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## General Introduction

### Rationale for the France/U.S. Study

The eating disorders (ED), anorexia nervosa and bulimia nervosa, are common, serious, and often chronic psychiatric illnesses affecting young people, mainly female adolescents and young women (1,2). Researchers (3,4) have argued that EDs seem to be concentrated in cultures in which food is abundant, where obsession with thinness arises, and where the forces behind the so-called “westernization” of cultures are at work (5). Sociocultural variables also appear to play a significant role in influencing the development of sub-clinical eating disturbances, whereby members of the same population from different ethnic groups (U.S.) have different rates of subclinical ED (6). To our knowledge, there are no previous studies comparing adolescent ED frequency between two countries showing culturally different eating patterns such as France and the United States.

Over the past few decades, a shift in the body mass of adolescents toward overweight and obesity (OB) has been observed in many countries worldwide, notably Western countries such as the U.S. and France (7–11). Comparisons between countries have shown higher rates of adolescent obesity in the U.S. compared to France (12,13). Research has shown that the role of environment (14) and eating behaviors are crucial and that changing every day eating (EDE) habits is essential in dealing with obesity (15–19).

Studying ED and OB together is increasingly common since it is becoming clear that risk factors for ED and obesity may be shared (17,20–22). Prevention and treatment of both disorders include development and maintenance of healthy eating behaviors and attitudes about food and eating. Every day eating habits impact weight status (15,23–25) and unhealthy eating attitudes may be one of many etiological factors for ED (26,27). Understanding more fully the similarities and differences in adolescents’ daily eating patterns and attitudes between two cultures such as France and the U.S. may further inform our knowledge about ED and obesity; such knowledge could in turn, inform health policy for the purpose of prevention and clinical practice in order to improve treatment of these disorders.

Therefore, we designed the current thesis which presents a comparative study on weight status, every day eating and disordered eating in French and American adolescents. This thesis represents one part of the France/U.S. study and serves as its basis.

## **THESIS:French and American Adolescents : obesity, eating disorders, attitudes and patterns of every day eating**

Cross-cultural comparisons can provide useful information regarding the relative importance of contributing factors to ED, weight status, weight perception, and weight control behaviors (28,29). These comparisons can serve in the development of hypotheses for future work and may eventually contribute to highlighting the similar and differing needs of each country regarding the specific content required in interventions aimed at promoting healthy weight and healthy eating behavior.

### **Objectives**

There are 4 main objectives of the France/U.S. study, although each article presented in this thesis presents secondary objectives in order to uncover and explore some other related elements in each domain.

The first objective is addressed in the first article, where our main purpose was to create an instrument to assess EDE in adolescents. This article describes in detail the 4-step process we undertook to create and validate our instrument: the first undertaking our research group (Martine Flament, Brigitte Remy, Angelina Allen and I) did was to meet several times to reflect upon and discuss how to set up a study of the two countries for weight, ED and EDE. I personally undertook a series of literature reviews focusing on the three domains in question: eating disorders across cultures, weight across cultures and every day eating across cultures. I searched among the vast body of literature to find and synthesize recent knowledge on these subjects. Next, our research group collected observations from each culture from which we developed our questionnaire items. Our next aim was to test and refine and validate the internal consistency of the questionnaire. Finally, we aimed to determine the component structure of the instrument through performing a factor analysis.

Our second main objective was to compare France and U.S.A. adolescents for self-reported EDE behaviors and attitudes by country and by gender. Using the instrument we developed, the APE questionnaire, we aimed to compare the scores on five subscales by country and by gender in order to establish and compare differences in an overall sense of “healthiness” in eating behaviors. The process of meeting this objective is described in detail in the second article.

The third main objective was to compare the prevalence of obesity, overweight, normal weight, and thinness according to international growth curves (10,30), by country and gender. The third paper describes how we met this aim.

The third paper included secondary objectives as well: to assess weight and shape concerns by gender and country; to examine ideal-actual BMI discrepancy by country and gender; to examine country and gender differences in the frequency of unhealthy eating and weight control practices. In sum, our goal was to examine differences across the U.S. and France on the aforementioned weight-related variables, taking into account gender, age and SES, as these are known to have effects on these variables (30–33).

In the fourth article, our final main objective of this thesis was to determine the prevalence of full- and partial-syndromes of ED in adolescents, according to gender and country of residence. We also aimed to examine differences in eating disorder symptomatology across countries and gender.

Overall we aimed to examine French and USA adolescents in terms of how they eat and approach food on a regular, every day basis, to compare their weight status and ED prevalence in order to formulate future hypotheses concerning associated factors, risk factors, etiology of ED and obesity and to increase our knowledge of these domains in the hopes of informing public policy, and in developing prevention tools and clinical treatment approaches.

### **Hypotheses:**

Researchers from France, the U.S.A. and Canada hypothesized that differences exist between the behaviors and attitudes related to food and eating in different Western cultures, and that these differences are accompanied by variations in weight status and the prevalence of eating disorders, both clinical and sub-clinical.

We hypothesized that adolescents from France would show healthier EDE attitudes and practices than their U.S.A. counterparts, as previous research with adult subjects has shown (34–38). Scores on the following APE questionnaire subscales were expected to be higher for the French group: “healthy eating,” and “homemade meals;” and scores on the following subscales were hypothesized to be higher for the U.S. sample: “unhealthy/increased eating,” “skipping meals,” and “eating diet/light foods.” We also expected that scores on Individual items on the APE would be in the direction of “healthier” for the French sample (See article2).

