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Competition, Comparison, and Pressure to Perform: An Analysis of the Impact of the Advanced Placement Program on Suicidality Among High Achieving Adolescents

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COMPETITION, COMPARISON, AND PRESSURE TO PERFORM: AN ANALYSIS OF THE IMPACT OF THE ADVANCED PLACEMENT PROGRAM ON SUICIDALITY AMONG HIGH ACHIEVING ADOLESCENTS

by

Jessica Rindels

A thesis submitted in partial fulfillment of the requirements
for graduation with Honors in the Economics

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Jeffrey Desimone
Thesis Mentor

Spring 2021

All requirements for graduation with Honors in the
Economics have been completed.

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Abstract

Excessive competition and social comparison among high achieving students is a well-documented phenomenon which is particularly existent withing accelerated high school programs such as the Advanced Placement (AP) Program. Hyper-competitiveness, social comparison, and excessive pressure to perform at a high level, among other mechanism, have been shown to positively impact a score of negative mental health outcomes by increasing their incidence. This analysis examines the effect of expansion of the AP Program to additional high schools and exam scores sent to more colleges on adolescent suicide rates. I utilize data on the AP program from the College Board and data on suicide rates from the Center for Disease Control, and use a two-way fixed effects framework to estimate the effects of the AP program on suicide rates for 15-18 year old adolescents. Overall, I find that for both specifications, increases in the number of schools offering AP exams and colleges receiving scores each predict significantly higher suicide rates among 15-18 year olds with joint significance levels of around 1%. The results indicate that the specifications had a combined effect of raising the suicide rate among high school students by nearly three quarters of a standard deviation, which amounts to nearly 30% of the sample average suicide rate. Further, I examined the effect on males and females separately and found that expansion of the program to more schools positively and significantly impacted male suicide rates, which account for nearly 80% of suicides within this age group.

Introduction

In recent years, the high school academic experience has shifted from one in which students learn foundational material to prepare for college, to one in which students are heavily encouraged to take courses that will earn them college credit while still in high school. Less a place to prepare for post-secondary education, and more a place to prematurely get ahead in it, high schools across America are generating accelerated learning environments where students earn high school and college credit at the same time. With more young adults attending college than ever before and college tuition rising each year, the chance to get ahead and earn some credit in a cheaper way becomes extremely appealing. There are several avenues for doing so including Advanced Placement (AP) courses, International Baccalaureate (IB), dual enrollment through a partnering college, and even honors sections of classes which, while they don't give

college credit, give students the opportunity to boost their GPA to appeal to colleges when applying. Geared toward high achieving, motivated students who learn quickly, these programs are meant to provide a more productive and immersive class experience, a more driven and focused cohort, and the chance to learn material beyond the scope of normal high school courses.

The Advanced Placement program began in 1955 and was developed with the intention of harboring creativity and innovation in both students and teachers. The program was meant "to challenge a small, elite group of able students" and act as a "solid collaboration between high school teachers and college professors, with an emphasis on subject content" (Litchen 2000). These classes are typically characterized by a form of accelerated teaching in which students are able to master more topics or skills in a shorter amount of time. This system exposes students to a greater amount of content, giving them a broader knowledge set that will put them ahead of peers in their post-secondary endeavors. Functionally, AP courses run like fast-paced, more rigorous versions of normal high school classes during the school year, but students can choose to take the AP exam for any/all course(s) at the end of the year in an attempt to earn a passing score and, subsequently, college credit for the class. The key point here is that college credit is based on exam performance rather than some measure of intangible growth for the students. A marked divergence from the initial goal of the program which was, in the words of the original AP program's committee member, Alan Blackmer, to "find a way to integrate high school and college education on a national basis, without having to standardize it," the AP program of today favors students who test well, and who can out-perform peers on their AP exams.

In 1979 there were over 4,457 high schools in the United States offering Advanced Placement (AP) courses to their students (note that these values are based off of the number of students who took the AP exams, which likely understates the true number of students who took the classes). In 2000, "more than half of American high schools and one third of four year college-bound seniors participated in the AP program" (Litchen 2000), and by 2018, that number had skyrocketed to 20,559 high schools, corresponding to over 2.7 million students and nearly 5 million AP exams taken in May of 2018. Offering AP classes does not require the same process of accreditation or a partnership with a college that IB and dual enrollment do, so it is relatively easier for high schools to create accelerated programs centered around AP courses. Because of the nature of AP courses and their prevalence in the U.S., the metrics associated with these classes offer a proxy for the type of accelerated high school programs that are becoming

increasingly popular. That is, analyzing the number of students taking AP courses and average scores on the AP exams offer a data-driven way to examine high achieving high school aged students, since it is likely that those students took an AP course at some point during their high school years.

