The 2 x 2 Model of Perfectionism: A Comparison across Asian Canadians and European Canadians

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Abstract
The 2 x 2 model of perfectionism examines whether four within-person combinations of self-oriented and socially prescribed perfectionism (i.e., pure SOP, mixed perfectionism, pure SPP, non-perfectionism) can be distinctively associated to psychological adjustment. This study examined whether the relationship between the four subtypes of perfectionism proposed in the 2 x 2 model (Gaudreau & Thompson, 2010) and academic outcomes (i.e., academic satisfaction and grade-point average) differed across two sociocultural groups: Asian Canadians and European Canadians. A sample of 697 undergraduate students (23% Asian Canadians) completed self-report measures of dispositional perfectionism, academic satisfaction, and grade-point average. Results replicated most of the 2 x 2 model’s hypotheses on ratings of grade-point average, thus supporting that non-perfectionism was associated to lower GPA than pure SOP (Hypothesis 1a) but to higher GPA than pure SPP (Hypothesis 2). Results also reported that mixed perfectionism was related to higher GPA than pure SPP (Hypothesis 3) but to similar levels than pure SOP, thus rejecting Hypothesis 4. Furthermore, results provided evidence for cross-cultural differences in academic satisfaction. While all four hypotheses were supported among European Canadians, only Hypotheses 1a and 3 were supported among Asian Canadians. Future lines of research are discussed in light of the importance of acknowledging the role of culture when studying the influence of dispositional perfectionism on academic outcomes.

Keywords: Perfectionism, achievement, well-being, culture, Asian, education
The 2 x 2 Model of Perfectionism: A Comparison across Asian and European Canadians

Perfectionism is a multidimensional personality disposition (e.g., Hewitt & Flett, 1991) that represents a tendency to strive for perfection and to evaluate, judge, and define oneself according to outstandingly high self-imposed (self-oriented perfectionism) and/or socially prescribed standards (socially prescribed perfectionism). Recently, the 2 x 2 model of perfectionism proposed a novel quadripartite conceptualization positing that the within-person combinations of self-oriented perfectionism (SOP) and socially prescribed perfectionism (SPP) − rather than the traits themselves − should be taken into account in examining the outcomes of perfectionism (see Gaudreau & Thompson, 2010). This line of reasoning, anchored in the variable-centered tradition, assumes that the intersections between low and high levels of SOP and SPP can be used as a heuristic to define and distinguish four prototypical subtypes of perfectionism. Of note, the model uses the parlance of a Latin square design merely as an analogy because the four subtypes of perfectionism are not and should not be analyzed and interpreted as naturally existing categories. As such, this study relied on a Multiple Group Latent Moderation Structural model (see Appendix) to examine the cross-cultural generality and specificity of the associations between distinct subtypes of perfectionism and academic adjustment of Asian and European Canadian students.

**Four Subtypes of Perfectionism**

The first subtype of the 2 x 2 model, non-perfectionism, corresponds to co-occurring low levels of SOP and SPP. The second subtype, pure self-oriented perfectionism (pure SOP), is characterized by high levels of SOP and low levels of SPP, thus representing individuals who hold perfectionistic standards stemming mainly from the self. Comparing these two subtypes offers a way of recasting the debate on the adaptive vs. maladaptive outcomes of SOP.
Considering the unsettled nature of this debate, the 2 x 2 model proposes three alternative hypotheses. Tenants of the healthiness, unhealthiness, and neutral nature of SOP (see Stoeber & Otto, 2006 for a review) would respectively expect that pure SOP should lead to better (Hypothesis 1a), poorer (Hypothesis 1b), and equivalent (Hypothesis 1c) psychological outcomes than non-perfectionism. Up to now, pure SOP has been associated to higher academic self-determined motivation, satisfaction, positive affectivity, goal progress (Gaudreau & Thompson, 2010), performance (Gaudreau, 2012), and marginally less depressive symptoms (Douilliez & Lefèvre, 2011) than non-perfectionism, thereby providing support for Hypothesis 1a. Also, two studies have demonstrated similar levels of negative affectivity (Gaudreau & Thompson, 2010) and well-being (Gaudreau & Verner-Filion, 2012) between pure SOP and non-perfectionism, thus lending support for Hypothesis 1c.

The third subtype, pure socially prescribed perfectionism (pure SPP), is typified by a combination of high levels of SPP and low levels of SOP, and represents individuals who strive toward perfection because of perceived pressure from significant others and to reach socially driven standards of excellence. Considering that pure SPP might be seen as a type of “externally regulated perfectionism” (Gaudreau & Thompson, 2010, p. 533), it should be associated with the lowest levels of internalization and psychological adjustment compared to all other subtypes (Hypothesis 2). Accordingly, studies conducted with students and athletes both reported that pure SPP was related to more depressive symptoms (Douilliez & Lefèvre, 2011) and negative affectivity, as well as to lower academic self-determined motivation, satisfaction, positive affectivity, goal progress (Gaudreau & Thompson, 2010), performance (Gaudreau, 2012), and well-being (Gaudreau & Verner-Filion, 2012) than all other subtypes.
The final subtype, *mixed perfectionism*, is represented by concurrent high levels of both SOP and SPP. The 2 x 2 model postulates that mixed perfectionism should be related to increased and decreased psychological adjustment compared to pure SPP (Hypothesis 3) and pure SOP (Hypothesis 4), respectively. Consistent with these hypotheses, mixed perfectionism has been linked to lower negative affectivity and higher academic self-determined motivation, satisfaction, positive affectivity, goal progress (Gaudreau & Thompson, 2010), performance (Gaudreau, 2012), and well-being (Gaudreau & Verner-Filion, 2012) compared to pure SPP; but to similar levels of depressive symptoms (Douilliez & Lefèvre, 2011). Furthermore, mixed perfectionism has been associated with more depressive symptoms (Douilliez & Lefèvre, 2011) and negative affectivity, and lower academic self-determined motivation, satisfaction, positive affectivity, goal progress (Gaudreau & Thompson, 2010), and performance (Gaudreau, 2012) than pure SOP. However, one study with competitive athletes reported comparable levels of well-being between these two subtypes (Gaudreau & Verner-Filion, 2012).

