

Medical students often identify gross anatomy as one of the most difficult first year courses; even more consider it a rite of passage,¹ distinguishing them from graduate students in the basic sciences and testing their mettle as future physicians. Anatomy is a complex experience. In addition to requiring endless hours of study and memorization, it is sometimes considered the student's first clinical experience, with the cadaver viewed as the student's first patient² and best teacher. As Rizzolo observes, anatomy "makes them [medical students] wonder about how the donor lived with the illnesses revealed by dissection; and wonder about their ability to become an effective physician."³ Because of the subject matter, anatomy also can raise students' death anxiety and cause them to reflect on issues of human dignity and grief.⁴ Even students who are not moved to ponder questions of life and meaning in response to anatomy are often disgusted by the smells and sights of the dissection lab. Other issues that may arise during anatomy courses include questions about how thorough was the informed consent of the donors and how the sanctity of human remains and the sacredness of the human body can be protected.² Students are often afraid to expose to their peers what they perceive to be weakness or discomfort as a reaction to dissection and may hide behind false bravado or crude humor.

The research is equivocal about the extent to which students are distressed by anatomy. One study found that a fourth⁵ of students enrolled in an anatomy class report fear and anxiety about death, while a study by McGarvey⁶ concluded that the anatomy experience provoked thoughts about death in general in 55.8% of the class, thoughts about the death of a friend in 33.7%, and thoughts about their own mortality in 41.8% of students. Approximately one-third of students in an earlier study reported psychological

symptoms of depression and anxiety.⁴ Other older studies^{7,8} reported serious psychological distress with symptoms similar to post-traumatic stress disorder.

However, other studies indicate that anatomy is only moderately, or not very, stressful, and in fact generates considerable enthusiasm and excitement among the large majority of students.⁶ In one study,⁹ 72% of respondents reported feeling eager and excited, with only 4% reporting fear or anxiety at the start of anatomy. To some extent, anatomy appears to be a self-correcting experience from a stress perspective. Several studies suggest that by the end of the course, and often much earlier, many students experienced less anxiety and fear than on their first day in lab.^{5,10} High levels of interest were maintained, although excitement and curiosity decreased.¹¹ A well theorized and executed study¹² investigated both state and trait anxiety in anatomy students. These researchers concluded that, initially, the situation of being in a dissection lab to dismantle cadavers made the greatest contribution to student anxiety, while, after initial exposure, students with greater personality tendencies toward anxiety were more likely to have higher levels of anxiety.

To manage the stresses of anatomy, students employ a variety of defense mechanisms such as intellectualization,¹¹ rationalization,¹³ denial,^{13,14} dissociation,⁴ and depersonalization.^{11,14} Interestingly, in one study, students denied the use of humor as a way of resolving dissection-related anxieties,⁴ while in other studies, between almost one-half^{6,13} and two-thirds¹¹ of students endorsed this coping strategy. In American studies, turning to philosophy or religion was mentioned only rarely.¹¹ (For a difference, see Abu-Hijeh).¹³

A couple of studies specifically addressed the issue of emotional detachment. Dickinson et al.⁵ discovered that up to 53% of their subjects agreed with the need for detached concern, with approximately a quarter of the students showing greater support, and an equal number indicating less support for this concept by the course's end. One old, but thought-provoking, study¹⁵ analyzed stories medical students tell about anatomy. The author concluded that students used "gallows humor" to portray themselves as a tight, macho, fun-loving, but emotionally detached group of insiders who were in control of pranks and jokes using body parts or the cadavers. Cadaver stories characterized emotions of anxiety, fear, and revulsion as inappropriate and weak. Demonstrating an absence of empathy and sympathy, they tended to treat the cadaver as a learning tool and an object for manipulation rather than as a formerly living human being.

Anatomy lab can be the beginning of a physician's training in how to isolate and restrict affect, or how to deal with affective responses^{3,16} such as disgust balanced by joy and awe. Tschering¹⁷ emphasized the importance of encouraging students enrolled in anatomy to express their emotions and not suppress them. Programs have used self-reflection, art, journaling, creative writing, and group discussion^{14,16,18} to encourage students to explore their emotional responses to dissection.³ One curriculum at the University of Massachusetts School of Medicine incorporated art, film, and a balletic interpretation of Rembrandt's *The Anatomy Lesson* to help students develop reflective self-awareness.¹⁴ Stewart and Charon¹⁶ report on a drawing class integrated into anatomy lab as a way to complement learning from dissection by recreating the human body from an empathic perspective.

Virtually all of the previous research we identified makes the assumption that anxiety about dissection and contact with cadavers is deleterious and negative and should be eliminated as quickly as possible. Some articles pathologize the level of anxiety by comparing it to post-traumatic stress syndrome. Other authors minimize the anxiety that students experience, implying that only a handful of vulnerable students are not tough enough to adapt to anatomy. Several investigators conclude that most students make a psychological accommodation to the gross anatomy lab through “clinical detachment.”⁹ Most authors seem to take heart that anxiety is dramatically reduced for students very quickly,¹⁹ often after one exposure. But what does this rather astonishing finding mean? What happened to all that anxiety? Does it simply evaporate, or is it repressed? Although this apparently rapid disappearance of psychological conflict may engender relief in some researchers, it triggers concern for us and forms the starting point for the research reported below.