Accelerated high school programs of all kinds have widely regarded individual and social benefits which will be discussed further in the literature review section. In summary, these programs increase human capital and improve the labor market while providing a productive environment for high achieving students to hone their skills and explore their interests. What has not been investigated as thoroughly, though, are the potential negative effects of these highly competitive programs. Being immersed in a rigorous, competitive, fast paced environment opens students up to several forms of anxiety, stress, excessive social comparison, depression, feelings of hopelessness/helplessness, and a host of other mental health or mood disorders as they attempt to live up to their own expectations as well as the expectations of their peers, teachers, or families. The goal of this analysis is not to discount the advantages of the programs, but to shed light on ways in which they may be lacking in terms of serving the students appropriately and producing human capital whom can contribute to their full extent in society.

In her Washington Post article "How the Advanced Placement Program is Failing Students," writer Annie Abrams highlights the fact that the AP program was developed with the intention of harboring creativity and innovation in both students and teachers, but has devolved into an antithetical system in which teachers teach to the external exam at the end of the school year. This emphasis on the AP exam could contribute to increased stress and anxiety, among other mental health problems, for students taking these courses, as college credit is contingent upon earning a passing score. Columnist Jay Mathews makes note of this phenomenon in his Washington Post article "The Good and the Bad of Advanced Placement and the Fattening Hippo of Schools Embracing It." The hypercompetitive nature of these courses reduces the likelihood of students collaborating with peers which is regrettable since a collaborative environment is a source of positive social interaction in school.

While gifted high school education programs have undeniable benefits for both students and society as a whole, the social, individual, and opportunity costs related to dealing with and treating mental health disorders, particularly depression and suicidality, caused by immersion in

a highly competitive environment among this cohort diminish the net positive effects of these programs.

Literature Review

Accelerated high school programs, as the name suggests, are characterized by a form of accelerated teaching in which students are able to master more topics or skills in a shorter amount of time. This system exposes students to a greater amount of content, giving them a broader knowledge/skill set that will put them ahead of peers in their post-secondary endeavors. Broadly, research shows that, among other things, gifted students excel in environments with other students who learn at a similar pace and in similar ways to them (Coleman et al. 2015) Education research has shown that gifted children document feeling bored at school when placed in classrooms with students who did not learn at the same pace as them, which often lead to a lack of enthusiasm about school and learning, among other adverse effects (Kanevsky & Keighley 2003; Ganry-Tardy 2005; Zbainos & Kyritsi 2013; Beck 2011). Talented students are more likely to outwardly express or embrace their intelligence in an setting with other intelligent students (Coleman et al 2015). Additionally, gifted students have lower levels of hopelessness than nongifted peers (Bolland et al. 2019). However, Calsamiglia and Loviglio (2019) provides empirical evidence that students in classrooms with more talented peers earn lower grades from the teacher than an identical student in a class with worse peers. This finding is certainly relevant, but the result speaks more to the ineffectiveness of certain examinations than to the impact of the learning environment itself – a situation which will be discussed further.

It is well known that there are both positive and negative social interactions occurring in all schools each day. I posit that the accelerated learning style could create a positive feedback loop in which increased stress and mental health problems among the students increase the number of negative social interactions during school hours, in turn increasing stress and mental health problems. This could be related to increased competition between high achieving students, increased rigor in accelerated courses, or other factors. High achieving students have expectations upon them to do well or be the best in their classes – whether the expectations are placed upon them by themselves or others. Spending 6-8 hours each day around people who they can readily compare their success to opens these students up for feelings of failure, hopelessness, depression, and more. Further, youth suicide rates decline during summer months

when school is not in session (Hansen & Lang 2011). Negative social interactions were cited as a likely contributing factor to this phenomenon.

With more and more students participating in accelerated programs of all kinds, there has been pressure to create an objective measure of success for these classes as a way to push back against potential biases based on a number of factors including gender, socioeconomic status, or race which may be present in more subjective grading techniques. Several studies show that teachers "exhibit gender biases in grading schemes through providing differential grades to female and minority students" and might "inflate grades for talented students whom they feel have had a bad test day" (Lavy 2008; Lavy & Sand 2015; Rangvid 2015; Terrier 2016; Diamond & Persson 2016; Calsamiglia 2019). These objective grading schemes certainly help to create a more equitable program in terms of who gets credit for the classes taken, however objective grading schemes can be detrimental to student's mental health outcomes through a variety of channels which will be discussed further.

There are several mechanisms by which students whom participate in accelerated high school programs may become victim to poor mental health outcomes. Broadly, we can define five mechanisms which may contribute to the issue: negative social interactions within schools, social comparison/excessive competition with peers, burnout, perfectionism, and imposter's syndrome. I will define these as separate pathways and indicate how and why their presence contributes to feelings of depression, hopelessness, and suicidality. It is important to note, though, that these mechanisms are heavily intertwined and it is not always clear where one mechanism ends and another begins. That is, while it is important to understand how these mechanisms function with regard to mental health separately, it is not necessarily the case that an individual of interest would be facing just one, rather than multiple of these experiences. This situation should become clear through a deeper look at each mechanism, as many aspects of the AP program can be thought to contribute to the incidence and prevalence of them.