**Perfectionism among Asian Americans**

The aforementioned studies have supported the overarching postulate that the four subtypes of perfectionism should distinctively relate to consequential outcomes. However, research using the 2 x 2 model has yet to consider the potential moderating role of culture. This limitation is hardly surprising given the recentness of the 2 x 2 model and the scant empirical attention allocated to cultural similarities and differences in the perfectionism literature. A recent review of studies conducted with members of ethnic minority groups living in the United States has provided a roadmap for studying perfectionism across cultures (DiBartolo & Rendon, 2012). A pivotal goal for researchers is to establish the equivalence of the perfectionism dimensions across cultures before enabling unbiased comparisons of the mean-levels of the dimensions of
perfectionism and/or their associations with important life outcomes. Although limited attention has been allocated to this issue, two multiple group confirmatory factor analysis studies have provided encouraging support for the measurement invariance of some characteristics of the perfectionism construct in African Americans (e.g., Mobley et al., 2005) and Asian Americans (Wang, 2010). However, research remains needed to examine more stringent forms of cross-cultural measurement invariance across European Americans and Asian Americans.

Some studies have also revealed that mean-level facets conceptually associated with SPP (e.g., concerns over mistakes, doubts about action, parental expectations) are significantly higher among Asian Americans than European Americans (e.g., DiBartolo & Rendon, 2012; Kawamura, Frost, & Harmatz, 2002). Despite these cultural differences, studies examining perfectionism-outcome relations among Asian Americans are scarce. Nevertheless, researchers have found that high personal standards – an important ingredient of SOP – was positively associated with academic grade-point average among female Asian American university students (Kawamura et al., 2002). Furthermore, the aforementioned facets conceptually associated with SPP have been shown to relate to various maladjustment outcomes such as depression, negative affectivity, stress, anxiety, and low self-esteem (e.g., DiBartolo & Rendon, 2012; Wang, 2010).

The Present Study

The 2 x 2 model of perfectionism offers an interesting platform to investigate the cross-cultural specificities and/or generalities in the relation between subtypes of perfectionism and consequential life outcomes. The goal of the present study was threefold. A first goal was to test for the stringent forms of measurement invariance (e.g., Vandenberg & Lance, 2000) of the short form of the Multidimensional Perfectionism Scale (MPS; Hewitt & Flett, 1991) across two sociocultural groups (i.e., Asian and European Canadians). Establishing the measurement
invariance of perfectionism was considered as a prerequisite to enable unbiased comparisons across European and Asian Canadians. Second, this study aimed at replicating the original 2 x 2 model of perfectionism (Gaudreau & Thompson, 2010) by testing whether subtypes of perfectionism are distinctively associated to key indicators of academic adjustment, namely academic satisfaction and grade-point average (GPA).

A third goal of this study was to examine whether the differential associations of the four subtypes of perfectionism with indicators of academic adjustment differ across cultures. Results for European Canadians should mirror the four hypotheses of the 2 x 2 model as they had initially been tested in mainly European Canadian samples. As reviewed above, Asian Americans and European Americans report comparable scores on facets associated with SOP. Similarly, research in human motivation has revealed that autonomy—perceiving oneself as the initiator of one’s actions and feeling volitional about one’s decisions—relates to equally positive outcomes across individualistic and collectivistic cultures (Ryan & Deci, 2011). It is thus plausible that pure SOP will be associated with higher GPA and academic satisfaction in both Asian and European Canadians (Hypothesis 1). Thwarting the satisfaction of the need for autonomy with coercive, punitive, and conditionally rewarding behaviors has been shown to be detrimental to psychological adjustment in both Asian and European countries (Ryan & Deci, 2011). Thus, it is hypothesized that a pure SPP subtype will be associated to the lowest levels of GPA and academic satisfaction across both Asian and European Canadian samples (Hypothesis 2).

What seems more uncertain is how the meaning attached to, and the outcomes associated with mixed perfectionism might differ across cultures. The mere presence of SPP—in both mixed perfectionism and pure SPP—could make these two subtypes equally vulnerable to
psychological maladjustment in Asian Canadians as their sense of self is more relational and contingent on social membership. This viewpoint will hereby be referred to as the *socially prescribed perfectionism as an aggravating factor hypothesis*.

An alternative line of reasoning indicates that East Asians operate more by *holistic* appraisal and dialectical thinking, in which they pay more attention to the wholeness of the context by transcending contradiction and finding equilibrium between opposing assumptions (Nisbett, Peng, Choi, & Norenzayan, 2001). As such, East Asians can more easily endorse self-beliefs that are seemingly mixed, contradictory, opposing, or even ambivalent (Hamamura, Heine, & Paulhus, 2008). Therefore, because of their capacity to integrate different sources of influence in a cohesive manner—such as the one reported in a mixed profile of perfectionism—Asian Canadians may find more harmony and meaning in mixed perfectionism than European Canadians. In several Asian cultures, social expectations, pressure, and family support are inherently associated with the traditional values of promoting academic excellence that are conveyed to students at their youngest age (Yee, 1992). In this context, high levels of SPP (when combined with high levels of SOP) would therefore represent a fully functioning subtype in which the values promoted by social agencies are closely aligned, coherent, and in harmony with those endorsed by the individual. As such, the social contingencies encompassed in SPP for Asian Canadians might be seen as an inherent component of their cultural makeup. As a consequence, mixed perfectionism might relate to comparably high levels of academic satisfaction than pure SOP among Asian Canadians. This viewpoint will hereby be described as the *socially prescribed perfectionism as a cultural makeup hypothesis*.