We expected that the rates of overweight and obesity would be higher in the U.S. adolescents compared to the French, both overall and by gender. Previous reports of country differences were based on percentages of obesity and overweight which were derived from using different methodology and criteria, especially concerning weight curves used, while the present study used the same measures and criteria to compare the students from two countries (the International Obesity Task Force cut-offs) (See article 3).

In addition to comparing weight status we proposed some secondary-hypotheses concerning weight and eating phenomena that are related to our study and can provide additional information to understanding weight and eating problems: females were expected to report greater ideal-actual BMI discrepancy than males in both countries. Due to a higher expected weight among U.S. adolescents, we also hypothesized that a greater discrepancy between ideal and actual BMI would be reported by U.S. compared to French adolescents, and that U.S. females would have the greatest discrepancy of all subgroups. We also hypothesized that females in both countries would report greater weight and shape concerns than their male counterparts, and that the Americans would report greater weight and shape concerns than the French. We hypothesized a greater frequency of unhealthy eating and weight control practices in females than in males, and in the U.S. relative to the French participants (See article 3).

Lastly, we hypothesized that the U.S. group would show higher prevalence of ED, both clinical and subclinical, as well as higher rates of ED symptoms and diagnostic criteria, which previous works comparing U.S. samples with those of other European countries have demonstrated (39,40).

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## Conclusion

This dissertation presents the results of a large comparative study comparing French (N=1073) and U.S. American (N=1573) adolescents for cultural differences in every day eating (EDE) habits and attitudes, eating disorders (ED) such as anorexia (AN) and bulimia (BN), and weight status, in particular, obesity (OB). Subjects were also compared for weight status, body dissatisfaction (which is linked to EDs and OB), ED symptoms and « diagnoses » of AN and BN. After first developing, testing and validating an instrument to assess EDE and choosing available, validated instruments to assess weight and ED, a series of questionnaires were administered in several French and American high schools.

Our four main objectives were: 1) to create and validate an instrument for the assessment of EDE, 2) to use this instrument to compare adolescents from the United States and France for cultural eating patterns, 3) to compare self-reported weight status between countries, and 4) to compare ED diagnoses and symptoms across countries and gender. Our ultimate goal was to compare the two populations in order to formulate hypotheses for future work in uncovering possible links, risk and protective factors or moderating factors between cultural eating behaviors and attitudes, weight status and eating disorders. Information gleaned from our work may inform clinical efforts at creating prevention and treatment modalities.

The main hypotheses for the thesis study were: 1.) that the French would report more “healthy” EDE behaviors and attitudes; 2.) that the French would report a lower prevalence of OB and overweight compared to Americans ; and 3.) that prevalence of clinical and sub-clinical ED would be lower for the French group compared the American group.

We first developed an instrument to assess EDE, and then used it, along with other validated instruments (which we translated in French), to compare a large population of adolescents from France and the United States in order to uncover cultural differences which may have an impact on weight problems and ED prevalence. A four-stage process was undertaken to create, test and validate the APE questionnaire. In the first thesis article we explained this process in detail. We also performed a factor analysis in order to detect components in the instruments which became our subscales for the final version of the Attitudes and Patterns of Eating (APE) questionnaire. The subsequent three articles present our findings of comparative studies on eating and weight.

## Findings and Results

This study allowed us to study for the first time, to our knowledge, the cultural variants in every day eating (EDE) as well as differences in weight status, frequency of obesity and EDs between adolescents from France and the United States. This thesis develops the first steps of a larger work in process.

The present study confirms our first two hypotheses : there are distinct differences between France and the United States for weight status and every day eating attitudes and behaviors, the French demonstrating healthier eating patterns overall and lower prevalence of obesity and overweight.

First, concerning EDE, we found significant differences on three APE subscales for both gender and country. The results support the hypothesis that the French would show healthier eating habits and attitudes than the American group, namely for eating regularly, having more homemade meals, and avoiding industrially marketed “light” foods. Gender differences showed healthier behaviors and attitudes overall for the male group, and this was true for both US and French males. On the “healthy eating” subscale, subjects from both countries saw themselves as making an effort towards healthy eating overall, or at least believing that it is important to eat in a healthy fashion. For the “unhealthy eating” subscale, both country groups appeared to be attempting to avoid unhealthy eating practices equally. French and U.S. American adolescents differed in certain attitudes and patterns with regard to every day eating.

The present research hypothesized overall healthier eating patterns and attitudes for the French group, and results supported this hypothesis in that the “homemade meals” subscale score was higher for the French than for the U.S. group, while scores on two of the three subscales which reflect non-recommended eating behaviors, i.e. “ eating diet/light foods” and “skipping meals” were higher in the U.S. sample. Mixed results were observed, between countries and between genders, on specific individual items. The overall trend is towards healthier practices and attitudes for the French compared to the U.S. group, and for the male compared to the female group. (These results are discussed in detail in paper 2).

Second we noted that, even if France and the U.S. are both part of the Western culture, distinct differences in weight status emerged between adolescents from the two countries. The prevalence of obesity was about double among American compared to French adolescents, and for overweight it was almost triple. In contrast, the overall rate of thinness was more than three times higher among French compared to American adolescents.

