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The Experience of Stress in a

Canadian Dental School:

A Qualitative Study

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A thesis submitted to McGill University in partial fulfillment of the requirements of a Masters degree in dental sciences.

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ABSTRACT

The Experience of Stress Among Dentistry Students in Canada: A Qualitative Study

Dental education is a stressful experience for some students. Dental students have been found to report stress levels higher than in the general population, with 36% of students reporting significant psychological distress. Canadian dental students have reported an increase in anxiety, depression and hostility. No research was found to have investigated dental education stress using a qualitative analytical approach. Objectives: This study aimed to better understand the experience of stress among dentistry students using qualitative methodology. Methods: 12 recent graduates from the McGill University Faculty of Dentistry were interviewed using a semi-structured interview guide. Themes from the interviews were identified and coded by reading and rereading the texts until information-saturation occurred. Results: Firstly, four sources of stress were identified: workload pressure, fear of failure, faculty relations, and transition stress. Secondly, three effective coping mechanisms were highlighted by the students: seeking support, focusing on things that they can control, and participating in extra-curricular activities. Finally, three types of students with respect to their experience of stress were found: the highly stressed student, the moderately stressed student, and the relaxed student. This typology of dental student is new information that has not been studied before. Conclusion: Faculties need to identify and aid highly stressed students.

RÉSUMÉ

L'expérience du stress parmi les étudiants de médecine dentaire au Canada : Une étude qualitative.

L'éducation en médecine dentaire est une expérience angoissante pour les étudiants qui rapportent des niveaux de stress plus élevés que dans la population générale. Au Canada, on a ainsi observé des niveaux élevés d'anxiété, de dépression, et d'hostilité parmi les élèves d'école dentaire. Aucune étude sur ce sujet, toutefois, ne semble avoir adopté une approche qualitative. Objectif : Cette étude avait pour but de mieux comprendre l'expérience de stress parmi les étudiants de médecine dentaire à l'aide d'une méthodologie qualitative. Méthode : 12 gradués récents de la Faculté de Médecine Dentaire de l'Université McGill, ont été interviewés en tête à tête à l'aide d'un questionnaire semi-structuré. Les thèmes des entrevues, une fois retranscrites, ont été identifiés, codés, et interprétés. Résultats : premièrement, 4 sources de stress ont été identifiés : le volume du travail, la peur d'échouer, les interactions avec le personnel de la faculté, et la transition entre les phases pré-clinique et clinique du curriculum. Deuxièmement, 3 mécanismes d'adaptation efficaces ont été mentionnés par les étudiants : la recherche de soutien, la concentration sur les situations qui peuvent être contrôlées, et la participation dans des activités parascolaires. Finalement, 3 types d'étudiants par rapport à leur expérience du stress ont été identifiés : l'étudiant considérablement stressé, l'étudiant moyennement stressé, et l'étudiant décontracté. Conclusion : Les facultés de médecine dentaire devraient identifier les étudiants stressés et les aider d'une façon significative.

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1 - INTRODUCTION

Dental school is perceived to be stressful as it is known to be highly demanding and intellectually challenging. To be deemed a competent oral health professional, a student must learn complex levels of scientific knowledge and clinical skills while also developing the right social and behavioural attitudes toward patient care in a short period of time[1]. Dental students not only face the stressors that dental practitioners face, but also ones that are specific to a student[2].

It has been found that dental students have stress levels higher than in the general population. Stress in dental school has been significantly linked to student symptoms of anxiety, depression and hostility[3]. As well, students who are stressed or are suffering from burnout are at a higher risk of suicidal thoughts, alcohol and drug abuse, and impulsive sexual activity[4, 5]. Recently, researchers have begun to try to understand the causes of stress and identifying ways that students can cope in their educational environment. However, despite this wealth of information on the sources of stress, we still lack information on several issues: we ignore how dental students experience stress on a daily basis and how it evolves along the curriculum; we also know little on how they deal with the multiple sources of stress and what kind of support they would need or expect.

All research to date has used surveys and questionnaires to understand this topic. However, in recent past, scientists in the medical and nursing education field have begun using qualitative research in their studies on stress[6-8]. It is believed that using qualitative methodology can better aid the understanding of a complex and multi-factorial emotion like stress[9]. To this end, this study will be the first to explore the topic of stress in dental school using a qualitative approach.

2 – LITERATURE REVIEW

2.1 - Stress and Coping

The researcher Hans Seyle defined stress in the 1930s as a strain on living organisms[8]. It is a state of physical and mental tension resulting from exceeding an individual's resources[10]. During the 1970s, Richard Lazarus broadened and illuminated the stress process by deterring that stress reactions are dependent on how a person interprets or evaluates the event[11]. His and his partners work has been thus the leading theory on stress known as the "Stress appraisal-coping model[12]." The key elements of stress process are the individuals interpretation of the threat and his/her ability to cope with the situation[12]. Stress begins with a stressor on an individual, which is defined as "any real or imagined event, condition, situation or stimulus that instigates a strain[13]". The individual will have to appraise the stressor as challenging, and thus a positive experience, or one that is threatening, and thus a negative experience[12]. An appraisal is an evaluative process that includes the individual reflecting and interpreting the event. If the individual interprets the event as a stressful event, it will likely generate stress[14]. Once the stressor has been appraised, coping then occurs by deciding which behaviours should be utilized to handle the event. Coping is defined as "constantly changing cognitive and behavioural efforts to manage and specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person[12]". Coping is the effort to manage stress by attempting to reduce the perceived discrepancy between situation demands and personal resources[11]. Research on coping has found support for the categorization of coping into approach and avoidant strategies[14].

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Approach strategies are defined as direct efforts to change a stressful event. It includes support-seeking, understanding and acceptance, and problem solving[15]. Avoidant strategies are defined as the absence of attempts to change the situation[14]. It includes wishful thinking, avoiding problem, and denying that a problem exists[15]. Studies have shown that using approach strategies may prevent burnout while the use of avoidant strategies may cause burnout and other mood disturbances[15]. There have been numerous researches on effective coping mechanisms to manage stress. Some elements that have been proven to help cope with stress include having good time management, knowing ones limit, avoiding unrealistic demands, being flexible, slowing down, talking to others about problems and concerns, exercise, good diet and rest[16-18].

Small periods of stress have been found to be a positive element to an individual since it brings out energy and drive, encouraging creativity and higher achievement[10]. This type of stress is called eustress, also known as constructive stress. However, if the stress prevails after a significant period, it can become a negative element on an individual, causing exhaustion and loss of focus and attention[19]. This type of stress is called distress, also known as destructive stress. If distress continues for months or years, the individual may not have a chance to recover and deleterious effects can occur like burnout syndrome[8].

2.2 - Burnout

Burnout syndrome can be characterized as the result of chronic stress manifesting itself in psychological and physical exhaustion[18]. Burnout is not a symptom of stress but a result of unmanaged stress[9]. Some of the symptoms of burnout are emotional

exhaustion, reduced personal accomplishment, and depersonalization[20]. Emotional

exhaustion is the feeling of being emotionally used up[9]. Depersonalization occurs when

the people one deals with are treated as mere objects[9]. Reduced personal

accomplishment is characterized by a tendency to be harsh on oneself and viewing

oneself as meaningless[18].

2.3 - Ways to measure stress

There are a variety of tools to assess stress, sources of stress, depression, and

burnout. The most common instruments will be discussed.

The most commonly used tool to evaluate stress and anxiety is the state portion of

the State-trait anxiety inventory[21]. It is a self reported assessment device which tests state

anxiety which the author reflects as a "transitory emotional state or condition that is

characterized by subjective, consciously perceived feelings of tension, and apprehension,

and heightened autonomic nervous system activity[22]."

The most common survey used in dental studies to assess sources of stress

associated with undergraduate course work and training is the dental environment stress

questionnaire[23]. The questionnaire was devised by W.H. Garbee and colleagues to

survey dental students' perceptions of stress in 1980 and has been used since by the

majority of researchers studying the same topic. It is a 38-item questionnaire based on 4

point Likert scale with scores ranging from 1 (not stressful) to 4 (very stressful)[24].

Example items include "difficulty of class work" and "fear of failing course."

Participants are then asked to rate each item to reveal which items are most stressful[24].

The most commonly used tool to evaluate depression is the Beck Depression Inventory[25]. It correlates well with a diagnosis of clinical depression in non-psychiatric patients and has been validated for the use of college and medical students[21]. The questionnaire includes 21 multiple choice statements that measure presence and degree of depression among adolescents and adults. The statements are rank ordered and weighted to reflect the range of severity of the symptoms from 0 (neutral) to 3 (maximum severity)[25]. A score of 10-18 is an indicator of mild to moderate depression, 19-27 indicates moderate to severe depression, while a score of 30-63 is an indicator of severe depression[21].

The standard instrument used to measure burnout is the Maslach Burnout Inventory. The questionnaire consists of 22 items in three subscales: emotional exhaustion, depersonalization, and personal accomplishment[26]. The items are scored on a 7 point frequency scale ranging from 0 (never) to 6 (daily)[26]. High scores on emotional exhaustion and depersonalization and low scores on personal accomplishment are indicative of burnout[21].

2.4 - Epidemiology of stress among health care professionals

Healthcare professionals are known to be more stressed than the general population[8, 15, 16, 27-29]. In a recent study, 60% of doctors and nurses surveyed were found to be experiencing high levels of stress, much higher than in other non-health professions[27]. Professionals who are responsible for the health and wellbeing of others are at the forefront of many stressful elements since they are facing illness and death on a daily basis. As well, they must attend to patients behaviours, which could be demanding

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and even aggressive and are in threat of complaints, litigation[27]. Research in this field has indicated that three main sources of stress exist with health care professionals[30]. The first source is patients themselves: dealing with nervous or demanding patients, being around sick or dying patients, and dealing with complaints and litigation from patients[30]. The second source is non-patient related: relationships with co-workers, juggling time and emotional demands, and lack of support and essential resources[30]. And the third source of stress is organizational: paperwork, workload responsibilities, and decreasing autonomy[30]. Another study found that the most stressful work environment factors found in the healthcare professions to be lack of control over the job, high job demands, lack of support in the work relationships, and dealing with death and dying[31]. Due to these work stressors, healthcare professionals are a high risk for suicide, substance abuse problems, high job turnover, and premature retirement[27]. As well, healthcare professionals are known to be at a higher risk of developing burnout syndrome due to day-to-day stressors[32-34]. Moreover, in a recent study, 34% of healthcare professionals were found to exhibit poor mental health status[32].

Studies suggest that problem-focused coping may prevent burnout in healthcare professionals[7], while the use of avoidance coping predicted mental distress. Study on coping found that nurses who used distancing as a coping method were more likely to have better mental health[35]. Distancing is the method of looking on the bright side of things and not getting too involved in the lives of the patients that are being treated[16]. The same study found that the use of self-control was associated with poorer mental health. Self-control includes trying to keep feelings to oneself, trying to solve problems

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alone, and not letting others know how bad things are[16]. Therefore it is evident that all healthcare allies are in need of better social support.

2.5 - Epidemiology of stress among dentists

It has been widely documented that dentistry is a stressful career. Although dentists tend to enjoy better physical health, it has been shown that their mental health is poorer than the general public[36]. Recent studies reporting levels of distress and emotional exhaustion of dentists found between 19 to 38% of those surveyed always feel anxious or distressed[4, 37]. One study found that 26% of dentists surveyed said that they consistently suffer from headaches, backaches, and abdominal problems, all attributed as psychological signs of stress manifesting as physiological problems[38]. Depression in dentistry is also rampant, with one study finding 9% of dentists surveyed scored in the depressed range[38]. Most alarming from that study was the fact that only 15% of those depressed dentists were receiving treatment. This is worrying as depression has been found to cause difficulty in concentration, making decisions, and apathy[39].

The stressors associated with dentistry arise from the work environment and the personality of people found in the dental profession. The two most common stressors found in the work environment were time management and staying on schedule[29]. Other stressors appear to be coping with difficult or uncooperative patients, workload, governmental intervention, constant drive for perfection, management of staff, and isolation from peers[29]. A study that concentrated on the stressors of young dentists found that the work pace, level of accumulated debt and fear of making mistakes and of

litigation were highest[37]. These stressors were hypothesized to decrease with time in clinical practice.

Also the personality of people who are attracted to dentistry may be a cause or at least prone to stress. A study found that dentistry attracts people with compulsive personalities, perfectionists, and ones who require social approval and status[40].