Perfectionism

Perfectionism is mental state characterized by fear of failure or mistakes, minimization of successes, overgeneralization of failures, development of internal attributions for failures and maladaptive achievement behaviors, and the setting of high performance goals and standards which may or may not be truly achievable (Abdollahi et al. 2018; Neumeister et al. 2003).

Among research on the prevalence and impact of perfectionism, a few things are generally agreed upon: perfectionism is relevant to research on gifted learners because it is common among this cohort, and there are two main types of perfectionism which are, broadly, adaptive and maladaptive perfectionism (Fong & Yuen 2014; Abdollahi et al 2018; Betts & Neihart 1988; Fletcher & Neumeister 2012; LoCicero & Ashby 2000; Schuler 2000; Silverman 1990; Wang et al. 2012).

Although the list of attributes of perfection listed above includes mainly characteristics which would have a negative impact on a student's mental health, it is true that perfectionism can present in a way that is advantageous for learning and school performance. "Adaptive" perfectionism, which is closely associated with "personal standards-" (Abdollahi et al 2018) and "self oriented-" (Neumeister et al 2003) perfectionisms, involves setting high standards and goals. Students who scored high in adaptive perfectionism markers tended to exhibit greater levels of resilience, effective coping skills in the face of failure or mistakes, and striving for outstanding success (Abdollahi at al 2018). Further, proponents of positive perfectionism suggest that, in addition to the outcomes already listed, perfectionism can lead to development of active coping (Weinger & Carton 2012), academic satisfaction (Franche et al. 2012), higher self-efficacy (Chan 2007), persistence, and conscientiousness in one's studies (Bieling et al. 2004; Chan 2007, 2009, 2012; Chang 2006; Chang et al. 2004; Dunkley et al. 2003; Fletcher & Speirs Neumeister 2012; Stoeber et al. 2008; Rice et al. 2011)

While evidence has shown that perfectionism can be valuable to development and school performance, it is unlikely that high achieving students are actually reaping benefits from this mental state. "Maladaptive perfectionism" is associated with "evaluative concerns-" and "socially-prescribed-" (Speirs et al 2003) perfectionisms and is characterized by a focus on avoiding mistakes, excessively high standards, feelings of self-worth dependent on performance, and reactions to failure which include harsh views of oneself (Abdollahi et al 2018). Studies by Orange (1999) and Schuler (1999) indicate that the prevalence of perfectionism among gifted adolescents could be between 87-89%, with other studies showing that between 15-20% of gifted students experience the negative aspects of perfectionism at some point during their educational careers (Orange 1997; Schuler 1999; Webb 1995). A view which is present among psychology research is that "perfectionistic tendencies are primarily destructive rather than beneficial" (Fong & Yuen 2014). The negative mindset that often accompanies maladaptive perfectionism has

been associated with range of negative outcomes including procrastination (Frost et al 1990; Mohamadi et al 2012; Seo 2008), depression (Black & Reynolds 2013; Flett et al 2012; Rice et al 2007; Wang 2012), anxiety (Hewitt et al 2002; O'Connor et al 2010; Rice et al 2012), eating disorders (Bardone-Cone et al 2009; Bastiani et al 1995; Wohs et al 1999), suicidal ideation (Hewitt et al 2006; Rasmussen et al 2012), underachievement, and decreased motivation (Nugent 2000; Speirs 2004; Speirs 2006; Stoeber et al 2009).

It is important to note that while self-oriented perfectionism has been linked with more positive outcomes, it can produce negative ones as well through its interaction with maladaptive perfectionism. The current view is that perfectionism tends to embody both maladaptive and adaptive forms even in a single student (Fong 2014). Mofield and Peters posited that high achieving students equate their self-worth with their achievements (Mofield & Peters 2015; Lee 2020). Further, Speirs noted that many gifted students "saw pleasing others as synonymous with doing well in school" and felt the "need to please others through academic achievement because achievement allowed them to maintain their self-worth" (Speirs 2003). These studies indicate that for high achieving students, perfectionism is rooted not only in self-perception but also external-perception in the face of potential failure. Perfectionist students face insecurities over their internal and external self-worth.

Of interest to my analysis is not simply the fact that perfectionism is prevalent among gifted adolescents, but more so the mechanism by which education programs, specifically accelerated high school programs such as AP, might be contributing to this prevalence. From its origins, AP was meant to provide a focused, fast-paced environment where high ability students could come together and learn beyond the scope of normal high school classes. The basis of this model is a concentration of intelligent students, all vying to maintain their status as "the smart one" or, rather, "the *smartest* one." In her study which utilized a qualitative interview design, Speirs noted that many interviewees commented that AP classes and exams were the first times they had truly been challenged throughout their academic careers, attributing their tendencies towards perfectionism in part to their lack of experience with failure (Speirs 2003). That is, these students had traditionally assumed the role of "smartest" among their cohorts, but upon entering AP classes where every student in the class held that title at one time or another, success was not as easily earned, leading to fear of failure and other negative outcomes.

