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Original article

Anxiety and dimensions of perfectionism in first year college students: The mediating role of mindfulness



Le rôle médiateur de la pleine conscience sur la relation entre les dimensions du perfectionnisme et l'anxiété chez des étudiants collégiaux de première année

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ABSTRACT

Introduction. – Anxiety and perfectionism affect academic success of college students. Mindfulness is associated with decrease anxiety and perfectionism among college students.

Objective. – This study evaluates the mediating role of dispositional mindfulness on the relationship between adaptive and maladaptive dimensions of perfectionism and anxiety in first year college students.

Method. – The subjects, 283 first year college students (59.5% girls), completed self-reported measures of anxiety, perfectionism and dispositional mindfulness.

Results. – Our results show that maladaptive perfectionism is associated with greater anxiety, and a higher dispositional mindfulness score is associated with less anxiety symptoms. Also, mindfulness mediates the relationship between maladaptive perfectionism and anxiety symptoms, especially in girls. When the shared variance of maladaptive and adaptive perfectionism is statistically controlled, adaptive perfectionism is associated with anxiety symptoms in boys and mindfulness in girls.

Conclusion. – This study confirms the mediating role of mindfulness on the relation between maladaptive perfectionism and anxiety. Gender differences, limits of the mindfulness measure and future research are discussed.

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RÉSUMÉ

Introduction. – L'anxiété et le perfectionnisme sont des facteurs importants qui affectent la réussite scolaire des étudiants collégiaux.

Objectif. – Chez ces étudiants, la pratique de la pleine conscience est associée à une diminution de l'anxiété et du perfectionnisme. Dans cette étude, le rôle médiateur de la pleine conscience sur la relation entre les dimensions adaptées et inadaptées du perfectionnisme et de l'anxiété est évalué auprès d'étudiants collégiaux de première année.

Méthode. – L'étude a été réalisée auprès de 283 étudiants, dont 59,5 % sont des filles, en première session dans un collège québécois. Les symptômes anxieux, le perfectionnisme et la disposition à la pleine conscience ont été mesurés par des questionnaires auto-rapportés.

Résultats. – Les résultats révèlent que le perfectionnisme inadapté prédit un score plus élevé de symptômes d'anxiété, alors que la pleine conscience prédit négativement ceux-ci. La pleine conscience agit comme une variable médiatrice de la relation entre le perfectionnisme inadapté et les symptômes anxieux, et ce, particulièrement chez les filles. Également, le perfectionnisme adapté prédit l'anxiété chez les garçons et la pleine conscience chez les filles lorsque la variance commune entre le perfectionnisme inadapté et adapté est contrôlée dans les analyses.

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Conclusion. – L'étude confirme le rôle médiateur de la pleine conscience dans la relation entre le perfectionnisme inadapté et l'anxiété. La discussion aborde ces résultats, les différences de genre, les limites de la mesure de la pleine conscience ainsi que des avenues de recherches futures.

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1. Anxiety, perfectionism and mindfulness

Over the past decade, there has been a significant increase in anxiety symptoms (Regehr, Glancy, & Pitts, 2013) and psychological counselling requests among college students (Hunt & Eisenberg, 2010). A high prevalence of 33–41% of moderate to severe anxiety is observed among first-year post-secondary students (Pirbaglou et al., 2013; Wong, Cheung, Chan, Ma, & Tang, 2006). Gender differences are observed, as young women in college tend to report more anxiety symptoms than young men (Blanchet, 2011; Eisenberg, Hunt, & Speer, 2013; Torija, Pozo, Bravo, Hurtado, & Romero, 2016), and women are twice as likely to develop an anxiety disorder than men (American Psychiatric Association, 2013; Barlow, 2002). Also, 32.5% of these students report that anxiety negatively affects their academic performance (American College Health Association, 2016), with anxiety being one of the ten most frequently reported mental health problems affecting their academic performance (Marcotte, 2014).

Considered as emerging adults (Arnett, 2015), these students experience a synchrony of transitions, a developmental transition and a post-secondary transition, which generates significant stress (Marcotte, 2014). While most students experience transition to college with ease, some will be more likely to experience psychological difficulties (Ramler, Tennison, Lynch, & Murphy, 2015), and this transition constitutes a vulnerability period for the development of mental health disorders (Fier & Brzezinski, 2010). The transition from adolescence to adulthood is critical as it involves changes in social roles, opportunities, freedom and exploration, which can contribute to the emergence of anxiety symptoms (Arnett, 2015; Schulenberg, Sameroff, & Cicchetti, 2004). Given the increase in anxiety symptoms and counselling requests for psychological services among these students, it is important to consider this phenomenon in the particular context of college studies.

Beck's cognitive theory of anxiety (Beck, Emery, & Greenberg, 2005) defines anxiety as a complex system of physical, behavioral and emotional responses that are activated when a situation is considered aversive to the person because it is perceived as uncontrollable, unpredictable and potentially threatening. For anxious students, cognitive schemes and distortions based on a present or future threat leads them to experience anxiety in the absence of apparent or imminent danger. Also, the transition to college, the specificity of this level of education, and the developmental period associated with early adulthood and its challenges (Arnett, 2015) can contribute to the emergence of anxiety among students especially in young women, since they are more likely to experience anxiety (Cleary, Walter, & Jackson, 2011; Fier & Brzezinski, 2010). Other factors, such as perfectionism, may contribute to the anxiety symptoms reported by college students following the college transition.