2.6 - Epidemiology of stress among students

Attending university is known to be a very stressful and demanding experience. The young adults are expected to comprehend, attain and apply new knowledge while many may be living alone for the first time, trying to manage their finances, experiencing new relationships, and figuring out who they are as an individual and as an adult in society. It is well known that mental health problems are numerous and increasing among university and college students[41]. It has been reported that 13.8% of undergraduates and 11.3% of graduate students screened positive for depression[41]. The same study found that both female and male students were equally likely to be depressed.

The most common reasons cited for depression are low grades, loneliness, money problems, and relationship problems with significant others[42]. A recent study found that approximately 1 in 10 university students in the United States have considered suicide during the past 12 months[43], with 1% of all students having attempted suicide while in university or college[42]. The reasons cited for suicidal ideation were found to be different than reasons for depression, the reasons were feelings of hopelessness, loneliness, and helplessness[42]. It is evident that mental health problems exist with students obtaining higher education but what is alarming is that only 17% of depressed students seek

counseling or help[43]. Much of the literature focusing on risk factors among students have only looked at suicide and has found higher risks for students older than 25 or male undergraduates[44]. Other risk factors include engaging substance abuse, being from a lower socioeconomic status, being a minority, and attending a large university[41-44].

Having support around, as well as being involved in a social fraternity or sorority, and living with a significant other was found to protect students from suicidal ideation[43]. It is clear from the data that many students suffer psychological distress while attending higher education.

2.7 - Epidemiology of stress among dental students

Stress in dental school has been widely documented in the literature[23, 45-48]. Dental students have been found to have stress levels higher than in the general population[3, 49]. Dental student were observed to have similar emotional distress to patients received psychiatric attention[50]. Researchers have observed that more than one third of students (36%) reported significant psychological distress at the recommended cutoff point[23] and half of students (50%) scored in the clinical range of psychological disturbance[51]. A European multi-center study indicates that twenty-two percent of students achieved high scores on the Maslach Burnout Inventory emotional exhaustion scale[23]. Another study showed that students suffered significant signs of burnout, including 10% severe emotional exhaustion, 17% severe lack of accomplishment, and 20% severe depersonalization[20].

2.8 - Consequence of dental student stress

Stress in dental school has been significantly linked to student symptoms of anxiety, depression and hostility[52]. As well, students who are stressed or are suffering from burnout are at a higher risk of suicidal thoughts, alcohol and drug abuse, and impulsive sexual activity[1]. Recent studies conducted in the United Kingdom have shown that dental students were drinking excessively and experimenting with illicit drugs[4]. The study found that 47% of second year and 54% of final year students were binge drinking. The same study found that 35% of second year and 27% of final year students are experimenting with illicit drugs. In another study, 17% of Dutch dental students reported to getting drunk at least once a month[5].

2.9 - Sources of Dental Student Stress

The stressors encountered in dental school are well reported. Much research has been done internationally identifying the sources of stress[2, 23, 45-48, 51, 53-56]. European studies have identified lack of leisure time, examination anxiety and transition to the clinical phase of dental education as more stressful[20, 23]. In Australia, examination and grades have been found to be most stressful[45], while a similar study in India found that full loaded day and fear of failing were the main sources of stress[47]. Finally, in Fiji, the top four stressors were full loaded day, followed by criticism from clinical supervisors, amount of assigned work, and fear of failing[2]. As evident from these and other similar studies, identifying sources of stress in dental school is multi-factorial, but is related to managing workload, developing positive relationship with faculty, and maintaining quality of life[52].

2.10 - Epidemiology of Canadian Dental Schools

Historically, there has been little research done about stress in dental school here in Canada. However, recently there has been an increase of research coming out from Canada regarding dental school stress. Muirhead and Locker identified examination and grades produced the most academic stress followed by inconsistent feedback from instructors[57]. The study found that students who had higher graduating debt had a higher total and academic stress scores[57]. As well, a cohort study following dental students throughout their entire dental education program found that students seldom to occasionally perceive the dental education as a positive learning environment[52]. As well, students reported decreases in their levels of problem focused coping and self-esteem, increased uses of avoidance and wishful thinking as coping strategies, and more anxiety, depression and hostility at various points[52]. Therefore, it is evident that Canadian dental students are stressed and some are finding it difficult to cope. Since Gutherie et al. have shown that psychological distress in medical undergraduate training is predictive of occupational stress in later years[58]; it is important to learn more about this topic to learn which students are struggling with dental education stress and find ways to help these students.

2.11 - Limitation in Literature

As evident from the above literature, there is tremendous data on the prevalence of stress in dental school as well as the identification of sources of stress inherent in dental education. Researchers have realized that dental school stress is a major problem that faces many dental students. However, knowledge of prevalence of dental student

stress is not sufficient for prevention and adequate treatment of mental health problems among dental school students. What is also needed is the identification of factors that predict such problems. Questions like "why do some students struggle with stress while others are able to adapt?", "are there any personality differences between students and how they deal with stress?", and "can Faculties identify students who will need more help dealing with stress?" are all questions that need to be explored. Unfortunately, such research is scarce and mostly only deal with medical students and young physicians. These studies show that factors like previous mental health problems, being single, personality traits of neuroticism and self-criticism, perceived medical student stress, and coping traits of avoidance and wishful thinking are all risk factors to mental health problems[59-61]. Only one study has been found to use dental students as subjects in identifying risk factors. The study found that students with higher ability, capacity, and skill to identify, assess, and manage the emotions of one's self, of others, and of groups (defined as emotional intelligence) experienced less perceived stress while in dental school[49]. It is evident that more in-depth knowledge is need into the topic of stress in dental school. More information is needed on the topic of stress in dental school other than mere prevalence and sources of stress studies that are available.

Research on stress in dental school has revealed that students relate to stress in emotional terms[49]. Stress is a multi-factorial process that touches on all aspects of life: the psychological, physiological and socio-cultural. One of the dilemmas of researching stress is that it is interdependent with the field of emotion and coping. Lazarus explains that one should view stress, emotion, and coping as existing in a part-whole relationship[12]. Separating and researching one without the others distorts the phenomena and does not

provide an accurate understanding of the part or the whole[11]. Somerfield explains that "the dynamic, complex, and interactional process of the stress model presents conceptual and methodological challenges that make testing difficult[62]". It is because of these challenges that stress researchers have adopted new and different research approaches: one of the most widely used is qualitative research. Qualitative research allows complex ideas to be understood by allowing the informants to share what they know with the researcher. It allows the person with the information to speak freely and guide the topics to be discussed. Qualitative research methodology allows for complex, multi-factorial thoughts and feelings to surface and be understood by allowing in-depth conversations to occur, whereas a quantitative questionnaires cannot. Medical and nursing research has increased their reliance on qualitative methodology when researching stress. New research has been published using one-on-one interviews and focus groups that have explained the experiences of doctors, nurses, and students as they struggle with stress[6, 8, 63, 64]. Unfortunately, scientists studying dentistry and stress have not yet adopted this crucial methodology in their research. To date, all studies focused on dental student stress have been conducted using surveys and questionnaires.

It is evident that the literature on dental student stress is lacking the in-depth knowledge that a qualitative research design can provide. Therefore it is the aim of this project to use a qualitative approach to reveal the thoughts and feelings experienced by dental students.

2.12 - Summary

Stress is defined as any real or imagined event, condition, situation or stimulus that instigates a strain. When individuals cannot cope with the stressors in their environment, they may be at risk for physical and mental ailments. All healthcare professions are known to be a highly stressful. Dentists in particular have been found to have poorer mental health than the general public. Furthermore, dental students have been found to suffer from anxiety, hostility and depression, and some are using drugs and alcohol as a means to cope with stress. Recent research on dental student stress has focused on identifying sources of stress and highlighting ways for students to better cope with their environment. All research has used surveys and questionnaires to answer these questions. However, surveys and questionnaires are limited in their capacity to understand an emotion that is complex, multi-faceted such as stress. Therefore, there is a need to explore this topic using an innovative approach. It is the aim of this study to use interviews as a means to achieve an in-depth understanding of the experience of student stress in dental school.

3 - OBJECTIVES

This study aimed to ask recent graduates of dentistry for their perceptions of stress in dental school, in order to better understand the causes of stress and to come up with initiatives to decrease the stress levels of future students. The objectives were:

1) Understand how students experience stress

2) Identify sources of stress

3) Find out how students deal with stress

4) Provide recommendations to improve the learning environment

4 - METHODS

4.1 - Research Design

One way to learn in-depth knowledge about a topic is through qualitative research. Qualitative research uses a naturalistic approach that seeks to understand a phenomenon in context-specific settings[65]. By using inductive data analysis like one-on-one interviews, the researcher aims to illuminate and understand a situation. By using descriptive, expressive words, a new perspective can be learned that may be lost through surveys and questionnaires like the previous quantitative studies.

4.2 - Sample Criteria

This study is based on a principle of purposeful sampling strategy[66]. Students were actively-sought after in order to represent all types of students in the program. Past students who were academically weak and strong, and who were happy and angry were all searched for and included in the study. The sample criterion was kept very general to include as many students as possible.

The participants for this research project had to 1) have successfully graduated from the D.M.D program at McGill University, 2) graduated between 1-4 years prior to the research, 3) be in the Montreal region. The reason why participants needed to have graduated between 1 to 4 years before the interview was because it was hypothesized that these participants who had left dental school and had entered another chapter in theirs lives would have gained perspectives over their struggles and challenges. The time period 1 to 4 years was chosen as it would give enough time for proper reflection but not too much time to have lapsed that would cause memory loss.

4.3 - Sample Recruitment

Participant recruitment took place between September 2006 and March 2008. The exploratory nature of this study made it possible to adopt numerous recruitment methods at various times for data collection. They included two emails sent out through class email lists, a snowball effect, and active enrollment of participants by phone calls (see table 1). Initially the data collected needed to be very emergent and generative,

therefore all interested past students were invited. Interested graduates were initially

informed of the study by email which included information of the study (see appendix 1).

Email addresses of the graduates were collected from class email lists collected by the

principal investigator from informants. Since the principal investigator was a past

student, he had contact with past students in the program. These informants were

students from various years whom the principal investigator had known and was still in

contact with. The email invited the potential participants to contact the principal

investigator if interested. Two emails were sent out; one on September 2006 and one on

May 2007. The first email received 3 interested participants, while the other received

another 2 participants, for a total of 5 participants.

From these initial participants, the sampling became purposeful by selecting

information-rich cases. The interviewees who were found to be extreme (i.e. very

stressed or very relaxed) were asked to suggest students like themselves to be interviewed.

This process is called a snowball sampling where participants help find more participants

for the study. It was the interest of the study to interview similar stressed and relaxed

students to understand what made them different. The snowball sampling provided

another 3 participants to enroll for a total of 8 participants.

At the end of the data collection, students from both ends of the extreme were

found but little information was found from the average student. Therefore, active

enrollment was chosen to target these students as it was found that they were less willing

to approach us since they felt their experience was "uneventful" and thus less important.

Since the principal investigator was a past student, he chose to directly contact students

from his class which he felt were considered average from the faculty and had a normal

experience. These students were contacted by phone numbers and email addresses that

the principal investigator had from past interactions with the students. From this

approach, another 4 participants were enrolled, for a total of 12 participants.

Once interest was generated by the graduates, an email was sent out to them with

more detailed information of the study given, with emphasis given ensuring that potential

participants understood the rationale for the study (see appendix 2). Confidentiality and

anonymity was guaranteed by ensuring that any potentially identifying features such as

specific incidents would be removed from the transcripts.

Table 1 - Participant Recruitment

Participant Recruitment	Number of Participants
Email Invitation	5
Snowball Sampling	3
Active Recruitment	4

4.4 - Interview Procedure

We conducted one-on-one interviews with the participants. A week before the interview, an email was sent with information of the study and the consent form. The interview location, date, and time was set to the participants convenience. At the beginning of each interview, the participants were briefed on the study's objectives and any questions or concerns were addressed. After the initial briefing, all participants were asked to sign the consent form which was approved by the Institutional Review Board from the McGill University Faculty of Medicine (see appendix 3). All semi-structured interviews were performed by the principal researcher between November 2006 and January 2008. Interviews were between the principal investigator and the participant lasted between 45 and 90 minutes. The one-on-one interviews were conducted at the interviewee's home, at a coffee shop, or by phone (see table 2).

The interview guide was modified following two pilot focus group interviews conducted with 4 year students between 2005 and 2006 (see appendix 4). The interview guide was further modified during the interview process. The interview guide was divided into three themes: patterns of stress, effects of stress, dealing with stress. Each interview began with opening questions about stress in general and it was followed by more specific questions from the three themes in order to probe the participants for more information. For example, an opening question would be "did you experience stress in dental school?" and a more probing question would be "what about the clinic caused you stress?" In addition, most follow-up questions were constructed during the interview in response to the answers and gestures of the participants by adapting to different response patterns.