**Method**

**Participants and Design**
Participants were selected to participate in this study if they met one of the two inclusion criteria: (1) they described themselves as Asian Canadians; or (2) they represented European Canadians (i.e., self-described Caucasians, born in Canada along with both of their parents, whose primary language was English). Students were recruited from large introductory psychology classes during the semester and were offered one point in their course if they agreed to participate in this online study. All participants provided informed consent and the study was approved by and conducted according to the guidelines of a Canadian university’s research ethics board.

**Asian Canadians.** The sample comprised 159 undergraduate students (64% female) ranging from 16 to 54 years of age ($M = 19.32, SD = 4.23$). Students were in their freshman (72%), junior (17%), sophomore (6%), and senior or above (5%) year of study and they were enrolled mostly full time (94%) in various programs such as arts (8.2%), sciences (31.3%), social sciences (28.6%), health sciences (24.5%), or others (7.4%). Participants from this sample were for the most part born in Canada (57.7%), where they have spent most of their life (79.2%). In contrast, both their mother and father were born outside of Canada (98.7%, respectively).

**European Canadians.** The sample consisted of 538 students (70% female) ranging from 16 to 49 years of age ($M = 19.36, SD = 3.36$). Participants were in their freshman (73.7%), junior (14.5%), sophomore (4.8%), senior or above (6.9%) year of study and they were enrolled mostly full time (96%) in diverse programs such as arts (16%), sciences (15%), social sciences (38%), health sciences (27%), or others (4%).

**Measures**

Descriptive statistics and correlations are displayed in Table 1 for both samples. Dispositional perfectionism was measured using the short 10-item version of the
Multidimensional Perfectionism Scale (MPS; Hewitt & Flett, 1991). Validation of this measure demonstrated excellent convergent validity, with inter-correlations between the short and original versions being over .94 (Cox, Enns, & Clara, 2002). A confirmatory factor analysis conducted by Cox et al. (2002) also indicated a superior fit for the short form in comparison to the original version. Participants were asked to report their general agreement with each statement on a 7-point scale ranging from 1 (Not at all agree) to 7 (Very strongly agree). In this study, SOP (α=.87; e.g., “One of my goal is to be perfect in everything I do”) and SPP (α=.85; e.g., “I feel that people are demanding too much of me”) displayed good internal consistency.

To capture students’ overall academic standing so far at the university, participants were asked to answer the stem “How would you describe your grade point average?” on a 1 (F) to 9 (A+) scale.

School satisfaction (e.g., “I enjoy school activities”) was measured using an 8-item subscale from the Multidimensional Students’ Life Satisfaction Scale (MSLSS; Huebner et al., 1998). Students were asked to report to what extent (1= Strongly disagree; 7= Strongly agree) they agreed which each statement in regard to their life as a student at the present moment. In this study, the internal consistency was good (α=.86).

Results

Measurement Invariance of Perfectionism

Multiple group confirmatory factor analysis was used to test the cross-cultural invariance of the perfectionism measure using MPLUS 6.02 with the maximum likelihood robust estimator (Muthén & Muthén, 2010). Results presented in Appendix indicated that the loadings, variances/covariances of the latent variables, residuals of the items, and intercepts of nine of 10 items were invariant across the Asian Canadian and European Canadian samples. Overall, these
results provided the sufficient and needed conditions to ensure that subsequent comparisons of perfectionism across the two groups are unbiased by measurement non-equivalence.

**Main Analyses**

**Overview.** Hypotheses of the 2 x 2 model were tested using the approach delineated by Gaudreau and Thompson (2010) and Gaudreau (2012). However, this approach (originally developed for multiple regressions) was adapted to estimate the interaction between SOP and SPP within the confines of the Latent Moderated Structural (LMS) model implemented in MPLUS with a full information maximum likelihood (FIML) robust estimator (Kelava et al., 2011; Klein & Moosbrugger, 2000). This approach directly estimates the SOP x SPP latent variable without requiring the tedious and somewhat arbitrary manual specification of product terms of the indicators. The FIML also imputes the missing data (i.e., less than 1% in this sample). Multiple groups were included in our LMS model by treating the model as a mixture model with known classes (1 = Asian-Canadians, 2 = European-Canadians) with random effects that allowed the parameters of the model to be freely estimated across groups. Our MPLUS input codes are available in the Appendix. Two levels of data integration were required to test these models with a total number of 225 points to be integrated. Conventional fit indices are not available for LMS models given that models that require data integration algorithms do not estimate a baseline model used in the calculation of relative fit indices. In all of our models, the loadings, error terms, variances/covariances, and intercepts were constrained to equality across the two groups. A first model was tested in which the effects of SOP, SPP, and SOP x SPP were freely estimated in each group. If non-significant, the SOP x SPP effect was fixed to zero to properly estimate the main effects of SOP and SPP, as recently recommended by Gaudreau (2012). Models in which these parameters were freely estimated and constrained to equality
across Asian and European Canadians were compared with the difference in scaled loglikelihood multiplied by 2, thus resulting in a scaled $\Delta \chi^2$. A significant $\Delta \chi^2$ would indicate that the effects significantly differed across Asian and European Canadians. In this case, the first model was retained to properly estimate the association between perfectionism and the outcome variable separately in each cultural group.