Perfectionism is generally defined as the constant and exaggerated search for perfection (Flett & Hewitt, 2002). However, its definition and involvement in relation to mental health disorders remain debated. Early writing on perfectionism defined the construct as a one-dimensional damaging personality trait (Blatt, 1995; Burns, 1980). Hamachek (1978) was one of the first authors to propose a dichotomous definition of perfectionism including neurotic perfectionism, then recognized as maladaptive and associated with

negative effects, and normal perfectionism, which represented an adaptive form of perfectionism. Currently, two currents are present in the literature: authors who define perfectionism according to two types, adaptive and maladaptive (or healthy and unhealthy, positive and negative) (Slaney, Rice, & Ashby, 2002; Stoeber & Otto, 2006), and the authors who define perfectionism as a multidimensional construct mostly maladaptive (Flett & Hewitt, 2002; Frost, Marten, Lahart, & Rosenblate, 1990; Hill et al., 2004). In order to clarify the multiple dimensions and factors included in perfectionism, some authors suggest grouping them according to two factors, namely perfectionistic strivings, which can be described as adaptive perfectionism and perfectionistic concerns, related to maladaptive perfectionism (Frost, Heimberg, Holt, Mattia, & Neubauer, 1993; Stoeber & Gaudreau, 2017; Stoeber & Otto, 2006). Adaptive perfectionism is defined by the striving for excellence and the adoption of high personal standards, and maladaptive perfectionism includes critical self-evaluation and the impression of a gap between expected and actual personal performance (Frost et al., 1990). With these two factors proposed by some authors, it is thus possible to group together the dimensions of perfectionism present in the literature and described as adaptive (for example: striving for excellence, personal standards, self-oriented perfectionism) and maladaptive (for example: concerns about mistakes, socially prescribed perfectionism, doubts about actions) beyond the different conceptual models (Stoeber & Gaudreau, 2017). Despite the conceptual inconsistencies, perfectionism is recognized as a personality trait associated with both beneficial and deleterious effects on mental health and psychological functioning (Flett & Hewitt, 2002; Lo & Abbott, 2013).

Perfectionism is a vulnerability and maintaining factor of psychopathology (Flett & Hewitt, 2002; Lo & Abbott, 2013), including various anxiety disorders (Wheeler, Blankstein, Antony, McCabe, & Bieling, 2011). Perfectionism can also be a risk factor for anxiety in students pursuing higher education (Perolini, 2011). In college students, perfectionism is associated with adjustment difficulties (Shafran & Mansell, 2001) and anxiety (Chang, 2006). More specifically, it is recognized that maladaptive perfectionism, which includes perfectionistic concerns, is associated with psychological distress (Hewitt & Flett, 2002; Hewitt, Flett, & Mikail, 2017; Hill, 2014; Stoeber & Otto, 2006). Maladaptive perfectionism is associated with depressive and anxious symptoms, and lower self-esteem among these students (Bieling, Israeli, & Antony, 2004; Lo & Abbott, 2013). Socially prescribed perfectionism is associated with a higher level of anxiety symptoms (Short, 2012) and social anxiety in college students (Newby et al., 2017). Also, concern over mistake, another dimension of maladaptive perfectionism, is associated with higher levels of worry and rumination (Flett, Nepon, & Hewitt, 2016). Furthermore, despite the fact that socially prescribed perfectionism, which is defined as the belief that others, such as parents, or educational programs, have high demands on themselves, is described as maladaptive (Finn, 2016; Flett & Hewitt, 2002), one study did report that it could also be associated with psychological well-being dimensions such as autonomy and life goals among college students (Chang, 2006). In this study, however, this relationship is mediated by stress (Chang, 2006), confirming the particular role of stress in the relationship between the different dimensions of perfectionism and psychological difficulties.

Moreover, adaptive perfectionism is associated with positive affect, higher self-esteem, a better sense of self-efficacy, better academic outcomes and usually not be related to symptoms of mental health disorders (Lo & Abbott, 2013; Stoeber & Otto, 2006). Indeed, adaptive perfectionism, when maladaptive perfectionism is statistically controlled for, does not predict depressive or anxious symptoms (Bieling et al., 2004). However, Flett and Hewitt (2002) suggest that adaptive perfectionism may be associated with anxiety when the person experiences stress or a threatening situation. This reflects the complexity of the relationship between different aspects of perfectionism and anxiety and reinforces the importance of clarifying these relationships. To this end, Newby et al. (2017) observed that self-oriented perfectionism, generally described as adaptive, is associated with symptoms of social anxiety only when maladaptive perfectionism is not controlled in the analyses. Also, Chang (2014) reports that a higher level of adaptive perfectionism would reduce the negative impacts of anxiety on procrastination among students with a high level of anxiety. Thus, there seems to be no consensus on the possible negative consequences of adaptive perfectionism, or the search for high personal standards (Hill, 2014).

Furthermore, some authors argue that adaptive perfectionism would have positive consequences, this time only when maladaptive perfectionism is statistically controlled in the analyses (Gotwals, Stoeber, Dunn, & Stoll, 2012; Stoeber, 2011). Finally, the relationship between maladaptive perfectionism and psychological difficulties on the one hand, and between adaptive perfectionism and indicators of psychological adaptation on the other, would be greater when the common variance between the two types of perfectionism is statistically controlled (Stoeber & Gaudreau, 2017). However, very few studies have investigated the links between adaptive, maladaptive perfectionism and anxiety by statistically controlling for the common variance between these two factors of perfectionism, and very few studies have focused on the mechanisms that explain the links between perfectionism and mental health (Gnilka, Ashby, & Noble, 2012).

