight/shape influenced how you think about (judge) yourself as a person?”*. These two items are measured on a 7-point scale, from “not at all” to “markedly” over the previous 28-day period. Compared to the interview version of the same instrument (EDE; Fairburn & Cooper, 1993), the EDE-Q has good convergence with respect to the subscale scores (Berg, Peterson, Frazier, & Crow, 2011). The internal reliability of this measure at Waves 1, 3 and 4 was 0.92, 0.96 and 0.75 respectively.

The second measure was a combination of three different risk variables (Jacobi et al., 2011). The first was the weight and shape concern subscales from the EDE-Q, with the two importance items removed to ensure it was differentiated from the first measure, leaving 10 items

e.g., *How dissatisfied have you felt about your weight/shape?*, where each is scored on a 7-point Likert scale, either that described above or using frequency over the previous 28 day period. Across Waves 1, 3 and 4 the internal reliability of this measure was 0.94, 0.95 and 0.96. The second was the Child Depression Inventory-Short Form (Kovacs, 1992) which consisted of 10 items scored on a 3-point Likert scale e.g., 0 = “*I am sad once in a while*” to 2 = “*I am sad all the time*” related to symptoms during the past 2 weeks (Kovacs, 1992). This self-report instrument has been found to discriminate between depressed and non-depressed samples of children (Kovacs, 1985). Across the three waves the internal reliability of this measure was 0.89, 0.89 and 0.91. Negative comments about weight was assessed using 8 items related to comments from peers (e.g., *In the past year, how often have girls/young women (including sisters) made fun of you because of your weight?*) and 3 items related to comments from adults (e.g., *In the past year, how often has a teacher or coach made a comment to you about your weight that made you feel bad?*) taken from the McKnight risk factor survey (McKnight Investigators, 2003; Shisslak et al., 1999), with each item rated from 1 = “Never” to 5 = “Always”. Across all the three waves the internal reliability of this measure was 0.93. These social pressure items have been found to correlate with thin body preoccupation and general psychological issues (e.g., depression), and predict time to onset of disordered eating in adolescents (McKnight Investigators, 2003). The three mean item scores were standardized before being added together, and the internal reliability of this combined measure was 0.95 at Waves 1, 3 and 4. All measures used in the study were coded such that higher scores indicated higher levels of the construct.

Statistical Analyses

Approaches to the use of longitudinal mediation in developmental research have previously been discussed by Selig and Preacher (2009). The general aim of such analyses is to explain the way in which one variable (typically assessed at baseline) has an effect on another variable (the outcome) through its influence on some intermediate variable (mediator) measured within the time period elapsing between baseline and outcome. Longitudinal mediation can be tested in several different ways with the most commonly utilized being the cross-lagged panel

model. However, the cross-lagged panel model does not explicitly incorporate the effect of the passage of time. Therefore an alternative approach has been outlined (Selig & Preacher, 2009), latent growth curve modeling, incorporating the average rate at which individuals change (the slope mean), and the inter-individual variability in that rate (the slope variance), in addition to the initial status on the mediator (intercept).

The latent growth curve model tested is shown in **Figures 1 and 2**, with the shaded variables showing the mediational pathways of interest, where the intercepts and slopes for the mediator and outcome variables (time variant variables) are represented as latent variables that were allowed to vary across individuals. BMI was also included in the model as a time invariant covariate as it was considered that it could influence the slope of our outcome variables.

Estimated parameters include the intercept and slope means, the intercept and slope variances and covariance, and residual variances. The model was tested using Mplus7.1 (Muthén & Muthén, 1999-2010) with the maximum likelihood (ML) estimator as the mean item scores were treated as continuous in Mplus. This method does not impute any data, but rather uses each case's available data to compute ML estimates. The ML estimate of a parameter is the value of the parameter that is most likely to have resulted in the observed data. This meant that all participants who completed baseline observations for a variable but did not complete any subsequent waves of data were included in the analysis (N=72 or N=71 for the ineffectiveness variable where baseline was at Wave 2; a total of 15% of participants). The modelling assumes missing data are missing completely at random.

