Université de Montréal

STUDY OF THE RELATIONSHIP BETWEEN ACADEMIC PERFORMANCE
AND SOCIOEDUCATIVE CLIMATES
IN GIFTED HIGH SCHOOL STUDENTS

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The Underachievement of Gifted Students: a societal problem

Before we start tackling the issue of gifted underachievement, we must define what a gifted individual actually is. A gifted individual, as defined by Gagné (2000), is a person presenting aptitudes or performing at a level significantly superior to the average. Furthermore, the leading conception of giftedness is that it is related to a domain in particular, and that "gifted" only means something when coupled to a set of aptitudes or performances: for example, athletic, artistic, or intellectual giftedness. In this article, unless explicitly presented otherwise, "giftedness" will be used to mean "intellectual giftedness", for increased clarity.

If we concentrate on academic aptitudes, gifted individuals seem to be at risk of performing lower than their abilities lead us to expect, a phenomenon we call underachievement. Underachievement is understood to be performance at a level significantly lower than the individual's aptitudes would lead us to expect (Reis & McCoach, 2000). Like giftedness, underachievement is also related to a particular domain: one could say that a particularly athletic individual who does not do well in sports is underachieving in that field. Again, as with giftedness, underachievement will be used in this article to mean "academic underachievement", so as not to add unnecessary weight to the text.

In a review of literature, Seeley (1993) looked through many studies to calculate, in each of those studies' samples, the number of gifted students who underachieve academically in a significant manner, and found them to be between 15 and 40 %, depending on the definition of both "gifted student" and "significant manner" used by the researchers. According to *Nation at Risk*, a government-ordered report on American schools, over half of America's gifted students' school performance stands at a subpar level when compared to their ability (National Commission on Excellence in Education, 1983). The only study of this sort led in Quebec identified that 16% of

gifted high school students in the province are underachieving in school (Rivest, 2013). Furthermore, Richert (1991) estimates that all of these numbers, including *Nation at Risk*'s 50 %, are not high enough. According to him, the identification of giftedness often discriminates against academic underachievers by defining it not through aptitude testing, but through achievement or perception, effectively excluding them from the gifted group, leaving us with a sample with fewer underachievers than it actually contains. While these numbers are certainly dated, they stand to prove the existence of this phenomenon. Even if these numbers had drastically decreased since in the last twenty years, the scientific interest in this phenomenon comes not from the amount of students who are part of this group, but from both the gaps in knowledge towards it (which will be discussed later in this document) and the lack of acknowledgement of its existence amongst the decision-makers, as hinted through their disregard for the gifted situation in the policies that are passed regarding education, as will be presented next.

1.1 An overlooked reality

Despite the amount of research led on this topic, this problem is seldom acknowledged by the general population. Indeed, as Morisano and Shore (2010) mentioned, the idea that a gifted student's performance could be subpar is rarely addressed. These authors see this lack of awareness as a consequence of an unrealistic perception of what giftedness truly is: many, even among those who work in education, see it as a synonym of academic success on a silver platter, which is a skewed vision of this group. Moon (2009) shares Morisano's and Shore's opinion on this topic: According to him, this myth's persistence is supported because it takes away the educators' responsibility towards these students: « If the myth [that giftedness automatically leads to effortless school success] is true, teachers, principals, and superintendents have no

responsibility to recognize the existence of this special population of students or to attempt to address their needs » (p. 274).

According to Peterson (2009), this type of myth goes back to the first few researches on gifted youth, where gifted subjects were identified as high-achieving students, and not as high-potential students. As such, these definitions only included successful students, those who were supported by their environment or were able to adapt to an environment which was not made to support them. However, those highly intelligent students whose needs were not met and who could not adapt on their own were excluded from this definition of giftedness. Nowadays, when searching for gifted students, the identification process usually focuses on potential rather than performance, therefore including this second group. This selection bias led to the idea that giftedness means automatic success, as it was through success that giftedness used to be defined. Aside from this myth, even when the needs which are specific to the gifted are understood, adapting the curriculum is often perceived as luxury, as even if their needs are not met, these students can often perform beyond the average, while still being far from achieving to their full potential. (Fredricks, Alfeld, & Eccles, 2010; Hertberg-Davis, 2009; Moon, 2009; Morisano & Shore, 2010; VanTassel-Baska, 2009).

1.2 Needs of the gifted and adaptation practices

Just as those with learning disabilities or developmental troubles, gifted students have specific needs which must be met in order to support them in their personal and academic development. We will start by presenting the current situation of gifted education in schools through various practices which are suboptimal to their development. We will then follow with the various

adaptations, both pedagogical and administrative, which are offered and supported by scientific literature.

According to the research, some pedagogical practices currently employed in our schools do not foster the academic success of gifted students. For example, it has been found that, in some cases, gifted students are used by teachers to artificially raise their groups' averages in order to give the illusion that the class has assimilated the content they have presented, and therefore, that they have done their job correctly (Hertberg-Davis, 2009). In other cases, when a gifted student who already masters the content being presented finishes an assignment or an exercise earlier than their peers, they will be handed larger amounts of the same work in order to keep them busy. Doing so does not make the student progress, as they already have mastered the assignment's content, and this fastidious busy work will only serve to lower their motivation (Fredricks et al., 2010; Gam, Matthews, & Jolly, 2010; Hébert & Schreiber, 2010; Hertberg-Davis, 2009).

Other researchers prefer to look into practices which would optimize these students' development. Amongst these specialists, one of the most common conclusions is the need to accelerate, to condensate and to enrich the content being presented in class in order to raise it beyond what they already know and to a difficulty level adapted to their abilities (Adams, 2009; Fredricks et al., 2010; Gagné, 2007; Gam et al., 2010; Hertberg-Davis, 2009; VanTassel-Baska, 2009). Such an adaptation of content greatly raises school motivation while it reduces boredom and risks of leaving school. Furthermore, it allows these students to develop at their own quicker speed, rather than be slowed down by classes targeted at slower and less motivated students (Fredricks et al., 2010). In addition, relating the content to real world application as often as possible helps gifted students understand that the work they complete in class is not only busy

work but knowledge and skills that will help them react to the problems of their society

(Fredricks et al., 2010; Gam et al., 2010; Watters, 2010).

Administratively speaking, it is important to differentiate for these gifted students as early as

possible. As Gagné said ironically: « believe it or not, precocity can manifest itself...

precociously! » [sic] (2007, p.102). While underachievement usually peaks around adolescence

(Baker, Bridger, & Evans, 1998), it is often based, as will later be explained, on negative habits

taken in prior years. A second aspect that is seen as primordial is the way in which students are

put into groups. Many authors support the idea of grouping students according to their ability

level rather than their age. Currently, in our school system, we use age as a predicting factor of a

student's ability level when creating groups: however, this creates heterogenic groups in terms of

their pre-existing knowledge, meaning that meeting all of their individual needs is an

unreachable goal: Gagné (2005) analyzed this difference in ability in a first grade cohort and

found a five year difference between the most capable (whose knowledge levels were that of an

average Grade 4 student) and the least capable (who were seen as unlikely to achieve a Grade 1

level within two years. Actually, according to Gagné and Gagnier (2004), the correlation

between age and academic achievement in first graders ranges between .10 and .25. However,

these researchers found that the use of other variables to group students, such as school readiness

or officially tested intelligence, increased that correlation to over .50, for both high-achieving

and low-achieving students. Using such variables would allow gifted students and those with

disabilities alike to have teachers who can more easily tailor their teaching to their students'

needs and levels (VanTassel-Baska, 2009) as their classes would be more homogenous.

Furthermore, mentoring, field experiences and other applied learning opportunities would be

beneficial to gifted students. Some schools even go as far as allowing students to do equivalent

individual projects instead of attending more traditional classes, or even allow them to take classes at a higher educational level, for example to allow a gifted high school student to follow the nearest university's Introduction to Physics class instead of their regular high school physics course (Heinbokel, 2011).

Regardless of what adaptations are chosen, it is important for this part of teaching not to be added to the regular load, for example for instances where it is given after school hours, but rather integrated to the regular class time (Adams, 2009). Indeed, the goal is not only to offer them learning opportunities adapted to their level, but also to maintain their level of school motivation: adding to the student's load would not help in that, as it would keep the motivation-lowering busy work in their schedule.

Overall, research offers many ideas for changes to schools' practices, whether pedagogical or administrative, in order to better support the academic, emotional and social development of gifted youth. The adaptation of activities to their level of understanding, the focus on real life application of class content, the concept of grouping students according to factors other than age, and the use of enriched content to replace (rather than add to) the regular content are many propositions from experts of the field which were reviewed in this section.

To conclude, given the specific needs of gifted students and the popular perception of giftedness, it is clear that research on this topic is necessary in order to better support these students' development. However, an overview of the existing scientific literature is necessary in order to determine the gaps in knowledge which have to be filled.

1.3 Gaps in knowledge

As previously presented, gifted underachievement is a socially important phenomenon in the field of education. As such, in recent years, many researchers from the field of giftedness have attempted to better understand it, in order to efficiently intervene in such cases.

S. B. Rimm's research is one of the fundamental pieces in the field (1986), in which she groups the factors associated with gifted underachievement in three classes. The first, individual factors, includes school motivation, use of learning and studying strategies and the student's reaction to the gifted label. The second, familial factors, includes the student's family's structure, situation and climate, in addition to parents' behaviour. Finally, the third one, school factors, includes the content taught in class, the level of adaptation to the needs of the gifted, and peer pressure. All of these factors will be explored in depth in the following chapters.

This third class, school factors, should, in our opinion, be subdivided into two categories. The first would be more centered on the pedagogical aspect of school: content taught, teaching practices and adaptation to students with special needs are some factors coming to mind which would belong to this category. The second category, which we will name socioeducative, would focus more on the school's climate, on the more social, affective aspect of an educational establishment, which can be affected by a slew of factors, whether social, economic, structural, organisational, or even academic. Indeed, while numerous articles have suggested a relationship between these variables and students' school performance in the general population (Center on Education Policy, 2012; Reiss, 2009; Renaud, 2009; Viau, 2009; Wang & Holcombe, 2010), few factors from this second category have been studied in the case of gifted underachievers.

Recently, Rivest (2013) conducted a research regarding the relationship between underachievement in gifted students in Quebec and both (1) their relationship with their teachers,

and (2) the amount of pedagogical support they received. In a more well-known review of literature, Reis and McCoach (2000) only presented a single research on the relationship between gifted underachievement and socioeducative variables (that of Baker, Bridger et Evans (1998)). The fact that only one research article discusses this relationship, and that this article is over fifteen years old, is in and of itself proof that further, more modern research is important. Furthermore, this article raises a few questions regarding its validity and its sample's representativeness of the gifted underachiever population.