We also found significant differences in ideal BMI, and BMI discrepancy. Despite a higher ideal BMI among the Americans compared to the French, the ideal versus actual BMI discrepancy was also significantly higher among the Americans. Thus, as hypothesized, the actual higher body mass in the Americans was associated with greater levels of concern about their weight and shape. These differences, however, did not translate into differences regarding frequencies of unhealthy eating and weight control practices between the two countries. The only significant difference was that more American than French adolescents reported exercising for the purpose of weight loss.

Regarding gender differences across countries, our results indicated that more males than females were in the higher BMI categories, while the usual female predominance was seen

for BMI discrepancy between actual and ideal body weight, weight and shape concerns, and all unhealthy weight control strategies (These results are discussed in detail in paper 3).

Finally, we proposed the hypothesis that, given higher obesity and overweight prevalence in the USA and overall healthier every day eating in France, the French adolescent population would also have lower prevalence of ED, as previous cross-cultural studies have shown between North America and Europe. However, the research project found no clear country differences in terms of clinical ED. Gender differences in ED emerged as expected, with females showing overall higher rates of diagnostic criteria or clinical ED than males. The prevalence rates were consistent with previously reported estimates. There were a few unexpected country differences in ED symptomatology, such as episodes of binge eating which were significantly more reported among the French than among Americans and compensatory behaviors which were higher for the U.S. group (These results are discussed in detail in paper 4).

## **GENERAL DISCUSSION**

This thesis presents one article presenting a new instrument for the assessment of every day eating behaviors and attitudes and three articles concerning eating and weight behaviors. Our main objectives were to test samples of French and American adolescents for eating disorders, weight status and every day eating. We found that high schools students sampled from the two countries were different in terms of weight status and every day eating, yet were similar in terms of eating disorders prevalence. A discussion on possible explanations of these results is discussed here article by article, since we cannot yet infer either relationships or causality between the three sets of results. The next step in the France/US project will be to develop hypotheses and perform cross-sectional analyses between the three data sets in order to observe possible associations between every day eating, weight status and eating disorder. Results from these future analyses may allow us to perform further longitudinal studies and explore conclusions about every day eating, weight and eating disorders between French and US adolescents which could, in turn, inform prevention and treatment strategies for these health concerns.

## **THE APE QUESTIONNAIRE**

The main objectives of the first paper in this thesis on the Attitudes and Patterns of Eating (APE) Questionnaire were to describe the construction of the APE questionnaire, a new instrument to be used in a study comparing French and American adolescents' eating behaviours and attitudes towards food and to present the testing for internal consistency of the English version. Validity and reliability testing for the French version as well as reliability testing of the English version will be presented in future works.

A principal components analysis identified 5 factors, four of which agreed, for the most part, with original themes formulated by the research team. After the PCA, certain original themes were renamed to better describe the items which loaded therein. Three original themes were not identified in the factor analysis, so they were eliminated: the items thought to load together therein did not, yet several items initially assigned to these themes loaded onto other themes and thus became part of respective new subscales. A new component emerged in the PCA and was labeled “*Skipping Meals*.” Items in this component were originally thought to be components of other original themes.

An item which the team thought would load onto our original “*Family Patterns*” theme, about eating in (non-fast food) restaurants, did not load sufficiently onto any factor. During the first two phases of the current study, high restaurant patronage was noted in both countries and previous research indicated that eating out increased intake of unhealthy ingredients in food and reduced intake in certain nutritive ingredients (1–4). Given indications of recent increases in this practice, at least in the U.S.A. (2–4), it was considered useful to keep this question as a stand-alone item in the France/U.S. study.

Another removed item, due to low loading onto any of the factors, was: “How often does your family have big or special meals for special occasions?” Country differences were observed by the researchers during Stage 1 of the study, whereby French families appeared to be having more frequent, special meals than U.S.A. families. We chose to use this item as a stand-alone question in the study on every day eating, since previous research has shown family meals eaten at home to be protective against adolescent eating problems (5–7).

The purpose of the APE is to measure certain eating attitudes and practices. The components uncovered by the PCA reduce the English version down to its most relevant and coherent parts. The factor analysis and testing of the English version APE questionnaire demonstrated its internal consistency. After doing the same for the French version and testing both versions for reliability, we will use the instrument for comparative purposes in the France/U.S.A. study.

## **EVERY DAY EATING**

The second article presented in this thesis aimed to compare France and U.S.A. adolescents for self-reported every day eating (EDE) behaviors and attitudes using the APE questionnaire, in order to explore whether differences in EDE exist, as they apparently do among adults from these countries (8).

The results supported our hypothesis that the French would show overall healthier eating habits and attitudes than the American group, namely for eating regularly, having more homemade meals, and avoiding industrially marketed “light” foods. Gender differences showed healthier behaviors and attitudes overall for the male group.

The high number of significant results observed on individual APE items provided could provide a number of discussion points. However, we reserve making an exhaustive exploration into possible explanations of each result for the next step of our larger France/U.S. study where we will observe associations between EDE and OB; EDE and ED. This next step should clarify results and enable a more coherent understanding of the EDE results and how EDE affects (or doesn't affect) adolescents' health. A few discussion points, notably about those results which yielded apparent consistencies across subscales or items or contradictions between them, are discussed here.