As the AP program becomes more popular, there are more and more students taking the classes and exams each year. This phenomenon has potential to influence perfection through two avenues. First, it is certainly possible to be "perfect" in an AP class or on an AP exam by earning an "A" in the class or a 5 on the exam. The caveat is that there would be no validity to grades or scores if every student received that "perfect" mark, meaning that only a select few can achieve the perfectionistic standards that they may have set for themselves. Failure in this sense is linked with feelings of inferiority compared to peers which, when interacted with burnout feelings, has been shown to significantly predict depression (Brenninkmeyer et al. 2001). Second, the increasing popularity of the AP program, while important for inclusivity and equal opportunities in education, may not have necessarily coincided with an increase in the number of students equipped to succeed in a fast paced, rigorous class environment. That is, the supply of high achieving, gifted individuals may not be as pliable as the demand for accelerated high school classes has been. Through this, there could be students who lack background necessary to compete effectively with peers to achieve success in these classes. These students may place extra emphasis on mistakes or failures, seeing them as evidence that they are inferior to their peers. Depression may be triggered through the same mechanism as mentioned above.

Though it was not the intention at its inception, the AP program as well as other accelerated high school programs have become increasingly evaluator centered and dependent upon "objective" class and exam performance to measure success and mastery. Research on effective teaching strategies to cope with perfectionistic students shows that a learning environment which emphasizes personal growth and allows students to set their own manageable goals can reduce the prevalence of maladaptive perfectionist tendencies (Brophy & Rohrkemper 1989). In its current state, AP courses are largely evaluator centered, leaving little room for students to set realistic goals for themselves. That is, each student is essentially hard pressed to set smaller, more achievable goals than to earn a high score on the AP exam since college credit is determined solely based on that score. This being the case, the margin for error in these classes is objectively low which opens the door for perfectionist mindsets among these students.

Imposter Syndrome

Imposter syndrome is characterized by an inability to internalize one's own success or status (Lane 2015), the belief that success has occurred due to luck, mistake on behalf of external

evaluators, or hard work rather than ability or intelligence (Kolligan Jr. et al. 1991; Wang et al. 2019), and a lack of trust in objective qualifications and accomplishments leading to the feeling that one does not belong in their academic or work environment (Leonhardt et al. 2017). Imposter syndrome has been associated with a wide range of negative and pathological outcomes including low self esteem (Chrisman et al 1995; Cozzarelli & Major 1990; Kolligian & Sternberg 1991; Thompson et al. 1998; Bravata et al. 2020; Schubert & Bowker 2017), workaholism (Bechtoldt 2015), self-consciousness and self doubt (Thompson et al. 2000), neuroticism (Kolligian & Sternberg 1991), burnout (Bravata et al. 2020), anxiety (Thompson et al. 2000; Lane 2015; Kolligian & Sternberg 1991), perfectionism (Bechtoldt 2015), and depression (Kolligian & Sternberg 1991; Bravata et al. 2020; Chrisman et al. 1995; Cozzarelli & Major 1990; Thompson et al. 1998; Wang 2019).

More research is needed on the prevalence of imposter syndrome among students involved in particularly competitive school environments, but a few phenomena can be noted from the existing literature on the subject. First, studies have found that imposter syndrome can be influenced by both internal and external factors (Thompson et al. 1998; Vaughn et al. 2020; Ward 1990; Lane 2015). Internal factors include perfectionism, lack of self-validation, and high motivation, while external factors include "constant comparison with the performance or perceived ability of others and being assessed at school through content, cognitive, or achievement-based examinations" (Lee 2020; Lane 2015). Lee et al. (2020) posit that designated exam periods such as midterms, finals, or standardized testing (such as AP exams) might impact the experience of imposter syndrome through fear of not performing on a comparable level to peers, and note that it is "salient to understand how … participation in [an] academically and socially competitive environment contribute[s] to imposter feelings of… students who have achieved success academically…" (Lee et al. 2020).

The current body of research on imposter syndrome gives evidence that the phenomenon is correlated with several negative outcomes. While its connection to accelerated schooling programs is not as well documented, the fact that one *must be* successful in order to develop feelings of imposter syndrome connects the two in a way that seems logical. That is, academically talented students tend to be the ones experiencing academic success, and success is a necessary precursor to the experience of imposter syndrome. The following are some

mechanisms by which accelerated high school programs might impact the prevalence of imposter syndrome among high achieving students.

Studies have shown that external factors such as one's work or educational environment can influence imposter syndrome (Clark et al. 2014; Lane 2015). When interviewed, gifted adolescents shared a common experience of never having felt challenged academically until they reached AP courses in high school (Speirs 2003). An environment where many students are being challenged for the first time is a breeding ground for excessive competition and social comparison, both of which were noted as external factors which predict imposter syndrome. Another external factor, content examinations, has become a marker of the AP program in recent years. Each student in a class faces the same examination and evaluation criteria making direct comparison not only possible but probable. Through the mechanism posited by Lee et al. (2020) noted above, the prospect of direct comparison could trigger feelings of imposter syndrome among these high achieving students.