1.4 Relationship between socioeducative environment and gifted underachievement

As seen earlier, only two recent studies have touched upon the relationship between socioeducative environment and gifted underachievement: those of Rivest (2013) and Baker, Bridger and Evans (1998). In this section, we will analyze what these studies brought to the table, and what has yet to be looked into.

1.4.1. Rivest (2013)

Rivest (2013) studied the impact of many variables on the academic underachievement of gifted students on a sample of over 9,000 subjects, from Grade 7 to Grade 11. While many were individual and psychological in nature, some were defined as environmental: many of these do belong in the socioeducative category we created earlier. These variables are: parental engagement, educative climate, friends' disinterest in school, relationship with teachers, parental support, parental supervision, pedagogical support, and parental valorisation of schooling. She concludes that three environmental characteristics have a statistical impact on gifted underachievement: parental support, quality relationships with teachers, and pedagogical support, all of which we declared o be socioeducative. However, Rivest's analysis of

socioeducative variables, while interesting and important, is not exhaustive: what about the feeling of security, or of belonging? What about inter-student relationships?

1.4.2. Baker, Bridger and Evans (1998)

In their 1998 research, Baker, Bridger and Evans proposed three groups of variables meant to explain gifted underachievement, each of them representing one of Rimm's three classes of factors (individual, family and school), in order to compare them and to determine how much of a role each one played in predicting underachievement in gifted students.

Each of these groups contained three variables.

The group of variables pertaining to school environment was formed of the school's academic quality, of the quality of the students' relationship with their teachers, and of their relationship to their peers. If we divide this third group of variables in two categories (pedagogical and socioeducative), as we suggested doing with school variables in the previous paragraph, we can include the school's academic quality in the pedagogical category, and the relationships with peers and teachers in the socioeducative.

It is also important to discuss this research's sample: participants were 56 students between grade 4 and 8. All were identified as gifted prior to being accepted in a gifted program, and all had "scores above the 90th percentile on standardized tests" (Baker et al., p.8), without specifying the standardized tests which were used. The students put in the underachiever group were those who were "at risk of academic failure or removal from gifted programs because of poor performance" (Baker et al., p.8).

According to their analyses, the individual group of variables would be the best indicator of underachievement in gifted pupils by a very small margin, being correlated at .78. The researchers also state that the other two groups were also statistically significant, both of them

being correlated at more than .73. However, in the case of the third group (school environment), not each variable was seen as significantly correlated to underachievement when analyzed individually: only the variable relating to the evaluation of the school's academic quality was seen as significant, the two variables relating to interpersonal relationships (relationship with peers and relationship with teachers) being seen as non-significant. With our unofficial subdivision, this means that Baker, Bridger and Evans' findings point towards the conclusion that the impact of the socioeducative subgroup of variables is statistically insignificant to gifted underachievement.

1.5 Limits of Baker, Bridger and Evans (1998)

Even though it is often the single article cited to support the relationship between school environment and gifted underachievement, Baker, Bridger and Evans' article presents many methodological limits which affect the generalizability of its findings: a problematic sample, invalid variables and reducing groups of variables.

First, the sample studied in this research counts 56 gifted students, only 26 of which are underachievers. The authors themselves present their insufficient sample size as a limit of their research. Furthermore, the participants are considered as not representative of the entire range of possible problems related to gifted underachievement: one of the main factors for that, we believe, is the participants' age. While the authors cite many researchers in their introduction who have suggested that gifted underachievement peaks in adolescence, the subjects' age ranged from 9 to 14 years old. With the speed at which teenagers evolve and change, differences between a sample consisting of students between 9 and 14 years of age, and another one consisting of students between 13 and 18 years of age will most likely be very important. Therefore, their sample is limited in how representative it is of the actual gifted underachiever

population. According to Seeley (1993), adolescence and its consequences (be they physiological, psychological or social) are factors which increase a student's disposition towards academic underachievement: a simple that has not yet reached these consequences will definitely yield different results.

In addition to sampling problems, the study's methodology leads us to believe that some information they gathered does not truly represent the variables they present in their groups of variables. One of the biggest reason leading us to this belief is the way in which information regarding all three variables from the school groups of variable (relationship with peers and teacher and academic quality) was gathered: the researchers questioned the students' parents, and used the parents' perception as being representative of the announced variables, most probably because of the participants' young age. This limit, while announced in the article's methodological section, is not brought into the discussion of the results, which affects the validity of the data collected, affecting the validity of the results, and as such, their generalizability.

Finally, the authors used only three variables per groups of variable, which is an important reduction from the dozens of variables which have been linked to gifted underachievement in other studies: variables which were discarded include school motivation, self-efficacy, familial relationships, parental expectations, or sense of security or of belonging. However, despite the absence of numerous variables, the authors consider their groups of variables as representative of Rimm's three classes. While the classes themselves might be statistically representative, many important socioeducative variables have not been looked at individually.

We can conclude that, because of its insufficient sample size, its data's debatable validity, and the reduction of the three classes to only three variables each, the results presented in Baker,

Bridger and Evans (1998) are not easily generalizable. This research is often presented as the only one in the scientific literature to explore the relationships between a gifted student's socioeducative environment and its school performance, and its methodological flaws beg for more research.

It is as a solution to this lack of knowledge on the relationship between educative environment and underachievement in gifted students that this research was conducted: indeed, the two articles cited above have ignored multiple important socioeducative variables. Through a multi-factorial approach which integrates the students' perception of their school and family environments and their academic motivation, we aim to improve our collective understanding of the relationship between educative environment and underachievement in gifted student and finally dig in what we believe is an often overlooked aspect of the problematic.

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STUDY OF THE RELATIONSHIP BETWEEN ACADEMIC PERFORMANCE AND SOCIOEDUCATIVE CLIMATES IN GIFTED HIGH SCHOOL STUDENTS

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It is said that 15 to 40% of gifted students perform at levels below their potential (Seeley, 1994). In recent years, many researchers have looked into this phenomenon in an attempt to explain it. However, only one research team has looked into school climates for a part of the answer, while many researchers have found such a relationship amongst the non-gifted population. This study aims to look for a relationship between socioeducative climates, family environment and performance amongst gifted kids to fill this gap. In order to do this, a sample of 1,885 Grade 10 participants was taken from the previously created database of the evaluation of Quebec's SIAA program, and a path analysis was conducted to create a model of the effect of environments on the performance of gifted youth, through the mediation of motivation. The findings suggest that the impact of socioeducative and family environment on the performance of gifted students is minimal.

Keywords: gifted, underachievement, underachiever, socioeducative environment, socioeducative climate, family environment, performance

The idea that intellectually gifted students could academically underachieve is seen by many as a contradictory phenomenon. Nevertheless, gifted individuals seem to be more at risk of this gap between aptitude and performance than other students. In a review of literature, Seeley (1993) found that between 15 and 40 % of gifted students underachieve academically. According to *Nation at Risk,* a government-ordered report on American schools, over half of America's gifted students' school performance stands at a subpar level

when compared to their ability (National Commission on Excellence in Education, 1983).

The only study of this sort led in Quebec identified that 16% of gifted high school students

in the province are underachieving (Rivest, 2013). Furthermore, Richert (1991) estimates

that all of these numbers, including *Nation at Risk*'s 50 %, are not high enough to truly

represent the extent of this reality, due to problems in the process of identification that

excludes gifted underachievers from the gifted label.

With these numbers in mind, it is not surprising that in recent years, many researchers from

the field of giftedness have attempted to better understand it, in order to efficiently

intervene in such cases.

One of the fundamental pieces of the field was written by S. B. Rimm (1986), in which she

groups the factors associated with gifted underachievement in three classes. The first,

individual factors, includes school motivation, use of learning and studying strategies and

the student's reaction to the gifted label. The second, familial factors, includes the student's

family's structure, situation and climate, in addition to parents' behaviour. Finally, the third

one, school factors, includes the content taught in class, the level of adaptation to the needs

of the gifted, and peer pressure.

This third class, school factors, should, in our opinion, be subdivided into two

subcategories. The first would include the pedagogical aspect of school: content taught,

teaching practices, and adaptation to students with special needs are some factors which

would belong to this category. The second category, which we would name

"socioeducative factors", would focus instead on the school's climate, on the more social

aspect of an educational establishment. Indeed, while numerous articles have suggested a

relationship between these variables and students' school performance in the general

population (Wang, 2010; Reiss, 2009; Renaud, 2009), few factors from this second category have been studied in the case of gifted underachievers.

In a comprehensive review of literature, Reis and McCoach (2000) presented only a single article which touched the subject of the relationship between gifted underachievement and socioeducative variables, that of Baker, Bridger et Evans (1998). The fact that only one article exists to document this relationship is in and of itself proof that further research is absolutely necessary. Furthermore, this article raises a few questions regarding its validity and its sample's representativeness of the gifted underachiever population.

In their 1998 research, Baker, Bridger and Evans proposed three groups of variables meant to explain gifted underachievement, each of them representing one of Rimm's three classes of factors (individual, family and school), in order to compare them and to determine how much of a role each one played in predicting underachievement in gifted students.

Each of these groups contained three variables. The variables related to school environment were the school's academic quality, of the quality of the students' relationship with their teachers, and of their relationship to their peers. If we divide this third group of variables in two categories (pedagogical and socioeducative), as we suggested doing with school variables in the previous paragraph, we can include the school's academic quality in the pedagogical category, and the relationships with peers and teachers in the socioeducative.

It is also important to discuss this research's sample: participants were 56 students between grade 4 and 8. All were identified as gifted prior to being accepted in a gifted program, and all had "scores above the 90th percentile on standardized tests" (Baker et al., p.8), without specifying the standardized tests which were used. The students put in the underachiever group were those who were "at risk of academic failure or removal from gifted programs because of poor performance" (Baker et al., p.8).

According to their analyses, all 3 groups of variables were statistically significant indicators of gifted underachievement, with the individual factors being a slightly stronger indicator. However, in the case of the third group (school environment), not each variable was seen as significantly correlated to underachievement when analyzed individually: only the variable relating to the evaluation of the school's academic quality was seen as significant, the two variables relating to interpersonal relationships (relationship with peers and relationship with teachers) being seen as non-significant. With our unofficial subdivision, this means that Baker, Bridger and Evans' findings point towards the conclusion that the socioeducative subgroup is statistically insignificant.