First of all, the question about choosing "creamy, sugary desserts" yielded mixed results, whereby French boys' scores were higher than those of U.S. boys, while U.S. girls' scores were higher than those of French girls. This result is consistent with the "importance of low fat-content" attitude, which was strongest for French females: i.e. French females reported eating fewer rich desserts, consistent with their belief in the importance of eating a diet low in fat; while their male compatriots didn't seem to care about eating a diet low in fat or calories and this was consistent with their reported choice to eat rich desserts more often. Relationships explored between these results may confirm this.

The question about frequency of carbonated beverage intake also yielded mixed results: U.S. boys and girls reported drinking soft drinks about the same as French boys at an average rate understood as "sometimes" and more often than French girls. Soft drink intake is a health concern since high intake is known to be related to weight problems (9–11).

The three questions about fruit intake yielded mixed results as well. Eating fresh fruit for dessert was reported to a significantly higher degree by the French group, while eating fresh fruit as a snack was reported to a higher degree by the U.S. sample. These results may most simply be explained as an indication of differing cultural attitudes about when one ought to eat fruits, attitudes whose resulting behaviors probably cancel each other out in terms of their impact on weight. Yet, perhaps this difference might be shown in future works to be associated with differing BMI rates.

The individual questions on the use of fresh ingredients, homemade foods and meals made from scratch yielded clearly and consistently higher scores in the French group, as reflected on the APE subscale results. These results appear contradictory to those of the question "how important is it to you that food you eat be healthy and nutritious?" which scored significantly higher in the U.S. sample. If we add to this discussion the fact that the U.S. group consistently scored higher on every item in the "dietetic foods" subscale, it may be that a cultural difference in beliefs or attitudes about what constitutes "healthiness" and "nutrition" may be at work: Americans may believe that healthiness comes from eating the "light," "diet," "low calorie" types of food that can be found more easily in the U.S.A. than in France. The "American paradox" (12) may be at play here: according to Pollan (13), Americans "are notably unhealthy people obsessed with the idea of eating healthily," and although Americans appear to

consume more industrially made fat-free, low-cal foods than the French (14,15,12,16), the rate of obesity in America is higher (17). Future studies by our group will explore this possible interaction.

The U.S. group reported higher restaurant (not fast-food) patronage than the French. This result was expected, since, in our previous study (18) we observed in the field that Americans seemed to be eating out more often than the French. Since eating out is associated with lower nutritional quality of food and higher intake of food overall, it is considered an unhealthy practice by nutritionists (19–21). We will explore a possible association of eating out with weight and ED.

Country differences were also expected for the question about frequency of fast-food patronage which were not found. Therefore, either the French have caught up with U.S. American fast food habits, or this result is due to the fact that the large majority of our French respondents came from Paris or its suburbs, where fast food outlets may be more frequent than in the countryside or small towns in France. All groups reported levels above or close to the mean on the fast food item, signifying that they eat fast foods at least “sometimes” and maybe “often.” This is a concern, especially if future research definitively demonstrates that high fast food patronage causes obesity. A future hypothesis our group plans to test is an association of BMI and fast food frequency where we will expect a positive association. If an association is found and if it can be shown in subsequent longitudinal works to be causal, if the results are robust and reliable then policy makers in both the U.S. and France will need certainly to increase obesity prevention efforts at reducing fast food overconsumption which is high among U.S. adolescents (22) and at reducing the increasing patronage in the overall French population (23). In the meantime, since research and common sense already proclaim the unhealthiness of this practice (19–21), public prevention efforts in the U.S. similar to those which have been put in place in France are recommended (24,25).

Contrasting with the eating-out behaviors results, the question “how often do you eat regular meals with your family at home, sitting at the table together?” yielded significantly higher scores for the French group, which is consistent with the home-made meals subscale result. In sum, American adolescents eat out more at restaurants, while their French counterparts eat homemade food together at home more often, yet both groups partake of fast food equally. Future studies associating these behaviors with ED and OB might further our understanding of how they affect eating and weight disorders.

A note on the item “do you eat a fourth meal or snack (i.e. after school snack)”: we expected country differences on this question as a result of our observations (16,18), which would reflect the French custom of “gouter,” which is not considered an unhealthy practice by nutritionists, and is not the same as grazing or eating between meals, practices widely considered unhealthy (4,26,27). On the factor analysis of the APE (77), this item loaded unexpectedly onto the “unhealthy/increased eating” component—APE subscale 2. This item

perhaps confounds subscale 2 due to cultural differences in definition of or beliefs about the healthiness of certain types of snacking. Results on this item revealed a country difference for boys, with French boys scoring significantly higher than U.S. boys. However, all four groups scored above the mean on this question, signifying from “sometimes” to “often.” It may be interesting to observe the results of subscale 2 (“unhealthy eating”) without including this item, which may be confusing the results. The question of whether a daily fourth meal or snack is healthy or unhealthy for adolescents remains to be answered. If it can be shown that associations exist between the “after school snack” question and weight or ED, then subsequent longitudinal works could further an effort at understanding its possible protective nature, its possible risk factor function, or its neutrality.

Overall we found that French and U.S. American adolescents differed in certain attitudes and patterns with regard to every day eating, the overall trend towards healthier practices and attitudes for the French compared to the U.S. group, consistent with previous work, and for the male compared to the female group. We found no previous studies demonstrating the latter result of higher EDE healthiness for adolescent males, yet we can view it as consistent with the fact that ED prevalence is higher for females (28,29), ED representing a different, clinical aspect of unhealthiness around food.