Results

Descriptives

The means and standard deviations of the variables used in the models are summarized in **Table 1**. Of those girls who completed baseline measures at Wave 1, 71% completed self-report measures at Wave 2, 80% completed self-report measures at Wave 3, and 76% completed these measures at Wave 4. Associations between missing observations at the waves subsequent to

baseline and the baseline variables in the model are shown in **Table 2**. Only concern over mistakes predicted decreased likelihood of completing Wave 3 assessment, where higher levels of perfectionism predicted less likelihood of not completing assessment at this time. Generally the results indicated that data were missing at random.

As shown in **Table 3**, there were strong correlations between the concern over mistakes measure and all the variables in the expected direction. There were only two weak significant correlations involving personal standards perfectionism, both with Wave 1 eating disorder risk status. Consistent with previous research, the two types of perfectionism had a positive and moderate association with each other at baseline.

Latent growth curve modeling

Four models were tested, one for each eating disorder risk variable and for each type of perfectionism. There was no support for a mediational relationship involving personal standards, as shown in **Table 4**, but such a relationship was supported for both risk variables for concern over mistakes¹. The unstandardized pathway estimates for the mediational model involving concern over mistakes, ineffectiveness and importance of weight and shape are shown in **Figure 1** with the standardized pathways parameter estimates provided in **Table 4** for the mediational pathways. In this model, the direct relationship between perfectionism and the slope of importance of weight and shape was significant but small and negative, while the mediational pathways were robust and positive. This suggests that a higher level of concern over mistakes at baseline has an effect on increasing the importance of weight and shape over time through its influence on higher levels of ineffectiveness. The amount of variance of the change in importance of weight and shape explained by the whole model was 48% (standard error=8.2).

The unstandardized pathway estimates for the mediational model involving concern over mistakes, ineffectiveness and the combined risk variable are shown in **Figure 2** with the standardized mediational pathways parameter estimates provided in **Table 4**. Similar to the previous model, the direct relationship between perfectionism and the eating disorder risk was

¹ The pattern of results was similar when the full weight and shape concern subscale was used in the composite risk variable

significant but small and negative, while the mediational pathways were robust and positive. This suggests that a higher level of concern over mistakes at baseline has an effect on increasing the risk of developing an eating disorder over time through its influence on higher levels of ineffectiveness. The amount of variance of the change in risk explained by the whole model was 38% (standard error=5.0).

The two models containing concern over mistakes were rerun using the control group participants only i.e., those girls who received no intervention (N=338), in order to establish whether the same model was supported or whether there was an impact of intervention status. The results, reported in **Table 4**, show that longitudinal mediation was supported in this group, with similar pathway estimates. The standard errors were slightly larger, as would be expected given the lower power.

Discussion

The main aim of the current investigation was to examine how perfectionism and ineffectiveness might influence changes in risk for developing an eating disorder in young adolescent girls. We found that mean levels of ineffectiveness over time mediated the relationship between concern over mistakes perfectionism at baseline and change in both of our eating disorder risk variables over time. In other words, higher levels of concern over mistakes perfectionism at baseline was subsequently associated with higher levels of ineffectiveness over time, which was associated with growth of risk over time. No support was found for a role of personal standards perfectionism (i.e., pursuit of high standards) in the mediating relationship.

For those girls with existing self-critical evaluative concerns, the challenges of entering adolescence, managing transitions to secondary school and experiencing various pressures from peers are likely to provide ongoing opportunities for a growing sense of ineffectiveness. It has been argued that evaluative concerns perfectionism influences disordered eating because of its association with self-criticism (Dunkley, Zuroff, & Blankstein, 2006) given the very high correlations between concern over mistakes perfectionism and measures of self-criticism, such as the Depressive Experiences Questionnaire (Blatt, D’Affiti, & Quinlan, 1976) and the self-

criticism sub-scale of the Dysfunctional Attitudes Scale (Weissman & Beck, 1978). In support of this argument, factor analysis shows self-criticism to load on to concern over mistakes perfectionism (Clara, Cox, & Enns, 2007), and the inclusion of self-criticism with measures of perfectionism in regression analyses show self-criticism to be the most robust predictor of maladjustment (Dunkley et al., 2006) with an independent relationship with psychopathology (Dunkley, Blankstein, Masheb, & Grilo, 2006).