Finally, all participants were encouraged to speak openly and honestly on any topic or theme that they deemed important. The initial interviews were less structured and more generative, whereas later interviews were more structured and specific themes were discussed in depth. All interviews were audio-taped and transcribed verbatim.

Table 2 – Interview Location

Interview Location	Number of Participants
Participant's home	9
Coffee shop	2
Phone	3

4.5 - The Researcher as a Tool

In qualitative research, the researcher is a tool in the study[65]. Getting close to the

subject matter and using experience from the researchers past are elements that enhance

the depth of a qualitative inquiry. The kind of detachment and objectivity used in

quantitative research can limit the openness and understanding of what one is studying in

qualitative research[65]. Qualitative inquiry means going into the field and capturing what

is happening[67].

In order to achieve this, the researcher in this study used his past experience as a

dental student in the program to aid him when constructing the interview guide. Having

gone through the program, the research was able understand what many students found

stressful and how they tended to cope with it. However the researcher understood that

being too involved with the subject matter can cloud judgment and lead to the researcher

to see the situation as he had experienced and not as the participants have. Therefore, the

researcher practiced reflexivity throughout the research process[66]. Being reflexive is

defined as being attentive to and conscious of the origins of one's own perspective and

voice as well as the perspective voices of those one interviews[65]. It is done by

undertaking an ongoing examination of "what I know" and "how I know it" to decide

whether new ideas are originating from the participants or from the researcher's past.

The researcher also chose an approach of "empathic neutrality" when dealing with his

participants and the subject matter. Patton defines empathic neutrality as remaining

neutral on a topic while still being able to take and understand the stance, position, and

feelings of others[65].

As well, to make sure that the researcher in this study was not being directive in

his interviews, or leading his participants, he practices critical appraisal of his tape

recordings. After every interview, the research would listen to his recorded interviews

and judge his performance. To assess his interviews, the author chose Whyte's six-point

directiveness scale to help analyze his interviewing techniques[67].

4.6 - Questionnaire and Graph

Each participant was asked to fill out a confidential questionnaire that asked

demographic information such as current age, sex, and educational level upon entering

dental school (see appendix 5). As well, questions related to living and finances were

included. Finally, their overall stress level while in school was rated by having

participants chose a numerical digit ranging from 0 (no stress) to 10 (the most stress).

In addition to the questionnaire, participants were asked to plot their stress levels

on a stress chart. The graph provided to the participants had stress level on the y axis and

the number of years on the x axis. Participants were asked to plot their stress level

chronologically from the beginning of their dental school experience until graduation.

Once they were done, the participants were asked to explain their graphs.

The graphs were analyzed by constant comparative analysis with each other.

Although each graph was different, some very similar features were identified across all

graphs. A stress graph constructed by the principal investigator which simulates an average graph is included for illustrative purposes (see graph 1).

Graph 1 - Average Student Stress Timeline

The most
stress

Transitional Stress

Workload Pressure

Fear of Failure

Workload Pressure

Stress
Level

Faculty Relations

Transitional
Stress

No
Stress

1   2   3   4

Academic Year
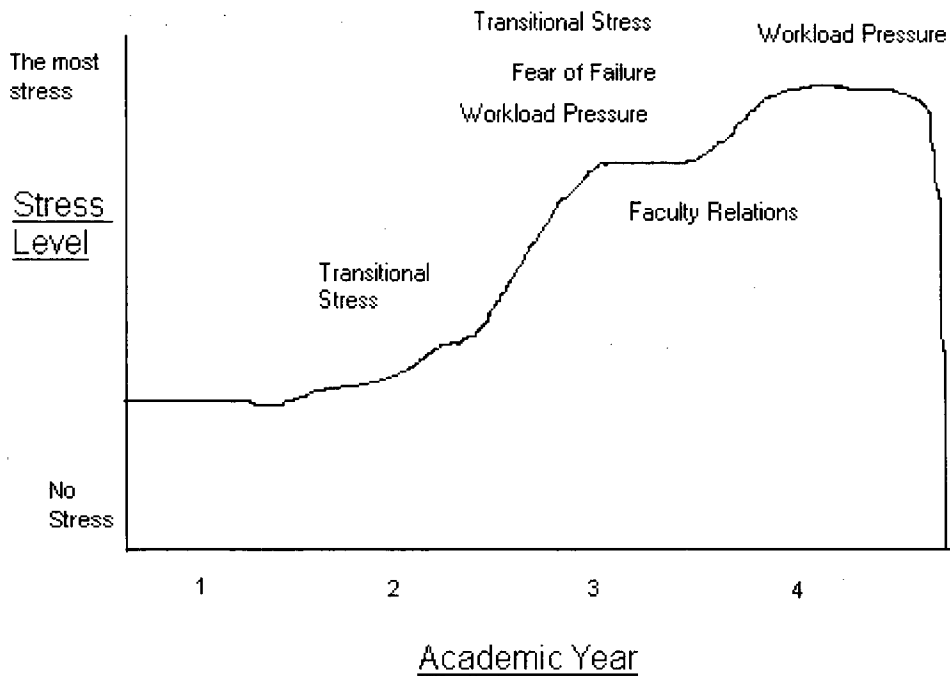
4.7 - Content Analysis

Content analysis of the interviews occurred using the principle of constant comparative method[68]. The theory evolves through continuous interplay between data collection and analysis, and thus data collection and analysis were carried on

simultaneously[69]. In total, the analysis included debriefing reports, coding of the complete transcripts into themes and sub-themes and finally, cross-analysis of the transcripts.

Firstly, short debriefing reports were competed following each interview in order to assess the overall effectiveness of the interview and to highlight the main themes mentioned in the interview (see appendix 6). The debriefing notes were done usually within one hour of the interview and at most within one day in order for the report to be as accurate and information-rich as possible. The assessment focused on new information obtained, old ideas reinforced or contradicted, salient themes present, critiquing of the methodology of the interviewer, and suggestions on what to ask in future interviews. These summary notes were the first approach at organizing and analyzing the data gathered, and were read by the researchers of the team. They helped highlight themes mentioned in the interviews and guided the subsequent interviews. The early interviews were emergent, seeking any information given and through the analysis of the debriefing notes, the later interviews were more fixed and targeted, bringing closure by moving toward confirmatory data collection.

The second part of analysis was full coding of the transcribed interviews using the constant comparative method[68]. This analysis also occurred during the data collection stage. Following full transcription of the interview, each transcript was micro-analyzed with each paragraph giving a code using the computer software, NVivo. This coding process involved reading the text and classifying sections of the data into themes, and categories. This coding process used the principle of inductive content analysis which specifies pattern-recognition should be done through open coding, meaning that the coding should be done with no existing framework or past coding guide. After all interviews were open coded, the initial codes were subsequently categorized into themes using a constant comparative method both between and within participants.

Finally, the categories and subcategories were linked together using an axial coding by answering questions of the type "who, when, where, why, how and with what consequences" conducted by deductive analysis[70]. This final confirmatory stage uses the themes and patterns from each interview to test and affirm authenticity and appropriateness by comparing and contrasting each interview in a cyclical, back and forth nature until all themes have been exhausted. By these steps, the analysis aided in

identifying overlap in the themes, and allowed several sub-themes to be merged into larger themes. As well through this process, some initial themes were found to be insignificant and thrown away while others deemed prominent and highlighted. This final stage of content analysis provides convergence of the data by looking at the information holistically to figure out what fits together. By going back and forth between each interview and comparing and contrasting the themes identified, content meaning emerged from raw interview data.

Lastly, relationships between the participants were analyzed using the advice of Miles and Huberman for matrix analyses and clustering[71]. The researchers suggest an economic way to observe associations by constructing a matrix display. Matrices are basically criss-crossed boxes in which one set of variable forms the heading for the column and another set forms the heading for the rows. Matrices help reduce data in a systemic way to help give meaning to information gathered[71]. Using this technique, a typology of students at the program emerged. At first, each participant was placed in one dimension of the matrix which was crossed with numerous variables, such as age, sex, sources of stress, and perceived stress level. Then, to test different patterns, the

participants were clustered using these variables to see whether patterns exist. Clustering

involves scanning, ordering, and selecting variables[71]. For example, male and female

participants were compared in dimensions of sources of stress, stress levels, coping

strategies, however no patterns were found. However, when participants were clustered

using level of stress as a variable, distinct patterns were noted when comparing with

sources of stress and coping strategies. Once the initial sense of a pattern was observed,

text was written down explaining the observation. Miles and Huberman advise writing

observations down as a form of analysis[71]. Verification of the pattern observed that lead

to classifying students into three typologies related to stress levels included careful

analyses of the matrices, looking for rival explanations of the data, and finally by further

testing through subsequent interviews and constant comparative analysis.

5 - RESULTS

A total of 12 graduates participated, 8 females and 4 males. The median age was 27, with a range of 24 to 29 (with one outlier at 39). No differences in the experience of stress were found with sex, age, or any of the other demographics (see table 3). Only self-evaluated stress levels and academic / clinical status was found to have a difference in how students experienced stress. Three of the students rated themselves as below average academically and clinically and had struggled in the program. Two of the students had to have repeated a year of the program. Four of the students believed they were above average and another five considered themselves average when compared to their classmates academically and clinically.

Participants were asked to rate their stress levels from 0 to 10. Using the survey and their interviewed accounts of their experiences, it was revealed that five of the students found the program highly stressful (rating their stress levels higher than 7), five found the program moderately stressful (stress level from 4 to 7), and two were found not find the program stressful at all (stress level below 4).

The students spoke at length about the perceived stresses that they faced in the program, how they tried to cope and ways they believe the faculty could do to help. The data from the interviews are divided into five main themes: student experience with stress, sources of stress, timeline of stress, coping mechanisms, and typology of students.

Table 3 – Sample Study

	N
Sex:	
Male	4
Female	8
Total number of participants:	**12**
Age:	
22-24 years	1
25-27 years	5
28-30 years	5
30 + years	1
Average Age: **27 years**	
Educational level (last level before entering dental school)	
College	5
College + 2 years of University	1
Completed University	6
Student Status	
In Province Students	6
Out of Province Students	6
International Students	0
Living Arrangements	
With Parents	5
Roommate	3
Alone	4
Grade Point Average (GPA)	
Above Average	4
Average	5
Below Average	3
Financial Worries	
Yes	6
No	6

5.1 - Student Experience with Stress

All students entered the program expecting the educational process to be highly demanding and were ready for the challenge. All students had excelled previously in their past educational endeavours and felt that they had the brain power and resolve to excel. The students were found to have a clear understanding of what stress means and how it can affect an individual's health, physically, mentally, and socially. All students felt that some stress is needed to excel in a program like dentistry. Many students felt that it was the highly demanding and stressful nature of their program is what motivated them to excel and prove themselves. However, most students believed that stress, once it reaches some sort of an imaginary threshold became a negative factor instead of a positive one.

5.1.1 - Definition of Stress

The students interviewed acknowledged that some stress is necessary in a students' life to motivate and push students to excel. However, the majority felt that the level of stress encountered in the program was too high and unmanageable. Students defined stress as a demand on them physically or mentally that can either be positive or negative on the person. Students defined positive stress as a motivator in achieving goals and helping them concentrate on their studies. One student felt that positive stress was the reason why he did well in his studies, saying it pushed him to excel. Students however identified negative stress as stress that prevented them from achieving their goals by causing lack of focus and distraction. Students did not believe that there are different types of stress that can be categorized as good or bad stress, but that the amount

of stress is what differentiates positive and negative stress. They felt that positive stress becomes negative when it becomes unmanageable and excessive. Students cited that at times the stress was too much when it came to studying that they would give up before starting. One student compared negative stress to a pressure cooker while another said it was a lack of digestion of the things being thrown at her. Another student spoke about a point where positive stress becomes negative, where stress is positive and motivating at the beginning but where it can turn negative when it reaches a certain point and they begin to lose focus and drive. One student explained it like an inverse "U" where stress helps motivate until a peak is reached and then it becomes a distractor.

