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Research Article

ETIOLOGIC RELATIONSHIPS BETWEEN ANXIETY AND DIMENSIONS OF MALADAPTIVE PERFECTIONISM IN YOUNG ADULT FEMALE TWINS

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Background: *Theory and research suggest that maladaptive perfectionism, specifically, concerns about mistakes (CM) and doubts about actions (DA), may be important etiologic and maintenance mechanisms for anxiety and its disorders. However, no studies speaking directly to the origins of the relationship, i.e. what etiologic factors underlie the phenotypic association between anxiety and maladaptive perfectionism, exist. The current study aimed to address this gap in the literature by exploring genetic and environmental relationships between anxiety symptoms and maladaptive perfectionism.* **Methods:** *The sample consisted of 292 young adult same-sex female twins from the Michigan State University Twin Registry. Anxiety symptoms were assessed by the State Trait Anxiety Inventory—Trait version and an anxiety problems scale derived from the Young Adult Self Report. Maladaptive perfectionism was measured using the CM and DA subscales of the Frost Multidimensional Perfectionism Scale.* **Results:** *Anxiety and maladaptive perfectionism were both moderately heritable, with estimates ranging from. 45 to .66. Moreover, multivariate analyses revealed that genetic factors were primarily responsible for associations between anxiety and maladaptive perfectionism (r_g = .59–.88).* **Conclusions:** *This is the first study to demonstrate the role of genetic factors in the relationship between anxiety and maladaptive perfectionism. Future studies are needed to uncover the specific biologic and genetic factors that contribute to this relationship and to evaluate whether maladaptive perfectionism represents an intermediate trait or risk factor for anxiety. Depression and Anxiety 29:47–53, 2012.*

Key words: *anxiety; perfectionism; twins; behavior genetics; etiology*

Anxiety is a basic human emotion that alerts us to potential threats.[1] At its extreme, however, disordered anxiety is one of the most common and burdensome mental afflictions.[2–4] Better understanding factors that contribute to the development and maintenance of anxiety are therefore significant to many individuals, including the everyday anxious test-taker, the anxiety disorder patient, and everyone in between. Empirical and theoretical literature suggests that maladaptive perfectionism, or the tendency to critically evaluate one's own performance, represents one such important contributory factor.[5–9]

The construct of maladaptive perfectionism and its link to psychological problems has been the

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focus of study for decades.[5,9] Frost et al.[6] in particular, conceptualize maladaptive perfectionism as a multidimensional, cognitive-behavioral construct. Using their Multidimensional Perfectionism Scale (FMPS),[6,10] Frost et al. define maladaptive perfectionism as composed of four subcomponents: concern over mistakes (CM; the tendency to view personal mistakes negatively and to interpret them as failures), doubts about actions (DA; the extent to which an individual doubts their abilities and the quality of their performance), Parental Expectations (PE; the belief that one's parents set extremely high goals), and Parental Criticism (PC; the view that one's parents are/were exceedingly critical). The CM and DA dimensions that represent personal cognitive-behavioral processes are most closely associated with anxiety in clinical[8,11] and nonclinical populations[6,12] and appear prominently in contemporary theories of several anxiety disorders as etiologic and maintenance mechanisms. For example, Heimberg et al.'s[13] influential theory of social phobia posits that perfectionism leads individuals who view social situations as potentially dangerous to believe that perfect social performance is the only way to prevent embarrassment. As this standard is never met, socially anxious individuals come to expect and focus on negative experiences (e.g. "mistakes") in social interactions and thus chronic social phobia ensues. Importantly, the association between maladaptive perfectionism and anxiety is generalized. Elevated CM and DA scores can be found in patients diagnosed with OCD, panic disorder, and social phobia[11] as well as students scoring high on general anxiety symptoms[6] and worry.[12] As a result, Egan et al.[5] have argued that maladaptive perfectionism represents a transdiagnostic process common to many anxiety problems (and other forms of psychopathology).