The inconsistent findings about a direct relationship between perfectionism and the growth of eating disorder symptoms (e.g., Boone et al., 2011; Mackinnon et al., 2011; Gustafsson et al., 2009; Vohs et al., 1999; Leon et al., 1999) may be partly explained by the results of the current study. We found a small but significant negative relationship between baseline concern over mistakes and the slope of both our eating disorder risk variables, suggesting that lower baseline perfectionism is associated with an increase in risk. In contrast, the relationships between perfectionism, levels of ineffectiveness over time and growth of risk are strong and positive. These findings are consistent with a suppressor effect, where the inclusion of ineffectiveness strengthens the relationship between perfectionism and eating disorder risk. This highlights the issue that direct relationships do not capture the complexity of the ways in which variables work together to increase risk for eating disorders. Further research is required that has the capacity to examine and test more complex models of eating disorder aetiology. Some issues that deserve further investigation include the following: whether self-criticism independent of the drive to meet high standards is important in increasing risk for disordered eating; given existing moderator models of perfectionism predicting disordered eating (e.g., Bardone-Cone et al., 2008; Boone et al., 2014), models should also investigate moderators simultaneously with the mediating relationships; it is likely that there are multiple and simultaneous mediators that can influence disordered eating and further investigation of these are required; the developmental relevance of this model also requires testing, in terms of children and older adolescents.

The results of the current study should be interpreted in the context of two limitations. First, we utilised self-report data. This may be of most relevance to ascertaining levels of importance of weight and shape, which can be a complex construct to understand. However the

self-report and interview version of the EDE have good convergence (Berg et al., 2011) and temporal stability of the EDE-Q in an adult Australian community sample aged 18 to 45 years over a median period of 315 days was 0.75 for shape concern and 0.73 for weight concern (Mond, Hay, Rodgers, Owen, & Beumont, 2004). Second, the results are not generalizable to clinical populations or young male adolescents.

The implications of the results which need to be tested in future research are as follows. Weight and shape concern, a larger construct which includes importance of weight and shape, is considered to be one of the most powerful proximal risk factors for the emergence of disordered eating behaviours (Jacobi & Fittig, 2010), and is an important target for prevention efforts. At the environmental level, interventions aimed at reducing stigma and bullying related to weight and shape could be implemented which can protect children from this type of harmful treatment by peers and adults.

When working at the individual level, our results suggest that weight and shape concern could be decreased by targeting either self-criticism and/or ineffectiveness. Mindfulness-based cognitive therapy may be useful in this context as it exerts its effect via an increase in self-compassion (Kuyken et al., 2010), with a pilot study in 12-16 year olds finding that a mindfulness intervention decreased depression and improved wellbeing at 3 month follow up (Kuyken et al., 2013). Experimental evidence also suggests that mindfulness training can impact on weight dissatisfaction (Wade, George, & Atkinson, 2010; Atkinson & Wade, 2012), and that mindfulness can lead to short-term decreases in weight and shape concern and eating disorder symptoms in young women concerned about body image (Atkinson & Wade, 2014). There is also some evidence to suggest that weight and shape concern and ineffectiveness can be significantly reduced by use of a media literacy approach (Wilksch & Wade, 2009; Wilksch et al., in press) in both girls and boys relative to control. This approach seeks to equip young people to become critical consumers of advertising and to develop skills to resist pressures from others to conform to some imposed ideal or behavior. An empirical question to address is whether a combination of a mindfulness approach and a media literacy approach has a more powerful impact on reducing risk for developing disordered eating behaviours than the use of either approach alone. The public

health importance of decreasing disordered eating supports the need for further research to investigate ways we can support the healthy development and well-being of adolescent girls.