While we agree that students who are so disturbed by anatomy that they lose weight, have nightmares, or suffer from diagnosable depression or anxiety (all reactions reported in the literature) need therapeutic support, we do not assume that some level of anxiety is necessarily problematic. Rather than “eliminating” anxiety either through suppression (“‘real’ medical students shouldn’t feel this way”) or detachment (“the cadaver is just a hunk of preserved flesh”), we believe that some anxiety is both natural and healthy, especially if it leads to reflection and self-analysis. Students report anxiety reduction both after exposure to actual cadavers and to video presentations of dissection.¹² But what is the mechanism by which this anxiety is reduced? And is its reduction beneficial or repressive? We believe there is more to be learned about students’

perceptions of the anatomy experience as well as about how to help students cope with the stress of anatomy. To further explore these issues, we undertook the project described below. Our primary goals were the following: 1) To learn more about how students experience anatomy through an analysis of their creative projects; 2) To learn whether creative projects have a beneficial effect on students who choose to complete them in terms of reducing self-perceived stress.

METHODS

Subjects. We recruited first year students enrolled in the gross anatomy course at our home institution from three consecutive years (2004, 2005, 2006) to participate in this project. As part of their educational experience, students were given the opportunity to complete two creative projects, one toward the beginning and one at the end of the class, for a total of 3 extra credit points (out of a possible total of 100). Over the three year period, a total of 115 students, or 38.72% of the total number of eligible students, took advantage of the creative project option. A breakdown by year, gender, and project completers is provided in Table 1.

Students were recruited by an email approved by our university's human subjects institutional review board (IRB), which explained the study in detail, and presented students various options for participation, including use of their creative projects and willingness to participate in a brief interview. Response to the email and choosing any of the options offered was considered as indication of consent to participate. A total of 34 students agreed to the use of their creative projects in the study. Twenty-four students also agreed to be interviewed regarding why they either did or did not complete the creative projects.

The research team developed separate coding instruments for the written and art works in order to conduct a content analysis. The specific coding categories are presented in Table 2. The research team coded a total of five written projects to test the preliminary coding instrument for written works and then refined this instrument based on our subsequent discussion of discrepancies. Three art projects were used to test and refine the art-coding instrument. Two trained raters (a pre-medical undergraduate [VN] and a second year medical student [SM]) coded all projects and achieved an acceptable level of agreement on both instruments. Because we were primarily measuring subjective responses to creative works (e.g., what emotion did the creative project convey?), our goal was not primarily to achieve inter-rater reliability; in other words, we wanted raters to have free rein to record their personal reactions to the works analyzed. In addition, faculty investigators (JS, TT, MR) reviewed and interpreted all projects, and their comments were incorporated into the data analysis.

An interview schedule was developed by JS and VN. It was designed to assess 1) why students chose either to complete or not complete at least one creative project; 2) what non-completers thought about the projects of their peers; 3) whether completing projects reduced stress or taught students something of value about the profession of medicine. Researchers stopped the interview process when theoretical saturation of the data was achieved. Face-to-face (22) and email interviews (2) were conducted. Twelve completers (students completing at least one creative project) and twelve non-completers (students who chose not to do a creative project) participated in these interviews, which were conducted either by VN or VN and SM. With two exceptions, all completers had completed both the initial and the follow-up projects. Interviews took between 15 and 30

minutes to complete. All in-person interviews were tape-recorded and subsequently transcribed.

Data analysis. Two trained raters coded all projects using the coding instruments developed by the research team. The instruments' items had face validity that allowed us to provide a descriptive summary of the coded projects (See Table 2.). In addition, three faculty raters, two psychologists and one psychiatrist, provided independent narrative interpretations of the projects, which considered the psychological implications of this work. The first author summarized all narrative interpretations (including those of the student coders), which were then reviewed and modified by all five members of the research team. In considering both the project analyses and the interview data, the team used a grounded theory approach^{20,21} to identify first recurring words and categories that were then organized into themes. The various themes were subsequently reviewed and discussed until researchers identified an overarching theme that they felt represented the large majority of projects reviewed.

This research was reviewed and approved by our university's IRB.

FINDINGS

Creative Projects. In the first year, approximately half of the class participated in the creative project option by completing at least one project; in subsequent years, approximately a third of the class participated. Of participating students, with the exception of slightly higher participation by female students in year 1, male and female students were more or less equally likely to complete projects. (See Table 1.) A total of 34 students gave permission to analyze their projects. (We were unable to locate the project of one of these students.) The total number of projects analyzed was 44. (See

Table 2.) In either/or categories (e.g., medium of an artwork; voice in a literary work), raters achieved 100% agreement. For artwork ratings, overall agreement was 75%; and for written work, 66.2%.

All of the art projects were representational, i.e., not abstract, showing recognizable forms or objects. Most of the projects focused on some aspect of the human body, often showing something related either directly or indirectly to dissection. Some of the projects contrasted the familiar outside of the body with the newly discovered inside of the body. The most common emotions conveyed were detachment and joy. The themes most often explored were similarly the awesomeness of the human body and desensitization or loss of humanity. (See Figure 1.)