In the presence of a significant interaction, simple slope analyses were conducted to estimate the effect of SOP at high (+1SD) and low (-1SD) values of SPP, as well as the effect of SPP at high (+1SD) and low (-1SD) levels of SOP, thus enabling statistical comparisons of the predicted values of the four subtypes of perfectionism (see Gaudreau & Thompson, 2010). However, in the absence of a significant interaction, the main effects of SOP and SPP (in a model fixing the SOP x SPP effect to zero) were used to calculate and compare the predicted values of the four subtypes of perfectionism (see Gaudreau, 2012).

**GPA.** The first model, which assumed that culture would moderate the effects of SOP, SPP, and SOP x SPP, resulted in a loglikelihood of -13486.57 with 43 parameters (scaled correction = 1.078). The second model, which assumed that the three effects were invariant across groups, resulted in a loglikelihood of -13488.25 with 40 parameters (scaled correction = 1.075). The addition of equality constraints did not significantly worsen the goodness of fit of the model ($\Delta \chi^2 = 3.01, \Delta df = 3, p > .05$). This model was retained as the best fitting and most parsimonious model. Culture did not significantly moderate the relation of SOP, SPP, and SOP x SPP with GPA. Nonetheless, the SOP x SPP ($\beta = 0.092, S.E. = 0.089, p < .05$) was significantly associated with GPA after controlling for the effects of SOP ($\beta = 0.554, S.E. = 0.079, p < .01$) and SPP ($\beta = -0.235, S.E. = 0.079, p < .01$). Simple slope analyses were conducted in order to obtain the predicted values of GPA for each of the four subtypes of perfectionism, pooled across
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the samples of Asian and European Canadians. Figure 1 depicts the results obtained with the simple slopes and reports the predicted values of GPA for each subtype of perfectionism.

Results of the first simple slope provided support for Hypothesis 1a by showing that pure SOP was associated with higher GPA than non-perfectionism, B = 0.451, S.E. = 0.094, p < .01. A second simple slope revealed that pure SPP was associated with lower GPA compared to non-perfectionism, B = -0.356, S.E. = 0.0988, p < .01, thus supporting Hypothesis 2. The third simple slope indicated that mixed perfectionism was significantly related to higher GPA compared to pure SPP, B = 0.657, S.E. = 0.094, p < .01, which is consistent with Hypothesis 3. Finally, the fourth and last simple slope analysis showed that the GPA of pure SOP and mixed perfectionism did not significantly differ, B = -0.114, S.E. = 0.098, p > .05, thus invalidating Hypothesis 4.

Academic satisfaction. Two latent variables of academic satisfaction were included in our analyses: academic satisfaction and reversed academic dissatisfaction. Multiple group confirmatory analyses of academic satisfaction are reported in the Appendix. Positively worded items loaded on a factor labeled academic satisfaction whereas negatively worded items (reverse scored) loaded on a factor labeled reversed academic dissatisfaction. The first model, which assumed that culture would moderate the effects of SOP, SPP, and SOP x SPP, resulted in a loglikelihood of -20749.10 with 71 parameters (scaled correction = 1.172). In this model, the SOP x SPP did not significantly predict academic satisfaction (European Canadian, B = 0.032, S.E. = 0.048, p > .05; Asian Canadian, B = -0.015, S.E. = 0.055, p > .05) and reversed academic dissatisfaction (European Canadian, B = 0.002, S.E. = 0.055, p > .05; Asian Canadian, B = -0.114, S.E. = 0.095, p > .05). As recommended by Gaudreau (2012), the SOP x SPP effect was constrained to zero to specifically examine the main effects of SOP and SPP. This second model resulted in a loglikelihood of -20750.43 with 69 parameters (scaled correction = 1.176). The
scaled difference (Δχ² = 2.57, Δdf = 2, p > .05) did not reach significance, thus indicating that
deleting the SOP x SPP effect lost no information. A third model, which constrained the main
effect of SOP to equality across groups, yielded a loglikelihood of -20750.51 with 67 parameters
(scaled correction = 1.176). The fit of this model did not significantly differ from the previous
model (Δχ² = 0.14, Δdf = 2, p > .05). The fourth model, which constrained the main effect of
SPP to equality across groups, resulted in a loglikelihood of -20754.02 with 65 parameters
(scaled correction = 1.811). The fit of this model significantly differed from the previous model
(Δχ² = 6.92, Δdf = 2, p < .05). The third model was retained as the most parsimonious model in
which the relationship between SOP and academic satisfaction was invariant across groups
whereas the relationship between SPP and academic satisfaction significantly differ across
European and Asian Canadians.

Results among Asian Canadians indicated that academic satisfaction was significantly
associated with SOP (B = .347, S.E. = 0.057, p < .01), but non-significantly related to SPP (B =
0.006, S.E. = 0.094, p > .05). Results were similar for the association of reversed academic
dissatisfaction with SOP (B = .296, S.E. = 0.069, p < .01) and SPP (B = -0.114, S.E. = 0.129, p >
.05). Using these results, the predicted values of academic satisfaction were calculated for the
four subtypes of perfectionism in the sample of Asian Canadians (see Figure 2). The main effect
of SOP was taken as evidence to support the hypothesis that pure SOP was associated with
significantly higher academic satisfaction compared to non-perfectionism (Hypothesis 1a). This
main effect also revealed that mixed perfectionism was associated with significantly higher
academic satisfaction compared to pure SPP (Hypothesis 3). Meanwhile, the non-significant
main effect of SPP indicated that pure SPP was associated with comparable academic
satisfaction than non-perfectionism. Moreover, this non-significant main effect indicated that
pure SOP was associated with comparable academic satisfaction than mixed perfectionism. Altogether, these last results contradict Hypothesis 2 and Hypothesis 4 of the general 2 x 2 model, but they are nonetheless providing support for the socially prescribed perfectionism as a cultural makeup hypothesis rather than the socially prescribed perfectionism as an aggravating factor hypothesis.