Even though it is often the single article cited to support the relationship between school environment and gifted underachievement, Baker, Bridger and Evans' article presents many methodological limits which affect the generalizability of its findings: a problematic sample, invalid variables and reducing groups of variables.

First, the sample studied in this research counts 56 gifted students, only 26 of which are underachievers. The authors themselves present their insufficient sample size as a limit of their research. Furthermore, the participants are considered as not representative of the entire range of possible problems related to gifted underachievement: one of the main factors for that, we believe, is the participants' age. While the authors cite many researchers in their introduction who have suggested that gifted underachievement peaks in adolescence, the subjects' age ranged from 9 to 14 years old. With the speed at which teenagers evolve and change, differences between a sample consisting of students between 9 and 14 years of age, and another one consisting of students between 13 and 18 years of age will most likely be very important. Therefore, their sample is limited in how representative it is of the actual gifted underachiever population. According to Seeley

(1993), adolescence and its consequences (be they physiological, psychological or social)

are factors which increase a student's disposition towards academic underachievement: a

simple that has not yet reached these consequences will definitely yield different results.

In addition to sampling problems, the study's methodology leads us to believe that some

information they gathered does not truly represent the variables they present in their groups

of variables. One of the biggest reason leading us to this belief is the way in which

information regarding all three variables from the school groups of variable (relationship

with peers and teacher and academic quality) was gathered: the researchers questioned the

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Finally, the authors used only three variables per groups of variable, which is an important

reduction from the dozens of variables which have been linked to gifted underachievement

in other studies, such as school motivation, self-efficacy, familial relationships, parental

expectations, or sense of security or of belonging. However, despite the absence of

numerous variables, the authors consider their groups of variables as representative of

Rimm's three classes. They even suggest that their results might mean that the individual

class of factor is of greater importance than the other two, generalizing their results while

having limited their analysis to three variables per class.

We can conclude that, because of its insufficient sample size, its data's debatable validity,

and the reduction of the three classes to only three variables each, the results presented in

Baker, Bridger and Evans (1998) are not easily generalizable. As this research is often

presented as the only one to explore the relationships between a gifted student's perception

of its environment's socioeducative climates and its school performance, it seems that this relationship is overlooked in research.

Concepts

Multiple concepts need to be clarified before going into the methodology of the study: giftedness, gifted underachievement and socioeducative environment are three concepts which will be defined in the following few pages.

Giftedness

A gifted individual, as defined by Legendre (1993), is a person presenting « aptitudes which are superior to that of an average person in one or more domains » (p. 398, author's translation). As this definition outlines, there exists as many types of giftedness as there are aptitudes. However, despite the existence of multiple other types, the use of the term giftedness, unless otherwise specified, is usually used to refer to academic giftedness. Stankowski (1978, cited in Davis & Rimm, 2003) presented 5 types of definitions of giftedness. The first was an a posteriori label of an individual whose influence and performance in their field was both exceptional and constant, without any objective measure necessary. The second type was the use of a cut-off score on an IQ test: for example, the Stanford-Binet defines a score superior to 135 as giftedness, but other researchers have also offered their own cut-off point. The third type is related to exceptional performance instead of ability. The fourth type is defined through creative ability. Finally, the last and most often used type is the definition of giftedness through the use of a standardized test, and with a cut-off score defined through comparison to other

participants and the scores' percentile rank. The target rank varies between 80th and 99th according to the author (Davis & Rimm, 2003), with many researchers using the 95th percentile. On the other hand, Gagné (2007) supported the inclusion of students whose ability were over the 90th percentile in the "lightly gifted group", and then defining other degrees of giftedness, each representing the higher 10% of the previous group.

Before Stankowski, Renzulli (1977) proposed the "three-ring definition" of giftedness. According to this researcher, giftedness could not be reduced to a single measure, and proposed three criteria: well-above average ability (whether general abilities, like intelligence, or specific abilities, like chemistry, or sculpture), high task commitment (enthusiasm, fascination, perseverance, and the setting of high standards for themselves, in a particular area), and high creativity (originality, but also adventurousness, openness to new ideas and willingness to take risks).

Gifted Underachievement

In 2000, Reis and McCoach published a review of the literature on the topic of gifted underachievement. Throughout this review, one of their objectives was to present a single, unified definition of gifted underachievement on which all researchers of the field could base their studies. After presenting different types of pre-existing definitions, they postulated this definition:

> « Underachievers are students who exhibit a severe discrepancy between expected achievement (as measured by standardized achievement test scores or cognitive or intellectual ability assessments) and actual achievement (as measured by class grades and teacher evaluations). To be classified as an underachiever, the discrepancy

between expected and actual achievement must not be the direct result of a diagnosed

learning disability and must persist over an extended period of time. Gifted

underachievers are underachievers who exhibit superior scores on measures of

expected achievement (i.e., standardized achievement test scores or cognitive or

intellectual ability assessments). » (p. 157)

Reis and McCoach's definition suggests three nuances regarding gifted underachievement:

(1) its exclusion of gifted students with a diagnosed learning disability (because, while their

situation is unique and interesting, the study of such students is a field in and of itself,

separate from that of underachieving gifted students), (2) the necessity of evaluating

underachievement through comparison of actual results and expected results, and (3) its

emphasis on academic performance. In this study attempting to explain the causes leading

to gifted underachievement, the first step was to define what gifted underachievement truly

is.

Despite their proposal for a universal definition, not all researchers agree to use the same

type of methodological definition. Much like with giftedness, many different ways of

identification of gifted underachievers have been used in the literature recently. Two,

however, seem to see the most use: while both of these definitions label gifted students

whose performance is inferior to a certain cut-off point as underachievers, the way the cut-

off point is defined is what changes. Many authors (Colangelo, Kerr, Christensen, &

Maxey, 1993; Hébert, 2001; Laffoon, Jenkins-Friedman, & Tollefson, 1989) decide to use a

universal cut-off point, such as a C, or even the group's average, which is then applied

equally to all gifted students, regardless of their level of abilities. Furthermore, most of

these definitions use a very low cut-off point, only identifying students who are performing objectively poorly, regardless of their own ability, as underachievers.

The second type of definition, more in line with Reis and McCoach's, defines a different cut-off point for each participant. By comparing the distribution of both aptitude and performance (using statistics such as the Z-score or the percentile ranks to compare them across different scales), they can identify students whose performance is inferior to their own aptitude. This has the advantage of including gifted students whose performance is still over average, yet still far below what they have the potential to reach. While more inclusive and in-line with the literary definition of underachievement, fewer authors use this type of definition (Lupart & Pyryt, 1996; Preckel, Holling, & Vock, 2006).

Socioeducative climates

The model of socioeducative environment which we will be using in this study is one which was developed by Janosz, Georges and Parent (1998). Janosz, Georges and Parent's model is often used in Quebec to thoroughly understand the strengths and weaknesses of a school's socioeducative environment. One of this model's strengths is its focus on participants' perspectives, given that it is not the environment itself that truly affects students, but their feelings and perceptions of their environment. Another reason for selecting this model is the fact that it was developed specifically for Quebec schools. We believe that a locally-developed model was better suited for analysing Quebec students than a test developed for a different cultural background and translated into French.

According to them, the socioeducative environment is formed from multiple different aspects of the learning environment, all of which are deeply interconnected. First are the

independent variables: the school's socioeconomical and socio-political conditions, its physical and organisational environment, and the characteristics of the learners and educators that form it. These variables are considered to be the basis of the environment, and they guide the decisions taken regarding the second tier variables, which we call "controllable variables": these include pedagogical strategies and practices, the amount, quality and style of support offered, and school-family relationships. The choices taken on this tier will definitely have an effect on the third tier, the socioeducative environment's climates, and the levels of performance, motivation, violence, indiscipline, and conflicts. While these are affected directly by both prior tiers, they cannot be directly controlled: school administrators and educators can only push the controllable variables towards what they believe will positively affect the third tier variables: how they actually react is, at the very least, hard to predict.

Janosz, Georges and Parent (1998) define the socioeducative environment's climates as "the personality particular to a school environment through how this environment answers individual needs" (1998, p.288, author's translation). This is affected by pedagogical practices employed in the environment and the socioeducative environment's problems, whether social or academic. This "personality" of the environment is then seen through five different facets, which are the different climates.

According to Janosz, Georges and Parent (1998), a socioeducative environment contains five different climates: the relationship climate, the educative climate, the climate of security, the climate of justice, and the climate of belonging.

The first, the relationship climate, focuses on the interpersonal relationships happening within the environment. Of course, a school environment contains many types of relationships: between students, between teachers, between students and teachers, and

between teachers and principals. All of these relationships must be taken into account to better grasp the quality of the relationship climate in an environment, and evaluated through three criteria: warmth, respect, and supportiveness.

The second aspect is the educative climate, which represent the importance given to education in the environment, the perception of school as a setting for teaching and learning. It is defined by the students' devotion to success, the quality of the education, the focus on sensible learning, and the belief in education's worth.

The climate of security is obviously related to the security level of the environment, but more importantly, to the feeling of security of its members, and their perception of the rarity of at-risk situations (violence, drug use, theft, intimidation). This climate's importance is linked to the difficulties associated with learning and teaching while feeling in danger.

The climate of justice designates a perception of the application of the rules, of the distribution of punishment and reinforcement, and of the academic evaluations as fair and equitable, linked to a person's actions and not to the person herself. While it is true of all climates, it is particularly important here to remind the reader that what is significant is not how fair the environment actually is, but how fair its members all perceive it as being.

The fifth climate, the climate of belonging, is defined as the creation of a relationship between the individual and the environment. It is identified by three aspects: a feeling of pride regarding the school one attends or works at, the importance it takes in these individuals' lives, and by identifying and applying the values promoted by the institution. This last climate is different from the four previous ones in that it is seen as a product of the interaction between these four previous climates.

Despite not using the term "climate" and not classifying them as Janosz, George and Parent did, authors Wang and Holcombe (2010) studied the relationship between the perception of one's school environment and school performance in 1000 American students. These researchers found a correlation between certain perceptions and school performance. The variable that was most strongly correlated with school performance was the identification with the school, a large aspect of what Janosz, George and Parent name the climate of belonging.