Although young women tend to report more anxiety symptoms than young men (Blanchet, 2011), few studies have examined gender differences associated with perfectionism. Studies that have evaluated these differences among students show either inconsistent or no differences in both total, adaptive and maladaptive perfectionism (Blankstein, Dunkley, & Wilson, 2008; Stoeber & Stoeber, 2009). For example, Blankstein and Winkworth (2004) report that adaptive perfectionism predicts educational success for boys and not girls, while Kawamura, Frost, and Harmatz (2002) report that it is more strongly associated with academic success among girls than boys.

In addition to perfectionism, mindfulness is negatively associated with anxiety symptoms (Bamber & Schneider, 2016). The concept of mindfulness and the interventions associated with it has been an interest to the scientific community for several years. However, there is no consensus on its definition, explanatory mechanisms and links to mental health (Baer, 2019; Grégoire & De Mondehara, 2016; Kang, Gruber, & Gray, 2013; Rau & Williams, 2016). Some authors define mindfulness as a one-dimensional construct (Brown & Ryan, 2003; Brown, Ryan, & Creswell, 2007), while others define it as a multidimensional construct (Bishop et al., 2004; Kang et al., 2013). Mindfulness was initially defined by Kabat-Zinn (1994, p. 4) as "the awareness that arises from paying attention, on purpose, in the present moment and non-judgmentally". Non-judgmental attention can be directed toward internal experiences, physical sensations, cognitions or emotions (Baer, 2019).

While the nature of the processes associated with mindfulness remains a matter of debate, authors agree to qualify the attention

and awareness that characterize mindfulness as open, curious, non-judgmental and acceptance and compassion-based attitudes (Baer, 2019). According to Brown et al. (2007), mindfulness is considered a natural disposition, or a trait, that can be cultivated through the practice of different strategies such as mindfulness meditation (Chiesa & Malinowski, 2011; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). In addition, there appears to be no gender differences related to mindfulness (Brown & Ryan, 2003; Kong et al., 2014), although some authors have observed sexual differences for some facets of mindfulness. In particular, women may have a higher level of conscious observation and men would have a higher level of acting in full consciousness (Alispahic & Hasanbegovic-Anic, 2017). Also, it has been shown that mindfulness is negatively associated with anxiety (Brown & Ryan, 2003; Lynch, Gander, Kohls, Kudielka, & Walach, 2011), and that perfectionists would be less mindful (Perolini, 2011). Several studies have assessed the effects of mindfulness practice on mental health issues and support the reduction of anxiety symptoms [see Gu, Strauss, Bond, and Cavanagh (2015) and Khoury et al. (2013) for meta-analyses].

No studies to date have linked dispositional mindfulness, perfectionism and anxiety although some studies have begun examining the links between anxiety, perfectionism and variables associated with processes that would underlie mindfulness, such as experiential avoidance. Cognitive anxiety theory (Beck et al., 2005), conceptualizes avoidance as the cornerstone of anxiety. The third wave of the cognitive-behavioral approach to psychotherapy, based on the notion of process (Hayes & Hofmann, 2018), proposes a variety of mindfulness practice strategies. It is suggested that experiential avoidance, the inappropriate tendency to avoid unwanted and uncomfortable emotions and cognitions, is one of the main causes and maintenance of anxiety (Orsillo & Roemer, 2011). Furthermore, avoidance associated with the anticipated consequences of anxiety would also play a central role in perfectionism among college students (Pirbaglou et al., 2013). For example, avoiding exposure to situations in which one can be assessed, such as in exams, and which could cause anxiety, would be associated with perfectionism in some students. More specifically, maladaptive perfectionism and experiential avoidance are associated with worries, a characteristic of generalized anxiety, and experiential avoidance mediates the relationship between maladaptive perfectionism and worry (Santanello & Gardner, 2007). Finally, higher levels of mindfulness would act as protective factors for perfectionist students since mindfulness would mediate the relationship between negative repetitive thoughts and psychological distress (Short & Mazmanian, 2013). In that sense, it is possible that in college students, the relationship between perfectionism and anxiety symptoms can be explained by a lower level of dispositional mindfulness, since the tendency to focus one's experience on the future or the past is an attitude present in both anxiety and perfectionism.

However, although Santanello and Gardner (2007) have shown that experiential avoidance plays a mediating role in the relationship between maladaptive perfectionism and worry, these links have not been examined by considering simultaneously, the dimensions of perfectionism, dispositional mindfulness and the presence of anxiety symptoms in college students. For their part, Short and Mazmanian (2013) considered the influence of mindfulness on rumination associated with perfectionism but did not measure its effects on anxiety specifically. Thus, it seems that dispositional mindfulness could influence the relationship between perfectionism and anxiety among college students. In this sense, the main research question of this study is: does mindfulness influence the relationship between the adaptive and maladaptive dimensions of perfectionism and anxiety symptoms in first-year college students?

2. Objectives and hypotheses

The main objective of this study is to evaluate the mediating role of mindfulness as a potential mechanism for explaining the relationships between the dimensions of perfectionism and anxiety symptoms. In both genders, it is argued that perfectionism in its total and maladaptive measure will predict anxiety. Specifically, it is suggested that higher levels of total and maladaptive perfectionism will be associated with more anxiety symptoms and lower levels of mindfulness, and that lower levels of mindfulness will also be associated with higher levels of anxiety. Furthermore, it is argued that adaptive perfectionism will not be associated with anxiety but will be associated with higher levels of mindfulness. Finally, it is assumed that mindfulness will act as a mediating variable in the relationships between total, maladaptive and adaptive perfectionism, and anxiety in these students, regardless of gender.