> *MS11: Stress could be motivational but when it's overboard, it just really disrupts your life and your psychological well beings, I guess.*
>
> *Q: So you said some stress is good.*
>
> *MS11: Yeah, a little bit of stress is good. Too much is not great.*
>
> *Q: So there's a point where it goes from being good to becoming bad, you think? You reach a point?*
>
> *MS11: Yeah.*
>
> *Q: Do you think people can become depressed if the stress is long term? If they have long term stress, is that possible?*
>
> *MS11: Yeah, for sure.*

HS8:   I just-- like as I say, the best way I can describe it is sort of like being in a pressure cooker. Like, you just feel like so much tension. You feel like you could just kind of like snap. And you just feel so much tension inside and you feel like it's just taking so much energy and you feel like your shoulders are tight and you're thinking, like, not super negative thoughts but, you know, kind of thinking negative things. And you just don't feel kind of happy, bubbly, light. And you just-- even when you're not thinking about stuff, whatever, like you just realize how much tension you're physically carrying in your body and in your mind. And it's exhausting to your body and your mind and as I said, I just kind of was afraid that, you know, somehow there might be sort of a breaking point for me.

HS5:   It's just that you have much less time to actually digest whatever is thrown at you and it gets to the point where you don't know if you're actually meeting expectations, which is another key word throughout the whole school. You know, short nights, early mornings, you have to get there, set up, and it's always like everything is on a roll.

5.1.2 - Physical manifestation of Stress

Some students believed that negative stress caused physical ailments to their health. They believed that they had physical manifestations of the stress that they endured in the program. Majority of those students complained of sleepless nights filled with worries about patients and treatments. However, some students suffered more serious clinical signs of stress on their bodies. One student spoke extensively about how

she believes stress caused her to have gastric reflux that almost caused an ulcer, and graying of her hair. Another student said that she began grinding her teeth because of the stress she experienced during her final, and most stressful, year in dentistry.

> *HS4: But I'm not gonna forget what I was suffering from reflux and I had almost ulcers. You know, that's not normal for somebody who's been through other difficult times academically, non academically, and I've always been able to get through it. The effect that dentistry had on me and that fear that I always had, I don't think I imagined it. I think it was real.*

> *MS5: It's just like it gets to the point where you get home and you just can't let go of the whole dentistry part. In the back of your mind, you always have a checklist: I called this patient, I did this, I poured these models, yes I sent a case to the lab, okay; tomorrow, I have to go get this signature. It's always there. You sleep thinking about school and what needs to be done; you wake up in the morning, okay, this person is coming in today, I have to double-check... Which is not exactly pleasant.*

5.1.3 - Social manifestation of Stress

Students spoke about how the stress they experienced in dental school affected their social life and quality of life. They mentioned at not having time for family and friends due to exhaustion that they experienced in school. One student explained how she would arrive home "drained" and not have the energy to socialize with family.

Another student claimed to have had a large group of friends that he eventually had to stop seeing because he was too stressed to socialize. Many students reported similar stories, with one saying that even when she did go out with friends to socialize, she would feel guilty and be unable to enjoy herself because she would still be worried about dentistry. Students who lived at home said that they did not have much time for family and would feel guilty for missing family gatherings. A lack of social life was identified to be caused by both not having enough time and energy due to the demanding nature of dental school and because of the stress they endured. Some students who were afraid of their academic status said that they couldn't afford time to go out with friends, instead they would spend their time studying or preparing for patients. Other students said that they couldn't socialize because of lack of energy.

> *HS1:   Obviously if you had social life that would help you because change of scene, change of atmosphere, that would help. But if you're stressed because of the situation, how would you go out and then do the socializing? You can't socialize. I cannot do that. If I know that I'm in a bad situation or bad position, I cannot ignore that and go out and socialize hoping that it's going to change. No. You have to do something to change it. Nothing is going to change it. Yeah, but, no, I don't think socializing, for me, would work a lot.*

MS5: Yeah. I [lived at home]. But it got to the point when you finished clinic, you were so drained both physically and emotionally, that you got home and you just didn't have the strength for it. So you just sat around for an hour or so, not necessarily being social with your family or anything like that, but just... you know? And then just go straight to bed.

5.1.4 - Mental manifestation of Stress

One potential manifestation of stress is burnout. Although no clinical tools were used to test burnout, many students spoke in terms that reflected potentially suffering from burnout. Students spoke at being drained because of the stresses that they faced that left very little energy to anything else. Some students explained how they could not concentrate even on their studies due to this mental fatigue.

Another psychological manifestation of stress that students could face is depression, although no students interviewed felt that they suffered from the mental health disease while in dental school. Most of the stresses that students face tend to be short-term, and therefore most manifestations of stress that students indicated seemed to be due to short-term stress. However, for one student, the fear of becoming depressed was very significant. The student spoke about how depression runs in her family and how she was afraid that she would become depressed. Although she feels she did not become depressed, the student was worried about her health, observing signs that she may be heading towards depression. The student says that her fear of depression did not end at graduation, but stayed for 6 months after; she was afraid that her mental state had become weak and that a major stressful event would cause her to slip into depression.

HS8: For example, [a family member] has depression and one of the things that

I was scared of was that all of that stress would somehow cause that. And so--

but at the same time when you're in it you kind of don't really see it. And so even

though you're kind of like looking out for the symptoms of that, for example,

you're kind of at the same time you feel tired, you feel cranky, you feel whatever.

And, you know, you don't really realize that all of that is to do with stress and you

kind of look at that stuff and you think, "Oh, gees, am I going to end up getting

depressed?" or something like that.

MS10: I felt like I was really drained. [I would be] worn out by the end of the

day. Then you'd come home, you'd cook for yourself and you'd finally eat, and of

course you're always tired. I would just, like, I would sleep and then try to wake

up the next morning, still [I would find it] hard to wake up in the morning.

5.2 - Perceived sources of stress and timeline

Dental School is a highly-demanding and fatiguing experience and there are many

sources of stress inherent in its nature. Sources of stress are numerous and multi-factorial,

however, some were identified by students as causing more stress than others. These are:

workload stress, fear of failure, transition stress, and faculty relationship.

5.2.1 - Workload Stress: Requirements and Exams

Students at the faculty are evaluated by two methods: academically through examinations, and clinically through competency exams and clinic demonstrator evaluations. As well, for students in the clinical part of the program to pass the year, they must complete successfully a certain amount of dental treatments that is decided upon by the faculty. These ascribed dental treatments are known to the students are requirements that they need to finish to pass the year. Meeting these requirements and doing well on examinations to graduate was identified as the most common source of stress to all students. While one student did not feel any stress related to requirements, all other students, whether identified as highly stressed or not, felt that the requirement component to their program was the single most potent stressor. Self-identified weak and strong students alike spoke at great length at how trying to finish their requirements and doing well on exams was a major headache that they endured throughout the clinical part of the program. The informants identified stress related to completing requirements as more potent, constant and worrisome than stress related to examinations, which tended to be more temporary. Students believed that if they were not able to finish their requirements at the end of each year, they could fail. Students who were highly-stressed were more likely to feel that the Faculty didn't do enough to secure cases or feel that the Faculty wasn't sympathetic or helpful in their plights with patients.

Another source of stress that students identified was the numerous amounts of exams that they had. Although all students realized that frequent exams were to be expected in a program like dentistry, some complained of fatigue of amount of exams and the schedule of examinations. Informants spoke of their exam schedule in third year

where they recalled having an exam once every week for months and thus were constantly studying while still attending normal lectures and clinic. The informants complained of being tired and unable to lead a normal life other than studying.

HS4: Well, it wasn't really that you would fail, but they would just say that you had to meet these requirements. I never felt like, oh, if I don't meet my requirements, I'll pass. I always felt like I still have to do more. Until the last minute, I was still doing more, till the last days, you know?

HS5: I was probably very unlucky with the types of patients I got and that just, like, increased the stress level beyond belief. And there's times when you have to face stuff like this and you don't really know if somebody is listening to your complaints or actually kind of cares. You know, they're just looking at the numbers on those printouts and it's like, "oh! you're in the lowest third as far as pullings, or for operatives. So can you please step up that?" "Yeah, sure, I'll start drilling my own teeth and I'll have the requirements"!

HS1: Also, the exam times are not really good schedule. For example, we had five exams in a row. Every time, I mean, midterms, finals in third year, also for fourth year, so it is not really a good idea to have that. They could do it much better than that, I guess. They could spread out the exams. They could do that. I know that they could do that. Why they're doing it. I have no idea why they're

doing it. I have no idea. 'Cause I remember, well, that's how I am. I know some

people have to get enough sleep but I have to study and not-- I'm not really fast

reader, so I'm a slow reader. So I remember those nights. I could-- I got to sleep

maybe two hours a night. I'm not exaggerating. Literally, two hours a night.

5.2.2 - Fear of Failure

Fear of failure was found to be the most potent stress for students who were

identified as highly-stressed during dental school. Students who were struggling

complained at how they were constantly afraid of failing, that they felt that any mistake

that they did could cause them to fail the year. As well, one student who struggled only

in the beginning of the program explained how although she was doing well later in the

program, her stress level remained high because she felt she was labeled by the faculty as

weak and thus still a target to fail. Informants spoke about not having enough

reassurance from the faculty at whether they are doing well in order for them to stop

worrying about failing the year. Even the students who were informed by the faculty that

they were doing well continued to worry. They felt that there were too many

determinants in assessing whether students pass or fail and so the students continued to

worry as in their opinion, "you can screw up one thing and that could be the reason why

you fail."

HS2: Yeah I failed at the beginning. That was the first two units of the year and

then I had to do eight.

Q: So it was always at the back of your head?

HS2: Yeah. Every exam I had to do, I was stressed.

Q: So it was a constant threat?

HS2: Yeah. When I got into dentistry, it was better because I got into the routine and I knew how to study. Yeah, it was working. But at the beginning...

5.2.3 - Faculty Relations

One source of stress that was identified from students who were struggling was faculty relations. Many students felt that faculty was unresponsive and uncaring to their plight in the program, especially to finding and retaining patients and finishing their requirements. They felt that the faculty should have taken a more active role in helping them achieve their goals. Some students complained about not feeling like part of a team with the program and believed that the faculty did not care about them. Informants complained at how they felt targeted in the program and labeled as weak by the faculty. Students felt that added undue pressure on them and they blame the faculty for this. Many students spoke about how students are labeled early on by staff as good or bad students, specifically in the clinic, and how it is very hard to change how demonstrators and staff members perceive you once you have been labeled. Informants remarked how the early months of the clinic are very important since it is then that students get labeled.

> *MS5 : I tried to avoid dealing with faculty members as much as possible. I mean, I knew what they were gonna tell me, you know, "go find more cases". So I did that on my own. If ever it got really to the point where I couldn't anymore and I needed their help, then, fine, I would go address that with them.*

HS8: But then I felt like the faculty really kind of washed their hands of their

responsibility and so things like trying to get requirements done or trying to get

the patients to fulfill your requirements or trying to get your patients to come in.

And the faculty really kind of washed their hands of their responsibility and so

you had all of this weight on your shoulders but you sort of felt like your hands

were tied as to what you could do about it. But yet the faculty was holding you

accountable for it.

5.2.4 - Transition Stress

Another source of stress to students was the transitory periods within the program. The program consisted of three distinct periods: medicine, pre-clinical dentistry, and clinical dentistry and thus each brought a peak of stress during the transition. Students mentioned being anxious in these transition periods as they were unaware of what to expect, and thus were more stressed at these periods than other times. However, all students realized that this is to be expected and most students were excited when change was brought on as it signified that they were ready to move on. Students were found to be most anxious when entering the clinical component as this was the first time the students would be responsible to providing dental care to patient. The least anxious transition period was found to be entering the medical program as the students only needed 60% to pass and continue in the program.

MS11: Transition stress was more like a phase. Yeah, there was a lot of-- well, I think a lot of it, like, dental school, there's a lot of transition and even ...in a clinic, there's still transition. 'Cause you're doing things you've never done before.

5.3 - Stress Timeline

The graduates were asked to plot their stress levels on a graph from the beginning of dental school until graduation (see graph 1). Each participant was asked to explain their graph. While each participant had a somewhat different experience, and thus a different graph, some major similarities were observed. The results indicate that overall stress begins to increase once students enter the dental program and continues to increase until graduation. Very little stress was indicated in the first year and a half when students were in the medical program. This indicates that graduates now see that part of their education as being one without much stress. The first peak was a moderate one that occurred at the beginning of preclinical studies. Students identified that stress as one due to transition. Transitional stress was found to have temporary steep spikes that would go back to their original levels when students entered the preclinical and then as well, the clinical programs. The second peak, which was wider and larger, occurred once students entered the clinic. Students identified this stress as transitional stress and due to the stresses associated with faculty relations. It is at this stage that students meet and start associating on a regular basis with faculty staff and clinic demonstrators that will be evaluating them on a regular basis. Students explained that dealing with the faculty was stressful and it remained that way until graduation. In fourth year, another larger peak

can be seen that plateaus until graduation and then finally dips down to zero. Students

identified the last peak being caused by workload pressure and the fear of failing.