Also in the same vein, a large amount of research has been conducted regarding the relationship between teacher-student relationships and school motivation (Fortin, Plante, & Bradley, 2011; Rousseau, Deslandes, & Fournier, 2009; Valencia, 2010; Viau, 2009) or performance (Renaud, 2009). Viau (2009) also supports the impact on academic motivation that both a sense of security and a sense of belonging can have. The Center on Education Policy (2012) also states that all aspects of school environment are correlated with a student's school motivation.

While the impact of all five climates on either motivation or performance is well-grounded in research, such a relationship has not been looked into for gifted students as a possible explanation for gifted underachievement.

It is as a solution to this lack of knowledge on the relationship between educative environment and underachievement in gifted students that this research was conducted. Through a multi-factorial approach which integrates the students' perception of their school and family environments and their academic motivation, we aim to improve our collective understanding of the relationship between educative environment and underachievement in

gifted student and finally dig in what we believe is an often overlooked aspect of the problematic.

Family environment

Family environment is a complex concept, and through this study, we have limited it to five aspects: parental involvement in education, student's communication with parents, family rules, parental supervision, and child-parent conflicts.

Parental involvement in education has been defined as the level of participation a parent has in their child's education and schooling. This is indicated by communicating well with teachers, assisting with homework, volunteering in the classroom or on school trips, and understanding their child's academic strengths and weaknesses (Steinberg et al., 1992). Researchers have concluded that parental involvement is positively correlated with multiple aspects of academic motivation: school engagement, perceived competence, perceived control, self-regulation, mastery-goal orientation, motivation to read (Gonzalez-DeHass, Willems, & Holbein, 2005), and a favorable attitude towards school (Trusty, 1996). Furthermore, it seems involved parents is positively correlated to a student's school performance (Hoover-Dempsey & Sandler, 1997; Paulson, 1994; Steinberg, Lamborn, Dornbusch, & Darling, 1992; Trusty, 1996). Finally, it has been found that students whose parents are highly involved are less likely to drop out in high school (Rumberger et al., 1990).

Student's communication with parents is defined as the mutual level of communication between a student and their parents, particularly of communication of an emotional nature. It also includes a transparency of parenting decisions – that is, telling the child why these decisions were taken. Family rules, on the other hand, denote not the quality of parent-

imposed rules, but whether such rules exist and children are aware of them. This includes rules regarding bedtime, the amount of time that should be spent on homework and studying or internet and video games, the circle of friends, the child's finances, and whether the child can smoke or drink alcohol. Parental supervision denotes how informed the parents are about their child's whereabouts: where they are, who they are with, and what they do. Taken together, these last three variables seem rather representative of Baumrind's authoritative parenting style (1973), which has been found to be correlated to school success (Baumrind, 1991; Strage & Brandt, 1999), fewer problem behaviour (Maccoby, 1994), positive self-esteem (Klein, O'Bryant, & Hopkins, 1996), an internal locus of identity and psychosocial success (Marsiglia, Walczyk, Buboltz, & Griffith-Ross, 2007).

Child-parent conflicts are defined as "situations of confrontation which include use of either hurtful, negative language or threats, and leading to negative emotional impacts: frustration, anger, humiliation" (Claes, 2004, p.213, author's translation). While conflict is usually a mutual confrontation, in parent-teenager relationships, they can very well be one-way, due to either the tacit acceptance of parental authority when the conflict is parent-only, or to maturity-level discrepancies or a desire for provocation when the conflict is child-only (Laursen & Collins, 1994). Research shows that conflict between a teenager and their parents is unavoidable (Cloutier & Groleau, 1987), due to the difference in goals and perception that teenagers and parents usually have.

With regards to goals, Smetana (1989) shows that while parents aim for socialization, convention and conformity, adolescents aim for personal affirmation and individualisation. As an example, Smetana presents the familiar situation of a parent who asks their teenage child to clean their room, because the family rule is that everyone in the house cleans their

own room; however, the teenager answers that what everybody else does is up to them, and that their room is not unclean, simply cleaned in a different way.

Research also supports the idea that parents and teenagers differ greatly in how they perceive the amount and intensity of conflicts in their relationship. Robin and Foster (1989) found that the correlation rate of these perceptions was inferior to .50. Teenagers usually report a larger amount and impact of conflicts than parents do.

It is because numerous researchers have looked into the impact of parenting and family environment on a child's motivation that we have included family environment variables into this research. Whether gifted students react the same way to such results has still not been looked into.

Motivation

Motivation is a highly researched topic in the field of education, and its relationship to academic performance is well established (Center on Education Policy, 2012; Gottfried, 1990; Shiefele, Krapp, & Winteler, 1992). Lack of school motivation has also been often presented through literature as one of the main causes of underachievement in gifted youth (Whitmore, 1986; Baker, Bridger & Evans, 1998; Reis & McCoach, 2000; Hébert & Schreiber, 2010). The model of motivation we are using for this study was developed by Monnard, Ntamakiliro, and Gurtner (1999) and is known as the "Multidimensional scale of motivation towards school learning" (author's translation). From this model, five variables were kept: attribution, school attractiveness, perceived usefulness of school, self-efficacy, and willingness to learn.

Attribution is "the causal explanations for success and failure that students assign to the things that happen to them--their beliefs about *what causes what*. These causal attributions in turn guide their future behaviour" (Ormrod et al., 2006, p.239). Furthermore attribution is not necessarily representative of the true state of affairs: a student could blame his unsatisfactory grade on his math test to the fact that the exam was too hard, that the teacher doesn't like him and that the explanations weren't clear, while it is truly due to a lack of effort or skills. In general, students attribute successes to themselves (to their intelligence and effort, for example), while they blame their failures on external factors (such as their teacher, peers, or lack of luck) (Marsch, 1990).

Attribution is usually defined through three aspects: locus, stability and controllability. Locus (or place) refers to whether the student attributes events to internal or external causes, such as concluding that a test result is due to studying hard (internal) or the teacher liking you (external). Stability refers to how changing the perceived causes are, such as attributing school results to intelligence (stable, unchanging) compared to luck (unstable, changing). Finally, controllability refers to how much the student themselves can influence the cause, such as a bad test result being blamed on being sick (uncontrollable), compared to lack of sleep (controllable).

Students who attribute success and failure to internal and controllable causes have been found to be more prone to asking for help in classroom settings (Ames, 1983), to expend more effort in your studies, and to perform better academically (J. S. Eccles, 1983): if you believe that a student's behaviour is the cause of their success, it is logical that you will be more inclined to put effort in your studies than if you believe luck is. On the other hand, attributing success to uncontrollable or external factors can lead to a state known as learned helplessness: the "general belief that one is incapable of accomplishing tasks and has little

or no control of the environment" (Ormrod et al., 2006, p.243), which has been found to be correlated to future failure (C. Peterson, 1990; Seligman, 1991).

School attractiveness represents a student's interest towards school, which includes not only interest for learning and classes, but also the social aspect of schooling. On the other hand, perceived usefulness of school refers to the student's perception that going to school will be beneficial to them in the future, whether for their future studies or career, or simply that they will use what they learnt in class. Research shows that these two variables seem to be inversely correlated with age: the older a student is, the less attracted to school they are, and the less useful they perceive it as being (Bouffard, 2005).

Self-efficacy is a person's perception of their own capabilities in a particular situation or task. While it is somewhat related to self-concept (a person's perception of the "quality" of their own person), self-efficacy is defined through specific tasks: for example, one may have high self-efficacy about basketball, but low self-efficacy about playing the guitar. Also, it is important to know that while the two are correlated, self-efficacy is not necessarily on par with their actual capabilities: we all may think of at least one person who thinks of themselves as highly gifted in a field where they are very average, and of the frustrating opposite who believes they are incapable in a situation where they are, at worst, average. Students with high self-efficacy have been found to achieve more than those with low self-efficacy, even when controlling for actual ability levels (Eccles et al., 1989).

Willingness to learn is what laymen (and probably many educators) probably define as school motivation: a student's drive towards the acquisition of new knowledge. However, this does not necessarily mean more effort is being put out: as we've seen in this section, many other variables impact the amount of effort the student is willing to put into their studies. For example, a student with high willingness to learn, but who attributes success to

external, uncontrollable factors, would want to learn, but not understand that studying and hard work will lead him to that goal: as such, they might not do any of these things, and will seem unmotivated.

As we've seen in this section, motivation is a major piece of the education puzzle, but it is also more complex than simply identifying who is motivated, and who isn't. Even looking at motivation through a spectrum, which accounts for the variation in between these two points, would be an oversimplification, because of its multi-faceted nature.

As we've seen, prior research has shown that multiple links exist between school performance and both socioeducative climates and family environment. The objective of this study is to seek whether such relationships also exist in the case of gifted students. If it is the case, it could solve another piece of the puzzle of gifted underachievement.

Methodology

In order to reach our previously stated objectives, we must follow an empirical methodology. This chapter will present the methodology we will be following throughout this study. First, we will present the characteristics of our sample. Second, we will present the four tools which were used to gather the data we will be analyzing. Last, we will discuss our analysis strategies for this study.

Participants

To answer our research question, we will analyse data previously gathered during the evaluation of Quebec's SIAA program (*Stratégie d'intervention Agir Autrement*, or, in

English, Intervention strategy to act differently). First of all, we will briefly describe what the SIAA is, to then go to the participants of this study.

The SIAA is a policy from Quebec's *Ministère de l'Éducation, du Loisir et des Sports* (Ministry of Education, Leisure and Sports, in English) aiming to improve the school success of students from lower socioeconomic status backgrounds. The 196 schools targeted by the policy annually receive budgets totalling 125 million dollars, which help the schools to put in place policies which were tailored to their individual needs, as determined in each establishment by a committee of employees (Janosz et al., 2010).

To effectively evaluate the effects of the strategy, a team of researchers led a study on the subject (Janosz et al., 2010). During this study, the team gathered data, each year, from a sample of around 30,000 students and 4,000 employees from 70 Quebec high schools. Due to school fusions, this number was brought down to 66 schools during the duration of the study, a number representing 35% of the number of SIAA schools in Quebec. Furthermore, 11 non-SIAA schools were added to the sample as a control group.

Even though the original study wasn't about gifted underachievement, it did include the battery of tests that our research requires, and a substantial sample size. Raven's Progressive Matrices, for example, were used as a control variable in the comparison of pre- and post-SIAA results. Because it includes all variables we needed to complete our analysis, we will conduct a secondary analysis of their data for this research.