3. Method

3.1. Participants

Data was collected from a sample of 283 college students from Quebec, Canada (166 girls, 113 boys, 4 missing). Participants in the sample are between 16 and 30 years of age, with an average age of 18.21 years ($SD = 2.58$). Of these students, 98% are full-time students, 42% are in pre-university programs, 47% are in technical programs and 11% are in the “Tremplin DEC” program, which provides access to pre-university and technical programs once certain courses are completed.

3.2. Measures

A questionnaire was used to obtain the socio-demographic data of the participants, including age, gender, student status and curriculum. Given the limited passing time for the questionnaires through classes, and that this study is part of a larger study, shortened versions of some questionnaires have been developed and used in this study. The French version of the Beck Anxiety Inventory (Freeston, Ladouceur, Thibodeau, Gagnon, & Rhéaume, 1994) was used to assess students' anxiety levels over the past week. The self-reported questionnaire includes 21 items that measures symptoms associated with anxiety (examples of items: nervous, fear of dying, unable to relax). Respondent answers on a four anchor Likert scale (0 = not at all, 3 = a lot, I could barely stand it). The total score, which represents the sum of the scores for each item, is between zero and 63. Scores between zero and seven show no anxiety, eight to 15 mild anxiety, 16 to 25 moderate anxiety, and 26 to 63 severe anxiety (Beck & Steer, 1990). The instrument shows good psychometric qualities (Freeston et al., 1994). In this study, the alpha coefficient ($\alpha = .93$) shows excellent internal consistency.

Perfectionism was measured by an abbreviated and translated version of the perfectionism inventory (PI) (Hill et al., 2004). This version of the questionnaire was shortened and translated in French by the research team. This short self-reported ten items questionnaire measures three dimensions associated with perfectionism: striving for excellence (four items), rumination (three items), and concern over mistakes (three items). The concern over mistakes subscale is defined as the tendency to experience distress or anxiety when a mistake is made (e.g., “I am particularly embarrassed by failure”). The rumination subscale is defined as the tendency to worry excessively about past mistakes and less than perfect future performance (e.g., “I spend a lot of time worrying about things I've done or things I have to do”). The striving for excellence subscale is described as the tendency to pursue perfect results and high standards of success (e.g., “I must achieve excellence in

everything I do”). The score for each of the subscales is calculated by the average score of each item. In this study, adaptive perfectionism, which is defined in particular by perfectionistic strivings (Stoeber & Gaudreau, 2017) represents the average score of the striving for excellence subscale, and maladaptive perfectionism, which refers to the factor of perfectionistic concerns (Stoeber & Gaudreau, 2017) is calculated by the sum of the averages of the rumination and concern over mistakes subscales. The questionnaire follows a Likert-type rating scale with five anchorages ranging from strongly disagree to strongly agree. The sum of the average scores at the three subscales indicates the total level of perfectionism (a higher total score indicating a higher level of perfectionism).

Factorial analysis of the original measure suggests a two-factors model of perfectionism: conscientious perfectionism and auto-evaluative perfectionism (Hill et al., 2004). The striving for excellence subscale is associated with the conscientious perfectionism factor from Hill's et al. (2004) measure, and with the perfectionistic strivings factor defines by Stoeber and Gaudreau (2017). To facilitate the presentation of results, the term adaptive perfectionism is used to describe this factor. Rumination and concern over mistakes subscales are related to the auto-evaluative factor of perfectionism defined by Hill et al. (2004). The concern over mistakes subscale is associated with the perfectionistic concerns factor of perfectionism defined by Stoeber and Gaudreau (2017). To facilitate the presentation of results, the term maladaptive perfectionism is used to describe this factor. This measure was chosen as part of this study because it is based on Flett & Hewitt (2002) and Frost et al. (1990) models of perfectionism and allows us to measure perfectionism as a multidimensional or categorical construct. The original questionnaire shows good psychometric qualities with alphas ranging from 0.83 to 0.91, showing a strong internal consistency, good convergent validity, good test-retest reliability ($r = 0.71-0.91$) (Hill et al., 2004). In this study, the alpha coefficient ($\alpha = .82$) of the shortened version of the questionnaire shows good internal consistency, which relates to the validation studies of the original measure.

Mindfulness was evaluated by a short version of the French version of the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003; Jermann et al., 2009). From the French version containing 15 items, seven items were randomly selected by the research team to constitute the short version. This self-reported questionnaire measures the disposition to be attentive and aware of the present moment in everyday life. This questionnaire is used with respondents who have no experience in mindfulness training and is suitable for a sample of college students. The questionnaire is built on a Likert scale with six anchorages ranging from “almost always” to “almost never” (item example: It seems I am “running on automatic” without much awareness of what I'm doing.). The total score is the average of each items score. A high average score reflects a higher dispositional mindfulness (Brown & Ryan, 2003). The French version of the questionnaire shows good psychometric qualities. These qualities are equivalent to the qualities of the original scale, the alpha coefficients vary between 0.80 and 0.90 (Brown & Ryan, 2003). In this study, the alpha coefficient ($\alpha = .73$) of the research team's abridged version shows satisfactory internal consistency.

3.3. Procedures

A set of questionnaires including anxiety, mindfulness and perfectionism measures were administered in classrooms of first-year college students from Quebec enrolled in various programs ($n = 13$) at the beginning of the 2014 academic year. Data were collected from students in both pre-university programs (e.g., arts, letters and communication, humanities, and nature) and technical studies programs (e.g., nursing, child education, special education, mechanical

engineering, accounting and management, etc.). Students in the “Tremplin-DEC” program were invited by email to complete the questionnaires in exchange of a financial compensation. Participants were invited to participate in a study on their student experiences following the transition to college and informed consent was obtained before completing the questionnaires. Two versions of the questionnaire were used, in which measures were ordered randomly. This study was approved by the Institutional Committee on the Ethics of Research Involving Humans of the University of Quebec in Montreal.