Unfortunately, much of the research linking anxiety and maladaptive perfectionism has relied on cross-sectional, correlational designs thus limiting the conclusions that can be drawn about the nature of their relationship. Recent research in OCD patients, however, provides preliminary support for the notion that CM and DA represent important etiologic mechanisms for anxiety. In examining the role of perfectionism in treatment for OCD, Chik et al.[14] replicated previous work by showing a significant association between OCD symptoms and maladaptive perfectionism at pretreatment. More importantly, they found that, although OCD symptoms decreased following Cognitive Behavioral Therapy (CBT), CM and DA scores remained unchanged. These findings suggest that CM and DA are trait-related to OCD—i.e. not just present during the disordered state—and therefore may represent risk factors for OCD. Moreover, treatments targeting maladaptive perfectionism directly lead to reductions in anxiety symptoms.[5]

Given the phenotypic relationship demonstrated between anxiety and maladaptive perfectionism and preliminary work suggesting the role of maladaptive perfectionism as an etiologic mechanism for anxiety, additional work is needed to elucidate what etiologic factors underlie the phenotypic association between anxiety and maladaptive perfectionism. One powerful way to clarify the etiologic underpinnings to phenotypic associations is in a twin design. Indeed, studying whether genetic or environmental factors contribute to the *overlap* between anxiety and maladaptive perfectionism is important in providing further support for and refining extant models of the development and maintenance of these co-occurring phenomena. Evidence for primarily genetic overlap would suggest potential shared genetic factors or mechanisms, whereas evidence for environmental overlap would indicate that similar environmental risk factors and processes may be operating in both phenotypes.

To date, however, anxiety and perfectionism have only been independently examined in twin studies. Anxiety shows moderate genetic influence across a variety of samples and age groups,[15–18] with heritability estimates ranging from 31 to 45%. There have been only two twin studies of perfectionism, however, both of which were carried out in middle-aged females.[19,20] Results suggest moderate genetic influence on maladaptive perfectionism, with heritability estimates ranging from 27 to 39%. Twin studies therefore suggest that genetic effects confer a moderate amount of the risk for anxiety and maladaptive perfectionism.

Although the above studies have clarified the univariate structure of anxiety and maladaptive perfectionism, we know of no study that has examined genetic and environmental influences on their *relationship*. Delineating the contributions of genes and environments to the relationship between anxiety and maladaptive perfectionism is not only critical to advancing our understanding of the etiologic mechanisms linking the two, but also to uncovering novel causes of each phenotype. We sought to address this gap in the literature by performing multivariate genetic analyses of anxiety and maladaptive perfectionism in a population-based sample of twins. Specifically, we examined genetic and environmental influences on the association between the anxiety and the CM and DA dimensions of maladaptive perfectionism that show the strongest associations with anxiety[6,11] in a sample of young adult female twins. We measured both general trait anxiety symptoms and DSM-IV anxiety disorder-related symptoms given research and current conceptualizations suggesting that maladaptive perfectionism represents a transdiagnostic mechanism.

METHOD

PARTICIPANTS

Participants were drawn from the Michigan State University Twin Registry (MSUTR)[21] that has a lifespan perspective focused on understanding risk factors for internalizing and externalizing disorders. The initial sample included 292 (162 monozygotic [MZ] and 130 dizygotic [DZ]) same-sex female twins (M age = 20.92;

SD = 2.47). MSUTR twins have been found to be broadly representative of the women in Michigan.[22]

Assessments were administered by computer in our MSU laboratory or through the mail. Participants were identified as Caucasian (85%), African American (8%), Hispanic (2%), Asian American (2%), or "other" ethnicities (2%). Socioeconomic status, measured using the Four-Factor Index of Social Status,[23] indicated that the majority of twins were in the middle-to-upper socioeconomic classes (i.e. Level 1 = 27.4%, Level 2 = 43.5%, Level 3 = 19.1%, Level 4 = 4.3%, and Level 5 = 2.3%).

Zygosity determination. Zygosity was determined using a physical similarity questionnaire shown to be over 95% accurate.[24] Decisions about indeterminate zygosity ($N = 5$ pairs) were made by the project's principal investigators (i.e. KLK, SAB) who reviewed questionnaire ratings and waist-up photographs of the twins.

MEASURES

Multidimensional Perfectionism Scale. Maladaptive perfectionism was assessed using the CM and DA subscales of the Multidimensional Perfectionism Scale (MPS).[6] The MPS is a 35-item questionnaire that measures overall perfectionism as well as six individual dimensions of the construct (i.e. Concern over Mistakes, Personal Standards, Parental Expectations, Parental Criticism, Doubts about Actions, and Organization). Items on the MPS are rated using a 5-point Likert scale, which ranges from strongly disagree to strongly agree.