The SIAA schools in the sample were randomly selected. However, in order to accurately represent the entirety of SIAA schools, the selection was made in order to maintain the population's ratio with regards to the school's teaching language, its size and its geographical situation. The first variable, teaching language, resulted into two groups: English and French. The second variable, size, knew three possible results: small (i.e. less

than 150 students), medium (i.e. between 150 and 499 students) or large (i.e. 500 students or more). Finally, the third variable, geographical situation, had three possible answers: rural, suburban, and urban (which only included school situated in Montreal, the metropolis). It is also obvious that size and geographical situation are interrelated in our sample: indeed, we can see that almost all urban schools were considered to be of large size, while only one of the fourteen rural schools was. However, the authors of the original study assure us that this situation is also representative of the repartition in the entire population of SIAA schools. The eleven comparison schools were, however, not chosen through these same criteria, but were schools which volunteered for participation in the study.

Within these schools, students and employees alike were interviewed. In average, the research team had a 70% response rate, resulting in a sample averaging 30,000 students. This study used the data gathered from Secondary 3 (Grade 9) students, as literature suggests this is the age at which gifted underachievement starts rising more importantly, reaching a peak in prevalence in Secondary 5 (Grade 11, final grade of mandatory education in Quebec) (Rivest, 2013). In order to maximize the number of participants who had undertaken all necessary tests, the participants we chose were all taken from the first year of the original study.

The initial sample of this research contained a total of 8125 participants. However, not all of those 8125 participants had completed both the Raven's progressive matrices and the performance in mathematics test. Only 6039 had completed the intelligence test, only 2254 had completed the performance test, and, more importantly, only 1885 had completed both. This last group constitutes our usable sample, giving us an n=1885, an enormous loss of 6240 participants. In order to ensure our sample's fidelity to the larger one, we conducted

analyses of variance of the students' scores in all variables of interest to this study, which will be presented in the following section.

Our sample is unevenly divided between males and females by quite a large margin: 1023 participants were females (a number representing 54.3% of the sample), and 862 (45.7%) were males.

The sample is unevenly divided on the age front as well. This, however, is easily explained by the fact that all students in our sample are in Secondary 3, where students will usually be 14 or 15 years old (barring repeated or skipped years): as would be expected, 83.3% of participants are within this age range. 0.3% of participants are younger than 14 (all of them 13 years old), and 16.4% are older. It is impossible to know the age of the oldest student, as all ages over 17 years old were put in the "18 or older" category. If we were to consider these students to all be 18 years old, the average age would be 14.77 years old.

On Raven's progressive matrices, the minimum score was 1, and the maximum 60, covering the entire spectrum of possible scores. That perfect score was reached by 6 of our 1885 participants. The average score was 49, with a standard deviation of 6.34.

As we explained in the previous chapter, this last variable is the one we will use to create our gifted group, for which we selected all participants whose score is over the 90th percentile: in this case, a score of 56.

The gifted group contained 196 subjects, slightly over 10% of our complete sample (due to the fact that a score on Raven's progressive matrices is a discreet variable), leaving 1689 non-gifted subjects. Of the 196 gifted subjects, 99 were males and 97 females, a more even distribution than that of the entire usable sample (as seen on table 1). We labeled 11.48% of male participants as gifted, and 9.48% of females.

The gifted group had an average age of 14.53 years old, a little younger than non-gifted participants who had an average age of 14.79 years old. 93.9% of gifted subjects were between 14 and 15 years old (the "normal" age range for Secondary 3 students), compared to 82.1% in the non-gifted subsample, which can probably be explained by the lower number of students who had to repeat a grade in the gifted group. Indeed, only 11 gifted participants were older than 15 years old, representing 5.6% of the subsample, compared to 17.7% in the non-gifted group.

Data gathering tools

For this study, four tools were used to gather the data we will be analysing: the questionnaire on socioeducative environment (QES, after its French acronym), Raven's matrices, the evaluation of school performance in mathematics, and the Psychosocial questionnaire. These three tools offered us our data: the QES offered a measure of the students' perception of the socioeducative climate of their school; Raven's matrices allowed us to identify the gifted students in ours ample; the evaluation of school performance in mathematics allowed us to identify each students' level of performance, and to categorize them as either high achiever or underachiever; the Psychosocial gave us data regarding the students' motivation and family climate. This following section will present each of these three tools.

Questionnaire on Socioeducative Environment (QES)

The QES is largely used to measure students' perception of their socioeducative environment. This tool has been entirely validated with highly satisfying results (Janosz &

Bouthillier, 2007). It is a long questionnaire: the version used with students contained 166 questions, while those used with adults counted 208. The QES is divided in 4 sections: the first is about the identification variables of the participant; the second evaluates the participant's perception of their school's socioeducative climate; the third measures their perception of the problems of their schools; finally, the fourth identifies the pedagogical practices perceived in the institution by the participant.

The QES' second section, and the only one of interest to us, measures the participant's perception of the different socioeducative climates: relational (between students, between students and adults, between employees, and between employees and administrators), educative, security, justice and belonging. Each of them is measure by four to six items of their perspective of their school, to answer on a six-level Likert scale. Examples of these questions are presented in Table 2.

The internal consistency of these scales, as measured through Cronbach's alpha, were between .829 and .920. As such, these scales' internal consistency can be considered good or even excellent.

Raven's matrices

Raven's matrices are an intelligence measurement tool, recognized as non-culturally biased, a rare feat in intelligence tests. It is, with Weschler's scales, one of the most used intelligence tests today (Larivée & Miranda, 2009). Raven's matrices measure non-verbal intelligence as well as abstraction capacity through matrices which become progressively more complex (Sattler, 1988). The test's fidelity is also impressive, with coefficients over 0.80, sometimes even reaching 0.90 (Larivée & Miranda, 2009). In addition to cultural

equity and fidelity, Raven's matrices are also used for its ease of administration to large groups. It is this simplicity that allowed its use during the SIAA evaluation.

The most often used test, the progressive matrices test, contains 5 series of 12 items each, presented in increasing order of difficulty, and is taken in a 40 minute time frame. For each item, the subject is presented with an incomplete figure or pattern, for which they have to first understand the underlying logic, and then choose amongst the possible answers which one would better complete the figure or pattern. When scoring these tests, the corrector will go through answers and stop correcting after two errors from the participant. Each answer is then worth one point, allowing a maximum score of 60.

Usually, the results are then given a percentile rank which represents where the subject's intellectual aptitudes rank amongst peers of their age. In this research's case, the results were not standardized through the usual standardization tables, as they are adapted to the American standards, and not those of Quebec. We did however standardize their raw scores by comparing them to other students in our sample: this, we believe, was more representative of the Quebec environment our subjects evolved in. The results were standardized into both a percentile rank, to identify our gifted group, defined as those whose aptitude was at the 90th percentile or higher, and into a Z-score, for a closer comparison to the performance of students.

School performance in mathematics

In this study, we will use school performance in mathematics as a measure of school performance. This decision is not meant to be a judgement on the value of other school subjects, but rather due to the stronger link between what many would call logical-mathematical (as measured by Raven's matrices) and results in mathematics than results in

other subjects. Indeed, while a high score on Raven's matrices represents abilities in mathematics and logic, for it to be coupled with low scores in history or second language classes is not necessarily proof of underachievement.

To gather information regarding the students' performance in mathematics, participants completed a 12-question performance test. The test was geared to the students' school level, as per the *Ministère de l'Éducation, du Loisir et des Sports'* (the government's department of education in Quebec) formation program, and contained items covering all domains of mathematics these students should know: numbers, operations, algebra, geometry, statistics and mathematical reasoning. These tests have been validated through analysis of their test-retest reliability, convergent validity, discriminant validity and predictive validity, with all of these being either acceptable or good (Janosz et al., 2010). In order to compare the subjects' performance to their aptitudes, while the two instruments use quite different scales, the scores on the performance test were standardized into a Z-score, comparing each subject's score to those of the rest of the sample.

Psychosocial

The Psychosocial questionnaire, or *Questionnaire on the school and social integration of students*, is a tool created by the authors of the SIAA evaluation study from many other instruments dealing with, among other things, motivation, school engagement, self-esteem, school anxiety, interpersonal relationship and family climate.

The two parts of this questionnaire we will be using for the current study are those regarding the family climate and motivation in mathematics. The first was created as a mixture of Leblanc's *Measures of social and psychological adaptation of adolescents in Quebec* instrument (MASPAQ, from its French acronym) (1992), Steinberg, Lamborn,

Dornbusch and Darling's scale of parental involvement (1992), and other scales created by the authors of the original study. The second, regarding motivation, was based on the *Multidimensional scale of motivation towards school learning* (EMMAS, for its French acronym), by Monnard et al. (1999).

In both cases, each variable was computed from three to six items, each to be answered on a Likert-type scale. Because of the multiple sources from which this questionnaire was created, the number of levels of each scale differed from four to six. Examples of items in this questionnaire include "I have fun while at school" (for school attractiveness), "When a student gives right answers, is it because they think about it a lot?" (for attribution), or "In your day-to-day life, do you and your parents sometimes disagree?" (for conflicts with parents).

Among the scales we used from this questionnaire, internal consistency (as measured through Cronbach's alpha) was between .721 and .919. Therefore, the scales' internal consistency was considered either good or excellent.

Administration Procedures

In order to assure the validity and to limit the possibility of bias in our participants' answers, certain procedures must be respected during data gathering. This section will briefly describe the procedures which were followed during the administration of the tests we presented in the previous section.

The QES was administered by the teachers to all students once, during their first year in the study: mostly in the fall of the study's first year, and then for students who came into the study in following years. The researcher had previously given the teachers a standardised procedure, and a research assistant was available to respond to problematic situations. The

students filled their questionnaires in class, directly on their paper forms. Overall, the administration of these questionnaires required an average of 4 class periods every year (a class period lasting usually between an hour and 75 minutes). Questionnaires were mostly filled on paper, although many schools preferred to administer them electronically. Raven's matrices were also administered as per the standardised procedure for the instrument, as presented in its instruction manual, with the exception that the test was untimed. As with the QES, the teachers were administering the test to their students. The matrices were administered to each student once, on their first year of participation in the study.

The psychosocial questionnaire was administered in the spring of each year of the study. Given that this questionnaire was built from multiple others for the sake of this study, it does not have a standard procedure. As stated above, students were either given a paper or electronic copy of the questionnaire and were asked to answer them either in their classroom or computer lab, respectively.