3.4. Data analysis

Correlation analysis were performed to verify the strength and direction of the relationships between the variables. *t*-tests have been carried out to verify gender differences. Mediation analyses using structural equation models were conducted to verify predictive and mediation effects. These models control covariance between the two factors of perfectionism, as suggested by [Stoeber and Gaudreau \(2017\)](#). Indirect models with re-sampling methods were used. The statistical analyses were carried out on the 20th version of *SPSS Statistics version 20* and *Mplus*.

4. Results

4.1. Preliminary analysis

Descriptive analyses indicate that 25.9% of students, or 14.3% of boys and 32.5% of girls, have moderate to severe anxiety symptoms. The results of correlation analyses for the total sample indicate that anxiety symptoms are positively associated with gender ($r = .38, p < .001$), total and maladaptive perfectionism ($r = .34, p < .001$; $r = .40, p < .001$), and negatively associated with mindfulness ($r = -.41, p < .001$). In the total sample, the adaptive dimension of perfectionism is not associated with mindfulness ($r = -.07, p = .25$), nor with anxiety ($r = .05, p = .40$). The results presented in [Table 1](#) show that for each gender, total and maladaptive perfectionism scores are negatively associated with mindfulness and positively associated with anxiety. Anxiety symptoms are negatively correlated with mindfulness. In women, adaptive perfectionism is positively correlated with anxiety symptoms.

On average, young women report more anxiety symptoms than young men [$t(276) = -6.86, p < .001$]. Finally, there are no gender differences for dispositional mindfulness [$t(275) = 1.80, p = .07$], total [$t(276) = -1.16, p = .25$], maladaptive [$t(275) = -1.35, p = .18$] or adaptive perfectionism [$t(276) = -.15, p = .88$].

4.2. Main analysis

In order to assess the mediating role of mindfulness in the relationship between perfectionism and anxiety symptoms, structural equation models were conducted for the total sample, for women and men separately, given the gender difference observed

for anxiety symptoms. In addition, given the strong correlation between the total perfectionism score, and the maladaptive perfectionism score ($r = .94, p < .001$), the analyses were conducted with the maladaptive perfectionism score only. The two factors of perfectionism (adaptive and maladaptive) were used as exogenous variables, mindfulness as a mediating (endogenous) variable, and anxiety symptoms as a dependent (endogenous) variable for the indirect re-sampling models.

First, the mediating role of mindfulness on the relationship between the adaptive and maladaptive dimensions of perfectionism and the symptoms of anxiety was verified with the total sample. This model shows satisfactory adequacy indices: $\chi^2(2) = 1.89, p = .39, RMSEA = 0.00 [.00; .12], CFI = 1.00, SRMR = .02$. [Fig. 1](#) presents the results of the path analysis model.

The results show that gender ($\beta = .32, p < .001, [.225; .423]$), maladaptive perfectionism ($\beta = .33, p < .001, [.209; .451]$), and mindfulness ($\beta = -.29, p < .001, [-.408; -.164]$) predict anxiety symptoms, with maladaptive perfectionism having a direct effect on anxiety. Maladaptive perfectionism predicts a lower level of mindfulness ($\beta = -.36, p < .001, [-.479; -.233]$), and is positively associated with adaptive perfectionism ($\beta = .41, p < .001, [.302; .513]$). A higher level of maladaptive perfectionism is associated with a lower level of mindfulness, and a higher level of anxiety. Also, a higher level of dispositional mindfulness is associated with a lower level of anxiety symptoms. The model showed a complete mediation of mindfulness on the relationship between maladaptive perfectionism and anxiety symptoms, with the bootstrap confidence interval for the indirect effect based on 5000 bootstraps samples not containing the zero value ($\beta = .10, p < .001, [.042; .162]$). The model explains 35.4% of the variance of anxiety symptoms ($p < .001$). Adaptive perfectionism has no direct effect on anxiety, and mindfulness has no indirect effect on the relationship between adaptive perfectionism and anxiety symptoms.

To examine the effect of gender, the models were analyzed separately for men and women. [Table 2](#) presents the results of the indirect re-sampling model by gender. The adequacy indices of this model show that the model is just identified, thus implying no degree of freedom, and thus, are not useful.

The results showed that in women, dispositional mindfulness mediates the relationship between maladaptive perfectionism and anxiety symptoms, since the value 0 is not found in the confidence intervals for the indirect effect based on 5000 bootstraps samples ($\beta = .17, p < .001, [.074; .269]$). Moreover, in women, adaptive perfectionism predicts a higher level of mindfulness. The model explains 25.5% of the variance of anxiety symptoms ($p < .001$). In men, although maladaptive perfectionism predicts a higher level of anxiety and a lower level of mindfulness, and adaptive perfectionism and mindfulness predicts a lower level of anxiety, mindfulness does not mediate the relationship between maladaptive perfectionism and anxiety ($\beta = .07, p = .06, [-.004; .151]$). The model explains 31.3% of the variance of anxiety symptoms ($p < .001$). Also, in men, adaptive perfectionism is not associated with maladaptive perfectionism, nor with mindfulness. In addition, multi-group analyses

Table 1
Correlations between variables.