The large majority of the written projects discussed in some way the students' experiences of refining or evolving a different perspective about anatomy. Another common focus dealt with becoming a doctor and self-reflection. Projects often referred to the cadaver as a tool for learning, but almost the same number focused on the cadaver as a person. Almost half explored the student-cadaver relationship. A handful reflected on death and mortality, as well as on spirituality and religious beliefs. The essays conveyed a variety of emotions, most commonly, gratitude toward the donor and awe in regard to the human body, and, less commonly, guilt/shame, fear/anxiety. The most common coping strategies in the written works were rationalization and sublimation/compassion/connection.*

* ¹ Sublimation refers to the act of diverting the expression of an emotion or response from an unacceptable form to one that is considered more socially acceptable. In this definition, anxiety (a less socially acceptable emotion in the context of medical education) may be "sublimated" into socially desirable emotions such as compassion toward and sense of connection with cadavers.

All except four were written in the first person singular voice (“I”). Of these 29 first person perspectives, only six were from the perspective of the cadaver; the rest represented the point of view of the student. (See Figure 2.)

Differences between art and written projects In general, unlike the written projects, the artworks did not focus on themes of death, but rather on celebration of the human body. In fact, none of the artworks appeared to represent a cadaver per se. By contrast, many of the written works were more focused on the cadavers either in terms of the cadaver as a person, the cadaver as a tool, or the cadaver-student relationship. The written projects also seemed to incorporate more self-reflection than did the art projects.

Differences between early and late projects (See Figures 1. and 2.) Early projects reflected students’ fear, anxiety, uncertainty, even disgust at what they perceived to be the unnaturalness and brutality of dissection.

“I must admit that the thought of taking human anatomy was a scary one. Despite, taking a Human Anatomy Lab course as an undergraduate five years ago, I felt nervous ...”

They were concerned about possible violation of the cadaver. Simultaneously, they were very concerned with the human aspects of the cadaver. They imagined the life of the cadaver and tried to connect with the cadaver as a person. Often, they saw the cadaver as providing inspiration, guidance and reassurance. They also expressed a desire to protect, comfort, and console the cadaver. At this early stage, students saw a connection, a sense of teamwork between themselves and the cadaver. Early projects also mentioned the beauty, complexity, and intricacy of the human body; but this awe was paired with a sense of disturbance.

“For me, the awe that I experienced when seeing the heart has not diminished, but has become complicated and conflicted.”

The later projects appeared split in terms of their final reactions to the course. On the one hand, a few students expressed revulsion at anatomy, and therefore at themselves for having participated, accompanied by an enduring sense of having done something morally wrong. More typically, follow-up projects were characterized by desensitization, detachment, alienation, and loss of compassion.

“Unfortunately, what I was warned would happen, happened. I soon became engrossed in all of the dissections and the immense amount of information I needed to learn. To a certain extent I became desensitized.”

In the words of one student’s poem,

Please,
do not try to move me
to thoughts of your life,
who you might be
or rather, wherefore
I just can’t care.

On the other hand, the larger number of projects focused on expressing appreciation for the marvel, beauty, and complexity of the human body, but, in comparison to the early projects, there was little evidence of anything disturbing. In the later projects, dissection was viewed as less sacrilegious and more acceptable. Later projects often were characterized by a sense of students’ bravery, accomplishment, and competence at having successfully navigated anatomy. They expressed self-pride and enthusiasm for having completed a great adventure. They also expressed gratitude and appreciation toward the cadaver. Further, they tended to imagine the cadaver happy, content, and satisfied at having transmitted knowledge and been of use to the student.

“[I have] no regrets or reservations...’
My purpose fulfilled/
The ability to teach and heal/...
Lives granted strength and happiness.”

Overall interpretation of creative projects. The interpretation of the creative projects was based on the written narrative comments of three faculty members, one medical student, and one undergraduate premedical student. Several themes emerged from the data. As we considered the relationships among these themes, we concluded that the predominant function of the creative projects was to help students cope psychologically with what was a complex, sometimes disturbing, sometimes inspiring one-of-a-kind experience. Over all, based on the grounded theory analysis, the research team interpreted the projects as the students' efforts to try to gain control over messy reality through art, since it was impossible to do so in the dissection lab. Below are the major themes that emerged from our analysis and contributed to this conclusion.

Out-of-bounds experience. Dissection was an out-of-bounds experience for students, because it went against normative societal taboos and prohibitions against violating a corpse. Students were permitted, indeed expected, to do unacceptable and horrifying things to a human body. In this sense, anatomy was a completely unique experience for which the students had no frame of reference.

“Anatomy is like nothing I have ever done before. There is nothing to compare it to and no past experiences to classify it with. It is its own world, its own category, and its own culture.”

Ambivalence. The feeling raised by anatomy for these students, especially in the early projects, was one of ambivalence. Students expressed positive feelings that included elements of awe, amazement, caring, and connection; but there were also underlying feelings of horror and unnaturalness.

“In fact, anatomy seems to be many contradictions all existing at once. It is emotional and logical, disturbing and beautiful, and, even more that anything else, dissociating and intensely personal.”

Other dichotomies in anatomy were expressed as its two sides, one “crude and nasty,” the other characterized by “design and precision.” One disturbing charcoal sketch of a hanging body suggested beauty and strength, but also pain, suffering, anguish and hopelessness. In another poem, the student eventually acknowledged that anatomy is like a fog – to acquire knowledge, one must sift through it, “ignoring hands and faces” (often considered by students to be the most personal parts of the body). The poem concluded on an ambiguously upbeat note: though bodies are “stiff and butchered wisdom is somehow acquired.”