The internal consistency of the CM and DA subscales was high in our sample ($\alpha = .89$ and .80, respectively) as in the previous studies of women.[6] Furthermore, convergent validity has been shown via significant correlations between both the subscale scores and the Burns Perfectionism Scale[25] and the Perfectionism scale from the Eating Disorder Inventory.[26]

State-Trait Anxiety Inventory (Form Y). The 20-item State-Trait Anxiety Inventory—Trait Version (STAI-T)[27] was used to assess trait levels of anxiety. The psychometric properties of the STAI-T are excellent in young adults.[27] In the current sample, the internal consistency was high ($\alpha = .93$).

Anxiety Problems Scale. In addition to the STAI-T, an Anxiety Problems scale was created for this study using items from the Young Adult Self-Report (YASR),[28] a 119-item scale measuring behavioral and emotional problems in adults, aged 18–30. The primary reason for including this second measure of anxiety was to attempt replication of anxiety-maladaptive perfectionism relationships across two separate anxiety scales. Nine items from the Anxious/Depressed Syndrome Scale of the YASR that assess DSM-IV anxiety disorder-related symptoms (e.g. "I worry about my future") were utilized to create the Anxiety Problems scale for the current study. A previous study created a similar anxiety problems scale using items from the Youth Self-Report (YSR), a scale similar to the YASR, but for younger populations.[29] Notably, this scale demonstrated good psychometric properties.[30–33] Similarly, the nine-item YASR-A Problems scale created for this study demonstrated high internal consistency ($\alpha = .86$) in the present sample.

STATISTICAL ANALYSES

Data preparation and preliminary analyses. Pearson correlations between the two measures of anxiety (i.e. STAI-T and YASR-A Problems) and the two measures of maladaptive perfectionism (i.e. CM and DA) were conducted across the entire sample to confirm the presence of significant phenotypic associations.

Genetic and environmental influences on anxiety symptoms and maladaptive perfectionism

Twin correlations. Twin correlations were calculated separately by zygosity using OpenMx for R[34] to provide initial indications of genetic and environmental influences on anxiety symptoms and maladaptive perfectionism individually, as well as on their covariation. Intraclass correlations (e.g. Twin 1's STAI-T with Twin 2's STAI-T) were first calculated for each phenotype using the double entry method. These correlations were used to provide indications of genetic and environmental factors on each phenotype individually. Cross-twin, cross-trait correlations (e.g. Twin 1's STAI-T with Twin 2's CM) were then calculated to provide preliminary indications of genetic and environmental influences on the covariation between our measures of anxiety and our measures of maladaptive perfectionism. For both types of correlations, significantly greater MZ than DZ twin correlations suggests that additive genetic effects (A: the effect of individual genes summed over loci) influence the trait or phenotypic association in question. MZ correlations that are greater than twice the DZ correlations suggest the presence of dominant genetic effects (D: the effect of a combination of genes at a particular locus). By contrast, similar MZ and DZ twin correlations suggest that shared environmental (C: the part of the environment common to siblings that acts to make them similar to each other) factors are important. Finally, nonshared environmental influences (E: environmental factors, and measurement error, differentiating twins within a pair) are implicated if the MZ twin correlations are less than 1.00.

Biometric models. Based on the intraclass and cross-twin, cross-trait correlations suggesting the potential influences of all four parameters (i.e. A, D, C, and E; see *Results* section), we fit multivariate ADE and ACE models[24] using the maximum likelihood option in OpenMx for R.[34] The raw data option in OpenMx considers missing data to be missing at random and can lead to less biased estimates than pairwise or listwise deletion.[35] Note that it is not possible to simultaneously estimate C and D in traditional decompositions of variance between reared-together twins because these parameters are estimated using the same information (i.e. the differences in twin similarity with genetic relatedness).

Univariate and multivariate estimates were extracted from multivariate models. The univariate estimates provided A, D, C, and E contributions to the variance within each of the measures. Multivariate estimates further provided the additive genetic, dominant genetic, shared environmental, and nonshared environmental overlap among the measures. These statistics reveal the extent to which the same genes or environmental factors contribute to the observed phenotypic correlation among the variables. In this way, the multivariate model allowed us to make inferences regarding the sources of both the variation within and the covariation among measures of maladaptive perfectionism and anxiety.

Model fit was determined using the Akaike's Information Criterion AIC.[36] When fitting models to raw data, their variances, covariances, and means are first freely estimated to get a baseline index of fit ($-2 \ln L$). The $-2 \ln L$ under this unrestricted baseline model is then compared with $-2 \ln L$ under more restrictive biometric models. The $-2 \ln L$ is used to calculate the AIC ($\text{AIC} = \chi^2 - 2 \times \Delta\text{df}$), the traditional fit index for twin research. The AIC measures model fit relative to parsimony. Better fitting models have smaller values. Using this approach, the baseline, "saturated," model was compared to the full ADE and ACE models and to the AE, DE, and CE submodels to ascertain whether a reduced model provided a better fit to the data.