For European Canadians, SOP (B = .347, S.E. = 0.057, \(p < .01\)) and SPP (B = -0.265, S.E. = 0.072, \(p < .01\)) were positively and negatively associated with academic satisfaction, respectively. Results were similar for the association of reversed academic dissatisfaction with SOP (B = .296, S.E. = 0.069, \(p < .01\)) and SPP (B = -0.445, S.E. = 0.083, \(p < .01\)). The predicted values of academic satisfaction of European Canadians are reported in Figure 3 for the four subtypes of perfectionism. The main effects of SOP and SPP, and the predicted values were taken as evidence to support all four hypotheses of the 2 x 2 model. These results are consistent with past research in which the four hypotheses were tested in mainly European Canadians.

**Discussion**

**Measuring Perfectionism in a Cross-Cultural Context**

Little attention has been paid to studying perfectionism in North American Asians and this study offered a rare opportunity to scrutinize the structure of this construct – as measured with a well-known and highly employed measure of perfectionism – across two important sociocultural groups of the Canadian population. Results from the confirmatory factor analysis were similar to prior validation of the questionnaire (Cox et al., 2002) and showed full invariance of loadings, variances, covariance, and residuals across Asian Canadians and European Canadians. The invariance of intercepts, known to be an overly strict and stringent test of
measurement invariance (e.g., Vandenberg & Lance, 2000), was nonetheless achieved for all except one item (i.e., “My family expects me to be perfect”).

Methodologically, these results are important because they indicate that both sociocultural groups interpreted the items similarly and thus, our results are probably not an artifact of the measure used in this study. These findings are theoretically important because perfectionism entails mental representations about the self that seem to develop in close continuity with perceived pressure and contingencies from the social environment. Assuming that socialization in different cultures can shape and develop different self-representations (Heine et al., 1999; Kitayama et al., 2007), it is even more impressive to observe that the core content of the perfectionism construct remained invariant across the two sociocultural samples in this study.

**The 2 x 2 Model in a Cross-Cultural Context**

The positive or negative outcomes associated with SOP remains a pervasive debate in the perfectionism literature. Our findings showed that pure SOP was associated with higher GPA and academic satisfaction compared to non-perfectionism in both the Asian and European Canadian samples. Such findings, which are in line with those obtained in prior studies (Gaudreau, 2012; Gaudreau & Thompson, 2010), provide further support for Hypothesis 1a of the 2 x 2 model.

Consistent with recent research (Gaudreau, 2012; Gaudreau & Thompson, 2010; Gaudreau & Verner-Filion, 2012), this study also revealed that mixed perfectionism was linked to higher GPA and academic satisfaction compared to pure SPP, in both Asian and European Canadian students (Hypothesis 3). This is theoretically important because it provides additional arguments, this time in both Asian Canadian and European Canadian students, for the hypothesis that mixed perfectionism should not be seen as the most debilitative subtype of perfectionism.
So far, our results depicted a certain amount of cross-cultural generalities. Of particular interest, they showed that culture moderated the relationship between subtypes of perfectionism and academic satisfaction (see Figures 2 and 3). Consistent with past research on the 2 x 2 model, pure SOP was associated to significantly higher satisfaction than mixed perfectionism in European Canadians (Hypothesis 4). For Asian Canadians, however, pure SOP and mixed perfectionism were found to lead to comparably high levels of satisfaction. This result seems to support our socially prescribed perfectionism as a cultural makeup hypothesis.

As eloquently explained by Yee (1992), the social pressure toward excessive performance standards is part of a cultural tradition among Asians that fosters and reinforces the importance of educational attainment. Students from Asian cultures are socialized in, and come to value and prefer, a system in which parents and members of the larger community expect them to reach the highest levels of school achievement. As such, the presence of high levels of SPP in mixed perfectionism is less of a deterrent because it might be seen as being part of the broader cultural makeup shared among many Asian Canadians. Meanwhile, the presence of high levels of SOP in mixed perfectionism indicates that the values, goals, and contingencies promoted by traditional values and reinforced by social agents are aligned with those endorsed by the individual. Goodness of fit between self-endorsement and traditional social values may express balance between self- and socially driven motives and explain why mixed perfectionism was not associated to lower levels of academic satisfaction compared to pure SOP.

Academic adjustment is a multilayered psychosocial phenomenon. What might work to promote academic success might be worthless to foster feelings of interest, pleasure, and satisfaction (Hulleman et al., 2010). Our results showed that mixed perfectionism and pure SOP were associated with comparable levels of academic achievement in both samples. It thus seems
like Asian Canadian students with mixed perfectionism are reaching both the achievement and satisfaction targets known to play an important part in the whole positive academic experience of students. This is consistent with the notion that mixed perfectionism might actually be a harmonious dialectical form of perfectionism within a holistic system of thoughts that typifies many Asian Canadians. In contrast, European Canadians with mixed perfectionism can be characterized by a more specialized or asynchronous profile of adjustment in which they perform equally well while being significantly less satisfied with their school experience compared to pure SOP. This is also in line with the idea that mixed perfectionism might be contradictory insofar as it is appraised within a more analytic system of thought that represents many European Canadians. Overall, these nuanced results illustrate the need to consider culture as a moderator of the association between subtypes of perfectionism and consequential life outcomes.