The projects attempted to resolve the ambivalence in favor of the actions students were required to pursue as part of their training. To regain a sense of control over the disturbing aspects of the experience, students sometimes suppressed, rationalized, or justified their negative feelings by emphasizing the future benefit and value to others. Students sometimes rationalized their ambivalence by emphasizing that they were doing not what they wanted, but what they needed to do in order to become physicians. Feelings of unease were quickly suppressed in favor of detached interest in the learning process.

“Although the cadaver didn’t look like a human being, I knew he had been a human being, and because I had never cut into a human being before, it felt wrong on some level. But that feeling might have lasted a minute or two, and then I became absorbed in the fascination of seeing the inside of a human body. It was so exciting!”

“...we were of course able to quickly switch over to the ‘ooh, that’s cool’ mindset”

Fear/anxiety/shame/guilt. Dissection appeared to arouse feelings of fear and anxiety, sometimes even revulsion and disgust, at least in some students.

“I suddenly took control, grabbed the saw, and began to cut across her exposed chest without even thinking... I don’t think that moment will ever leave me.”

Some students felt a sense of guilt and shame, and talked about having committed a sin.

“But sometimes the things we do to the cadavers in the process of dissecting them seem so crude... When I myself did all of these things, I felt pangs of guilt...”

“And when my lab partner cut into her breast, it made me angry. How dare he? The act felt violent and violating.”

“For all I know you even grinned/When it occurred that I might have/Sinned.”

During the first few days of gross anatomy, one student found him/herself not really considering the person-that-was, but instead took a more objective view, seeing only a collection of parts. Yet when the student started to use a saw and hammer, s/he became obsessively concerned about causing pain to the cadaver. In this essay, dissection was seen as an act of aggression.

Proving ground/adventure. Anatomy appeared to access some students’ intensely competitive spirit. For these students, the course became a proving ground where they could test their strength and toughness and overcome weakness.

“I dread the process but take pride in the ability to get through it.”

A related idea was that anatomy is “a great adventure” of learning. This exclusive focus on fun and challenge allowed these students to set aside their anxieties about anatomy as irrelevant and cowardly.

“I willingly accept the challenge to perform an action I am uncomfortable with in order to learn...”

“Adventures never cease to arouse my curiosity.../Anatomy: a new look at life/
an adventure in knowledge/an appreciation for the beauty that is us.”

“Thus as I left that very first day
I finally understood:
A great adventure

this would be,
And truly grow I would.”

Beauty and complexity of the body. A prevalent reaction among students was to focus on the complexity, intricacy, and beauty of the human body. The cadaver often evoked feelings of wonder and awe in students. Dissection became the vehicle that allowed the discovery of this marvel. Thus it was a method of initiation into secrets and mysteries to which only physicians were privy. Students also focused on the cadaver as a wonderful learning tool that evoked fascination and appreciation. The terms “wonder” and “amazement” kept reappearing in students’ writing, or were implied in student artwork.

“I share in the wonder of seeing anatomy first hand that is unforgettable and amazing”

“Holding the human heart in my hands/ Marveling at its complexity and beauty.../ I am amazed”

“I liked the elegance of [the] gastrointestinal system which seemed so logical”

“Amazing creation!/ Never ceases to confound/Altogether wonderful/Outrageously complex/Magnificent construction...”

Detachment and connection. Many students grappled with the “humanity” of the cadaver, and their relationship to it. Sometimes students began anatomy with a vague apprehension that it was “wrong,” only to become desensitized as time went on. Such students ended up defining the cadaver as only a body absent a soul, merely a receptacle.

“Rarely did I think of the cadavers as people.”

“Unfortunately, the only way that I can get through the dissection is to purely set my mind on the anatomical aspect of the assignment...”

“The only things I focused on were the anatomical positions and physiological functions of the structures my group slowly uncovered... I did not see my cadaver

as a once living person, nor did I see it simply as a learning tool. Truthfully, I did not see the cadaver at all.”

These projects had a quality of chilliness, desensitization, and emptiness. Drawings of this type, for example, frequently omitted the faces of the figures. In one project, the student was portrayed as a tool of dissection, downplaying the student as a human being. The project suggested the prioritizing of the technical skills of dissection and the dehumanization of the student. As human hand and scalpel become one, the work expressed alienation and reductiveness.

For others, there was a concern about how an emotional bond with their cadaver could affect them personally.

“I should tell you up front:
I can’t get bogged down in anything
Beyond a purely physical relationship.
I simply haven’t the time for it.”

On the other hand, sometimes students began by trying to regard anatomy simply as a technical task, but could not avoid the human implications of what they were doing. In one poem, for example, the student attempted to establish a position of detachment toward the cadaver. The poem described the effort it took to remain separate, to not recognize the person-that-was; yet even when trying to consciously distance him/herself, the writer became aware of the life that had passed. In a similar poem, the student tried to rationalize his/her detachment from the cadaver because of fear of emotional connection. Yet, by its conclusion, the poem demonstrated an almost unwilling shift from an impersonal, physical perspective to a holistic, personal perspective. This issue represented the one most deeply and consistently explored in the projects and yielded several sub-categories of interpersonal connection that are described below.