When a student takes an AP exam, their raw score on the multiple choice and free response portions of the exam is converted to a 1-5 scale which becomes the student's official score which determines if they will earn college credit or not. From year to year, the number of correct answers required to earn a certain AP exam score varies, but the distributions are released by the College Board for certain test and certain years. On the 2007 AP Psychology exam, a multiple choice score of 113 out of 150 total points was considered within the "5" range meaning a student could earn the highest possible AP exam score on that test by answering 75% or more of the multiple choice questions correctly (College Board 2010). This scoring method could incite feelings of imposter syndrome if a student feels that they can earn the highest AP exam score while only having mastered 75% percent of the course content, which would coincide with just a "C" in a normal classroom. This could foster a sense of distrust over these and other objective evaluations and, consequently, imposter syndrome.

Decreasing school duration without changing the amount of content presented has shown to have negative effects on students perceived stress and mental health outcomes, especially for female students (Quis). While AP programs do not, strictly speaking, decrease school duration, they do require students to master more topics in the same amount of time during which other students would be exposed to much less. The fast pace means that if a student begins to struggle with a certain concept, there is little time in the schedule for them to slow down to focus on that

problem area. Whether or not this impairs the understanding of subsequent topics, a student may leave the AP course or AP exam feeling as though they do not truly understand all of the course content, leading to the feeling that they have succeeded out of luck or mistake rather than on their own merit.

Competition and Social Comparison

AP courses bring talented students together in learning environments which tend to be very productive and enriching, but also highly rigorous and highly competitive. Increased geographic concentration of juveniles was one of three channels that lead to an increase in the number of potentially volatile interactions within schools (Jacob et al.). To be specific, research has shown that "intense individualized competitiveness… [and] high social conflicts in families or communities where individuals cannot escape from each other… have been implicated in depression" (Gilbert 2006; Wilkinson 1996; Kasser 2002). Further, Gilbert (2006) notes that social stresses via elevated competitive behavior, lack of affiliative relations, and social insecurities, among other things have been implicated in the development of depression. In conjunction with the fear of failure brought on by perfectionism, when people feel that they are failing at competing for social resources depression can be triggered (Baldwin 2005).

Students who choose to participate in accelerated high school programs such as AP or IB which give opportunities to earn college credit are making an investment in their future educational experience, indicating that they are planning and preparing for education beyond the high school level. During a time when GPA, class rank, and even the volume of AP courses taken by a student are taken heavily into account during the college admissions process, it is likely that students view their classmates less as supportive peers and more as competitors that they need to "beat" in order to achieve their goals. That is, college acceptances can be thought of as private goods in that they are rival and excludable, so one student's acceptance into a certain college could literally mean that one of their peers faces failure in that respect. If students see their peer's failure as a opportunity for their own success, an affiliative, cooperative, or supportive class environment is unlikely. With a competitive disincentive to collaborate with peers, depression could be triggered through the mechanisms listed above.

The increasing popularity of the AP program means that each student has more people to compete with in order to be successful. As this "competition vector" increases in size, students

face increased pressure to perform at a high level. Students noted that they were often regarded as "the smart one" among their friends, and commonly felt that since they were good at academics they might as well be the best (Neumeister 2003). This mindset interacts heavily with perfectionist tendencies, but also speaks to the great sense of competitiveness fostered by these programs. It is one thing for a high achieving student to be "the best" in a regular high school class, and another for that student to be the best in a fast-paced, rigorous class filled with "bests."

The transition towards objective scoring styles in AP courses enables direct social and academic comparison. Through this it is possible and simple to determine an "objective" ranking of students in a class, driving students to do whatever it takes to be at or near the top. Gifted students remarked that they felt a sense of superiority when they knew they were being perceived as smart, and also saw pleasing others as synonymous with doing well in school because their academic achievement allowed them to maintain their self-worth (Neumeister 2003). In a system where rankings are viewed somewhat as castes, failure to compete can cause students to lose their sense of superiority over peers and possible even their own self-worth. Inferiority interacts with feelings of burnout (which itself has overlapping features with depression) to significantly predict levels of depression (Brenninkmeyer et al. 2001). Intense social and personal pressure to compete effectively with peers, especially in the high school setting where students are forced to be together for around eight hours per day, is likely having severe negative effects on their mental health outcomes.

Burnout

The first papers that discussed burnout defined the phenomenon as a staff member's condition of having failed, been worn out, or become exhausted by making excessive demands on energy, strength, or resources (Freudenberger 1974). It has also been perceived as the end stage of long-term chronic stress and is considered a work related mental health impairment (Maslach 2003; Awa et al. 2010). Freudenberger (1974) made the claim that "the dedicated and the committed" are most prone to burnout, an idea that aligns burnout closely with the high achieving students of the AP program. Burnout is typically represented by three symptomatic dimensions which include mental and emotional exhaustion, feelings of emptiness and depersonalization, and a reduced sense of personal accomplishment which indicates a negative evaluation of one's achievement at work (Maslach & Jackson 1981). Dysmorphic symptoms

such as fatigue, emotional exhaustion, and feelings of anxiety and depression are considered most characteristic of burnout (Morse et al. 2012; Maslach & Schaufeli 1993). Burnout has been identified to mediate between stress and depression (Ahola et al. 2009). Burnout is also associated with social withdrawal, an inability to regulate emotional expression, absenteeism, lowered morale, reduced efficacy, and reduced performance (Gorgievski & Hobfoll 2008; Ahola et al. 2008; Taris 2006). Further, when burnt-out individuals feel that they have been defeated they experience a loss of superiority and, consequently, depression (Brenninkmeyer et al. 2001).