Upon graduation, the students entered residencies and associateships. The majority of the

participants believed that the stressors they experienced after graduation was lesser in

intensity than while in school. However, one participant believed that she now

experiences almost no stress while working in dentistry, while another felt that he

experiences more stress now. The sources of stress that the graduates now experience is

due to personal goals set by themselves and dealing with staff and patients.

5.4 - Coping Mechanisms

With various stressors that the students were facing on an on-going basis, the

participants spoke about different coping mechanisms they used to deal with their

environment. Talking to family, going out with friends, not thinking about their

problems, playing sports, and asking for help from clinical demonstrators were all

different coping strategies that the participants mentioned as trying, with varying degrees

of success. Upon analysis, three main effective coping strategies emerged as ones most

commonly used by the participants: seeking support, focusing on what is controllable,

and participating in extracurricular activities.

5.4.1 - Seeking support

The participants spoke at how the support of their family and friends is what kept

them sane. Support was seen to come from different sources: family, friends, significant

others, roommates, classmates, students from upper years, and faculty. It was evident

that the more happy students were the ones that had more support. Although the support of family and friends were regarded highly by the participants, it seemed that the most effective support came from classmates and faculty. The graduates mentioned that it was these individuals who truly understood what they were going through, who could relate, and offer some helpful advice.

> *NS6: Probably mostly if I had any problems, I would talk to my classmates because they sort of understood, they had the same issues. But I had two big sibs when I was in the first year and both of them were amazing. They were very, very helpful, they told me what to sort of focus on, what things I needed to know.*

5.4.2 - Focusing on what is controllable

All participants during the interviews had complained that success in dental school is dependent on many outside elements. Patients showing up to their appointments, the laboratory finishing their case on time, the clinic demonstrator agreeing to a certain treatment are all things that the students cannot control, yet influence how the student will fair in the program, especially in the clinic. However, it was evident through the interviews that the students who perceived that they had control over their success and achievement were more able to cope with the stressors encountered than the ones who did not. Moreover, even the students who felt that they did not have much control but concentrated their energy on the aspects of the program that they can control coped better in their environment.

MS7: *Yeah, I think I had some control. And I think that it shows when you work*

hard so I figured, you know... If you put your effort in. I think they're aware of

people that are trying and not trying to slip under the radar.

5.4.3 - Participating in extracurricular activities

Finally one effective way that students coped with their stressful environment is

to participate in extracurricular activities. Many of the participants said that jogging and

going to the gym helped release tension, while another student had an active position in a

dental association. They all mentioned that these activities on the side helped keep their

minds off of dentistry, which they said was needed to have a more balanced life.

MS3: *We'd go to movies, go out for dinners, whatever it happens to be.*

MS7: *Well I went to the gym a lot... And I run every morning [with my*

boyfriend]. I run and that helps me release [tension].

5.5 - Typology of Students

Most importantly, through the fabrication of matrices analysis and clustering, the

study found new and original information about the types of students that exist within a

dental program. Three different types of students were identified to exist in relation to

how they respond to stress. The three were the highly-stressed student, the moderately-

stressed student, and the non-stressed student. A table similar to the matrix used to

analyze the data is included below to help compare and contrast between the different

types of students (see table 4). The highly-stressed student was one that enjoyed the program least and was stressed throughout most of the program, the non-stressed student is one that seemed to pass through the program with ease and enjoyed the program extensively. Finally the third group is in the middle, who although felt the program was manageable, they also had periods of intense stress. There are differences in the personality and outlook to these three groups that we will speak of more thoroughly below.

Table 4– Summary of Typology of Students

Typology	Sources of Stress				Coping Techniques		
	Workload Stress	Transition Stress	Fear of Failure	Faculty Relations	Support	Control	Extra-curricular Activities
Highly Stressed (struggling)	✓	✓	✓	✓			
Highly Stressed (perfectionist)	✓	✓	✓				
Moderately Stressed	✓	✓			~	~	~
Relaxed	✓				✓	✓	✓

5.5.1 - The highly-stressed student

One group of students was identified as highly stressed. These students indicated that their experience studying dentistry was mostly a negative one as it was extremely stressful. They all had rated their stress levels higher than 7 out of 10. The students in

this category were found not to be homogeneous but to consist of two types of students. The majority of these students were students who at one point struggled with the program academically or clinically, while the other group consisted of students who were highly-critical perfectionists. The students who had struggled had either failed a year or an exam, or had been considered below average by the faculty. Two of the more highly stressed students interviewed were ones that had failed the year and had to repeat it. The other types of students had stressful personalities and were perfectionists. They identified themselves as high strung that put a lot of stress on themselves to over-achieve.

Both types of highly stressed students had potent stressors of fear of failure, while the group that had struggled with the program also had stress due to faculty relationship. These students had indicated they would stay up at nights with worry about school. They would not be able to go out or socialize with friends as they would be filled with guilt that they should be studying more or preparing for cases to better increase their chances of passing the year. These students had a negative impression of the faculty and felt that they were unhelpful and unsupportive. They felt that the faculty didn't understand or care about their problems and were unsympathetic with their plight.

> *HS8: And then in third year, you know, one of the things that I remember being*
> *so stressful about school was that there was a lot of things that we're responsible*
> *for. And so you had all of this weight on your shoulders but you sort of felt like*
> *your hands were tied as to what you could do about it. But yet the faculty was*
> *holding you accountable for it.*

Some students even felt that the faculty had targeted them to fail. These students eventually adopted an approach of hiding from the faculty. They spoke at how they would ask very little questions from the clinical demonstrators or from the clinic director because they wanted to be forgotten from the faculty. These students said many times that they felt that the best way to deal with the faculty is to be out of their way.

> *HS4:   You know, I felt like I was being watched and I have to hide, I have to be a chameleon ,I can't stand out, I have to just get out of here! Again, for me, I felt like what I had to do to sort of get through was to be invisible. That was sort of my ticket out. You know? Just try to be under the radar, get everything done, it's okay if they don't know your name. If you stand out, for me it was not a good thing, because either you stand out because you're really good, or you stand out because you're really bad. And having a problem with a patient and having to address the faculty, you stand out. So it was scary for me to stand out.*

Students in this category seemed to indicate feeling isolated and alone. Their support network seemed limited when compared to less stressed students. Stressed students did not feel supported by the Faculty, by upper year peers or even by their own classmates. Although stressed out students had their own support network (usually a few friends or classmates), it did not seem they had a large support network like students who were not stressed.

HS4: Our class itself was difficult to be in. I mean, I think a big, big factor in our experiences in dental school is your peers. I had some really good friends, but there were also a lot of other people who were very loud, who sort of made the experience not so great.

As well, they did not seem to adopt good coping mechanisms. Students in this group did not participate in any extracurricular activities or had given up their hobbies because they felt that time did not permit it.

HS4: I felt like I was lacking exercise or something, or lacking oxygen. And just being in the building itself was difficult, morning till night, sitting for lectures, never-ending lectures, and then going to the lab, never-ending lab and it's never good enough and...No social life, after that. But also health-wise I was much more active in the first year. In the second year, I started gaining weight. I couldn't be as active as I wanted to because I just didn't have the time, I was in the lab till late.

Students who were highly-stressed were more likely to feel that they had no control in the program than ones who were not stressed. Stressed students complained of always being in fear of failure, of never knowing their status in class and feeling helpless in trying to change their environment. As well, they felt that nothing could be done to fix their problems. The students who felt lack of control were more likely to use helplessness tactics in dealing with their stress like worrying, avoiding, and complaining

instead of trying to fix the problems that they faced.

> *HS8:   Well, I found it very difficult to cope with the stress because I found that*
>
> *we didn't really have any down time. I think also because of the fact that it was a*
>
> *type of-- as we talked you, you feel a little helpless to be able to control your*
>
> *situation. It was the type of stress that, you know, if you could just go out and do*
>
> *something to fix your situation , then that would give you control and give you*
>
> *something productive to do. But it was the type of stress that there wasn't*
>
> *anything you could do about it and we tried not to think about it too much but that*
>
> *was basically the only thing you could do was just think about it.*

5.5.2 - The moderately-stressed student

The second group was the moderately stressed students. These students comprised the majority of the students in the class who felt that the program was stressful but manageable. They believed that the stress was controllable with the necessary energy placed in to studying and preparation. These students rated their stress level between 4 to 7 out of 10. The students felt that the stress they encountered pushed them and motivated them to excel. These students considered themselves average academically and clinically. They faced problems with patients and tended to try to deal with them by themselves. Although the students in this category weren't close to the faculty, they respected them and felt that they were there to help them if they needed them, although they tended to feel that the faculty wasn't that effective in helping.

The main stressors identified by this group were found to be requirements and

exams. They believed that the exams were too close together and they became exhausted from the on-going studying. They also complained at how they were excessively stressed trying to finish requirements. This group of students also believed that they could fail the year if they did not finish their requirements. Although they said that they knew that other classmates were worst off then them academically or clinically, they would every once in awhile, be overcome with worries of something going wrong and failing the year.

Students in this group were less isolated than the highly-stressed students. They had more friends within the class and also had contacts with upper years and took advantage of the information that they had. Their relationship with the faculty was stronger than the highly-stressed students. They were exceptionally close with the clinical demonstrators, who they felt confident in asking questions of the demonstrators and felt that it was acceptable to make mistakes in the clinic to learn.

> *MS3: Well, for me, my-- having good friendships with people in the classes above me helped quite a bit... Above me because that-- they're all so, "Okay, expect that, don't worry about that, that will happen, or that person's--" they put things more into perspective. And that was the biggest thing. When you were inside the situation, you tend to over blow things up. When someone comes and tells you, "Oh, he does that to everybody," or "She's mean to everybody," then you kind of go with the flow. So I think that's probably helped most.*

The moderately-stressed students tried to find time to do social activities when time permitted, but were unable to continue extra-curricular activities on a regular basis.

However, between examinations or during down-time in the program, the students would try to socialize. Most of the activities in this group were things that could be done sporadically, like going to the movies or going to a restaurant.

Finally, the students in this group were similar to the stressed group in that they also felt that most things within the program were outside their control. However, it did not seem to worry the students as much as in the stressed group. They tended to focus on the things that they can control.

5.5.3 - The relaxed student

Students who were identified as relaxed rated their stress level as being below 4 out of 10. They felt that dental education was relatively easy and none had any problems academically or clinically. It is important to note that these students in this group were not the top academically, they were average to above average students but were usually top in clinical production and clinical feedback. These students possessed confidence in their skills and were liked by their patients and peers. They spoke of their good relationship with their patients and not having difficulties meeting their requirements. They also possessed good relationship with their clinical instructors and their full-time faculty staff. They felt that the staff was there to help and support them if they needed them. However, the majority of these students did not need the faculty's aid but when they did need help from the faculty, they found the faculty to be helpful in easing their worries and pointing them in the right direction. The major source of stress identified for this group was stress due to finishing requirements, although one student in this group felt that he did not experience any stress at all in dentistry.

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Students in this category had lots of support, from friends, family, and faculty. One of the more effective support network in this group was their friendship with students from upper years. They spoke about how older students or even faculty members were helpful in guiding them in the right direction and help calm their nerves.

> *NS9:   And the other thing is that I felt that I had a lot of support around me with friends and students and-- as well as faculty. And I think that there's some students that didn't have the faculty support that I had that made it easier for me and they felt more at risk and more targeted. And I didn't have those issues so I-- so that would definitely have added stress.*

Other then a rich support network, students in this category coped with stress by attempting to participate in many extracurricular activities. All of the students in this group continued to run, jog, and go to the gym daily while in dentistry. As well, students felt that they had control in the program and they believed that with proper studying and attention, they would easily pass the program.

> *NS6:   Yeah. I think if you put the time in, it wasn't anything overwhelming that someone couldn't do. As long as you put the time in, things were fine. The same with the requirement, as long as you kept up with the patients, made sure your patients were booked. You know, I didn't find any time constraint or anything like that.*

6 - DISCUSSION

6.1 - Introduction

McGill University faculty of Dentistry admits 30 students to its four-year undergraduate program, leading to the granting of a D.M.D degree. The first 18 months of the curriculum is taught by the Faculty of Medicine. Dental students participate in all aspects of this program, which includes lectures, labs and small group sessions. The next 6 months is spent in pre-clinical training in dentistry, with about half the time devoted to lectures and the remainder to developing technical skills. The final two years of the program are spent at the Undergraduate Dental Clinic, where students divide their time equally between clinics and attending lectures. Students in the clinical part of the program are the primary health caregivers for their patients. They are expected to manage and treat a wide variety of oral health conditions. After obtaining their degree, most students take an additional year of post-graduate training before entering practice.