---*Camaraderie*. There was at times a certain camaraderie expressed between cadaver and student. In one poem, both were portrayed as lonely, experiencing a unique journey together. In another, a bond occurred when the student took the cadaver's hand and held it, rather than dissecting it. Although they started out as strangers, student and cadaver came to know each other intimately in certain ways. The poem emphasized how much cadaver and student learned about each other through the process of dissection. Student and cadaver had a close, personal relationship, in which the cadaver is loved and cared for.

“Suddenly I am no longer nervous, scared, or cold.
They are curious yet *compassionate*.
And into great doctors I can tell they will all mold.”

In a similar poem, a student insists on the importance of learning everything s/he can about his/her cadaver:

“But I want you to know
That I want to know.
I need to know.
And I will listen to you.”

One intriguing self-portrait that showed the student decked out in jewelry, which, on closer inspection, consisted of anatomy parts, suggested a profound interconnectedness between student and cadaver.

--*Shared humanity*. Connection was also expressed through recognizing the shared humanity of cadaver and student. Many projects commented on the presence of nail polish on the cadaver's fingers or toes, body tattoos, or surgical scars. Such tangible evidence of the cadaver's personhood frequently triggered imaginings about the life of the cadaver.

“One of the cadavers had painted nails and it was a poignant reminder of the humans these cadavers were, with daily mundane activities like everyone else but also their own great life story filled with rich experiences.”

Others wrestled with the simultaneous awareness of presence and absence of that common bond.

“Although it is this mass we study/Learn meticulously/hover over and inhale/
It is not/The dad who adores us/The mom who loves us/ The man who holds us//
It is a mass.”

Still others struggled to understand the relationship between the physical structure and the desire that animates it.

“I had to dissect this body, but nobody told me that I would also have to open my heart as well. There were times during lab when I would find myself, unconsciously, rubbing our “patient’s” arm, wondering how she died and whether or not she knows what is happening to her body right now.”

--***Gratitude and appreciation.*** Students’ dominant emotion toward the cadaver was one of gratitude.

“I hold you in high regard./... Thank you.”

“During my first month in the lab I remember talking to the cadavers, thanking them for donating their bodies for the benefit of our medical education. I also recall wishing them a good weekend and Merry Christmas. I will be forever grateful for their donation and contribution to my medical education.”

Students also projected this emotion onto their peers. In one poem, crude behavior on the part of other students was quickly minimized in favor of a more positive view of fellow dissectors as usually full of caring, gratitude, and awe. In several other projects, students were portrayed as gentle, respectful, compassionate, grateful people who tried to get emotionally close to the cadaver.

“As I studied with my classmates... I knew they were grateful for these cadavers... when they literally get to the bottom of it.”

Many works expressed specific gratitude for the cadaver's role in contributing to the making of future "great doctors;" and one poem went so far as to thank the cadaver for making its writer "a better man." There seemed to be an implicit contract between students and cadavers that the best way that they could repay the generosity and selflessness of the cadaver was to learn as much as possible and carry this knowledge forward to help others.

"You have touched me in a way which even my closest have not/
It is with your gift that I can touch the lives of others."

---*Cadaver as mentor and teacher*. A frequent theme was that the cadaver trusted the student with the task of dissection and was the student's wise guide, teacher, companion, and mentor. Many projects imagined the cadaver giving permission, approving, or even encouraging the student to proceed.

"But don't you cringe or feel
Any sorrow for my death or life.
Just focus and dissemble this shell
With your quaking, gleaming knife."

The cadaver invited inquiry and exploration.

"He bade us/to sharpen our knives/now we split his slumbering skin."

An imagined interview with a cadaver portrayed a kind and generous corpse whom the adoring student treated with respect and friendliness. Sometimes the cadaver consoled the student. One student coped with his/her fear and anxiety by imagining the cadaver encouraging students:

"So cut and explore and open the doors
To the mysteries that lie inside me
Work real hard to memorize it all.
But don't forget to stand in awe."

In another poem, the cadaver was apostrophized as the captain of the ship (à la Whitman's famous poem), thus in imagination giving the cadaver leadership and control. Cadavers were often depicted as willingly enduring dissection in order to transmit knowledge that will ultimately help others.

“Learning, admiring/ Just feeling honored and privileged to learn/
From selfless and pale phantom teachers.”

In these works, the cadaver was typically gratified by dissection, felt useful and fulfilled. They portrayed the cadaver and student as on the same side, functioning together as a team, of which the cadaver was the leader and initiator.

--Balance between detachment and emotion. Several of the works concluded that emotional balance was the best solution to their ambivalent feelings about whether they were engaged in a technical or a relational process. These students began to see this question as less one of either/or and more one of both/and. In one essay, for example, the student hoped over time to find a way of being professional and not emotionally overwhelmed while also remaining emotionally open.

“[I am] attempting to distance myself in a professional manner while maintaining some empathy.”

Another student used almost identical language:

“One must distance emotionally in order to do the job, but must also preserve empathy.”

Yet another author rationalized that since body and soul are two separate entities, manipulating the body still preserves the integrity of the soul.

“A clinical physician must be able to look at the body as a physical medium or machine for human existence, separate from the emotions and feelings of the inner soul.”