Limitations and Conclusion

Although self-reported measures represent a reliable way to measure personal variables such as perfectionism and satisfaction, future research should try to complement self-reported measures with objective criteria (i.e., grade-point average) or reports from informants in order to control for the effects of shared-method variance (Podsakoff, MacKenzie, Lee, & Podsakoff 2003). This study used a cross-sectional correlational design, which has informed us on the significant strengths of the relationships between perfectionism and outcome variables, but not on their directions. Further research adopting longitudinal designs could thus be useful to examine the cross-lagged associations between perfectionism and key educational outcomes.

Asian Canadians were treated as a monolithic group. Future research should try to account for the regional, ethnic, and religious diversities encompassed in the broader Asian population (e.g., DiBartolo & Rendon, 2012) while considering the influence of acculturation
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(Ryder, Alden, & Paulhus, 2000) by comparing first and second generations of Asian Canadians. Similarly, measuring the degree to which North American Asians identify with collectivistic or individualistic values or in terms of an independent and interdependent self might be useful to examine whether the cross-cultural differences in perfectionism are attenuated by acculturation and individualistic self-construal of some Asian Canadians.

On a final note, the socialization in Asian American families seems to play a ubiquitous role in the development and acquisition of perfectionism because having higher perfectionistic expectations will lead parents to reinforce and/or model perfectionism (DiBartolo & Rendon, 2012). However, Yoon and Lau (2008) demonstrated that high levels of parental warmth might be a sufficient condition to attenuate the negative outcomes usually reported with high parental expectations, criticism, and pressure. Given these particular findings, future research conducted among Asian Americans should thus address the need to consider perceived parenting style.

Results of this study provided further support for the idea that subtypes of perfectionism defined in the 2 x 2 model of perfectionism offer a useful heuristic to differentiate the outcomes associated with distinct within-person combinations of SOP and SPP. This study extends prior research by offering novel insight on the cross-cultural specificities and generalities of the relationships between subtypes of perfectionism and key educational outcomes in Asian and European Canadians. Overall, these results inform the debate on the adaptive vs. maladaptive nature of perfectionism, while outlining the importance of considering the unique pattern of associations that might characterize members of ethnic minority groups living in North America. Future work should examine the differential associations of subtypes of perfectionism with indicators of adjustment and maladjustment (e.g., depression, test anxiety, burnout).
References


and strain among domestic and international student sojourners: A longitudinal study.  


cultural context: Perspectives on the psychology of agency, freedom, and well-being.


Table 1

*Inter-correlations and Descriptive Statistics*

<table>
<thead>
<tr>
<th>Variable</th>
<th>European Canadian</th>
<th>Asian Canadian</th>
<th>$F$</th>
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<tr>
<td>1. SOP</td>
<td>4.31</td>
<td>1.36</td>
<td>4.57</td>
<td>1.37</td>
<td>4.45*</td>
<td>.19</td>
<td>.44*</td>
<td>.31*</td>
</tr>
<tr>
<td>2. SPP</td>
<td>2.94</td>
<td>1.36</td>
<td>3.35</td>
<td>1.36</td>
<td>11.07*</td>
<td>.30</td>
<td>.51*</td>
<td>—</td>
</tr>
<tr>
<td>3. Academic satisfaction</td>
<td>5.05</td>
<td>1.04</td>
<td>4.92</td>
<td>1.07</td>
<td>2.13</td>
<td>-.14</td>
<td>.18**</td>
<td>-.10*</td>
</tr>
<tr>
<td>4. GPA</td>
<td>6.25</td>
<td>1.58</td>
<td>6.48</td>
<td>1.75</td>
<td>1.99</td>
<td>.12</td>
<td>.34**</td>
<td>.09*</td>
</tr>
</tbody>
</table>

Note. Inter-correlations of European Canadians ($n = 538$) and Asian Canadians ($n = 158$) are presented below and above the diagonal, respectively. SOP = Self-oriented perfectionism; SPP = Socially prescribed perfectionism; GPA = Grade-point average. * $p < .05$. ** $p < .01$. 
Figure 1. Results of simple slope analyses between subtypes of perfectionism among Asian and European Canadians. Predicted values of GPA are reported in parentheses. *represents a significant difference at p < .05 between subtypes.

Figure 2. Predicted values of academic satisfaction among Asian Canadians across the four subtypes of perfectionism. Predicted values are reported in parentheses. Main effects of SOP are explicitly displayed horizontally whereas main effects of SOP are implicitly displayed vertically (Gauvreau, 2012). *represents a significant difference between two subtypes of perfectionism.

Figure 3. Predicted values of academic satisfaction among European Canadians across the four subtypes of perfectionism. Predicted values are reported in parentheses. Main effects of SOP are explicitly displayed horizontally whereas main effects of SOP are implicitly displayed vertically (Gauvreau, 2012). *represents a significant difference between two subtypes of perfectionism.
Appendix

Measurement Invariance of Perfectionism

A multiple group confirmatory factor analysis was conducted to test the cross-cultural invariance of the perfectionism measure using MPLUS 6.02 with the full information maximum likelihood robust estimator (Muthén & Muthén, 2010). Along with the $\chi^2$ statistic, the following goodness-of-fit indices were used to evaluate the model: comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Values between .90 and .94 for the CFI and TLI indicate acceptable fit whereas values of .95 and higher indicate relatively good fit. Values smaller than .08 for the RMSEA and SRMR indicate acceptable fit whereas values smaller than .05 indicate close fit. As recommended by Vandenberg and Lance (2000), either a substantial change in CFI ($\Delta$CFI > -.01) or a significant change in the $\chi^2$ ($p < .01$) was a condition to reject the null hypothesis of factorial invariance.