Research has shown that burnout can negatively influence the quality of one's work and has also been "hypothesized to produce a generalized negative outlook toward self and others" (Rupert et al. 2015; Paris & Hoge 2010). When individuals withdraw from their roles they stop striving to do their best work and typically do the minimum to get by (Maslach 2003). This indicates that burnout can be harmful to the individual who suffers from it, but also peers and others whom interact with that person or their work (McCormack et al. 2018). AP students who face prolonged stress related to their difficult course load could have negative impacts on their peers' mental health outcomes as their burnout symptoms facilitate a negative learning environment. As students lose efficacy they face worsening grades, inability to retain course content, subsequent incapacity to perform on AP exams, as well as a host of other negative social outcomes which all have the ability to trigger depression and suicidality.

Maslach and Leiter (2005) cite sources of burnout which include workload (high volume of work coupled with low volume of resources), control (micromanagement, lack of influence, accountability without power), reward (low compensation, acknowledgment, or satisfaction with respect to output), community (isolation, conflict, disrespect), fairness (discrimination, favoritism), and values (ethical conflicts, meaningless tasks).

Many gifted students have intense, focused interests, but often view them as a natural part of their existence (Coleman et al.). It follows that the opportunity to choose from a very broad range of classes in order to fit specific interests would be beneficial. A curriculum change in China allowed students to take more elective courses, provided flexibility in course selection so that not all students took the same courses, and emphasized arts and physical education courses (Yu & Mocan 2018). Overall, students that experienced the new curriculum had better academic performance in university, were more likely to reveal a willingness to learn and master course material, were more engaged in social activities, had more self-confidence and confidence in

their academic abilities, showed improved mental health, were less likely to report feeling depressed, panicked, or feeling like their life had no value, felt happier, and were more likely to maintain a healthy body mass index. It is true that the AP program offers a broad range of courses for students to choose from, however few of the courses could be truly described as "electives." Students are also not necessarily free to choose just courses that they're interested in because they must take courses to fit graduation requirements, and also must consider which courses' credit will actually be useful to them in college. Further, students risk falling behind in class rank or other metrics if they do not take as many AP courses as their classmates do. If students feel constrained to certain classes and face potential loss of superiority if they do not take the classes, burnout could be triggered.

High achieving students are more likely to face "academic demands" by way of an overwhelming workload, extensive projects, and pressure to do well whereas traditional students are more likely to face "academic struggles" such as poor grades and difficulties with course content and teachers. These "academic demands" have the potential to influence burnout through the heavy workload channel noted by Maslach and Leiter (2005) above. Even though it is not cited specifically by Maslach and Leiter as a source of burnout, it seems reasonable to posit that intense personal and external pressure to perform at a high level could lead to burnout via long-term stress and mental/emotional exhaustion from fear of disappointment and failure.

The structure of AP courses may lead to burnout through the "reward" mechanism. As noted, students earn college credit for AP courses if and only if they score well on the AP exam. While it is surely the case that some students take AP courses just to gain a deeper understanding of a subject without regard for the opportunity to earn college credit, it seems appropriate to assume that the vast majority of AP students choose those courses because 1) there is often a chance for a GPA boost and/or 2) they can earn college credit through the AP exam. The tradeoff in these courses is that they are often extremely challenging, and good grades/AP scores are not easily obtained. This in mind, if a student comes out of an AP courses without passing the AP exam, this could be perceived as low compensation or satisfaction with respect to their hard work in the class. Per the sources listed above, this could trigger burnout.

Data

The data for this analysis comes from two sources. The data on the Advanced Placement Program comes from the College Board's AP Data Archive. The archive contains a separate file for each state for each year going back to 1997 which list data including total exams taken by subject and overall, score distributions and average scores overall and by exam, as well as annual AP program participation for the state across the past several years. I am utilizing data on the number of schools with students who took AP exams, the number of students, number of exams taken, number of colleges that scores were sent to, and average score across exam subjects for each state for each year from 1979-2018. In addition, I gathered the data on the gender breakdowns for number of exams, number of students, and average score across tests in order to examine how effects vary by gender.