#### **WEIGHT STATUS and BMI DISCREPANCY, WEIGHT CONCERN, WEIGHT CONTROL PRACTICES**

France and the U.S. are both part of the Western culture. However, distinct differences in weight status, ideal BMI, and BMI discrepancy emerged in our study between adolescents from the two countries. The prevalence of obesity was about double among American compared to French adolescents, and for overweight it was almost triple. In contrast, the overall rate of thinness was more than three times higher among French compared to American adolescents.

Despite a higher ideal BMI among the Americans compared to the French, the ideal versus actual BMI discrepancy was also significantly higher among the Americans. Thus, as hypothesized, the actual higher body mass in the Americans was associated with greater levels of concern about their weight and shape. These differences, however, did not vary with differences regarding frequencies of unhealthy eating and weight control practices between the two countries. The only significant difference was that more American than French adolescents reported exercising for the purpose of weight loss.

Regarding gender differences across countries, our results indicated that more males than females were in the higher BMI categories, while the usual female predominance was seen for BMI discrepancy between actual and ideal body weight, weight and shape concerns, and all unhealthy weight control strategies.

Our results are consistent with recent estimates for the prevalence of overweight and obesity among American youth (9), although they are lower than in some previous reports (35). They are also consistent with previous findings among French youth in which objective measures of BMI were used (10). The finding of an overall rate of thinness more than three times higher among the French than the American adolescents is novel, since we are not aware of previous data regarding the comparative prevalence of thinness in the two countries. Gender differences for weight categories are less pronounced than differences across countries. The higher rates of overweight and obesity among males compared to females in the current study is congruent with most previous data (9,10).

Several explanations can account for the differences in ideal weight between U.S. and French participants in this study. First, our results indicated differences in the actual body weight between countries, and this may impact adolescents' perceptions of what is a desirable weight. U.S. males were on average heavier than everyone else and may have been inclined to compare themselves to their peers and report a higher ideal weight. This is consistent with the suggestion that youth compare themselves to their peers more than to media ideals when it comes to characterizing their weight (16), nevertheless, media exposure may affect the perception of an ideal weight. The higher ideal weight among U.S. males may reflect a drive for muscularity, consistent with increased use of muscular images of men in the media and action toys in the U.S.A. (15).

Although the ideal BMI was, on average, higher among US than French adolescents, the discrepancy between actual and ideal BMI was greater for the US youth. That is, they were further away from their ideal. This is probably why concerns about weight and shape were greater among the US youth, although the size of the difference was small.

We had anticipated that greater actual BMI among the American group would lead to greater BMI discrepancy and more weight concerns, and that more weight concerns would in turn lead to more frequent use of unhealthy weight control behaviors. The latter was not true, except for "exercising for weight loss". There were no differences, whatsoever, between the US and French youth for purging (vomiting), use of laxatives or diuretics, taking diet pills, or fasting. However, comparisons revealed an increased use of exercise for the purpose of weight loss among U.S. adolescents relative to their peers in France.

The frequencies of certain weight control behaviors, such as diet pill use, reported by females in the current study, are lower in comparison to previous estimates using a North American sample (6% vs. 19%) (7). Low SES has been associated with the more frequent use of unhealthy weight control practices among students in the U.S. (36). It is possible that the students in the present sample were of higher SES on average relative to that in previous research (6). Unlike the previous purging and restricting behaviors, which are universally considered as unhealthy by dietitians and other clinicians, engaging in physical exercise is generally viewed as healthy for many reasons including weight control. Except for clinical cases

of anorexia nervosa, what represents “excessive” exercise is difficult to define. As in many other questionnaires regarding ED behaviors, the question that we use, i.e., “In the past year, how often have you exercised to lose weight” might not discriminate healthy vs. unhealthy exercise for weight loss. The higher frequency of “excessive exercise” among the Americans may reflect a possible greater cultural emphasis on physical exercise in the U.S. as a means of controlling one’s weight and being healthy and/or that there are more American adolescents who are overweight, and/or the drive for muscularity is greater among American males, leading to increased use of excessive exercise. This result may also reflect a possible cultural emphasis on physical exercise in the French population for other reasons than weight loss or it may reflect a tendency towards less exercise among the French overall. Further studies into this question, using new questionnaire items which could distinguish between healthy and unhealthy exercising (e.g. “how many hours do you exercise per week?”) and the differing reasons for exercising (e.g. “to feel better,” “to sleep well,” “to lose weight,” “to digest well,” “to have a well-balanced lifestyle” etc.) may lead to a clearer understanding of the purposes of exercise between these two cultures and possibly lead to clearer conclusions about its healthiness.

Differences in weight and shape concerns were more salient between genders than between countries. The finding that females were more likely to report a greater BMI discrepancy than males is inconsistent with previous literature (35,37,38). Females appear at greater risk for weight discrepancy, and there are data that link weight discrepancy (rather than actual weight) with depressive symptoms (39) as well as eating pathology (40).

While the frequency of regular binge-eating (at least twice a week for 3 months) ranged from 2.7 to 6.0% in the study subgroups, no significant gender or country differences emerged, although females in both countries reported more frequent use of unhealthy weight control behaviors. Defining and evaluating binge-eating is difficult at all ages, because of the highly subjective interpretation of what constitutes a “binge” (41).

The present findings confirm the presence of ideal vs. actual weight discrepancy and weight and shape concerns among adolescents, and more so in females than in males, and in the US than in France. These perceptions need to be considered in both obesity and eating disorders prevention programs, as well as general promotion of mental health.