The first model tested a two-factor model with the same fixed and freed parameters in each group to estimate the configural invariance of the model. This model yielded an acceptable fit: $\chi^2 = 317.60$, $SB\chi^2 = 284.25$, $df = 68$, $p < .001$, CFI = .92, TLI = .90, RMSEA = .10, SRMR = .065. The average standardized factor loadings of self-oriented perfectionism (.76 in European Canadians and .75 in Asian Canadians) and socially prescribed perfectionism (.73 in European Canadians and .71 in Asian Canadians) were all acceptable. Subsequent models provided evidence for the invariance of factor loadings ($\Delta$SB$\chi^2 = 5.20$, $\Delta df = 8$, $p > .05$, $\Delta$CFI = -.001), factors’ variances and covariance ($\Delta$SB$\chi^2 = 1.09$, $\Delta df = 3$, $p > .05$, $\Delta$CFI < -.001), and items’ residual ($\Delta$SB$\chi^2 = 14.11$, $\Delta df = 10$, $p > .05$, $\Delta$CFI < -.001). Testing the invariance of the intercepts ($\Delta$SB$\chi^2 = 39.18$, $\Delta df = 10$, $p < .05$, $\Delta$CFI = -.011) revealed that the intercept of item 8 (i.e., “My family expects me to me perfect”) could be considered non-invariant across samples.
After relaxing this equality constraint, the scalar invariance of 9 out of 10 items was assumed \( \Delta S B \chi^2 = 17.64, \Delta df = 9, p > .05, \Delta CFI = -.006 \), thus providing sufficient evidence of the most stringent form of measurement invariance for the two dimensions of perfectionism. A final model indicated that the latent means of SOP (\( \kappa = 0.22, \phi = 1.75, p < .05, \) Cohen’s \( d = .13 \)) and SPP (\( \kappa = .33, \phi = 1.24, p < .01, \) Cohen’s \( d = .27 \)) were significantly higher among Asian Canadians than European Canadians.

**Measurement Model of Academic Satisfaction**

The academic satisfaction scale contains five positively worded items and three negatively worded items. Reversed items are generally useful to reduce lenient responding. Nevertheless, reversed items create challenge for the unidimensionality of latent variables because positively and negatively worded items tend to load on separate factors despite the absence of substantial justification for a bidimensional factor structure (e.g., Spector, Van Katwyk, Brannick, & Chen, 1997). In this study, we explored the tenability of both the unidimensional and bidimensional factor structure of the academic satisfaction scale. Results of the unidimensional model (without equality constraints across groups) failed to provide non-ambiguous evidence for the tenability of this factor model: \( SB \chi^2 = 219.81, df = 40, p < .001, CFI = .906, TLI = .868, RMSEA = .11, SRMR = .060 \). Modification indices suggested that the addition of correlated uniqueness for the negatively worded items would significantly improve the model fit. This evidence thus pointed out the necessity of considering a bidimensional factor structure. Results of the bidimensional model (without equality constraints across groups) provided more convincing evidence for the goodness of fit of this model: \( SB \chi^2 = 98.29, df = 38, p < .001, CFI = .968, TLI = .953, RMSEA = .068, SRMR = .033 \). The average standardized factor loadings of the positively worded items (.75 in European Canadians and .74 in Asian Canadians) and the negatively worded items (.70 in
European Canadians and .72 in Asian Canadians) were all acceptable and the inter-factor correlation suggested a moderately high level of overlap between the two dimensions of academic satisfaction (.78 in European Canadians and .73 in Asian Canadians). Further analyses provided evidence for the invariance of loadings ($\Delta S\beta \chi^2 = 7.84, \Delta df = 6, p > .05, \Delta CFI = -.001$), variances/covariances ($\Delta S\beta \chi^2 = 2.56, \Delta df = 3, p > .05, \Delta CFI < -.001$), uniquenesses ($\Delta S\beta \chi^2 = 8.31, \Delta df = 8, p > .05, \Delta CFI = +.001$), and intercepts ($\Delta S\beta \chi^2 = 13.04, \Delta df = 8, p > .05, \Delta CFI = -.003$) across European Canadians and Asian Canadians. Overall, this bidimensional model of academic satisfaction was retained in subsequent analyses because it provided an invariably good fit to the data in both samples of European and Asian Canadians.

**Multiple Group Latent Moderation Structural models**

The user’s manual of MPLUS (version 6.02; see example 5.13) contains the proper input codes to estimate the Latent Moderation Structural (LMS) model developed by Klein and Moosbrugger (2000). The approach described in the MPLUS user’s manual cannot readily accommodate multiple group models. The online technical support service of MPLUS was consulted in order to generate input codes that would enable the estimation of Multiple Group LMS models. A publicly available syntax code posted by Linda Muthén on the online MPLUS discussion forum enabled us to properly estimate our Multiple Group LMS:


We further expanded these input codes in order to allow us to add cross-group equality constraints on the SOP, SPP, and SOP x SPP effects. Our annotated input codes for a model **without** cross-group equality constraints (SOP, SPP, and SOP x SPP freely estimated in each group) are reported in Table A1. Our annotated input codes for a model **with** cross-group equality constraints (SOP, SPP, and SOP x SPP constrained to equality across groups) are reported in Table A2.
Complementary Analyses of Reversed Academic Dissatisfaction