The data on suicides comes from the CDC Wonder database. I utilize two different datasets of suicide data. One suicide dataset includes the number of suicides per state among adolescents ages 15-18 for the years 1999-2018. The second dataset includes the number of suicides per state among adolescents ages 15-19 for the years 1979-2018. Ideally, both datasets would have included suicide data for 15-18 year old adolescents since those ages capture students who are actually in high school. Due to constraints in how the data could be pulled through the CDC Wonder database, it was not possible to get suicide data for the 15-18 age group prior to 1999. It was possible, though, to get suicide data for years before 1999 for the 15-19 age group. Some concerns could be raised that a small portion of the age group is no longer high-school-aged and would not be participating in high school classes of any kind, however since the bulk of the age group is high-school-aged and suicides for this age group are already low, it seemed appropriate to use this data for analysis.

I also gathered data to use for controls in my analysis. This includes data on other deaths for this age group such as homicides, unintentional deaths, and non-injury deaths. Further, I include several socioeconomic markers such as the unemployment rate, per capita income, population, as well as breakdowns of the population by gender and race. Data to be used as controls covers each state for each year.

Methods and Results

I estimate the effects of increases over time in the number of secondary schools in a state offering AP exams and the number of colleges to which AP exam scores are sent in a state using

a two-way fixed effects model. The dependent variable is the death rate per 10,000 state residents in the specified age group. Each regression includes controls for the unemployment rate, the population of the corresponding age group, and the log of the fraction of male, White, Black, Hispanic, and Asian in the age group. Fixed effects for each state control for all factors that differ across states but change little over time, while fixed effects for each year control for all factors that vary from year to year bit affect all states similarly.

The use of two-way fixed effects implies that the coefficients are difference-in-differences estimators. That is, coefficients are interpreted as the predicted within-state change in the suicide rate (or other mortality rate from other causes in falsification checks) resulting from a within-state increase from one year to the next in the number of schools offering AP exams or colleges receiving exam scores. Since the schools and colleges variables are in log form, we can interpret their coefficients as mortality rate responses to a given percentage increase in each factor.

The important assumption enabling the difference-in-differences interpretation is that states with different rates of change in schools which offer AP and receiving colleges are counterfactuals for each other. To be precise, the two-way fixed effects specification assumes that youth mortality rates are not trending differentially in different states, so that year-to-year changes would not vary even if different states had the same percentage increase in schools and colleges from one year to the next. To maximize the likelihood that this assumption is satisfied, all regressions also include state-specific linear time trends, which account for factors that vary across states but combine to produce a relatively constant rate of change over time in death rates.

I further employ two additional strategies to account for the possibility of remaining differences in underlying suicide rate trends. One set of estimates includes a different set of year fixed effects for each of the nine census regions. This restricts comparisons to geographically

Table 1 – Youth mortality rates (per 10,000 in age group) & AP exams

Death category:	Suicide					Homicide	Accidental	Non-injury
Gender:	All	Males	Females	All	All	All	All	All
Age (years):	15–18	15–18	15–18	11–14	19–22	15–18	15–18	15–18
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Year-by-census division fixed effects								
Log (# schools offering AP exams)	0.31*	0.57*	0.05	– 0.01	0.18	– 0.09	0.09	0.21
	(0.14)	(0.22)	(0.17)	(0.07)	(0.25)	(0.14)	(0.29)	(0.19)
Log (# colleges sent AP exam scores)	0.27*	0.37	0.16	– 0.10	0.20	– 0.25	0.45	– 0.20
	(0.12)	(0.24)	(0.17)	(0.09)	(0.19)	(0.19)	(0.27)	(0.14)
F-statistic for joint significance [p-value]	4.93	4.58	0.73	0.68	1.12	1.33	1.39	1.52
	[0.011]	[0.015]	[0.487]	[0.513]	[0.336]	[0.274]	[0.258]	[0.230]
B. State-specific quadratic time trends								
Log (# schools offering AP exams)	0.37*	0.58	0.14	0.05	0.23	0.32	0.25	0.28
	(0.16)	(0.31)	(0.20)	(0.08)	(0.23)	(0.20)	(0.40)	(0.30)
Log (# colleges sent AP exam scores)	0.35*	0.47	0.23	– 0.14	0.22	– 0.34	0.56	– 0.06
	(0.15)	(0.24)	(0.19)	(0.08)	(0.21)	(0.19)	(0.29)	(0.20)
F-statistic for joint significance [p-value]	5.28	3.91	1.33	1.49	1.13	2.22	1.84	0.56
	[0.008]	[0.027]	[0.273]	[0.235]	[0.332]	[0.119]	[0.170]	[0.577]

Data are an annual panel of all U.S. states and D.C. from 1999–2018. All regressions include as controls the unemployment rate, the population in the corresponding age group, and the log of the fraction male, White, Black, Hispanic, and Asian in the age group, along with state and year fixed effects and state-specific linear time trends. Regressions are weighted by the average state population in the specified age group during the sample period. Standard errors clustered by state are in parentheses. * denotes significance at the 5% level.

proximate states that are likely to be more intrinsically similar with each other in difficult to measure ways A separate set of estimates alternatively includes quadratic state-specific time trends, which allows for the possibility of smooth but nonlinear underlying changes over time in suicide rates that vary across states. Similar results from these two different approaches to addressing the parallel trends assumption would bolster the interpretation that estimates indeed reflect effects of increases in schools offering exams and colleges receiving them.