The evaluation in mathematics was measured through a single questionnaire, handed out alongside the QES evaluation and a similar one regarding performance in the language of instruction (French in French school, and English in English school). Each year, half the students (as defined through the first letter of their last name) underwent the language test, while the other half filled the math test, and then alternating in the following year. These tests were administered during the spring, roughly two-thirds of the way through the school year, and lasted one hour each. For the math evaluation, students were allowed to use calculator and geometry tools.

Analysis strategy

Participants whose scores on Raven's matrices were in or higher than the 90th percentile will be declared gifted in terms of logical-mathematical intelligence, as per Gagné's (2007) definition of giftedness. Those whose score was inferior to the 90th percentile were considered "non-gifted"

First, we went through various descriptive analyses of our sample, as such statistics are unavailable for Quebec students. First, we calculated the percentage of gifted students who received the underachieving label, giving us a better understanding of the number of students touched by this problematic in Quebec. Because two schools of thought exist on how to define underachievement methodologically, we calculated this percentage twice, once with each of the two usual definitions: first, by considering gifted students as underachievers when their performance score was inferior to the school average, and second, by looking at the difference between the Z-scores of aptitude and performance, and considering a difference higher than one standard deviation to be underachievement. While we do create these two groups for the sake of evaluating the number of underachievers, these two groups will not be used during the remainder of the analysis. Second, we went through a preliminary analysis: in order to ensure the solidity of our sample's responses, we calculated, for every one of our variables, the mean of students' scores for both the gifted and non-gifted groups, for the sake of comparison. I

Third, we ran, for the gifted group, Pearson's chi-squared test to compare the average scores of each of our variable (including motivational, familial or socioeducative, and even performance), in order to guide use towards the next step. We also compared it to the exact same analyses, conducted on the non-gifted group.

Finally, we used the information found from the correlations to design a path analysis which could represent the relationship between family and school environment, motivation, and performance in gifted students. That model will allow us to answer our query regarding the possible impact of the school environment on such students' performance.

This choice of using performance as a dependant variable rather than for grouping was made to better represent our perception of underachievement as a problem that plagues gifted students, rather than a subgroup: as such, this is a research on the underachievement of gifted students, rather than gifted underachievers. Furthermore, by doing that, we keep the entire spectrum of underachievement rather than forcing a subjective cutting point.

Results

This chapter will present the results obtained through the conduction of analyses presented in the previous section. First, we will start with the results of our descriptive analysis, followed by our analysis of the interactions between these variables, and concluded with our path analysis.

Descriptive Statistics

In the gifted group, scores on the performance in mathematics test had an average of 6.872, more than a whole point higher (on a 12-point scale) than those of the non-gifted group, which stood at 5.559. Interestingly enough, the minimum and maximum scores were the same in both groups: 0.65 and 10.51, respectively. The standard deviation for this variable in the gifted group was 1.48.

We also were looking for the amount of gifted students who were considered underachievers. Depending on the type of definitions we used, two numbers came up: 17.3% (34 of 196) of students we identified as gifted had a performance score under the

sample's average, and 19.9% of gifted students (39 of 196) had a difference higher than one SD between the Z-score of their performance and that of their intelligence.

With regards to the perception of socioeducative climates, as presented in Table 3, scores are rather similar between the gifted and non-gifted groups. As presented in the previous chapter, these variables were calculated from between 4 and 8 Likert-type items, scaled from 1 (totally disagree) to 7 (totally agree). While the gifted group's perception is consistently better than that of the non-gifted, the difference is too small for it to mean much. Both groups, on average, seemed to have rather neutral perceptions: while more "extreme" perceptions exist in individuals, the distribution is not skewed one way or another.

As presented in Table 4, the gifted group's perception of their parental situation related to education is very similar to that of the non-gifted group. These variables, as presented in the preceding chapter, where calculated from multiple items, and do not all have the same scale: items from both parental involvement and communication were answered on a 1 to 4 scale (1 being "never" and 4 being "always"); items relating to family rules were answered "yes" (1) or "no" (0); items regarding both parental supervision and conflict with parents were calculated on a 0 ("never") to 3 ("continually") scale. Participants, on average, seem to think their parents are highly involved in their school life: 77.4% of participants have a computed score of at least 3, "often", and 19% have answered "always" to all 7 items regarding this variable. Also, conflicts with parents are apparently a rare occurrence in both groups. However, the distribution of the perception of communication in the family is skewed toward the "never" side. The participants' perception regarding the amount of family rules and parental supervision both seem neutral, on average.

Table 5 presents the average results on variables relating to school motivation for both the gifted and non-gifted groups, all of them calculated from multiple Likert items, ranging from 1 to 7. While most variables seem to present little difference between the two groups, the scores of the gifted group are much higher than those of the non-gifted with regards to both school attractiveness and self-efficacy in mathematics.

Representativity of our usable sample

As presented in the preceding section, only 1885 of our 8125 participants (23.2%) answered both the aptitude and performance test. In order to ensure our sample was representative of the larger one, we conducted analyses of variance and correlation between the two groups, regarding all variables we used in this study: aptitude, intelligence, socioeducative climates, family factors, and motivation. Our results, presented in Table 6, show that while most of the differences between both groups are not statistically significant, they are in 8 of the 20 groups: aptitude, performance, climate of belonging, climate of security, family rules, parental supervision, school attractiveness, and willingness to learn. This does limit to a certain extent the generalisation of the current study.

Relationships

Before building the model, we must first look into the interactions between our various variables in our gifted sample. This section will present correlations between motivation, school environment, family environment and performance.

School environment variables are all significantly correlated to one another, as can be seen on Table 7. We can see that these correlations are usually between .400 and .700; however all correlations with the climate of security have lower number, mostly hovering around de

.200 line. Another important piece of information from this table is the fact that none of the school environment variables are significantly directly correlated with school performance in gifted students.

Family environment, on the other hand, shows us a more complex situation, as 7 of our 15 possible correlations are considered to be significant, as presented on Table 7. In general, these correlations are much weaker than those we found between school environment variables, except for one: Parental involvement in education, and Communication with parents. The Family Rules variable was only significantly correlated to one other variable: Conflict with parents. Interestingly, this was the only positive correlation for the Conflict with parents variable. Also noteworthy is the fact that only one Family environment variable was significantly correlated to school performance: Parental supervision. While the correlation was significant, it was weak (.189).

The motivational variables show quite a lot of significant correlations amongst themselves, as only one relationship was not considered significant: the relationship between Self-efficacy in mathematics and Perceived usefulness of school. Two motivational variables were considered to be significantly correlated with performance: School attractiveness and, more strongly, self-efficacy.

In between variable types, we can see that 60% of the relationships between environmental variables and motivational ones are significantly correlated. This increases to 68.9% if we exclude Climate of Security and Family Rules, the two variables which we found to be correlated with very few variables of the same type.

Comparison to non-gifted students

As stated earlier, much research has been conducted to link motivation, socioeducative climates, and parental factors to performance in non-gifted students. However, to avoid comparing apples to oranges, we conducted these analyses within our available data.

As presented on Table 8, the relationship between motivational, family, socioeducative variables, and academic performance, seems to be much stronger. While no socio-educative variable was significantly correlated to performance in gifted subjects, all 6 climates were for the non-gifted; 3 out of 5 family variables are significantly correlated to performance for non-gifted, compared to only 1 for the gifted folk; and 4 out of 5 motivational variables, compared to 2 for the gifted. Furthermore, all relationships we identified as significant for the gifted folk were also significant for the non-gifted.

Path Analysis

As stated earlier, one of our objectives was to create a model to explore the relationship between environmental factors (both socioeducative and familial) and academic performance in gifted students. While our correlational analyses saw few direct correlations between environmental factors and school performance, as we highlighted before, relationships do exist between environmental factors and motivational ones, and the same can be said of the relation between motivation and performance. These results pushed us to test a three layer model:

Furthermore, due to their few correlations with motivational factors, we were unsure of how to proceed with the variables Family Rules (FR) and Climate of Security (CoS). As such, we created and tested four models, all following the same architecture: model 1

included both of these variables; model 2 included only Climate of Security, but not Family Rules; model 3 included only Family Rules, but not Climate of Security; model 4 included none of the two. As presented on Table 8, we tested 5 measures of a model's goodness of fit (that is, how well they fit the reality of the data): the first, minimum discrepancy by degrees of freedom (CMIN/DF), should have a value close to 1 in a good model, with values as high as 2 or 3 being considered good (Byrne, 1989; Carmines & McIver, 1981); the second, comparative fit index (CFI), could reach a value of 1 in a perfect model, but considers values of at least .930 to represent a model's good fit (Byrne, 1994); the third, root mean square error of approximation (RMSEA), aims for a value under .05 for a good model, and considers values between .05 and .10 to be adequate (Browne & Cudeck, 1993); the fourth, p value of Close Fit (PCLOSE), aims for a value over .05 for close-fitting models (Browne & Cudeck, 1993); finally, the Akaike information criterion (AIC) is a measure used for comparative measures to determine which model among many is the best fitting, with lower values indicating a better fit (Schumacker & Lomax, 2010). The AIC is not meant to be used as an evaluation of a model's absolute goodness of fit, and as such, does not have a target value to reach.

As we can see on Table 9, all four models met the criteria for three of the four "absolute" measures, and only two (models 2 and 4) reached the CFI target value of 0.930. The AIC however suggests that Model 4 (which excludes both family rules and climate of security) is closest to the data of this research and should be preferred to the other three.

Now that our final model has been selected, we must look into the effects of the variables in it. Variable X's effect on variable Y is the average increase in variable Y for each point by which X increases. As shown in Figure 2 and Table 10, our model shows that motivation does have a strong relationship with academic performance in gifted students. The

relationship between family environment and school performance is so weak that it barely deserves a mention; similarly, there seems to be no relationship whatsoever between socioeducative climates and performance in those students.

Discussion

One of our main goals for this research was to document the possible relationship between socioeducative climates and underachievement in gifted students. As we've seen in the previous section, the results of our path analysis show that such a relationship does not seem to exist. Also, the impact of each of our three variable sets confirms the findings of Baker et al. (1998) that motivation is the best predictor of underachievement in gifted students, with family environment and school environment essentially being non-factors. However, in agreement to prior research, our results suggest that motivational, family, and socioeducative variables do play a part in the academic performance of non-gifted students.

Negative direct effects

One of the most surprising results of this study was the fact that both environments we inquired about had a negative direct effect on school performance: how could a positive perception of your environment negatively affect your performance? First, let's look at what these numbers mean: path analyses evaluate direct effects after controlling for other variables in the model. In other words, this means that among two students with the same motivation levels, and the same score on the family environment variables, the student whose perception of their socioeducative climates is most positive generally has lower grades.