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Listing of titles for figures*Figure 1*

Latent growth curve model of risk for importance of weight and shape examining the mediational relationship between baseline concern over mistakes perfectionism, the mean intercept of ineffectiveness (Ineff), and the slope of importance of weight and shape (S_{wti}) over 3 waves of data collection. Only significant pathways are included with unstandardized parameter estimates. In order to simplify the presentation, associations with covariates and error variance terms are not shown. BMI is included as a covariate.

Figure 2

Latent growth curve model of the combined risk factor variable (including weight and shape concern, depression and weight-related comments) examining the mediational relationship between baseline concern over mistakes perfectionism, the mean intercept of ineffectiveness (Ineff), and the slope of risk (S_{risk}) over 3 waves of data collection. Only significant pathways are included with unstandardized parameter estimates. In order to simplify the presentation, associations with covariates and error variance terms are not shown. BMI is included as a covariate.

Figure 1

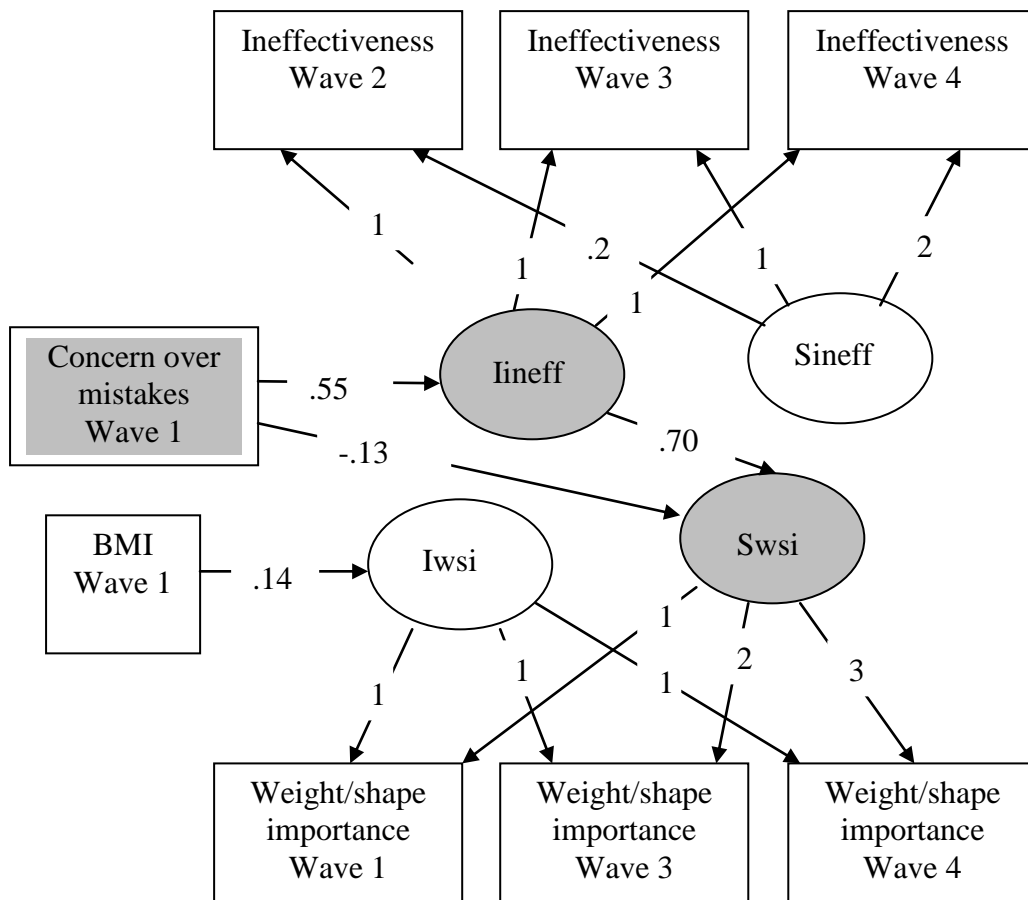


Figure 2

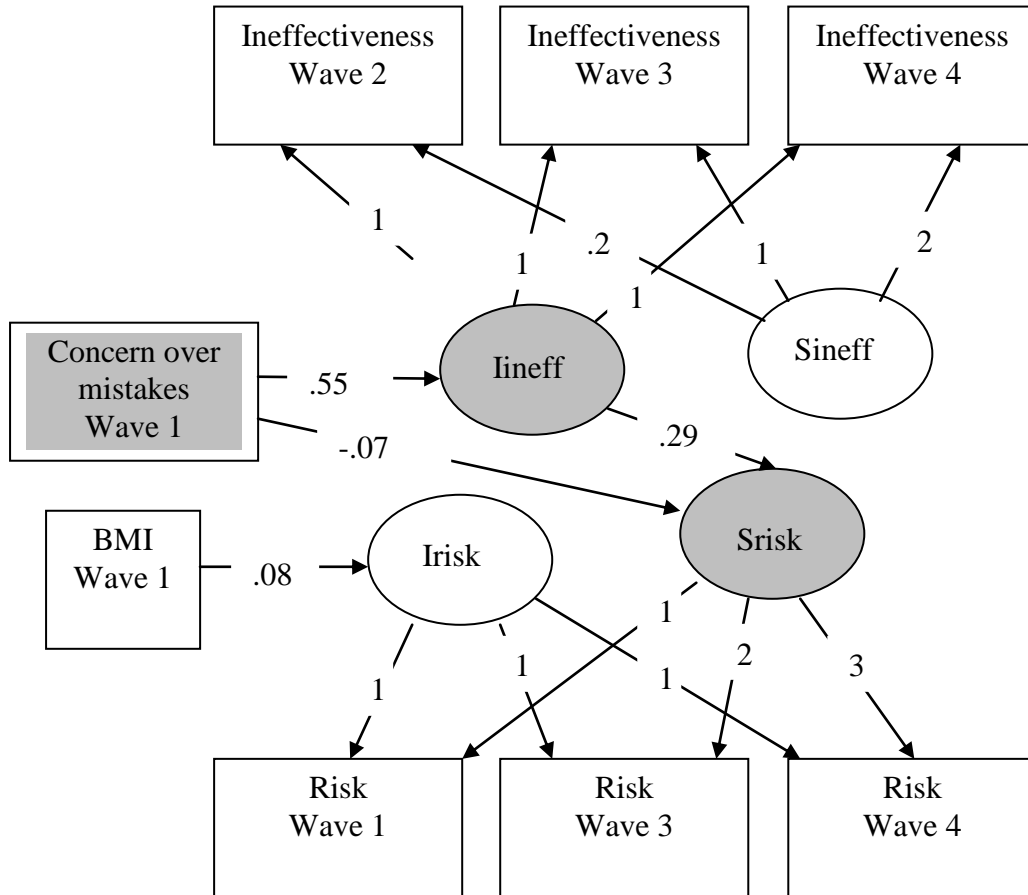


Table 1

Descriptive statistics for variables included in the mediational analyses

Variable	Wave	Mean (SD)	Range
Concern over mistakes	1	2.17 (0.77)	1-5
Personal standards	1	3.03 (0.71)	1-5
Ineffectiveness	2	2.48 (0.95)	1-6
	3	2.52 (0.96)	1-6
	4	2.68 (1.04)	1-6
Weight/shape importance	1	1.97 (1.84)	0-6
	3	1.98 (1.91)	0-6
	4	2.23 (1.97)	0-6
Eating disorder risk (unstandardized)	1	1.54 (0.77)	0.3-4.5
	3	1.55 (0.81)	0-4.5
	4	1.66 (0.83)	0.3-4.5
• Weight/shape concern	1	2.63 (1.65)	0-6
	3	2.58 (1.69)	0-6
	4	2.89 (1.72)	0-6
• Depression	1	0.36 (0.40)	0-2
	3	0.36 (0.42)	0-2
	4	0.44 (0.47)	0-2
• Negative comments about weight: Peers	1	1.79 (0.92)	1-5
	3	1.79 (0.95)	1-5
	4	1.85 (0.97)	1-5
• Negative comments about weight: Adults	1	1.44 (0.65)	1-5
	3	1.47 (0.72)	1-5
	4	1.55 (0.76)	1-5