Regressions are weighted by the average state population in the specified age group during the sample period. This implies that the estimates represent effects for an average adolescent rather than adolescents in and average state, which would be the case without population weights. Standard errors are clustered by state, which adjusts for both heteroskedasticity and within-state serial correlation in unobserved mortality determinants.

Table 1 shows the estimation results. In column 1, for both specifications, increases in the number of schools offering exams and colleges receiving scores each predict significantly higher suicide rates among 15 to 18 year olds, with joint significant levels of around 1%. Regarding effect size, the average of each coefficient across the two specifications is slightly less than the suicide rate standard deviation of 0.35. From the first to last sample year as the number of schools offering AP exams and colleges receiving scores both rose steadily, the average value of log schools and colleges increased by just over 0.5 and 0.25 points (i.e. 50% and 25% in the actual variables), therefore predicting suicide rate increases of just under 0.5 and 0.25 standard deviations, respectively. One could argue, then, that the expansion of the AP program to students in additional secondary schools, who sent scores to additional colleges, had the combined effect of raising the suicide rate among high school students by nearly three-quarters of a standard deviation, which amounts to nearly 30% of the sample average suicide rate.

Columns 2 and 3 indicate that these effects are attributable largely to males, who account for nearly 80% of suicides in this age group. While only one of the four coefficients across the two specifications is significant at 5% for males, the other three are significant at 10%, and in each case the pair of effects is jointly significant at 5%. Meanwhile, while all coefficients for females

Remaining columns show results of falsification tests, with the dependent variable comprising suicide rates for adjacent four-year age ranges in columns 4 and 5 and rates of death from other causes in columns 6 through 8. As expected if estimates represent effects on anxiety

and depression leading to suicidality among students taking AP exams, coefficients for untreated students and other mortality causes are always individually and jointly insignificant regardless of specification, with signs nearly as likely to be negative as positive.

Discussion

The idea that high achieving students are subject to increasingly competitive environments in school is not new, and likely offers the best justification for the results of the analysis completed here. The expansion of the AP program has been shown to increase the suicide rate for 15-18 year old students in states where the AP program has expanded to more high schools and where colleges are receiving more scores from students. This result in consideration, the mechanism discussed which seems to make the most sense as a mediating effect is the hypercompetitive and comparison centered nature of the AP program. With more colleges receiving scores, each student experiences increased pressure to achieve high scores on the exams they take. One could also posit that, through this, a student has a competitive disincentive to collaborate with other students to prepare for exams, since a certain student appears more impressive if their peers do worse on exams.

The impact of expansion of the AP program to additional high schools could be interpreted as a result of more/new students being subjected to the competitive environment. Students in schools which recently adopted the AP program may be experiencing academic rigor for the first time in their educational careers. With a lack of experience in coping with a competitive environment and rise of social comparison for this cohort, these students may be unable to deal appropriately with negative pathological outcomes, leading to an increase in the suicide rate.

As mentioned, the AP program and accelerated high school programs in general do have widely regarded personal and social benefits for the students involved and the labor market which searches for high-potential workers. This analysis highlights an outcome that has not yet been studied in health or education economics by showing that students in states where the AP program is expanding to more high schools and where more colleges are receiving scores face higher suicide rates. I believe that this analysis calls to attention the dire necessity of transforming the AP program to better serve this cohort. While the benefits of these programs should not be discounted, and should be investigated further, I believe it is important to act on

the results of this analysis as an attempt to spare lives of adolescents who appear to have fallen victim to competitiveness and negative social comparisons fostered by the AP program.

Further Research

Further research of the utmost importance is examination of how the AP program could be altered to better suit the high achieving students whom take part in it. Based on research done for this analysis, this transformation could come in the form of a new evaluation style for these courses which prioritizes student improvement and individual learning, however further research on what type of learning environment would truly benefit these students the most.

Further analysis could utilize similar methodology to examine if suicide rates respond to seasonal trends associated with yearly milestones of the AP program such as when exams are taken in May and when scores are released in the summer. This analysis looks at the AP program exclusively, but further research could be completed in order to determine if the results are specific to the AP program or if they extrapolate to other accelerated high school programs as well.

Finally, it would be of great interest to determine how the AP program or accelerated high school programs in general impact rates of anxiety and depression within this cohort. My analysis is interesting because the results indicate increased suicide rates which can be thought of as the "last resort" option for students who are truly struggling with their mental health in response to these high school programs. We might expect to see even greater effects on rates of anxiety and depression since, while serious, these mental health outcomes represent a less severe response to the competition, rigor, and comparison of the accelerated programs.

It is my hope that my analysis will spark not only further research on the topic, but also policy implementation in response to the results. It is extremely regrettable that adolescents are facing high suicide rates in response to the expansion of the AP program, but uncovering this relationship might function to improve the learning environment that these students face, ultimately diminishing this effect in the future.

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