Now that we agree on what the number means, there are multiple ways of explaining this surprising result. One possible explanation for this is that a fifth variable (or variable group) exists, which we overlooked in this study, but which could be directly correlated to school performance, and negatively correlated to the perception of school and family environments, or vice versa. Such a variable could be critical thinking: a more critically thinking student could be harsher in their evaluation of these environments, while also achieve better academically. Another possible variable would be the level of socialization: a more social student might have a more positive perception of their socioeducative climate, but could lead to less time for studying, and therefore, lower results. Another way of explaining this is the unclear causality relationship of motivation and achievement. While the literature linking motivation and achievement in education is numerous (Center on Education Policy, 2012; Gottfried, 1990; Shiefele et al., 1992), the correlation between them does not equal causality. Motivation and performance seem to form a virtuous circle: yes, motivated students work harder, which leads to better results, but better results also can lead to a heightened sense of competence and therefore, higher motivation. Our model does not take this circularity into account: as such, maybe this negative direct effect represents the fact that for motivation to be the same between our two students, despite the fact that they differ in their perceptions of their socioeducative climates, would mean that they must differ in performance to "balance out" this difference.

Comparison to prior literature

Our findings regarding this lack of relationship between socioeducative climates and academic performance amongst non-gifted students is in-line with the work of Wang and Holcombe (2010). However, our hypothesis that such a relationship could also exist in

gifted students was proven wrong: as stated before, no socioeducative climate was significantly correlated to performance of gifted students in our research.

A similar comparison can be made to the works of Renaud (2009), who found a strong relationship between teacher-student relationships and performance in non-gifted students. Our results go in the same direction, but do not apply to gifted students as we hypothesized. With regards to family environment, multiple studies, as stated before, had found a relationship between parental involvement in education or authoritative parenting, and academic performance (Baumrind, 1991; Hoover-Dempsey & Sandler, 1997; Paulson, 1994; Steinberg et al., 1992; Strage & Brandt, 1999; Trusty, 1996) in the general student population. Our data, again, supports the existence of such a relationship in the non-gifted population, but not when you focus on the gifted population itself.

On the other hand, the correlation between socioeducative climates and academic motivation that we found is well established in the literature (Center on Education Policy, 2012; Fortin et al., 2011; Rousseau et al., 2009; Valencia, 2010; Viau, 2009). The same can be said about a positive family environment (Gonzalez-DeHass et al., 2005; Klein et al., 1996; Marsiglia et al., 2007; Trusty, 1996). On that front, our data suggests that gifted students do not differ from the non-gifted population.

When discussing the number of gifted students who underachieve, Seeley's (1993) evaluation of 15 to 40% is the most often cited number. Both of our evaluations (17.3% and 19.9%) fall towards the lower end of this spectrum, regardless of the definition for underachievement we used. The fact that we identified more male underachievers than female ones was also not surprising, as multiple researchers have made similar findings in the past (Colangelo et al., 1993; McCoach & Siegle, 2003; J. S. Peterson & Colangelo, 1996).

Also expected were the differences in motivation between the gifted and non-gifted group. Multiple authors had already concluded the existence of such a gap (Chan, 1996; Clinkenbeard, 1996; Gottfried & Gottfried, 1996; Vallerand, 1994). However, we found no differences between the two groups related to the attribution variable, which goes against the results of Chan (1996).

The similarities between gifted and non-gifted students with regards to their perception of their socioeducative and familial environment were however surprising: research usually supports the idea that the school environment is mismatched to the needs of gifted students, and that families of gifted students are often ill-prepared to deal with such children (Hébert, 2001; Hébert & Schreiber, 2010; Moon & Hall, 1998; Rayneri, Gerber, & Wiley, 2003; Seeley, 1993). If such statements were true of our sample, it did not seem to affect their perception of their environment.

Limitations

That being said, this research, like any other, does have limitations to its generalization. One of the most important is the fact that all participants attended schools targeted by the SIAA project, which were located in low-socioeconomic status neighborhoods. While this does not necessarily mean that all participants came from poor families, we can safely assume that it skews the distribution towards the lower end of the socioeconomic spectrum, and that our subjects' parents were probably less educated than average. While we did not have access to such numbers, we probably can also assume that participants who were from non-Quebecois families were overrepresented in our samples, which brings additional obstacles to school performance, such as proficiency in the language of education, and sometimes cultural identity.

Another limitation of this study is the fact that we did not have access to these participants'

diagnoses regarding learning disabilities, which, as stated before, would see them being

classified as "twice exceptional" rather than "gifted underachiever". While we did only

include students who were placed in regular, non-special-need classes in our analyses,

students with disabilities who were included in regular classes were still included in our

sample, as were students with undiagnosed disabilities. While not major, the inclusion of

such students could affect our results by diluting the number of actual gifted underachievers

in our sample, and adding some results that are more indicative of twice exceptional

students and not of gifted underachievers. However, given that we have no information

related to the number of such students, it is impossible for us to know how big an impact it

had on our results.

Finally, our research stood on the assumption that students with higher intelligence should

have a higher performance, and that those who did not were automatically underachievers.

However, this relationship between intelligence and performance is not perfect, and, as

we've described it earlier, intelligence is, at best, the least imperfect predictor of

performance, which would mean that some of those we identified as underachievers should

not have been expected to perform, because of lower scores on other predictors we did not

have access to. Furthermore, we only tested one aspect of intelligence, compared to

performance in a single school subject: this, too, limits how generalizable our results are.

While we did manage to evaluate the number of gifted underachievers in Quebec,

something that had been done only once before, our data comes from prior to the Quebec

school reform of the mid-2000's. It would be interesting to see if the numbers have changed

since this new school system was put into place. Likewise, seeing if these results also apply

to students from non-SIAA schools would be significant, and even to students from post-

SIAA schools: the SIAA was, after all, a policy put in place to diminish the impact of low

socioeconomic status on school performance, and a focus on its effects on gifted youth

could also be important.

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Annex 1: Tables and Figures

Table 1

Comparison of the gender distribution in the gifted and non-gifted subsamples

	Gifted		Non-Gifted		Total	
	Eff	Perc	Eff	Perc	Eff	Perc
Male	99	50.51%	763	45.17%	862	45.73%
Female	97	49.49%	926	54.83%	1023	54.27%
Total	196	100.00%	1689	100.00%	1885	100.00%

Table 2

Socioeducative climates and examples of items

Climate	Example of an item
Relational Student-Student	Students help each other
Relational Student-Teacher	Students and teachers talk outside of class time
Educative	In this school, we feel that students' success is at the heart of teachers' priorities
Security	There are places in the school where students are scared of going
Justice	In this school, students are treated fairly
Belonging	I am proud of being a student of my school

Table 3

Comparison of the perception of socioeducative climates by gifted and non-gifted

	Gifted	Non-Gifted
Justice	3.99	3.82
Educative	4.29	4.15
Relational (Student-Teacher)	3.91	3.80
Relational (Student-Student)	4.05	3.92
Security	4.23	4.01
Belonging	4.22	4.05

Table 4

Comparison of the perception of parental relationship of gifted and non-gifted

	Gifted	Non-Gifted
Parental Involvement in Education	3.42	3.34
Communication with Parents	1.71	1.68
Family Rules	0.43	0.43
Parental Supervision	2.25	2.08
Conflict with Parents	0.95	1.19

Table 5

Comparison of the school motivation of gifted and non-gifted

	Gifted	Non-Gifted
Attribution	4.19	4.16
School Attractiveness	4.36	3.88
School's Perceived Usefulness	4.93	4.73
Self-Efficacy in Mathematics	5.66	4.62
Willingness to Learn	6.09	5.85

Table 6

ANOVA of the usable and non-usable data

	Usable	Non-Usable	Sig.
Raven's matrices	46.581	49.004	.000
Performance in Mathematics	5.846	6.030	.001
Climate of Belonging	4.068	3.965	.005
Educative Climate	4.168	4.158	.730
Climate of Justice	3.840	3.790	.163
Relational Climate (T-S)	3.812	3.815	.932
Relational Climate (S-S)	3.935	3.905	.312
Climate of Security	4.038	4.112	.020
Parental Involvement in Education	3.351	3.324	.170
Communication with Parents	1.686	1.685	.994
Family Rules	0.430	0.412	.024
Parental Supervision	1.983	2.099	.000
Conflict with Parents	1.166	1.179	.480
Attribution	4.166	4.157	.772
School Attractiveness	3.929	3.801	.002
School's Perceived Usefulness	4.753	4.746	.845
Self-Efficacy in Mathematics	4.731	4.700	.502
Willingness to Learn	5.875	5.761	.001

Table 7

Correlations between School environment (1-6), Family environment (7-11) and Motivational (12-16) variables, and academic performance (17) in Gifted students (n=196)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Climate of Belonging	-															
2. Educative Climate	.668**	-														
3. Climate of Justice	.522**	.562**	-													
4. Relational Climate (T-S)	.552**	.645**	.470**	-												
5. Relational Climate (S-S)	.506**	.471**	.244**	.417**	-											
6. Climate of Security	.170**	.182**	.193**	.207**	.360**	-										
7. Conflict with parents	-.087	-.160*	-.202**	-.110	-.028	-.032	-									
8. Parental Supervision	.180*	.128	.217**	.031	-.033	.014	-.131	-								
9. Family Rules	.288**	.216**	.076	.104	.077	-.190*	.182*	.086	-							
10. Communication with parents	.164*	.256**	.223**	.223**	-.003	.003	-.413**	.294**	.091	-						
11. Parental involvement	.131	.292**	.300**	.236**	.043	.075	-.309**	.223**	.003	.719**	-					
12. School Attractiveness	.489**	.510**	.410**	.529**	.257**	.070	-.128	.262**	.185*	.283**	.222**	-				
13. Self-Efficacy	.218**	.246**	.163*	.160*	.113	.016	-.185*	.229**	-.036	.184*	.222**	.299**	-			
14. Willingness to Learn	.220**	.233**	.228**	.173*	.072	-.054	-.020*	.178*	.074	.197*	.182*	.459**	.268**	-		
15. Perceived Usefulness	.202**	.173*	.160*	.065	.087	-.035	-.037	.193*	.153*	.144	.059	.367**	.072	.434**	-	
16. Attribution	.103	.185*	.142	.090	-.540	-.045	-.173*	.073	.150	.181*	.152*	.170*	.153*	.256**	.311**	-
17. Performance	.043	.139	.094	.036	.023	-.009	.040	.189*	.099	.051	.044	.182*	.500**	.083	.052	.095