Adolescents consistently experience a discrepancy between their actual and ideal weight (and resulting BMI), likely to be related to dissatisfaction about their weight and body shape. The extent of these findings differs between genders and between countries. The gender differences are well known and have been associated to the much higher rates of eating disorders in females compared to males. Differences between countries like France and the U.S., which are both representative of the Western culture, have less often been studied. They may reflect divergent cultural and environmental influences on adolescent weight status and weight perception.

## CLINICAL AND SUB-CLINICAL EATING DISORDERS

While previous research has outlined stark differences between France and the United States for weight disorders and every day eating attitudes and behaviors, the French showing lower weight and healthier eating attitudes and patterns, the present research project found no clear country differences in terms of clinical ED. Gender differences in ED emerged as expected, with females showing overall higher rates of diagnostic criteria or clinical ED than males. These prevalence rates were consistent with previously reported estimates (30).

There were a few unexpected country differences in ED symptomatology, such as episodes of binge eating, which were significantly more reported among the French. If this result is shown to be robust in future work, we may hypothesize that this is due to higher stress rates for students in France than the U.S. since binge episodes vary with stress (31,32). Binge eating may be an indication that the French group is at higher risk for BN.

Another unexpected country difference was found whereby the U.S. group used compensatory behaviors to lose weight more often than their French counterparts, which may be explained by the fact that the US group had higher BMI overall, which may incite them to engage in unhealthy compensatory behaviors to lose weight. Perhaps this result can be understood in the cultural context: if it is true that the culture in France provides an atmosphere where it is easier to engage in healthier eating (8,14,33–36), and if this healthier eating is associated with lower BMI in France than the U.S., then perhaps Americans compensate for their “obesogenic” (37,38) environment, which promotes unconscious overeating and is associated with higher weight problems (39), by engaging in more extreme compensatory behaviors. This latter hypothesis will be explored in the France/U.S. study. The higher rate of compensatory behaviors may indicate that the U.S. group is at higher risk for BN.

Country differences in females emerged whereby twice as many French were underweight compared to U.S. adolescents. This could either indicate that the French are more at risk of developing AN, or that their morphology is naturally smaller than that of Americans.

The higher proportion of U.S. females than French females reporting overconcern with their weight or shape might reflect the fact that they indeed had higher BMI overall. As Raich et al (35) noted, since the U.S. population has higher rates of obesity and overweight it may follow that concerns about weight are more prevalent there, especially given the opposing message of the thin ideal, commonly diffused in western media, which may engender anxiety about not measuring up to the images portrayed therein.

For adolescent males, our results highlighted a few country differences. More U.S. males than French males “thought they were fat while others said they were too thin” which may indicate a sensitivity to the “thin ideal” in French boys and may indicate a higher risk of developing AN for U.S. boys. In contrast, rates of binge eating and use of compensatory behaviors were unexpectedly higher in French males than U.S. males which may put the French

boys at higher risk for developing BN. Indeed, there were more “cases” of full syndrome BN among French males than U.S. males (and as much as the French female group).

Although the sample groups in this project were large, they were perhaps still too small to detect significant differences in disorders whose prevalence gravitate around the 1% mark. For future studies of the two populations in question, we would recommend still larger sample groups (although this is highly time and cost intensive) in order to achieve enough differential power to compare clinical cases of ED (12). We would also change the methodology to include the use of a two-stage screening approach: i.e., the use of a structured clinical interview to make more viable diagnoses of ED, after screening with a self-report instrument such as the SCOFF. The weighing and measuring of subjects by researchers, as opposed to self-report, is recommended for future studies and finally, validation and reliability studies of the McKnight VI French version are in order.

Regarding the three comparative articles presented in this thesis, certain sociodemographic differences between the two countries may have affected the results. The U.S. students came from more educated families, most probably because there were more private schools in the U.S. sample. A future comparison of students from only public schools might yield different results. Another socio-demographic phenomenon which emerged was the rate of subjects whose ethnic origin was other than European or North American (range: 18-45%). Future analyses separating out these groups and comparing them may also be of interest and could possibly clarify results.

Finally, although efforts were made to compile representative samples from both countries, the vast majority of schools who participated from France were in the Paris region. This may have affected results. Future efforts at gathering more data from various regions of France, as we were able to do in the U.S., are highly recommended.

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## **Strengths and Limitations**

While much has been written in recent years about the obesity pandemic, the rise of eating disorders and eating differences between French and American adults, such a study concerning adolescents, a high risk group for ED and OB, has never been done before. This study is one of the few studies that have compared the French and U.S. youth population across several parameters that are important for both obesity and eating disorder research, namely weight status as well as body dissatisfaction and disturbed eating and weight control practices. Second, this study to our knowledge is the first to use international growth curves to compare French and U.S. adolescents.

The present study compares differences in EDE using a tested and validated instrument. We also used rigorously developed, tested and validated instruments for the other aspects of our study, lending to its strength.

Another strength of the study is the representative samples from each population: we prospected energetically and were given access to many schools on the west and east coasts as well as in the mid-west USA. In France we visited many schools as well, but were less successful in gaining access to schools in province. In both countries we were able to gather data from populations representing all socioeconomic levels. We compared large samples taken from different parts of each country.