Our multiple group LMS models of academic satisfaction contained two outcomes: academic satisfaction and reversed academic dissatisfaction. The manuscript reported the main effects of SOP and SPP for both academic satisfaction and reversed academic dissatisfaction. The results were very similar for both outcomes and, therefore, the manuscript did not present the predicted values of reversed academic dissatisfaction. It is important to note that the interpretation (in light of the four hypotheses of the 2 x 2 model) was identical for both academic satisfaction and reversed academic dissatisfaction. Nonetheless, the predicted values of reversed academic dissatisfaction of the four subtypes of perfectionism are presented in Table A3 for European Canadians and Asian Canadians.
Table A1

MPLUS Input Codes for the Multiple Group LMS model with the SOP, SPP, and SOP x SPP Effects Freely Estimated in Each Group

DATA:
FILE IS "C:\Users\Desktop\MPLUS\AsianCan\Fall2010_AsianCan.dat";
VARIABLE:
  NAMES ARE id_code gpa mod perf1 perf2 perf3 perf4 perf5 perf6 perf7 perf8 perf9
  perf10 acasat1 acasat2 acasat3 acasat4 acasat5 acasat6 acasat7 acasat8 acasat9 gpar;
  USEVARIABLES ARE
gpar cperf1 cperf2 cperf3 cperf4 cperf5 cperf6 cperf7 cperf8 cperf9 cperf10;

!GPA from 1(F) to 9(A+).
!Centered scores of perfectionism.

MISSING ARE ALL (999);
CLASSES = C(2); !Class 1 = European Canadians; Class 2 = Asian Canadians
KNOWNCLASS IS C (mod = 1 mod = 2);

! The multiple group latent moderation structural model is estimated as a mixture model.
! The KNOWNCLASS code is the trick used to conduct a multiple group analysis.

DEFINE:
cperf1 = perf1 - 4.013; !All variables are centered to facilitate simple slope analyses
cperf2 = perf2 - 3.192;
cperf3 = perf3 - 3.911;
cperf4 = perf4 - 2.885;
cperf5 = perf5 - 4.518;
cperf6 = perf6 - 3.129;
cperf7 = perf7 - 4.924;
cperf8 = perf8 - 3.173;
cperf9 = perf9 - 4.516;
cperf10 = perf10 - 2.769;

ANALYSIS:
  TYPE IS MIXTURE RANDOM;
  !Random effects allow the parameter to vary across the two groups
  ALGORITHM = INTEGRATION;
  !Random effects require the data integration algorithm.
  ITERATIONS = 1000;
  CONVERGENCE = 0.00005;
  COVERAGE = 0.10;

Table 1 to be continued
Table A1

Continued

OUTPUT: SAMPSTAT MODINDICES RESIDUAL STANDARDIZED CINTERVAL
TECH1 TECH3;
!Tech 3 is needed to obtain the ACOV matrix to estimate simple slopes
!See http://www.quantpsy.org/interact/mlr2.htm

! The loadings, residuals, intercepts, variances, and covariances are constrained to
equality across groups because they are not written in the class1 and class2 model.
MODEL:
%OVERALL%
SOP BY cperfil1@1 cperf3 cperf5 cperf7 cperf9;
SPP BY cperf2@1 cperf4 cperf6 cperf8 cperf10;
GRADE BY gpar@1;
GRADE@1;
GRADE ON SOP SPP; !Main effects of SOP and SPP
SOPxSPP | SOP XWITH SPP;
GRADE on SOPxSPP; !Interactive effect of SOP X SPP

! In this model, SOP, SPP, and SOP x SPP are freely estimated in each group
because they are written in both the class1 and class2 models.

%C#1% !Class 1 = European Canadians
GRADE on SOP;
GRADE ON SPP;
GRADE on SOPxSPP;

%C#2% !Class 2 = Asian Canadians
GRADE on SOP;
GRADE ON SPP;
GRADE on SOPxSPP;

Note. Our personal notes were added in bold characters after the symbol !.
Table A2

**MPLUS Input Codes for the Multiple Group LMS model with the SOP, SPP, and SOP x SPP Effects Constrained to Equality Across Groups**

! The first part of the input codes is identical in Table 1 and Table 2.

! The loadings, residuals, intercepts, variances, and covariances are constrained to equality across groups because they are not written in the class1 and class2 model (as per Table 1).

! In this model, SOP, SPP, and SOP x SPP are now constrained to equality across groups because they are written in the overall model rather than in both the class1 and class2 models (which are no longer included in the input codes).

MODEL:
%OVERALL%
SOP BY cperf1@1 cperf3 cperf5 cperf7 cperf9;
SPP BY cperf2@1 cperf4 cperf6 cperf8 cperf10;
GRADE BY gpar@1;
GRADE@1;
GRADE ON SOP SPP; !Main effects of SOP and SPP
SOPxSPP | SOP XWITH SPP;
GRADE on SOPxSPP; !Interactive effect of SOP X SPP

Note. Our personal notes were added in bold characters after the symbol !.
Table A3

*Predicted Values of Reversed Academic Dissatisfaction for the Four Subtypes of Perfectionism in Asian Canadian and European Canadian Samples*

<table>
<thead>
<tr>
<th>Subtypes</th>
<th>Asian Canadians</th>
<th>European Canadians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure SOP</td>
<td>0.51</td>
<td>1.05</td>
</tr>
<tr>
<td>Mixed perfectionism</td>
<td>0.26</td>
<td>0.17</td>
</tr>
<tr>
<td>Non perfectionism</td>
<td>-0.26</td>
<td>0.27</td>
</tr>
<tr>
<td>Pure SPP</td>
<td>-0.51</td>
<td>-0.72</td>
</tr>
</tbody>
</table>