RESULTS

PHENOTYPIC CORRELATIONS

Table 1 lists the bivariate correlations between the measures of anxiety and dimensions of maladaptive

TABLE 1. Phenotypic correlations between anxiety measures and dimensions of maladaptive perfectionism

Measure	YASR-A	CM	DA
STAI-T	.78	.54	.61
YASR-A	–	.61	.64
CM	–	–	.68

Note: STAI-T, State Trait Anxiety Inventory—Trait Version; YASR-A, Young Adult Self Report–Anxiety Problems scale; CM, Concern over Mistakes; DA, Doubt about Actions. All correlations are significant at $P<.001$.

TABLE 2. Intraclass and cross-twin, cross-trait correlations for anxiety measures and dimensions of maladaptive perfectionism

Measure	MZ	DZ	Test of equality Z[a]	P
Intraclass twin correlations				
STAI-T	.69***	.33*	2.95	<.01
YASR-A	.62***	.26*	2.68	<.01
CM	.60***	.09	3.50	<.001
DA	.50***	.18	2.14	<.05
Cross-twin, cross-trait correlations				
STAI-T				
YASR-A	.58***	.23	2.50	<.05
CM	.43***	.05	2.38	<.05
DA	.49***	.16	2.18	<.05
YASR-A				
CM	.49***	.10	2.53	<.05
DA	.50***	.13	2.44	<.05
CM				
DA	.46***	.12	2.19	<.05

Note: STAI-T, State Trait Anxiety Inventory—Trait Version; YASR-A, Young Adult Self Report–Anxiety Problems scale; CM, Concern over Mistakes; DA, Doubt about Actions.
*$P<.05$; **$P<.01$; ***$P<.001$; correlation is different from 0.
[a]Test of significant difference between MZ and DZ correlations.

perfectionism. The correlation between the two anxiety measures was largest ($r = .78$), indicating they share 61% of their variance. The correlation between the two perfectionism measures was next highest ($r = .68$), indicating they share 46% of their variance. The cross-construct correlations were smaller (r range = .54–.64), indicating that anxiety and perfectionism share between 29 and 41% of their variance. Overall, these analyses suggest modest within- and between-construct overlap and support the use of multivariate twin modeling.

TWIN CORRELATIONS

Table 2 lists the twin intraclass correlations for the anxiety scales and dimensions of maladaptive perfectionism. The difference between MZ and DZ correlations for anxiety measures suggested that anxiety is primarily influenced by additive genetic factors. MZ correlations were greater than twice the DZ correlations for perfectionism measures, suggesting that perfectionism is primarily influenced by dominant genetic factors. These analyses also suggest significant nonshared environmental effects, as the MZ twin correlations were less than 1.00. This pattern of genetic/environmental effects extended to the bivariate case as well. As summarized in Table 2, the magnitude of the differences between MZ and DZ cross-twin, cross-trait correlations suggested the presence of shared dominant and additive genetic effects within- and between-anxiety and maladaptive perfectionism.

TABLE 3. Model fit statistics for multivariate ADE and ACE models

Model	$-2\ln L$ (df)	χ^2_Δ(df)	P	AIC[a]
Saturated	6,656.84 (1,062)	–	–	–
ADE	6,705.35 (1,116)	–	–	−59.49
ACE	6,704.58 (1,116)	–	–	−60.26
AE	**6,706.59 (1,126)**	**1.24 (10)**	**1**	**−78.25**
DE	6,709.92 (1,126)	4.57 (10)	.92	−76.92
CE	6,719.62 (1,126)	15.04 (10)	.13	−65.22

Note: $-2\ln L = -2$ times log likelihood of data; df = degrees of freedom; χ^2_Δ, chi-square difference test calculated by taking the difference in the $-2\ln L$ between the full ADE/ACE model and each submodel; AIC, Akaike's information criteria. The best-fitting model is indicated in boldface.
[a]AIC was calculated using difference in $-2\ln L$ values between the saturated model and all other models.