Women	Men				
	1	2	3	4	5
1. Anxiety	-	-.36***	.36***	.45***	-.09
2. Mindfulness	-.45***	-	-.25**	-.27**	-.04
3. Perfectionism (total)	.36***	-.29***	-	.93***	.52***
4. Maladaptive perfectionism	.38***	-.35***	.96***	-	.18
5. Adaptive perfectionism	.21**	-.07	.78***	.56***	-

** $p < .01$.

*** $p < .001$.

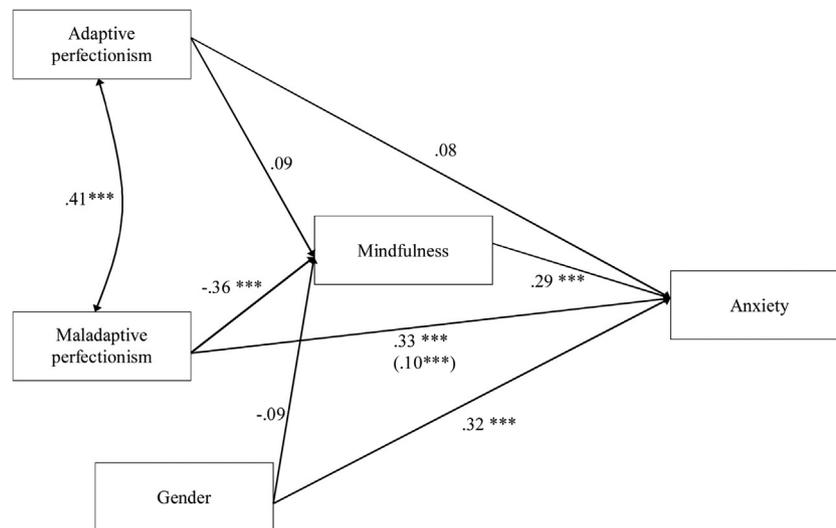


Fig. 1. Mediation analysis using the structural equation modeling for the total sample.

Table 2
Results of the mediation models, by gender.

Predicted variable	Predictor	Women (n = 166)			Men (n = 113)		
		β	SE	CI (95%)	β	SE	CI (95%)
Anxiety	Adaptive perfectionism	.06	.09	[-.117; .236]	-.19*	.09	[-.373; -.005]
	Maladaptive perfectionism	.21*	.10	[.017; .402]	.42***	.08	[.259; .583]
	Mindfulness	-.37***	.08	[-.524; -.212]	-.27**	.10	[-.467; -.064]
Mindfulness	Adaptive perfectionism	.19*	.09	[.015; .370]	.01	.11	[-.194; .218]
	Maladaptive perfectionism	-.47***	.08	[-.620; -.312]	-.28**	.09	[-.458; -.095]
Maladaptive perfectionism	Adaptive perfectionism	.57***	.06	[.452; .680]	.18	.09	[-.001; .351]
Total effect on anxiety	Adaptive perfectionism	-.01	.10	[-.203; .180]	-.19*	.10	[-.379; -.005]
	Maladaptive perfectionism	.38***	.09	[.207; .555]	.50***	.07	[.352; .637]
Indirect effect on anxiety	Adaptive perfectionism	-.07	.04	[-.144; .002]	-.003	.03	[-.062; .056]
	Maladaptive perfectionism	.17***	.05	[.074; .269]	.07	.04	[-.004; .151]

Standardized B coefficients. 5000 bootstraps samples.

* p < .05.
** p < .01.
*** p < .001.

showed that the mediation model in women differs significantly from the mediation model observed in men [$\chi^2(6) = 17.91, p < .01$].

In summary, these results suggest that maladaptive perfectionism is associated with anxiety symptoms, even when the adaptive dimension of perfectionism is statistically controlled for in structural equation models. In addition, mindfulness predicts anxiety symptoms in men and women, and mediates the relationship between maladaptive perfectionism and anxiety symptoms in women only. Finally, when the maladaptive dimension of perfectionism is statistically controlled for, the adaptive dimension, defined by the striving for excellence, is associated with a lower level of anxiety symptoms in men.

5. Discussion

The present study attempts to answer a question that remains unanswered in the scientific literature: how are explained the relationships between the dimensions of perfectionism and anxiety? This study expands the study of these relationships by taking into account the common variance between the factors of perfectionism and examines the influence of mindfulness as a potential process of explanation. The results confirmed the mediating role of mindfulness in the relationship between maladaptive perfectionism, which includes concerns over mistakes and ruminative thinking as defined by Hill et al. (2004), and anxiety symptoms. The results distinguish gender differences. Previous studies have linked

perfectionism, which is primarily defined as maladaptive, with a higher level of anxiety symptoms (Egan et al., 2011; Pirbaglou et al., 2013). Perfectionism has also been linked to lower levels of mindfulness (Papay, 2017; Perolini, 2011), and mindfulness is associated with a lower level of anxiety (Kocovski et al., 2015). The results of our study support the initial assumptions about the maladaptive perfectionism model and support the findings of Chang (2006) who showed that perfectionism is associated with anxiety. The results of the study also confirmed those obtained in Perolini's study (2011), showing a link between perfectionism and mindfulness among college students. According to Perolini (2011), the negative association between perfectionism and mindfulness could be explained by the fact that perfectionist students direct their actions and their concerns towards the future to achieve performances according to their high standards, while students with a higher level of mindfulness experience events in the present moment without adopting a future vision of their performance. The results also support those of Brown and Ryan (2003), which showed that the presence of a natural disposition to be mindful is associated with a lower level of anxiety symptoms, and they highlight the important role of mindfulness in the relationship maladaptive perfectionism and anxiety. Students who are more mindful, that is, oriented towards the present moment, would also demonstrate a higher level of self-control and emotional regulation, and thus be less vulnerable to psychological problems, more optimistic and have better self-esteem (Brown et al., 2007). These more mindful students may be less anxious

since people with a higher level of dispositional mindfulness tend to be more aware of the present moment and less preoccupied by future or past stressful events and tend to ruminate less about their anxiety (Arch & Craske, 2010).