6.2 - Student Experience with Stress

Although some students reported high stress levels while studying dentistry, all students agreed that stress is an expected part of dental education and that at normal levels it helped motivate the students to study and excel. Researchers have identified this positive effect of stress as "constructive stress."[10] Constructive stress can be found with low to moderate levels of stress which acts in an energizing way to stimulate creativity and productivity[8]. However, some students felt that the levels of stress that they encountered became excessive and that it negatively affected their lives.

Researchers have identified this type of stress as destructive stress[10]. Destructive stress

can be found with high stress levels which causes a breakdown in a person's physical and

mental abilities leading to a decrease in productivity[11]. The difference between

destructive and constructive stress is not the type of stress but the level of stress; the

productivity continues to increase with increasing level of stress until it reaches a peak

when the productivity level begins to decrease with increasing level of stress[10].

No gender differences were found in the study. This finding is similar to other research

on gender differences and stress levels that have been found to be inconclusive. It is

known that women in the general population have a higher risk for depression and

anxiety[72]. Some studies have found differences in stress levels between the genders[2, 45, 46, 54, 56, 73], while others have not[23, 58, 74]. What has been found to be conclusive is that there

are differences in how the different genders deal with stress, with females being more

vocal in reporting and speaking about stress[51, 75].

6.3 - Perceived Sources of Stress

This study identified four sources of stress: workload stress due to examinations

and requirements, fear of failure, transition stress, and lack of faculty support.

6.3.1 – Workload Stress

The study found out that all students complained about the stresses associated

with workload like requirements and examinations. These fears seemed to be the most

common complaints with all students. This finding supports Davis et al. who concluded

that workload pressure and time management are significant predictors of dental students

mood state[76] and other studies that have consistently shown that dental students perceive academic-related problems to be more stressful than non-academic ones[19, 51, 54, 75]. Dental school is known to be very time-consuming and demanding. Students need to learn all aspects of a profession within a short period of time. Faculties need to find ways to modify and alter their exams to help students cope better with their environment while continuing to learn. One study that compared dental students from a traditional school and a more progressive school found that students from the school that focused on lectures and exams were more stressed than students in the problem-based learning school[77].

Although the informants complained about the frequency and schedule of exams as a source of stress, their major concern when speaking about workload stress was requirements. This agrees with Dodge et al. who found students reporting significantly higher stress levels when clinical training is based on unit requirement[78]. Many felt that the faculty didn't do enough to help them meet their requirements and that the students were being blamed for things that the faculty should be doing, like making sure there is enough patients for the students. This agrees with literature that found that one reason for low morale with dental students is due to student constant concern over patient pool[79]. One way to eliminate this source of stress is by eliminating requirements as a prerequisite to pass. Faculties may worry that eliminating requirements will cause students to be lazy, but research by Dodge suggests that dental and medical training can remove requirements from the program and it will not weaken the student education[78]. Another approach which some students have suggested is a patient-centered approach, where students would be in charge of all treatments necessary for their patients as opposed to a

requirement based approach. This is a favored approach by students who feel that it would encourage students to see patients in a more holistic approach.

6.3.2 – Fear of Failure

The second of source of stress identified was fear of failure. This was a worry mainly seen only by the highly-stressed students. Several authors have noted that fear of failure is a significant source of stress for dental students[47, 53, 55]. It was observed in our study that students who struggled clinically were more stressed about failing than students who struggled academically. This finding agrees with recent literature that found dental students perceive their clinical studies as the most important aspect of their dental education[79, 80]. Others who were afraid of failing were actually doing well in the program, but had high self-expectations and had placed undue pressures on themselves to excel. The participants who fell in this category admit to being perfectionists. Both students who are struggling and are perfectionists need a lot of feedback from the faculty about their progress. Students who are struggling will benefit from more feedback that provides information on how they can improve. Whereas perfectionist students will benefit from feedback as they are in need of reassurance over their achievements.

6.3.3 – Faculty Relations

Stress related to faculty support was rated highly among students who were struggling in the program, which agrees with literature that found students reporting higher levels of stress on the "faculty and administration" factor tended to show lower grades for clinical competency and contextual understanding[19]. Studies have also shown

that poor student-faculty relations is the factor most strongly associated with a decrease in student morale[79]. Therefore students who are struggling academically or clinically have higher stress levels when relating with faculty. Through our research, the reason for this was hypothesized to be that these students are in a very vulnerable state and need the support from the faculty. Therefore, when staff provides negative feedback to the students on how they are doing, the students begin to reject the faculty and see the staff as an enemy instead of a friend. This may be the reason why in the interviews, some of the participants complained at how they felt the staff was unsympathetic to their problems as they struggled in the program. The faculties need to realize that these students are in a dire need of faculty support and recognition as they are struggling academically or clinically and need to know how to improve. Faculties could help by identifying the weaker students and providing them with support on how to improve instead of merely focusing on their weaknesses.

6.3.4 – Transition Stress

Another source of stress mentioned was stress during transitory periods. The students first enter the medical program, followed by preclinical dentistry and finally clinical program and therefore once a student has become confident to the program, change occurs and students are forced to change location and start new meeting new staff and learning new material. Participants explained that they were most worried when entering the clinic. Studies have shown this to be the most stressful time for dental students. A Japanese study found a peak in stress levels during transition between preclinic and clinic studies while a Fiji study found an increase in overall mean stress

scores over the years with a peak in third year when students enter the clinic[2, 51, 74]. The participants mentioned that the stress they felt during transition was mostly excitement about the change, but that they also had feelings of anxiousness and uncertainty over this uncharted territory. Understanding this, the faculty could do more to explain the new program and try having a meeting with students at the beginning of each new year to answer questions and calm fears. At our program, information sessions are given at the beginning of each term, however this may not be enough and more innovative ways could be thought to provide more information to students.

6.4 – Stress as an Environmental Factor or Personality Trait

It is evident that stress in dental school cannot be equivocally categorized as environmental or as a personality trait. The students who were categorized as highly stressed were observed to be from two sources, one environmental and the other due to a personality trait.

The majority of the highly stressed students were stressed due to an environmental factor: doing poorly academically and/or clinically. Because these students were struggling, they became afraid of failing and felt helpless in changing their outcome. Therefore, in this situation, it was the environmental status of struggling with the curriculum that caused their stress. This observation agrees with literature which found that students reporting higher levels of stress tended to show lower grades for clinical competency and contextual understanding[19]. The other group was stressed due to a personality trait: they identified themselves as self-critical and perfectionists. These students were doing well academically and clinically and their outside environment was

not stressful. However, internally, they placed high expectations on themselves and tended to be unhappy with their results. Furthermore, they explained that they would worry over their status even when they knew they were doing better than a lot of their classmates. As was mentioned previously, many studies exist that show the link between self-critical perfectionism and distress symptoms[17, 81-87]. Therefore in this study, stress was observed to originate both from the dental school environment and from students' own personality traits.

6.5 – Stress Timeline

The informants were also asked to chart their stress levels on a stress chart. The overall stress increases once the students enter dentistry and continues to increase until graduation. This agrees with literature that suggests a trend of increasing overall mean stress scores over the years[2, 51, 57, 74]. Research also has observed a spike in stress levels during the transition period between preclinical and clinical training[20, 51]. Research from Canada also concluded that third year may be a critical point due to the transition to clinic and patient care and students may be in need for additional support.[57] Finally our stress chart indicates another larger peak once students enter fourth year which plateaus until graduation. Fourth year is the final year where requirements and board exams are due and students explained that they were stressed over workload and fear of failure. This agrees with some literature that found that the final year produces the greatest anxiety due to final examinations and worries over the future[4, 47, 48, 55].

The majority of the participants believed that upon graduation, their stress levels decreased and become more easily controllable. This is hypothesized to be the case

because they were now dealing with stress related to personal goals, and dealing with staff and patients. In these situations, the participants are in a superior position and have more control in the outcome as compared to when they were students. There is literature in the medical field that indicates young doctors find the first year post-graduation the most stressful, with a decrease in stress levels as time passes[88-90]. However, most recent studies tend to disagree with these results, showing that stress levels remain high with time[91]. As of yet, there has been no study that compares the stress levels of dental or medical students to that of young doctors. However, research has shown that one of the predictors of mental health problems in young doctors is perceived medical school stress[59, 60]. Therefore some of the students who will struggle with stress during their education will go on to struggle with stress and may develop mental health problems when they become young doctors. Therefore it is important to find these students while in the education process to provide them with the necessary skills to deal with the stressors that they may face, while in school and when they graduate.

6.6 - Coping Mechanisms

Recent studies have questioned why some dental students are better able to cope with stressors better than others. Research has suggested that students who have well-developed coping strategies may be better in handling educational stress[1, 12, 49]. Our study found three coping strategies that help the students interviewed to better deal with their stressful environment. The three coping strategies identified were: having good support, feeling in control, and participating in extra-curricular activities.

6.6.1 - Seeking Support

Participants that had a stronger support group and a richer network fared better than students that did not. Students who were isolated and were loners were more likely to be found in the highly-stressed group. Social support has been found to help in stress reduction, increased well-being, and reduced mortality[92]. The quality of the support is more important than the quantity. Research has found that the quality of the support is associated with well-being[93]. Having an intimate confiding relationship appears to be the best measure of social support and reduces the consequence of stressful experience[94].

Research has found that the most helpful support group for dental students is classmates since they are experiencing similar problems[64, 95]. It would make sense that the students that had more friends would have more access to solutions than not. A study found students perceive informal peer advice as the most effective type of advice, even faring better than professional and self advice[95]. Peer support, consisting of both classmates and upper classmates, were able to provide solutions since they may have gone through similar problems.

Although friends and peers were found to be important, our research found that having a network with older students seemed to be just as important. Family support wasn't found to be as important as support from colleagues. A recent study found that students living with their parents had higher stress scores than students with other living arrangements[57]. However, this contradicts other studies, one finding the opposite to be true showing that students who lived at home while attending dental school gain some protection against stress[23] while another finding no difference between living at home or away[74]. From the students who lived alone, none complained about family except for one

who struggled in her first year because she was missing family and felt isolated and alone. This suggests that more attention needs to be paid to first year students who are living alone in a new city with very little friends or family.

Adjusted students also had better networks with faculty members and enjoyed a better relationship. Whether that is due to the fact that the faculty likes them because they are doing well academically or whether they are doing better academically because of their network with faculty members is unknown. A study found that approximately 40% of students consulted with advisors, course director, and other faculty members over an issue during their dental education. However, their effectiveness was seen to be very little compared to other modes of support, like peer, self and professional[95]. This is a problem since faculty advice and support should be one of the more effective modes of problem-seeking advice. Support is very important in that it helps student cope with their environment. Therefore the students who lack this network or are reserved in sharing their problems will not benefit from its effect.

6.6.2 – Focusing on what is controllable

One of the reasons why some individuals find dentistry stressful is due to the uncontrollable nature of the profession: patient management, treatment results, acquisition of skills, can be in part, uncontrollable to the practitioner and the practitioner-student. Control and power has been linked to stress. In a study of Canadian dental students, a national survey found that one of the top concerns of students was feeling powerless in the educational system[57]. A person who feels they have some control of the results that they achieve will be more motivated to put more effort[96]. In contrast, if a

person feels that their effort has no effect on the results achieved, the person will be less inclined to try. Locus of control refers to the perception of the amount of control one believes they have over their lives[97]. If one believes that they have control over their fate, they have a higher internal locus of control. However, if one believes that external events and people control their fate, they have high external locus of control. Having a high external locus of control has been found to be a major source of stress[97]. Perceived control refers to an individual's perceived ability to predict and influence outcome in their environment[96]. Studies have shown that students perceived control is linked with both academic motivation and achievement[98]. As well, believing that the locus of control is internal, one is more willing to rely on self to solve problems and become creative in finding solutions. If the locus of control is external, one is more willing to adopt helplessness behaviours.

Although it will be impossible to eliminate all of the uncontrollable components of dental education, administrators should try to give as much control to students as possible. For examples, students spoke about demonstrators showing up late or not showing up at all at times at the clinic and therefore causing students much worry. Another complaint of students is about patient compliance to the treatments suggested. Therefore, these can be controlled by adopting an innovative, and maybe tougher approach with clinic demonstrators and patients.