In a reflective poem, the student balanced awe for scientific/medical learning with the emotional impact of both the procedures and the awareness of the humanness of the cadaver.

“Have I lost my compassion?
I hope not
Their beauty lies not in what I can see
or how I can describe them
but rather how they fill my mind.”

Spirituality and religious beliefs. In a student body characterized by religious diversity, only a handful of the students referenced their religious beliefs either directly or indirectly. Most of these did not find a contradiction or conflict between their faith and their science. The majority regarded the body as a vessel for the soul and believed that once the soul has departed what is left behind is just a shell. Dissection did not appear to violate any religious beliefs for these students. The human body was seen as a work of God, a source of beauty, awe, and discovery. One more philosophical poem struggled to understand the relationship between the “mass” on the dissecting table and the person of the cadaver. It concluded that “what keeps us afloat” is love, which links souls. When we do not acknowledge “the depth of our own existence,” we limit ourselves to “the borders of our skin.”

Findings from Interviews (See Table 4):

Completers. When asked why they had participated in the creative project option, half of the students responded that they did so primarily because they liked doing creative things. These students also invariably described the idea of doing the project as “fun.” However, an almost equal number acknowledged that they completed the projects mainly for the extra credit. Almost all the students who did the project felt it improved

their self-awareness, and most felt it reduced either anatomy-related stress, or stress in general.. They saw the project as a relaxing break, a way to avoid burn-out, a calming, tension-releasing experience, and a means of attaining a different, and healthier, perspective on anatomy. The majority of students felt that completing the projects changed or reinforced their attitude toward medicine in a positive way, while almost half reported that the project had improved their attitudes toward anatomy. Half of completers also agreed that the project enhanced their empathy. Some students also felt that the project gave them additional insight into the doctor-patient relationship. Some of the respondents felt that doing the project helped them think about death and/or had increased their spirituality Others commented that they learned to think about the perspective of the cadaver, or to see anatomy not just as a science class but as an important part of their life-experience.

Over all, students completing creative projects appreciated the opportunity to “integrate” their scientific and artistic sides. It provided an outlet for difficult emotions, encouraged reflection, offered a way to acknowledge the “feeling” aspect of medicine, to experience shifting perspectives, and to obtain closure. Perhaps most important, it sent a message to students that the profession itself valued the humanistic dimension of medicine.

Non-completers. The majority of non-completers said they didn’t participate in the creative projects option, because they were not “creative.” However, half of the non-completers mentioned that they had seriously considered, or even attempted, the project. Almost half of non-completing students also mentioned that they decided not to do the project, because of lack of sufficient time, and because they perceived the project as

simply extra work. Eleven of the twelve students had viewed creative projects done by their peers. The large majority of these students described these projects as “awesome,” “impressive,” “amazing,” “very creative,” “beautiful.” They were astonished and impressed by the creative talents their classmates exhibited. About half of the non-completing students spontaneously made positive comments about the value of the creative projects. The most frequent reason they offered was that it was a good opportunity for people who “liked that kind of thing.” Two students mentioned that seeing the projects had provided them with an important way of understanding and processing their own feelings about anatomy.

DISCUSSION

The interpretation of students’ creative projects suggests that the students who expressed themselves through these projects often had profound ambivalence about the experience of anatomy. Yet, because anatomy was a required and crucial step on their path to becoming physicians, they attempted to resolve their ambivalence through employing one or more defense mechanisms. Using rationalization and minimization, some students emphasized the mechanical, technical aspects of the experience. Others used sublimation to focus on the awe and beauty of dissection and the human body. Still others imagined a human connection between themselves and the cadaver, characterized by encouragement, teamwork, even friendship.

Yet it would be simplistic to dismiss students’ projects as mere rationalization and sublimation of negative emotions. The student projects showed clear evidence of authentic wrestling with the issues discussed above. In our judgment, students were making a sincere effort not to avoid the complexity of the task they had undertaken. They

recognized that much was at stake both for them and for their future patients. Their projects suggested that they were seeking a “middle way” in which they could avoid excessive involvement while retaining humanitarian feelings. Student interviews indicated that completing the projects helped them to reduce the stress of the anatomy course as well as improve their perceptions of anatomy and medicine in general. The projects also were influential in helping students to develop self-awareness and reflect on the doctor-patient relationship, empathy, death and dying, and their own spirituality. Even students who did not do projects generally reported positive effects from viewing the work of their peers.

Some medical educators believe that the student-cadaver relationship should provide the model for organizing the doctor-patient relationship.²² Yet, if in an effort to manage their anxiety, all students learn is an objective, detached curiosity, the potential for the anatomy experience as a foundational model becomes severely limited. The emphasis in previous approaches to students’ uncomfortable emotional experiences in the gross anatomy lab has been on elimination of negative feelings. We suggest that, up to a point, anxiety may be a valuable learner response. While present interventions are based on desensitization models of exposure, an arts-based intervention emphasizes personal wrestling, reflection, and integration. The end point may be the same – i.e., reduced anxiety – but an approach that allows for the processing and metabolizing of anxiety may ultimately be more psychologically helpful to students and provide them with a stronger foundation on which to build relationships with patients that acknowledge uncomfortable emotions in both doctor and patient.