Table 2

Examination of associations between baseline variables included in the model and failure to complete assessments at Waves 2, 3 or 4

Baseline variable	Wave 2	Wave 3	Wave 4
	Odds ratio (95 % CI) <i>p</i>	Odds ratio (95 % CI) <i>p</i>	Odds ratio (95 % CI) <i>p</i>
BMI	1.00 (0.99-1.01) 0.86	0.97 (0.93-1.01) 0.10	1.03 (0.99-1.07) 0.16
Weight and shape importance ¹	1.03 (0.99-1.02) 0.72	0.98 (0.90-1.07) 0.63	0.93 (0.86-1.01) 0.10
Ineffectiveness	0.94 (0.81-1.09) 0.41	0.97 (0.83-1.13) 0.68	0.97 (0.83-1.12) 0.63
Unstandardised eating disorder risk ¹	1.03 (0.84-1.26) 0.78	0.93 (0.75-1.16) 0.53	0.84 (0.69-1.04) 0.10
Concern over mistakes	0.90 (0.76-1.07) 0.23	0.81 (0.68-0.97) 0.02	0.86 (0.72-1.02) 0.08
Personal standards	1.04 (0.87-1.26) 0.66	0.91 (0.75-1.11) 0.36	0.96 (0.80-1.16) 0.68

¹ Covarying for BMI

Table 3

Correlations between the variables in the model

Variable	Personal Standards (Wave 1)	1	2	3	4	5	6	7	8	9
Concern over mistakes (Wave 1)	.38	.49	.41	.38	.46	.37	.28	.47	.33	.28
1. Ineffectiveness (Wave 2)	-.02		.71	.56	.51	.49	.36	.60	.53	.42
2. Ineffectiveness (Wave 3)	.01			.70	.43	.58	.50	.52	.63	.53
3. Ineffectiveness (Wave 4)	.01				.40	.49	.65	.46	.55	.68
4. Importance of weight/shape (Wave 1)	.09					.61	.53	.79	.56	.52
5. Importance of weight/shape (Wave 3)	.05						.65	.65	.81	.63
6. Importance of weight/shape (Wave 4)	.04							.57	.67	.81
7. Eating disorder risk (Wave 1) – combined variable	.08								.73	.67
8. Eating disorder risk (Wave 3) – combined variable	.02									.76
9. Eating disorder risk (Wave 4) – combined variable	-.001									

Note: Bolded correlations were significant at the $p < 0.001$ level, italicized correlations were significant at the $p < 0.01$ level

Table 4

Testing a dual growth model to examine whether levels of ineffectiveness over time mediate the relationship between perfectionism at baseline and changes in eating disorder risk measures over time showing standardized parameter estimates

Model: mediational pathway	perfectionism → intercept	perfectionism → slope	Intercept → slope
	Standardized estimate (SE) <i>p</i>	Standardized estimate (SE) <i>p</i>	Standardized estimate (SE) <i>p</i>
Personal standards → intercept ineffectiveness → slope importance of weight and shape	-0.03 (0.04) 0.93	0.04 (0.03) 0.20	0.67 (0.05) <0.001
Concern over mistakes → intercept ineffectiveness → slope importance of weight and shape	0.52 (0.03) <0.001	-0.13 (0.05) 0.007	0.75 (0.07) <0.001
Personal standards → intercept ineffectiveness → slope combined eating disorder risk variable	0.01 (0.04) 0.82	-0.02 (0.03) 0.48	0.60 (0.04) <0.001
Concern over mistakes → intercept ineffectiveness → slope combined eating disorder risk variable	0.50 (0.03) <0.001	-0.16 (0.04) <0.001	0.68 (0.04) <0.001
<i>Models containing concern over mistakes – control group only</i>			
Concern over mistakes → intercept ineffectiveness → slope importance of weight and shape	0.51 (0.05) <0.001	-0.16 (0.07) 0.03	0.76 (0.09) <0.001
Concern over mistakes → intercept ineffectiveness → slope combined eating disorder risk variable	0.50 (0.05) <0.0001	-0.13 (0.05) 0.01	0.60 (0.06) <0.001