6.6.3 - Participating in extracurricular activities

Our results showed that students who were less stressed were more likely to carry on on-going extracurricular activities while ones who were stressed had none. Well

adjusted students had many sporting activities like jogging, cycling and soccer. One student found time to jog everyday while in school. Regular exercise and a healthy image are important to well-being. Moreover, the link between depressive symptoms and lack of physical active is evident[28]. It is well known that diet, exercise and sleep affects a persons well being[28, 99]. One study in a Japanese dental school found that students who had a habit of regular exercise of more than once a week showed significant lower stress levels and higher psychological general well being[74]. While a Canadian dental school study found that students' appearance self-esteem decreased over time, which the author hypothesized to be due to the fact that the students not having enough time for regular exercise[52]. Our study shows that the students who are able to regularly exercise were less stressed than ones who were not.

Not all students interviewed chose sports as their extracurricular activity, some were involved in social clubs and professional organizations. The students who were involved in non-sport activities were found to also be less stressed. Therefore it is not solely due to physical exercise that students gets benefit, but it may be related to social interaction that may add another level of support. There is numerous literature evidence that high quality extracurricular activities, like sports and school clubs, is positively linked to academic outcomes, favourable mental health such as high self-esteem and lower rates of depression[100]. By participating in these activities, students learn teamwork, leadership, and the importance of winning and losing.

It has been concluded that participating in extracurricular activities provides these positive elements by promoting interpersonal and social skills[101]. Good social skills have been found to safeguard an individual from an extensive list of psychosocial problems

like loneliness, anxiety, and depression[94, 102, 103]. Furthermore, there is evidence that social skills help individual better cope with stressful events[102]. This is hypothesized to be done because these people are more likely to understand how to effectively deal with problems based on their past successes[103]. As well, people with effective social skills are able to marshal support from their social network when faced with stressors[94]. This is in contrast to students who were more stressed who said that they either never had any activities or had to give them up later on because of time constraint.

Whether the highly stressed never participated in extracurricular activities because the stress and fears of falling behind forced them to quit leisure activities or whether these students were never invested in extracurricular activities cannot be known. However, studies have shown that the strongest predictor of emotional exhaustion was limitation of leisure activities[20]. It is understandable for the students who are afraid of failing to feel that they must spend every moment studying dentistry, although in fact, this might be detrimental in the long run. The purpose is not to demonstrate whether stress affects social life or vice versa. It is likely to be difficult, if not impossible, to conclusively determine which came first. However, through our research, it is clear that the students who could afford or were able to make time for extracurricular activities had protective elements against stress and anxiety.

6.7 - Typology of Students

Most importantly, this study found interesting and original results by identifying three types of students that exist within the dental program. No other study has attempted

to classify dental students in this way. This information can aid faculty members in adopting different techniques in how to help their students cope with the stresses of dental education

6.7.1 - The highly-stressed student

The results indicate that the highly-stressed students are unable to function regularly due to the stressors encountered. The study found that the highly stressed students are not homogeneous but can be divided into two subcategories: students who did or were struggling academically or clinically in the program and ones that were classified as perfectionists. The students that struggled throughout the course, or struggled at one brief period were both found to be highly-stressed. Previous studies in the dental field have shown that grades in dental school significantly predict anxiety and depression scores. It indicates that academic performance directly affects stress levels[75, 104]. Burk and Bender found that students with a low class rank were more likely to report higher severity of a number of problems in performance, emotional and adjustment categories[95]. In a study looking at medical students, it found that grades significantly predicted anxiety and depression scores[104]. While it has been found that grades can cause anxiety, it has not been proven whether anxiety negative affects grades. One study found that there is a weak but significant negative correlation between anxiety and performance[105], while a more recent study found no correlation at all[19].

The other group was a smaller minority who were overly stressed even though they were strong academically and clinically. This group consists of students that are self-professed perfectionists. Perfectionism is defined as high and unrealistic standards

with relentless self criticism[81]. Perfectionism includes both adaptive (positive or neutral) and maladaptive (negative or neurotic) forms. Adaptive characteristics include a desire to excel, high goal-setting, high self-esteem and social adjustment[87]. Maladaptive components include a strong focus on avoiding error, overly general high standards, feelings of unworthiness, dependent on performance, and responses to failure involving harsh views of self[81]. Recent work on perfectionism has revealed two types of perfectionism: personal standards and self-critical perfectionism[17, 83, 84]. Personal standards perfectionism has been found to contain individuals with mainly adaptive components mentioned above, while self-critical perfectionism as having mainly maladaptive components[84]. Several studies have confirmed the large link between self-critical perfectionism and depressive symptoms[17, 81-87]. A longitudinal study of doctors showed that self-criticism to be the foremost characteristic predicting stress and depression over ten years[106]. Another study found that students who are self-critical perfectionists were at a significant greater risk for psychological distress[86]. Self-critical perfectionism is assumed to generate high levels of daily stress because they engage in rigorous self-evaluations and magnify negative aspects of events, they are also concerned about rejection and loss of respect from others and they tend to use avoidant coping mechanisms[17].

Furthermore, this study found that both groups of the highly stressed students had a fear of failure while only the subcategory of struggling students also were stressed due to their relationship with the faculty. These students tended to worry about their status in class, afraid that they will fall behind, and fail. This is because the students who are struggling have real fears that they could fail while the students who are not struggling

but are perfectionist may underestimate their achievements and fear they are at risk as well. The students who were behind in this category also had an antagonistic relationship with the faculty. The students were fearful of standing out, and most wanted to hide out and not be seen in the program.

It was revealed that the struggling students adopted helpless behaviours like avoiding, worrying and other anti-social behaviour when it came to the faculty. These behaviours such as avoiding and worrying are considered maladaptive coping techniques as well as blaming self and wishful thinking[85]. While adaptive coping techniques are problem-focused thinking and seeking social support[85]. Studies have shown that more stressed students were found to use ineffective coping skills, which were identified by professional students to include acting angry, complaining, not thinking about the problem, thinking of the worst, and altering eating habits[92]. Most expressed fears of making mistakes and viewed mistakes as detrimental to their survival as opposed to a chance to learn. This feeling tended to come from both groups in this category: the struggling students who are afraid that any more mistakes or weaknesses from their side would help the faculty decide that they should fail and the perfectionism group who are overly concerned with their mistakes and failures. Burk and Bender found that the problems perceived as most serious by students were of an emotional nature relating to academic performance[95]. Therefore students who are struggling would be expected to be more stressed. Students had very little perceived support and lack any networks observed with other non-stressed classmates. There is a need to help establish support and a good solid network for these students.

Students in this category were found to have very poor coping mechanisms. Highly-stressed students were likely to have very little social activities outside of dentistry and when they do go out, it tended to be with other dental students where most of the conversation revolved around dentistry. Whether having no social life caused the students to be stressed or the existing stress caused them to not have a social life is unclear. However, it is known that stress in dental students is linked to low emotional intelligence, which was shown to predict a withdrawal from social support network[49].

One network that was deemed very helpful by most students is the sibling program where students are paired up with an upper year student in order for the student to guide and provide advise to the younger, more novice student. Many schools have similar type of peer support programs, whether organized formally or informally. However, students in this category didn't utilize the program instead relied on a few close classmates or themselves for support, thus isolating themselves in that aspect as well. This fact seemed to be especially true with the perfectionists, which research has shown that they perceive that others are unwilling or unavailable to help them in times of stress[17].

Finally overly stressed students were likely to feel that they possessed no control over their progress in the program. The informants in this category were mostly found to express hopelessness and a loss of autonomy and control over their academic destiny. These students tended to be struggling and felt that they did not possess tangible ways to improve their environment. They complained that they could not control whether their patients showed up or whether a case would arrive on time to the clinic and thus would be left to worry about it endlessly. A similar study with nurses found that the belief that they could not influence their work situation caused them to have a feeling of

hopelessness which was linked with negative work stress[8]. Many students spoke about "luck" when it came to patients. It seemed that students felt that control and power played very little role in success. In contrast, students who were not stressed time and time again mentioned feeling control over their success and did not feel a difference in studying dentistry from an undergraduate degree.

6.7.2 - The moderately-stressed student

The second type found is the moderately-stressed student, which consisted of the majority of our interviewed group. The students in this group were students who would rate themselves as average in their class academically and clinically. They may be weak in a unit or one field in dentistry, but overall they felt they had a good understanding of the material. These students felt that they were stressed in the program, but that it was manageable with effort and perseverance. The results indicate that the majority of stress that they experienced was due to their requirements and exam schedules. This group of students also experienced stress due to transitional stress. They explained being nervous and excited at the same time when entering a new educational phase.

The participants in this category were observed to have better coping skills than the ones in the highly-stressed category. They had a better network of support, felt they had more control over their achievements, and participated in extra-curricular activities. No one here had any ongoing activities but would participate when they would find the time between examinations. They would find time to sporadically go to the gym or hike and would spend time going to the movies and restaurants with friends and classmates.

These students had allies with the program, usually clinic demonstrators that they could go to ask questions. Therefore they weren't as scared to make mistakes and felt that it was part of the learning process. It is important to note that these students did not only adopt good coping skills, but had a mixture of adaptive and maladaptive techniques of coping. One of the maladaptive techniques used is avoiding faculty unless it was necessary to talk to them about their problems when it came to their patients. These results agree with a Canadian study that found a decrease overtime in dental students adaptive coping and an increase in maladaptive coping from entry to exit[57]. It seems this phenomenon of using maladaptive coping strategies is not just with highly stressed students but all dental students in general.

6.7.3 - The relaxed student

The final category of students was the ones that were not stressed but relaxed throughout the program. These students were the ones that didn't struggle with the program having the manual dexterity and didactic component come natural to them. Solely on their academic and clinical achievement, the students in this category are the ones that a faculty would consider above average. These students spoke very highly of the program and the faculty, having enjoyed their experience there. They said that it was easy for them to complete their requirements and did not find studying for exams to be very difficult. They felt that the faculty was very supportive and helpful, although most admitted not needing faculty with any problems with requirements or with their patients.

The students in this category used all of the coping techniques that were identified in this study. These students had a rich network with older students and students from

other dental schools to help them. These students said that they had no problem with sharing their problems with faculty or friends in order to find solutions. Sharing feelings and discussing problems with other person have been found to be a coping strategy for stress[73]. These students also felt that they had full control in the program and didn't seem to feel that there is anything in dentistry that was worrisome. One felt that it was a very relaxed program that gave him lots of free time, more free time than his girlfriend who was doing a graduate degree. This suggests that students that are doing well need less attention and could even benefit by tutoring other students in class since they have knowledge given to them by faculty and peers that some other students may not have. These students had a very full life outside of dentistry, volunteering in outside activities. Whether this is because of the free time they were able to afford or if the social activities helped eliminate their stress is unclear. By being social and active in and outside of school, these students were adopting the most effective coping techniques. A study that had students rate their most effective coping skills identified talking to friends, exercising, talking to family, watching TV or movies, and play or recreation topped the highest[92].

6.8 - Limitations to the Study

This study deals with the experiences of dental students with stress. However, this study has a number of limitations. The data obtained in this study reflects only a small and limited sample that may not reflect a larger population. The participants of this study reflect a sample of recent graduates from the McGill University Faculty of Dentistry who are still living near Montreal, Quebec. Due to the specificity of the sample criteria, only twelve participants were recruited. Nonetheless, much information was acquired from

this relatively small sample size due to the informative qualitative approach of this study [107].

As well, the sample selection was not random but purposeful, with half of the participants voluntarily responding back to the initial invitation email, and the other half of the participants hand-selected by the principal investigator. It is possible that this contributed to responder bias as participants who had more stress in the program may have ignored the request, or perhaps actively chosen to participate. As well, all the participants interviewed attended the same dental school, and two were in the extreme situation, having failed a year, which may limit the generalisability of the findings. However, the goal of qualitative research is not to gain data that is generalisable, but to gain understanding of the group being studied.

Furthermore, this study is the first to use qualitative methodology to analyze in depth the ways that dental students experience and cope with stress and thus, it was necessary for the study to be exploratory in nature. To this end, this study maintained a flexible approach in exploring dental student stress throughout the research process. Modifications were made by choosing different recruitment methods and adapting the interview guide as new themes and ideas were highlighted by previous interviews.

Finally, this study aims to understand student stress through the oral history of recent graduates, which has its own limitations. Firstly, the participants can carry personal biases that translate into their account of events. Secondly, all participants in this study were graduates who had left the program between one to four years prior to the interviews. Therefore, some of their recollections could be inaccurate simply due to forgetfulness. Finally, when speaking to participants about the stress timeline, the

graduates were retrospectively plotting their levels of stress to each year. Studying the timeline of stress using this methodology brings up issues of accuracy and bias. For a more accurate method to learn about times of stress, a cohort study would be best.

This research project can therefore serve as a pilot study on which to base larger studies focusing on dental student stress. Larger studies may also want to focus interviews on one class to eliminate confounding variables. Finally, future studies may want to focus on the typology of dental students as the findings from this study were original and no other information exists on this topic.