It therefore seems that perfectionism and anxiety have common explanatory mechanisms. It is possible students with a higher level of mindfulness are less likely to worry and ruminate about their mistakes and performance while aiming for high standards (Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Short & Mazmanian, 2013), and thus be less vulnerable to the development of anxiety symptoms. The tendency to worry and ruminate among maladaptive perfectionists is similar to the cognitive distortions present in anxiety (Beck et al., 2005). Like anxious students, maladaptive perfectionists show attentional and memory biases that lead them to overestimate the likelihood of future failure and amplify the possible consequences of failure (Burgess & DiBartolo, 2016). They are more likely to avoid future failures and show higher levels of experiential avoidance (Santanello & Gardner, 2007). It is recognized that avoidance is the cornerstone of maintaining anxiety symptoms (Beck et al., 2005; Orsillo & Roemer, 2011) and is associated with lower levels of mindfulness (Williams, 2008). Therefore, it is argued that students who exhibit a high level of maladaptive perfectionism and low levels of mindfulness share common vulnerabilities, behaviors and dysfunctional attitudes with anxiety (Hewitt & Flett, 2002), thus possibly contributing to the emergence and maintenance of their anxiety symptoms (Burgess & DiBartolo, 2016). Accordingly, the results of the study confirm that mindfulness mediates the relationship between maladaptive perfectionism and anxiety among college students, while taking into account the common variance between the two factors of perfectionism. Dispositional mindfulness could act as a protective factor for these vulnerable students.

This study highlights the need to better define and study perfectionism in order to differentiate between adaptive and maladaptive perfectionism. Although the results confirm the assumptions about the maladaptive perfectionism model in total sample, it is surprising that the results do not confirm a link between adaptive perfectionism, measured by the striving for excellence subscale (Hill et al., 2004), the presence of a higher level of mindfulness, and a lower level of anxiety symptoms. In this regard, results from previous studies have shown inconsistent results between adaptive perfectionism and anxiety (Burgess & DiBartolo, 2016; Stoeber & Otto, 2006). It was stipulated that adaptive perfectionism would predict higher levels of mindfulness and therefore lower levels of anxiety since this type of perfectionism is associated with fewer avoidance behaviors (Hamachek, 1978). This link was not supported in the main model of this study. This result may be explained by the few numbers of items included in the adaptive perfectionism subscale. However, these results are consistent with some previous studies and it would appear that adaptive perfectionism is less deleterious than maladaptive perfectionism (Burgess & DiBartolo, 2016; Stoeber & Otto, 2006), even if this dimension of perfectionism is not associated with a higher level of mindfulness, nor acting as a protective factor against anxiety. In addition, the mediation model presented in this study demonstrates that in the total sample, when the common variance between adapted and maladapted perfectionism is statistically controlled for, as suggested by Stoeber and Gaudreau (2017), adaptive perfectionism is not associated with anxiety, and maladaptive perfectionism remains a strong predictor of anxiety symptoms.

5.1. Gender differences

The results of this study show significant gender differences. When models are analyzed by gender, the results show that mindfulness mediates the relationship between maladaptive

perfectionism and anxiety symptoms only in women. Indeed, although maladaptive perfectionism predicts mindfulness and anxiety, and mindfulness predicts anxiety in both men and women, the relationship between maladaptive perfectionism and anxiety is explained by the indirect effect of mindfulness only in women. Beyond the mediating effect, the results show gender differences in the predictive relationships of this study. In men, anxiety symptoms are negatively associated with adaptive perfectionism while this type of perfectionism is not associated with anxiety in women. It is possible that men who show a higher level of adaptive perfectionism use strategies to manage their perfectionism in order to help them experience fewer anxiety symptoms associated with their high personal standards. Men who show a higher level of adaptive perfectionism would adopt attitudes that would possibly match the definition of healthy perfectionists proposed by Stoeber and Otto (2006). As well, men who show a tendency to seek excellence while having few perfectionist concerns would be less inclined to express preoccupations associated with maladaptive perfectionism (examples: fear of failure, doubts about actions, gap between expected and actual performance).

Furthermore, women tend to experience more anxiety than men (Barlow, 2002; Blanchet, 2011). This is confirmed by the results of this study. Women tend to report higher levels of anxiety because they show greater sensitivity to indices of potential threats such as social rejection, more avoidance-based coping strategies, have a lower sense of control over their lives and a greater tendency to rumination and worry (Altemus, Sarvaiya, & Epperson, 2014; Craske, 2003; McLean & Anderson, 2009). Socialization factors are advanced to explain the gender differences observed for anxiety (Christiansen, 2015; McLean & Anderson, 2009; Panayiotou, Karekla, & Leonidou, 2017). In particular, women and men would be encouraged to respond to potential threats in different ways (McLean & Anderson, 2009). During their development, girls would be encouraged to fear potential threats, avoid stressful situations, use emotional-centered problem-solving strategies, unlike boys, where approaches to stressful situations and solution-based problem-solving behaviors would be strengthened (Christiansen, 2015; Panayiotou et al., 2017). The traditional perspective of women's role, which promotes dependency at the expense of autonomy and control, may promote the development of anxiety among girls (McLean & Anderson, 2009). In addition, anxious girls have emotional vulnerabilities, cognitive distortions and avoidance behaviors that distinguish them from boys. For example, anxious girls are more likely than boys to worry and ruminate when faced with a problem (Craske, 2003), which may lead them to feel anxiety associated with their perfectionistic concerns. As proposed by Pirbaglou et al. (2013), the activation of maladaptive demands for perfect performance biases the healthy process of striving for excellence associated with perfectionism, because it leads to maladaptive cognitive processes such as rumination and worry, which might increase anxiety symptoms in women.