An international team of clinician researchers were involved in the project from different sites, different continents even, which strengthened our reflection process through lively discussion and input of all of the members.

A vast amount of data was gathered concerning risk factors for ED and OB, socio-cultural factors, environmental factors, individual and family components. Further research from several possible angles is therefore possible and may further our knowledge on the subjects at hand.

The present research project was nonetheless subject to certain limitations. The amount of data gathered is vast, yet the time has been too limited for the present thesis to include all of the possible analyses that we intend to pursue. While this thesis presents the tip of the iceberg, presenting the main three results on weight, EDE and ED, we plan to continue and deepen our study of this data in order to glean ever more useful information.

In terms of the development of the APE questionnaire, we have not yet completed the validation of the French version and the reliability testing of both versions. This is planned for the near future.

The use of self-report instruments was a limitation in this study. We were constrained to use of this method due to time, funding and the great distances entailed in data collection. In a future study we would recommend changing the methodology to include the use of a two-stage screening approach: i.e., the use of a structured clinical interview to make more viable

diagnoses of ED, after screening with a self-report instrument such as the SCOFF. The weighing and measuring of subjects by researchers, as opposed to self-report, is also recommended for future studies.

Another limitation of this study is that it could not examine temporality between the variables under study, and thus causality cannot be inferred.

Certain sociodemographic differences between the two countries may have affected the results. The U.S. students came from more educated families, most probably because there were more private schools in the U.S. sample. A future comparison of students from only public schools might yield different results. Another socio-demographic phenomenon which emerged was the rate of subjects whose ethnic origin was other than European or North American. Future analyses separating out these groups and comparing them may also be of interest and could possibly clarify results.

Although the sample groups in this project were large, they were perhaps still too small to detect significant differences in eating disorders, where prevalence estimates gravitate around the 1% mark. For future studies of the two populations in question, we would recommend still larger sample groups (although this is highly time and cost intensive) in order to achieve enough differential power to compare clinical cases of ED (4).

Finally, although efforts were made to compile representative samples from both countries, the vast majority of schools who participated from France were in the Paris region. This may have affected results. Future efforts at gathering more data from various regions of France, as we were able to do in the U.S., are highly recommended.

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## **Statement: Background and overview of the research process**

This doctoral thesis presents my research in a comparative study on eating, weight status and culture. After working for ten years as a clinician specializing in eating and weight disorders in the United States, I moved to France 15 years ago and continued my clinical career as I do to this day, part time, as I have completed this thesis work. My experience as a clinician and my observations of two different cultures led me to desire practical solutions for the treatment of eating and weight disorders and to understand more deeply cultural differences in eating behaviors which, if shown to be protective and reparative, could prove helpful in developing prevention and treatment programs.

Some years ago, while working in France as a clinician, I contacted Dr. Martine Flament in the interest of studying eating disorders and culture, and we formed a group with other researchers from France, the United States and Canada. We aimed to develop a research project in order to investigate the nature of relationships between adolescents for eating disorders, obesity and every day eating in France and the U.S., two western countries in which adult groups have demonstrated differences in eating behaviors and where prevalence of obesity appears different. Martine Flament, Brigitte Remy (French researchers) Angelina Allen (an American student from Stanford University, living in France for 2 years at the time) and I met together on a regular basis in the first days to formulate our project and to discuss and reflect upon our initial hypotheses and methodology. In order to assist our group in formulating coherent, evidence-based hypotheses, I undertook a thorough literature review on the three areas in question (eating behaviors, eating disorder, and weight across western cultures) and presented it to the group. Since the literature on these domains is vast, this undertaking was of no small consequence; indeed, throughout the years that this project has run, I have revised and updated the literature review many times in order to stay abreast of other works which could inform our study. Portions of the literature reviews are included in each article presented in this thesis.

The next phase of the study brought Nathalie Godart on board, who joined the project and agreed to act as my thesis director along with Martine Flament. Once our methodology was

decided upon we undertook to select instruments to assess ED, ED symptomatology and risk factors and EDE as well as weight status. We found validated instruments for the assessment of ED and methods for assessing weight status; each of which are presented in detail in the respective articles. We did not, however, find an appropriate instrument for the assessment of every day eating behaviors and attitudes; therefore, we constructed, translated and validated the Attitudes and Patterns of Eating (APE) questionnaire. The 4-step process of developing the APE is explained in detail in the first article of this thesis, which was published in the journal *Eating and Weight Disorders* this year.

At the same time we were preparing our methodology and developing our instrument, we began the process of prospecting high schools in the United States and France for participation in the study. We chose to intervene in high schools in order to provide representative community samples of adolescents. Angelina Allen found two schools in northern California who were willing to participate and I found nine in the United States, representing the East and West Coasts and the Midwest. A researcher who joined our project along the way, Clothilde Van Lerberghe, prospected two schools in the Paris area. I contacted a school in the East of France who participated and one in the Southwest (which unfortunately cancelled at the last moment). Martine Flament, Nathalie Godart and Brigitte Remy together acquired the participation of four more schools in France. I voyaged to the United States three times to collect the data from nine schools and I personally collected all of the data from the French schools except for data collections in two schools in France done by Clothilde Van Lerberghe.