BIOMETRIC MODELS

Results from the multivariate models are summarized in Table 3. With all four variables in the model, the AE model provided the best fit indicating that additive genetic and nonshared environmental influences were primarily responsible for relationships among and between anxiety and maladaptive perfectionism measures. Parameter estimates for all models are summarized in Table 4. Based on the univariate estimates derived from the best-fitting AE models, anxiety, as measured by the STAI-T and the YASR-A scale, was largely influenced by additive genetic effects (66 and 58%, respectively). The same model revealed somewhat lower heritability estimates for CM and DA (54 and 47%, respectively). The remaining variance in anxiety and perfectionism was accounted for by nonshared environmental factors.

Univariate estimates derived from the full ADE and ACE models (Table 4) suggested that variance in all four phenotypes was influenced by additive genetic and nonshared environmental influences. As evidenced by 95% confidence intervals that overlapped with zero, neither dominant genetic nor shared environmental influences were statistically significant (although in some cases these estimates were moderate in magnitude). Most important to the primary aims of the current study, genetic and nonshared environmental correlations (Table 5) indicated that relationships

TABLE 4. Estimated proportions of variance in anxiety measures and dimensions of perfectionism attributable to a^2, d^2, c^2, and e^2 for ADE, ACE, and best-fitting AE models

Measure	Model	a^2	d^2	c^2	e^2
STAI-T	ADE	58 (0, 75)	8 (0, 70)	–	34 (25, 46)
	ACE	50 (10, 74)	–	16 (0, 51)	34 (25, 47)
	AE	66 (54, 75)	–	–	34 (25, 46)
YASR-A	ADE	39 (0, 68)	19 (0, 66)	–	42 (31, 56)
	ACE	47 (11, 67)	–	11 (0, 44)	42 (31, 56)
	AE	58 (44, 69)	–	–	42 (31, 56)
CM					
	ADE	11 (0, 64)	44 (0, 66)	–	45 (33, 60)
	ACE	53 (19, 66)	–	1 (0, 30)	46 (34, 61)
	AE	54 (39, 66)	–	–	46 (34, 61)
DA					
	ADE	30 (0, 59)	17 (0, 58)	–	53 (40, 69)
	ACE	44 (9, 60)	–	3 (0, 36)	53 (40, 68)
	AE	47 (31, 60)	–	–	53 (40, 69)

Note: STAI-T, State Trait Anxiety Inventory—Trait Version; YASR-A, Young Adult Self Report–Anxiety Problems scale; CM, Concern over Mistakes; DA, Doubt about Actions; a^2, additive genetic influences; d^2, dominant genetic influences; c^2, shared environmental influences; e^2, nonshared environmental influences. Ninety-five percent confidence intervals are presented in parentheses.

TABLE 5. Genetic (above the diagonal) and nonshared environmental (below the diagonal) correlations for best-fitting AE model

Measure	STAI	YASR-A	CM	DA
STAI-T	**1.00**	.86 (.77, .93)	.59 (.42, .74)	.80 (.66, .93)
YASR-A	.66 (.53, .76)	**1.00**	.80 (.65, .93)	.88 (.74, 1.00)
CM	.46 (.28, .61)	.35 (.17, .51)	**1.00**	.85 (.71, .97)
DA	.40 (.23, .55)	.37 (.20, .53)	.51 (.35, .64)	**1.00**

Note: STAI-T, State Trait Anxiety Inventory—Trait Version; YASR-A, Young Adult Self Report–Anxiety Problems scale; CM, Concern over Mistakes; DA, Doubt about Actions. Ninety-five percent confidence intervals are presented in parentheses.

between anxiety and maladaptive perfectionism are, in large part, accounted for by common additive genetic effects, with genetic correlations ranging from .59 to .88. The nonshared environmental correlations were uniformly smaller (r_e = .35–.46); however, these moderate correlations suggest significant influence of nonshared environmental factors on the association between these phenotypes as well. The relationships between the two anxiety measures and between the two dimensions of perfectionism followed the same pattern, with larger genetic (.86 and .85, respectively) than nonshared environmental correlations (.66 and .51, respectively).

Although there is evidence of significant etiologic overlap emerged between anxiety and maladaptive perfectionism, results also suggest some key differences between the two constructs. First, the univariate etiologic structures of anxiety and perfectionism may be somewhat different. Although dominant genetic influences were uniformly nonsignificant, they did appear somewhat larger for CM than for the other phenotypes examined here. Also, DA showed larger nonshared environmental influences than the other phenotypes. The multivariate analyses further showed that the genetic and nonshared environmental overlap within construct (e.g. between anxiety measures) was generally greater than that across constructs. Thus, although the two constructs are related at the phenotypic and etiologic levels, they still retain some unique properties as independent constructs.