Moreover, although gender differences for anxiety are well established, few studies have examined these differences for perfectionism, and several studies on perfectionism are primarily based on women samples (Stoeber & Otto, 2006). However, the results of the study reinforce the importance of considering gender differences in the examination of the two factors of perfectionism. In this study, adaptive perfectionism is negatively associated with anxiety in men, and positively associated with mindfulness in women.

5.2. Measuring mindfulness

To date, there are several definitions and measures related to mindfulness, which leads to inconsistencies in the definition of the construct itself, and difficulties measuring it. Mindfulness is

defined as an internal trait, disposition or resource (Brown & Ryan, 2003; Kabat-Zinn, 1994), a metacognitive ability (Bishop et al., 2004) or as a set of skills that can be learned and practiced (Baer, 2019). In addition, mindfulness is used as an intervention strategy in several contexts, and its definition differs depending on the theoretical frameworks of these interventions (Baer, 2019). Given the heterogeneity in the definition of mindfulness, self-reported questionnaires measure this construct differently. Some are based on a one-factor structure while others are built on several factors, factors debated for their involvement in the definition of mindfulness (Baer, 2019). Although the MAAS (Brown & Ryan, 2003) is one of the most widely used self-reported questionnaires for measuring mindfulness, this instrument is still criticized by some authors for its simplicity, its one-dimensional measurement of mindfulness and use of negative items (Grégoire & De Mondehare, 2016; Sauer et al., 2013). However, its unifactorial structure allows studies of moderating or mediating effects of mindfulness, and its small number of items allows a rapid assessment of dispositional mindfulness (Baer, 2019). The current study demonstrates that mindfulness, defined and measured as a trait, or a human disposition that can be developed, in a sample that does not practice mindfulness strategies, is a potential mechanism for explaining the link between maladaptive perfectionism and anxiety, especially in women.

5.3. Strengths, limitations and future studies

This study focuses on a large sample of first-year college students and takes into account gender differences and their potential influences. The sample is representative of the reference college population, which is 57% female and 43% male (Gaudreault, Normandeau, Jean-Venturoli, & St-Amour, 2018), promoting the generalization of the results. It also allows the study of perfectionism in its adapted and maladapted dimension, and to evaluate the relationships between these dimensions, anxiety and mindfulness in a model that takes into account the common variance between the two factors of perfectionism. In addition, while several Canadian, US or European studies are interested in anxiety and perfectionism among post-secondary students, and several studies use convenience samples from post-secondary students (Finn, 2016), this study is one of the first to focus specifically on anxiety, perfectionism and mindfulness among college students simultaneously in an integrative model. Given the growing number of students experiencing anxiety and the negative consequences of anxiety on their academic performance, this study provides a better understanding of a potential mechanism of interaction between anxiety and perfectionism dimensions.

This study has some limitations. First of all, as this is a correlational and transversal design, it does not allow to determine the temporal relationship between the variables under study, thus excluding the presence of causal relationships. In this sense, it is not possible to determine whether changes in the predictor variable, perfectionism, precede observed changes in the dependent variable, anxiety symptoms. Moreover, mediation does not guarantee the direction of the relationship between the variables under consideration. A longitudinal study would verify the causal relationship and temporality of the variables and verify the influence of the college transition on the level of anxiety and perfectionism of these students. Also, some of the measures are abbreviated and the subscales have few items, which may have contributed to the lack of significant relationship, especially between adaptive perfectionism, mindfulness and anxiety in the total sample. Moreover, the results of the current study must be interpreted with regard to the choice of dimensions of perfectionism included in the short-form perfectionism questionnaire. In this study, the perfectionism questionnaire contains only one subscale for measuring adaptive perfectionism and two subscales for maladaptive perfectionism,

which may limit the generalization of the results. In addition, a study with a larger sample including more men, a long and validated perfectionism questionnaire for both factors, and based on structural equation modeling, would generalize the results of this study.

6. Conclusion

In sum, this study shows that mindfulness acts as a mediating variable in the relationship between maladaptive perfectionism and anxiety in college students. Students, and especially women, who shows a lower level of mindfulness and a high level of maladaptive perfectionism are more likely to experience symptoms of anxiety. Considering the consequences of anxiety and perfectionism on the mental health and academic success of college students, school-based intervention programs including the practice of mindfulness, could reduce the anxiety and perfectionism of these students. Many of these intervention and prevention programs, such as *Zenétudes: Making a healthy transition to college* (Marcotte, Viel, Paré, & Lamarre, 2016), are currently implemented on college and university campuses. Some of these programs have shown effects on increased mindfulness and decreased anxiety among students (Kang et al., 2009; Sears & Kraus, 2009). The results of this study show that young women with maladaptive perfectionism could benefit more from the practice of mindfulness in order to manage their anxiety symptoms. Future research will examine the role of mindfulness training in the relationship between perfectionism and anxiety, as well as the role of the post-secondary transition on the development and maintenance of perfectionism and anxiety among these students.

Disclosure of interest

The authors declare that they have no competing interest.

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