Arreaz-Aybar et al.¹² document that medical students have different levels of trait anxiety – i.e., some students are more anxious than others. Were the students in our study who chose to do creative projects more anxious than students who did not? While we did not quantitatively address this question, information from student interviews suggests that non-completers reported slightly less stress. But what we should conclude from such a difference is ambiguous. Is this slightly higher stress a good or a bad thing? It may mean only that students who do creative projects are more self-aware than students who do not. In fact, non-completing students reported being helped to think about anatomy more deeply by viewing the projects of their peers! One hypothesis is that students doing creative projects may be especially good at exploring issues that many students wonder about, but can't express easily.

Our findings support the conclusion that doing a creative project reduced stress for students who completed such a project, according to their self-reports. However, we suggest the possibility that, by allowing students to explore their anxiety in an open-ended and creative fashion, rather than simply stifling, or detaching from, this emotion, students were able to grapple with it. They were able to acknowledge that cadaver dissection is a “very big deal,” and that the questions it provokes - about doctor-patient relationships, physician identity, mortality and immortality, suffering and healing -are questions very much worth asking and ruminating on. We suggest that creative projects, at least for some students, may be a more effective way of dealing with anxiety than simple desensitization that does not necessarily rely on introspective growth, but only on familiarity.

References

1. Bender J. From theater to laboratory. *MSJAMA*, 2002; 287: 1179.
2. Wenger, DCK. It's not your parents' anatomy course. *Academic Physician & Scientist*, March, 2006,1 -3.
3. Rizzolo LJ. Human dissection: An approach to interweaving the traditional and humanistic goals of medical education. *Anat Record*, 2002; 269: 242-248.
4. Horne DJ de L, Tiller JWG, Eizenberg N, Tashevskia M, Biddle N. Reactions of first year medical students to their initial encounter with a cadaver in the dissecting room. *Acad Med*, 1990; 65: 645-646.
5. Dickinson GE, Lancaster CJ, Winfield IC, Reece EF, Colthorpe CA. Detached concern and death anxiety of first-year medical students: Before and after gross anatomy course. *Clin Anat*, 1997; 10: 201-207.
6. McGarvey MA, Farrell T, Conroy RM, Kandiah S, Monkhouse WS. Dissection: A positive experience. *Clin Anat*, 2001; 14: 227-230.
7. Penny JC. Reactions of medical students to human dissection. *J Med Educ*, 1985; 60: 58-60.
8. Finkelstein P, Mathers L. Post-traumatic stress among medical students in the anatomy dissection laboratory. *Clin Anat*, 1990; 3: 219-226.
9. Dinsmore CE, Daugherty S, Zeitz HJ. Student responses to the gross anatomy laboratory in a medical curriculum. *Clin Anat*, 2001; 14: 231-236.
10. . Ellis TA 2nd, Bacon DR. The anatomy laboratory: a concept ahead of its time. *Mayo Clin Proc*, 2003; 78: 250-1.
11. Snelling J, Sahai A, Ellis H. Attitude of medical and dental students to dissection. *Clin Anat*, 2003; 16: 165-172.
12. Arráez-Aybar LA, Casado-Morales MI, Castaño-Collado G. Anxiety and dissection of the human cadaver: An unsolvable relationship? *Anat Record (Part B: New Anat.)*, 2004; 279B: 16-23.
13. Abu-Hijelh MF, Hamdi NA, Moqattash ST, Harris PF, Heseltine GF. Attitudes and reactions of Arab medical students to the dissection room. *Clin Anat*, 1997; 10: 272-278.

14. Marks Jr SC, Bertman SL, Penney JC. Human anatomy: a foundation for education about death and dying in medicine. *Clin. Anat*, 1997;10:118-122.
15. Hafferty FW. Cadaver stories and the emotional socialization of medical students. *J Health Soc Behav*, 1988; 29: 344-356.
16. Stewart S, Charon R. Art, anatomy, learning, and living. *JAMA*, 2002; 287:1182.
17. Tschernig T, Schlaud M, Pabst R. Emotional reactions of medical students to dissecting human bodies: A conceptual approach and its evaluation. *Anat Record*, 2000; 261: 11-13.
18. Coulehan JL, Williams PC, Landis D, Nase C. The first patient: reflections and stories about the anatomy cadaver. *Teach Learn Med*, 1995; 7:61-66.
19. Dinsmore CE, Daughtery S, Zeitz HJ. Teaching and learning gross anatomy: Dissection, prosection, or "both of the above?" *Clin Anat*, 1999; 12: 110-114.
20. Strauss, Anselm and Juliet Corbin. *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Newbury Park, CA: Sage Publications, 1990.
21. Strauss A and Corbin J. "Grounded Theory Methodology - An Overview," In *Handbook of Qualitative Research*, N. K. Denzin and Y. S. Lincoln (Eds.), Sage Publications, Thousand Oaks, 1994, pp. 273-285.
22. Bastos LAM, Proenca MA. A pratica anatomica e a formacao medica. *Pan Am J Public Health*, 2000; 7: 395-402.