7. CONCLUSION

As the results of this study show, some students find it very difficult to cope with the stress encountered in dental school. Students find workload pressures, fear of failure, faculty relations and transition as sources of stress. However, many students cope with these stressors by seeking support, focusing on what they can control and participating in extracurricular activities. By using a qualitative approach in studying student stress, this study was able to classify students into a typology. This is the first study in dentistry to offer a typology of students. This information should aid faculties in identifying and helping students who are struggling with stress.

7.1 – Recommendations to Faculties

7.1.1 - Support

Receiving support was highlighted in this study as being an effective way to cope with stress. Furthermore, the study revealed that students who had very little stress were the ones who felt they had the support of the faculty. Therefore, one of the recommendations is for faculties to make a stronger effort to support their students. An effort needs to be made to help students feel that they are an appreciated member of a larger team with the faculty, instead of being on opposing teams. Things like social activities, sporting events and working together on non-academic issues will help students see faculty staff in a new, more relaxed setting. More importantly, faculties need to reach out to students who are struggling as these students may be afraid of staff and could be avoiding them, but in reality, they need to feel the support of the faculty more than other students.

7.1.2 - Feedback

One of the sources of stress found by students was fear of failure. Many students were constantly worried about failing, unsure of how they were doing in the program. One way to eliminate this fear is through regular and in-depth feedback from clinical demonstrators and the clinic director. Although feedback such as this already exist here at the McGill University Faculty of Dentistry, the participants complained that it lacked real information on how they were doing, how they can improve, and usually focused on the negative. For example, students who were struggling were usually told that they were weak clinically, but no advice was given on how to improve. As well, students mentioned that their accomplishments were ignored, yet their mistakes were always highlighted. Faculties need to realize that although mistakes are important to mention as students usually learn most through their mistakes, it is equally important for students to receive positive feedback and constructive criticism that is given with advice on how to improve.

7.1.3 - Requirements

The most common source of stress by all students in this study was finishing their dental treatments that were required of them in the clinical program. Students spoke extensively of not receiving help from the faculty in trying to find and retain patients that were suitable for their requirements. The faculties need a more aggressive approach in finding and retaining patients, perhaps more advertisements or flyers in community centres. As well, the clinics may consider changing the way they accept patients. Instead of having the students try to convince their patients on treatments with the possibility of

patients refusing treatment for cheaper alternatives, a possible alternative would be for patients to agree on and sign off on treatments during an initial screening appointment. In this appointment, patients would be informed of their treatment options and chose the treatments that they want before they are assigned to students. This would guarantee that a student will accomplish the requirements that are needed of them.

7.1.4 - Transition

Students are stressed and anxious during transitory periods. At the McGill University Faculty of Dentistry, information is giving to students entering preclinic and clinic by the clinic director and associate dean of academics. However, through the interviews, it is evident that this isn't sufficient in helping students. A new and innovative way to answer student questions and worries need to be brought in. One way to do that is by scheduling information session between the students and their upper classmates from the year ahead. The upper classmates were found in our research to be a good source of information to most students. Therefore, if this meeting between students is a scheduled event, it should be successful at providing important information to the students about the new transition. Furthermore, students will most likely feel more comfortable to ask other students questions that they may not feel comfortable asking staff.

7.1.5 – Wellness Program

It is evident through the study that many students do not know how to cope with stress. Many of the stressed students used maladaptive coping skills like worrying and avoiding in dealing with their environment. Since stress is not only found in dental school, but the participants will have similar, if not more, stress when they become dentists, it is imperative that they learn effective stress-management skills. Faculties need to design and implement a stress-management and wellness course for their students. Topics such as coping with stress, time management and choosing realistic goals could be addressed. As well, overall wellness should be emphasized by discussing the importance of sleep, diet, exercise and other stress relievers like yoga and meditation. Faculties of Dentistry have a responsibility to educate future dentists in all subjects and fields in order for them to become competent dentists; their stress and wellbeing is just as important in their overall competence as any other subject currently taught in dentistry.

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Appendix 1 – Email Advertisement

Decreasing student stress
at the McGill University Faculty of Dentistry

Principal researchers: Drs Haissam Dahan, Christophe Bedos

Faculty of Dentistry, McGill University

Funding for Research: CIHR Training Program in Applied Oral Health Research

Participant Information Sheet
There is a considerable literature on the stressful and highly-demanding nature of dental school education. Specifically, it has been reported that dental students express considerable stress symptoms during their training, and they are more stressed than the general population. Our objective is to get a more thorough critique from students and recent graduates on their perceived sources of stress in order to improve the teaching and learning environment at the Faculty. In order to develop a better understanding of the student experience, we are seeking interviews with recent graduates to learn about their dental education experience.

What will participation in the study involve?
You will participate in a one-on-one interview lasting between one to two hours. The interviewer will be the principal investigator, Haissam Dahan. The interview will be tape-recorded, to make sure that no important information is missed. The recording will be transcribed verbatim for purposes of analysis. As soon as the tape is transcribed, it will be destroyed. In order to guarantee absolute confidentiality, your name will be replaced by a pseudonym: thus, your identity will remain confidential.

What steps will be taken to ensure confidentiality?
Interviews will not be conducted by McGill Dentistry teaching or administrative staff; only the principal investigator will be meeting you. Only he will know your identity and he will not divulge names. The meeting will not be held at the Faculty of Dentistry but in a nearby campus building. No Faculty members at the McGill University Faculty of Dentistry will know who participated.

If I need any further information, whom can I speak to?
The principal investigator can answer your questions:
Haissam Dahan (hdahan@hotmail.com, 613-355-4275)

Appendix 2 – Supplemental Information for Interested Students

Background:
A collaborative group consisting of researchers, faculty administrators, and students came together at the McGill University Faculty of Dentistry to study and improve the learning environment. The team chose a qualitative research approach to allow a more inductive approach to data collection (i.e. the identification of a problem and its solutions to come from the data and not from the researchers themselves).

Goals:
Before the collaborative team is able to brainstorm and implement changes to the program that will improve the learning environment, it is imperative that a deeper knowledge is sought about the perceived stresses encountered by the students. Specifically, more information is needed to understand:

　　　　　1) The patterns of stress encountered
　　　　　2) How students deal with stress
　　　　　3) The effect of stress on students

Method:
a) Qualitative approach: one-on-one interviews will be conducted

b) Sampling: Recent graduates of the program will be sought as literature suggests that time and distance provides objectivity when recounting an experience. Therefore, we will look at graduates from McGill University between 6 months to 4 years. We will divide the informants into two groups by self-perceived academic standing: high performance and low performance and we will compare the two.

c) Contacting participants: The participants will be contacted through the following methods; 1- Names and contact information will be sought from the Faculty
2- Ones living in the Montreal and Ottawa region will be pre-selected
3- The individual will be phone-called or emailed explaining briefly the study
4- Documents explaining study and ethical concerns will be mailed to potentially interested participants
5- Interested participants will be contacted to organize a 1-hour interview in person in either Montreal or Ottawa

d) Data collection: - fabrication of an interview guide
　　　　　　　　　- interview will be conducted and tape-recorded
　　　　　　　　　- transcription of interview

e) Analysis: - coding of key themes and categories
　　　　　　　- interpretation of results with the collaborative team
　　　　　　　- validation of results

Appendix 3 – Consent Form

Decreasing student stress
at the McGill University Faculty of Dentistry

Principal researchers: Drs Haissam Dahan, Christophe Bedos

Faculty of Dentistry, McGill University

Funding for Research: CIHR Training Program in Applied Oral Health Research

Participant Information Sheet
There is a considerable literature on the stressful and highly-demanding nature of dental school education. Specifically, it has been reported that dental students express considerable stress symptoms during their training, and they are more stressed than the general population. A focus group conducted at the Faculty of Dentistry at McGill University during Spring 2006 seems to collaborate these results. Therefore, our objective is to get a more thorough critique from students and recent graduates on their perceived sources of stress in order to improve the teaching and learning environment at the Faculty. In order to develop a better understanding of the student experience, to seriously evaluate all aspects of the dentistry program, and to contemplate meaningful curriculum changes, we would therefore very much appreciate your participation in an one-on-one-interview.

What will participation in the study involve?
You will participate in a one-on-one interview lasting between one to two hours. The interviewer will be the principal investigator, Haissam Dahan. The interview will be tape-recorded, to make sure that no important information is missed. The recording will be transcribed verbatim for purposes of analysis. As soon as the tape is transcribed, it will be destroyed. In order to guarantee absolute confidentiality, your name will be replaced by a pseudonym: thus, your identity will remain confidential.

What steps will be taken to ensure confidentiality?
Interviews will not be conducted by McGill Dentistry teaching or administrative staff; only the principal investigator will be meeting you. Only he will know your identity and he will not divulge names. The meeting will not be held at the Faculty of Dentistry but in a nearby campus building. No Faculty members at the McGill University Faculty of Dentistry will know who participated.

Why should I participate?
We hope that as a result of this research we will better understand students' concerns and ultimately be able to implement changes that will improve the dental program for students.

Appendix 4 – Interview Guide

Interview Guide

Opening Question
    1. What motivated you to participate in the study?

Introductory Question
    2. So tell me about your experience studying dentistry at McGill?
    3. In your opinion, where do you think you stood academically and clinically in comparison to the rest of your class?

Key Questions
Patterns of Stress
    4. Was Dentistry school stressful for you?
    5. Why do you think it was stressful to you?
    6. What about dentistry school was stressful to you?
    7. Which components of your dental education were more stressful? Less stressful?
    8. Were there critical points where you were more stressed? Less stressed?
    9. Did you experience similar stress before entering dentistry?
    10. Could you draw a stress chart?

Dealing with Stress
    11. How did you cope with the stress you encountered?
    12. How do you think other students dealt with the stress?
    13. What would you do to relax?
    14. Who did you relax with? Did you have family?
    15. Were there services available for you if you were overwhelmed with stress?
    16. Would you have gone?
    17. What services do you think are lacking for students at our program?

Effect of Stress
    18. How did stress in dentistry affect your life?
    19. Did stress have any affect on your academic life?
    20. Were you happy at that time in your life?
    21. Do you think you may have been depressed?
    22. Is there such a thing as good stress?
    23. Do you think it helped prepare you for the stress that you encounter now in dentistry?

Closing Question
    24. Is there anything else that you'd like me to know?

Appendix 5 – Questionnaire

Decreasing student stress
at the McGill University Faculty of Dentistry

Principal researchers: Drs Haissam Dahan, Christophe Bedos

Faculty of Dentistry, McGill University

Funding for Research: CIHR Training Program in Applied Oral Health Research

Confidential Questionnaire

1) Sex:

2) Present Age:

3) Age span while in program:

4) In province or out-of-province student:

5) Living Arrangement (i.e. living at home, abroad, etc.):

6) Highest degree before entering dental school:

7) In your opinion, what was your academic standing in the class (i.e average, above average, or below average)

8) Did you have financial worries?

9) From 0 to 10, 10 being the most stress possible, how stressed were you?

Appendix 6 – Debriefing Notes

Summary of Informal Interview
Sunday November 19, 2006
45 minute interview at former student's house

1) Existence of Stress
- Started in dentistry, mostly in clinic
- Wasn't stressed in pre-dentistry or in medicine
- Mostly stress concerning failing, which encompassed stress with exams, requirements, staff, etc.

2) Patterns of Stress
- std felt stress is not needed to motivate students, can motivate in other ways
- Dental profession is stressful, but different type of stress than is encountered in dental school
- If dental school is supposed to prepare students for the profession, they should teach students how to manage stress
- Std felt if (s)he failed, whole life and all goals so far would be over, would need to restart on a new path
- Fear of failure stress increases at the end of second year and stays high
- Staff relationship stress is minimal and stays constant after third year
- Exam stress fluctuates with exam schedule
- Requirement stress is high at the beginning to mid of third and fourth year and decreases as the year goes on and patients are accumulated
- Transition stress is low and very brief between med and dent, and preclinic and clinic

3) Dealing with Stress
- studying a lot, avoiding things that might cause problems
- no social life, classmates consist of small social circle
- talk to classmates for support and advice
- Std did not have family here, felt it would have been helpful
- Life is organized around dental school
- Socialized with classmates during "breaks" from studying
- Std would feel guilty if "wasted" time on non-dental school aspect
- No services available for help from outside, if there were some, std "may" have gone

4) In Retrospect
- was not a good experience, still gets upset when std remembers the feelings of the past
- felt that stress to that degree was not necessary
- felt that stress experienced by the students was a valid response to what they were going through at the time, and not an exaggeration