Note: *p<0.05; **p<0.01

Table 8

Comparison of the correlations to performance in gifted and non-gifted students

	Non-Gifted	Gifted
Climate of Belonging	.110**	.043
Educative Climate	.110**	.139
Climate of Justice	.064*	.094
Relational Climate (T-S)	.092**	.036
Relational Climate (S-S)	.090**	.023
Climate of Security	.095**	-.009
Parental Involvement in Education	.026	.044
Communication with Parents	.007	.051
Family Rules	.096**	.099
Parental Supervision	.111**	.189*
Conflict with Parents	-.110**	.040
Attribution	.041	.095
School Attractiveness	.152**	.182*
School's Perceived Usefulness	.078**	.052
Self-Efficacy in Mathematics	.409**	.500**
Willingness to Learn	.147**	.083

Note: *p<0.05; **p<0.01

Table 9

Comparison of the fitness of four models

	CMIN/DF	CFI	RMSEA	PCLOSE	AIC
Model 1 (with FR and CoS)	1.751	.917	.062	.106	317.083
Model 2 (without FR)	1.518	.950	.052	.428	266.870
Model 3 (without CoS)	1.829	.915	.065	.067	289.969
Model 4 (without FR and CoS)	1.680	.941	.059	.207	248.214

Table 10

Standardized effects in selected model

	Motivation			Performance		
	Direct	Indirect	Total	Direct	Indirect	Total
Socioeducative	.590	-	.590	-.617	.622	.005
Family	.381	-	.381	-.200	.402	.203
Motivation	-	-	-	1.055	-	1.055

Figure 1:
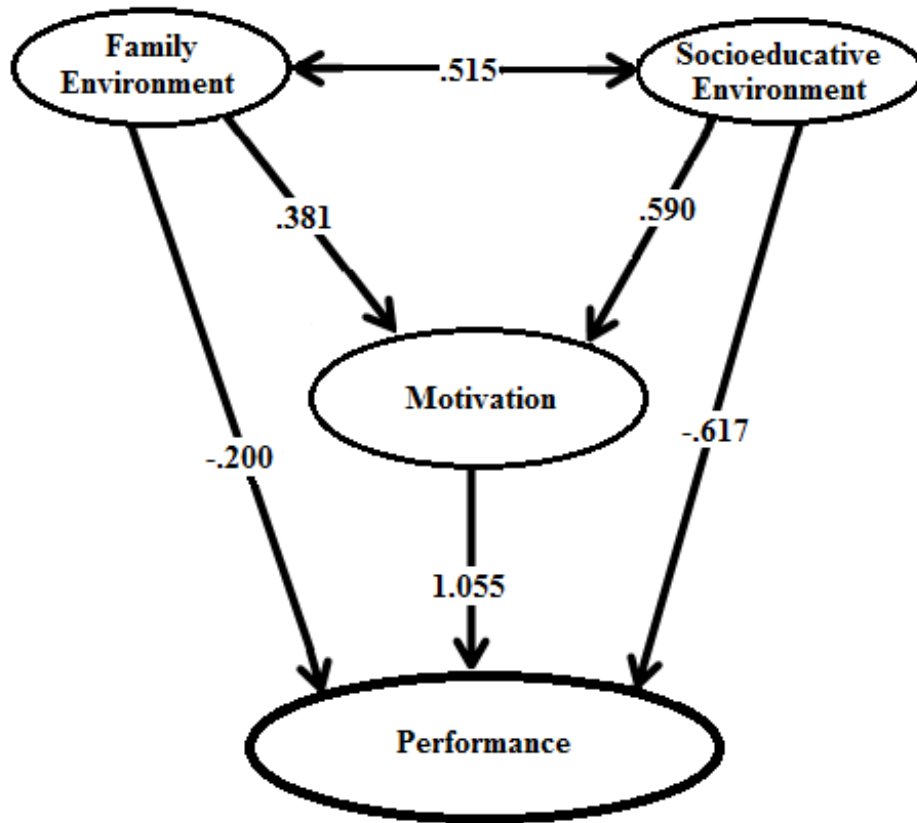
Simplified presentation of model
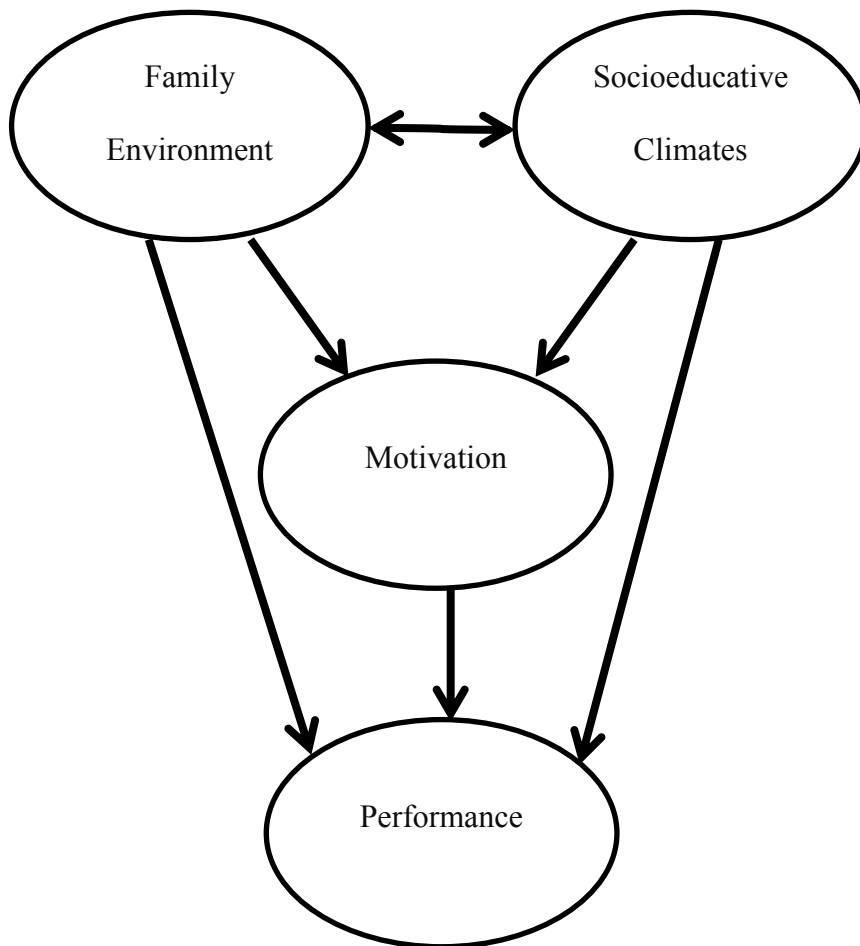
Figure 2

Final simplified model

Conclusion

At the beginning of this study, we presented prior literature which found a relationship between motivational, family, and socioeducative variables, and academic performance, in the general population. We hypothesized that such a relationship could exist in the gifted population, despite most of the literature about performance issues in gifted students being linking it to motivation and motivation only. Our findings are that while the impact of the family and socioeducative environment on performance is significant in non-gifted students, these variables are mostly non-factors in the experience of gifted students. Furthermore, we discussed the possibility that an additional variable (or variable group), which we overlooked in this study, could have led to the negative direct effect from environmental variables to performance. Such a variable would need to either be directly correlated to school performance, and negatively correlated to the perception of school and family environments, or vice versa. As such, we proposed either critical thinking, or level of social integration, but further research definitely would be necessary.

We stated before that little to no adaptation to gifted students' need is made in our school system, especially when compared to the levels of adaptation which are offered to students with learning or developmental disabilities. However, our findings suggest that the factors which help non-gifted youth perform better do not necessarily have the same effect on gifted students, and that gifted students and their performance are in general not affected by motivational, socioeducative, and motivational factors, while non-gifted students are. . Because of this difference from the general population, gifted students might be compared to students with learning or developmental disabilities, yet, no adaptation is offered to them, while students with difficulties see a multitude of them. The same can also be said of families with gifted kids, which also could

see in this research ideas for adapting the way in which they support their gifted children, much like they would if they had other, more well-known special needs.

While our results further raise the question of the need for gifted students for pedagogical and didactical adaptations, the picture we painted is not complete as to what would benefit these students' development: identifying that missing variable we posited in the article (or infirming its existence) would clarify which adaptations are needed. Even without further research, we did identify a relationship between motivational factors and academic performance, which is often discussed in the literature. Multiple solutions have been offered by respected authors in the field of gifted education, mostly to do with the adaptation of the curriculum to these students' more advanced needs, whether through enriched classes, or by simply grouping them with students of their ability level, rather than their age, and all aim to reduce, or altogether avoid, boredom from school. However, we wouldn't be surprised if most high school students were to identify their main issue with education as boredom: as such, this is not one of the special needs which come with giftedness.

We did present in our article the theory that gifted students underachieved because they lacked the "school survival skills", the strategies to success they failed to develop because they could succeed on raw talent early on: most of us can think of an individual who would never study, yet would always succeed, with high scores to boot. Many of them probably hit a metaphorical wall at some point, either in high school, college, university, maybe even in their career, were raw talent was not enough, yet they could not do more, and had to learn those basic skills and strategies. However, this theory was not taken into account in our study, for lack of data on such

variables. A longitudinal study of gifted students, looking at their early development in comparison to their later performance, would be of interest.

Also, we opted to view underachievement as a problem in the gifted population, rather than a subgroup of the gifted population, which few researchers have done before. We chose this different perspective as it more easily allowed us to compare the paths to performance of the gifted and the non-gifted. However, seeing as how the two groups' paths are different, and how our path analysis suggested the existence of another major variable group to complete our model, looking at gifted underachievers as a group could help us identify that missing variable group, by assessing how they differ, on average, from gifted achievers. Another question which is raised by the perception of underachievement as a group is whether "gifted underachiever" a single subgroup, or if there are multiple different types of underachievers, each with their own characteristic paths to performance, and therefore different, specific needs to succeed.

As our results suggest, the academic performance of a gifted student is affected by different factors than that of a non-gifted one, which suggest the need for adaptation of the school system for these students' special needs. The nature of these adaptations could be identified with further documentation, although we already documented the role of motivation in these students' performance. Furthermore, we proposed an in-depth look at the gifted population, to see how the underachievers differ from the achievers, and posited that the underachiever group could be subdivided into other types, each with their own special needs.