Table 1
Total Anatomy Students and Creative Project Completers by Year and Gender

YEAR	# STU	% FEMALE	# COMPLETERS	% FEMALE
2003-4	93	46.24	47	57.45
2004-5	102	52.94	33	57.58
2005-6	102	46.08	35	51.43

Table 2
Coding Categories for Art and Written Creative Projects

Art Projects

- Type of art (representational or abstract)
- Medium (i.e., drawing, painting, photograph, etc.)
- Content (i.e., what the project portrays descriptively)
- Themes (the main point of the piece)
- Tone (serious, humorous, angry, compassionate, etc.)
- Emotions conveyed (fear/anxiety, sadness, joy, gratitude, etc.)
- Interpretation (narrative)

Written Projects

- Concerns about self-image and becoming professionals
- Views of the cadaver
- Death and dying
- Spirituality
- Tone
- Emotions conveyed
- Defense mechanisms utilized (isolation of affect, repression, rationalization, desensitization, sublimation, humor)
- Voice (1st, 2nd, 3rd person, etc.)
- Interpretation (narrative)

Table 3
Summary of Creative Projects

Total number of creative projects analyzed: **44**
 Total art projects: **11**
 Total written projects: **33***
 Essays: **13**
 Poems: **19**
 Miscellaneous: **4**
 Number of students submitting both early and late projects: **9**
 Number of students submitting 2 art projects: **3**
 Number of students submitting 2 written projects: **8**
 Number of students submitting 1 written/1 art: **1**
 Number of early phase projects: **24 (4 art and 20 written)**
 Number of late phase projects: **23 (7 art and 16 written)**

***36 written projects were analyzed because one student submitted 4 poems as his first project**

Table 4
Summary of Interview Data for Creative Project Completers and Non-Completers

Completers N = 12	Non-completers N = 12
Reasons for doing project	Reasons for not doing project
<i>Liked doing creative things</i> 6	<i>Not creative</i> 8
<i>Fun</i> 6	<i>Lack of time</i> 5
<i>Extra credit</i> 5	<i>Extra work</i> 5
Effects of projects	<i>Intended to do project</i> 6
<i>Increased self-awareness</i> 10	Reactions to projects N=11
<i>Reduced stress</i> 9	<i>Awesome, beautiful</i> 8
<i>Improved attitudes toward medicine</i> 8	<i>Perceived value of creative projects</i> 7
<i>Enhanced empathy</i> 6	
<i>Improved attitudes toward anatomy</i> 5	
<i>Gave insights into doctor-patient relationship</i> 5	
<i>Helped think about death</i> 4	
<i>Increased spirituality</i> 4	

Figure 1
Combined Coder Ratings for Art Initial and Final Projects

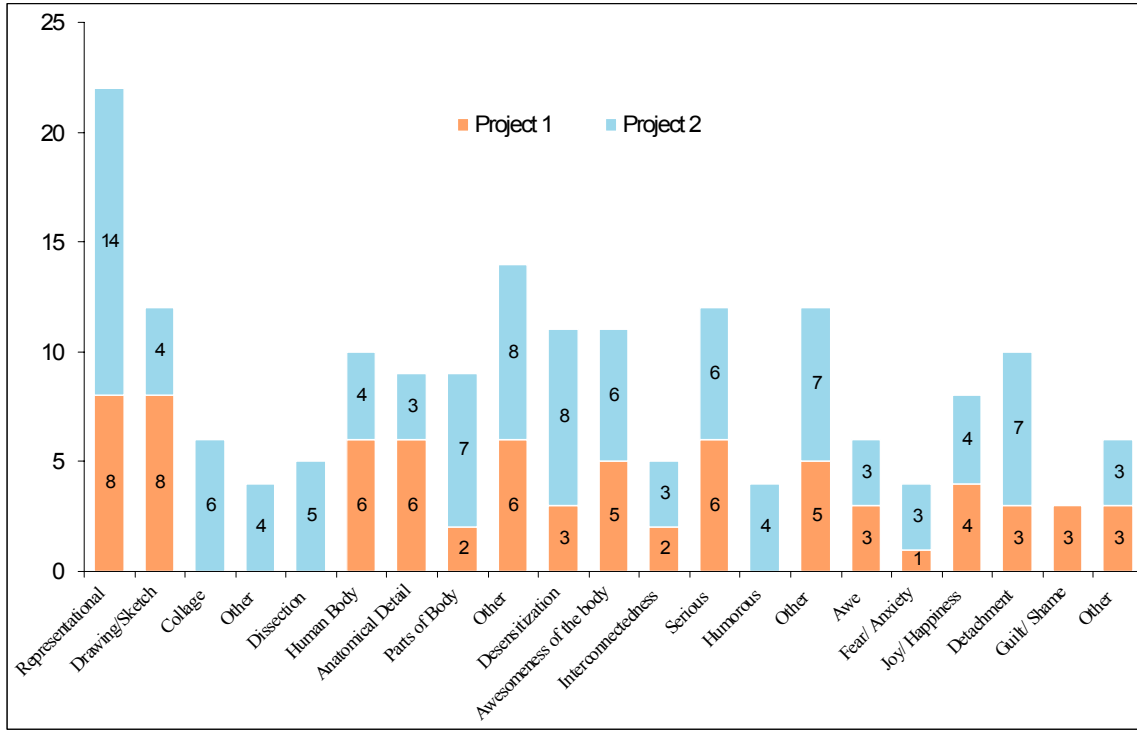


Figure 2
Combined Coder Ratings for Written Initial and Final Projects