The procedure of data collection is explained in detail in the second article of this thesis. I contacted each school a number of times before intervening in the classrooms, in order to set up the data collection ahead of time. I visited each school at least once in person before data collection and I visited some schools more than once in order to discuss in detail with participating teachers (or nurses or principals) the data collection procedure. I also intervened in each classroom the day before data collection to present the study to students, explain the procedure and to pass out consent forms. I returned one time more to each classroom the day after administering the questionnaires in order to present a talk on healthy eating, eating and

weight disorders, prevention, healthy body image and media messages. The schools appreciated this intervention very much and indeed, I believe it is the reason we had high participation rates. The time invested to engage the schools and follow the entire preparation, data collection and presentation process was worth the effort in the end.

As data were collected from the schools in both countries, I worked with Martine Flament and her team on gathering the data together in one site, at Martine's research department at the University of Ottawa in Canada, for analysis. I traveled to Canada and Martine traveled to France on occasion to discuss analysis of the data, how to organize the analysis and ultimately the results of the statistical testing. Statistical testing was done by Martine's research team in Canada and I'm sure I can speak for the entire France/US study team, in expressing my gratefulness for their careful work of cleaning and analyzing the data sets in a rigorous and exacting fashion. I worked with Martine and her team in analyzing the results and synthesizing them to come up with understanding of a vast amount of information. We have only begun this work in the present thesis, which presents our primary objectives, hypotheses and results. More information is certain to be gleaned in continuing to work together to analyze our large body of cross-cultural data.

Finally, once the analyses were completed and Martine and I were able to make sense of the results, I worked to prepare articles for submission to scientific journals. This thesis presents the first four of these articles. I wrote, submitted, revised and resubmitted the first article presented here which has been published. The following three articles are in the process of being submitted to scientific journals. The experience has been rich as I learned how to compile large amounts of information and synthesize them into a coherent whole. The teamwork has been gratifying and I am pleased to say we shall continue our work on this project in order to produce further works together with the goal of furthering the knowledge of eating disorders etiology and cultural links in eating and weight disorders.

In spite of the length of time it has taken to complete the present work, because I have also continued my work as a clinician and the thesis work has been engaging, the time has seemed very short. It has been an adventure of six years of intense work, with visits between

the United States, Canada and throughout France to collect data and collaborate closely with colleagues; I collected the data, prospected and kept in contact with the schools, worked with the statistician to plan the analyses and present the results; I wrote some of the articles completely and wrote portions of other ones. With the help of my colleagues and co-authors, I experienced and continue to do so, the difficulties and satisfaction of submitting scientific articles. The exercise of preparing a doctoral thesis has helped me learn how to synthesize vast amounts of information both in the large body of literature on the subjects studied and on the large amounts of data collected. It also taught me much in the way of scientific reflection and in developing and proposing the possible interpretations of the meaning of our results.

The necessity to submit my thesis in time necessitated my attention and hindered me for the moment, from preparing and writing up other articles comparing different aspects of the large data base collected. There are many possibilities that lie ahead in understanding further what this data set offers.

I appreciated immensely working with experienced and enthusiastic researchers Martine Flament, Brigitte Remy, Nathalie Godart and with young and dynamic researchers Angelina Allen, Iffat Sumia, Nicole Obeid and Irene Vitoroulis. It has been an enriching and satisfying experience.

## **Final Conclusion and Perspectives**

France and the U.S. are both part of the Western culture. However, distinct differences in eating behaviors and attitudes and weight status emerged between adolescents from the two countries. It is as yet unclear whether these differences are linked or whether there are associations between these dimensions and eating disorders. Eating disorders prevalence may be similar in the U.S. and France although there may be differences in symptomatology.

These comparisons also highlight the similar and differing needs of each country regarding the specific content required in interventions aimed at promoting healthy weight and healthy

eating behavior. Interventions for the prevention of ED have been developed studied by researchers (1,2) in the U.S., however, programs which show promise U.S. may not have the same impact on French adolescents, therefore, they need to be developed, tested and validated in French populations, taking into account cultural differences such as those uncovered in this study. Public prevention programs for overweight and obesity have been put in place in France and show promise (3,4) as well, yet cultural differences need to be taken into account when developing such programs for U.S. adolescents.

## **Perspectives**

The France/U.S. study is a continuing project: In our next step (and future reports), we will investigate the differences in socio-cultural and other environmental factors in boys and girls from the two countries, and examine the relationships between those and the frequencies and characteristics of eating and weight disorders. We also plan to investigate similarities and differences for putative risk factors for eating and weight disorders across genders and countries; investigate possible relationships between ED symptoms and EDE behaviors by country and by gender; examine possible interactions between weight category and EDE behaviors/attitudes; and finally, investigate possible interactions between weight status, ideal-actual weight discrepancy and ED symptoms.

Identifying differences between countries on factors that affect body dissatisfaction and other risks for eating or weight disorder might indicate prevention interventions specifically tailored to the health and cultural climate of each country, as well as help formulate hypotheses regarding the environmental factors which contribute to their etiology.

The present study highlighted the fact that environmental factors such as food beliefs and eating habits may interact and moderate the effects of more deeply rooted biological variables, but this hypothesis remains to be tested. Of interest to policy makers and healthcare practitioners is how accurately adolescents perceive messages from their environment regarding healthy eating, appropriate weight, or the means by which to achieve healthy weight. Our long-term goal is to develop evidence-based prevention tools and literature in order to

educate the public on what constitutes healthy, balanced eating and develop treatment techniques based on EDE behaviors and attitudes if certain ones are found to be protective and/or reparative of ED and OB.

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