DISCUSSION

This study is the first to examine the extent to which genetic and environmental factors underlie associations between anxiety and maladaptive perfectionism. First, results replicated extant research[16,17,19,20] showing that anxiety and the CM and DA dimensions of maladaptive perfectionism are moderately heritable, with estimates ranging from 58 to 66% and 45 to 54%, respectively. Most important to the aims of the current study, results indicated that genetic factors were primarily responsible for the phenotypic association between anxiety and maladaptive perfectionism. This pattern of results was robust in so much as it emerged across two measures of anxiety and two dimensions of maladaptive perfectionism. The current findings therefore point to the role of common genes in the etiology of anxiety and maladaptive perfectionism.

That the current findings demonstrated the primary role of common genes in explaining the association between anxiety and maladaptive perfectionism suggests the need to identify and explore biologic and genetic factors that could contribute to the relationship. Neurophysiologic research points to the error-related negativity (ERN) as a biologic factor that might contribute to the relationship between anxiety and maladaptive perfectionism. The ERN is an event-related brain potential[37] that reflects the motivational significance[38] and aversive nature[39] of an error and correlates with self-reported perfectionism scores.[40,41] Importantly, the ERN is consistently elevated in anxious individuals.[42] Enhanced ERN in anxious populations may therefore be a physiologic manifestation of maladaptive perfectionism.

Given that the current results—along with the findings reported in the treatment of OCD[14]—are consistent with the possibility that perfectionism may be an intermediate trait[43] or endophenotype (i.e. measurable components that mediate the relationship between genotype and disease)[44] for anxiety, it is interesting to note that emerging evidence indicates that the ERN may also be a genetic risk factor for anxiety.[42] Investigating the relationship between the ERN and anxiety in twin studies represents an

important avenue for future research. For instance, based on the current results one reasonable hypothesis would be that measures of maladaptive perfectionism should be exaggerated in both affected and unaffected twins discordant for anxiety.

Also essential to elucidating the role of perfectionism in the development and maintenance of anxiety is longitudinal work. Although the current results cannot speak to direction of effects, theory proposes that maladaptive perfectionism plays a causal role in the genesis of anxiety disorders such as OCD[45] and social phobia.[13] As an example, it may be that individuals who are genetically predisposed to being critical of their own actions become chronically anxious because of their worry about not performing something "just right" as in OCD. Heimberg's[13] theory of social phobia is more nuanced and suggests that a genetic predisposition to fear of social situations leads to perfectionistic beliefs about performance that then feed back onto the social fear and ultimately contribute to the development of chronic social phobia. The current results provide novel insights regarding the etiologic relationship between anxiety and perfectionism in that a common or "general" set of genes seem to predispose individuals to both perfectionism and anxiety, consistent with research on the overlap between anxiety and depression.[46] From this foundation, future longitudinal work can help flesh out the dynamic nature of the emergence of these inter-related phenomena.

Nonshared environmental influences also seemed to play a role—albeit a smaller one—in the relationship between maladaptive perfectionism and anxiety, as evidenced by the nonshared environmental correlations. Although speculative, one possible common nonshared environmental factor contributing to both maladaptive perfectionism and anxiety may be childhood teasing (e.g. teasing about social behavior). A strong phenotypic association exists between anxiety and teasing[47,48] and recent work suggests that a similar relationship is found between maladaptive perfectionism and teasing.[49] Furthermore, research suggests that teasing predisposes children to anxiety-related problems.[50,51] Thus, individuals exposed to early life teasing may be prone to develop anxiety and maladaptive evaluation concerns.

This study represents an important step in understanding the etiologic mechanisms that give rise to phenotypic associations between anxiety and maladaptive perfectionism. A few limitations and directions for future research should be mentioned, however. First, the sample size was relatively small for a twin study, and thus future larger-scale twin studies are warranted. Yet, none of our confidence intervals in the final models included 0, suggesting that we had adequate power to detect significant effects. Our small sample, did, however, likely contribute to our inability to detect dominant genetic effects for most of our analyses. Our findings were also limited to one measure of perfectionism, i.e. the MPS, and two measures of anxiety, i.e. the STAI-T and YASR-A scale. Given disagreements surrounding the measurement of perfectionism,[6,10,52] future investigations should consider employing multiple perfectionism scales. In addition, future investigations into the generalizability of these effects across anxiety symptoms and diagnoses is warranted in order to further evaluate the notion that maladaptive perfectionism does, indeed, represent a transdiagnostic etiologic and maintenance mechanism.[5]

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