

# High School Psychology Is Science

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This report was developed by a Working Group on Psychology as Science from the APA Summit on High School Psychology Education (July 2017):

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## Executive Summary

High school psychology courses continue to be popular and are growing in number. This course is an ideal platform for teaching not only scientific content that is relevant to the daily lives of students and of intrinsic interest to them, but also the scientific principles that underlie psychological knowledge. High school psychology students develop a basic knowledge of scientific concepts and learn the skills necessary to evaluate the sources and methods used to acquire information. For some students, a high school course may be their only formal exposure to psychological science. This course also serves as the start of the pipeline into the discipline for those who go on to major in psychology in college or who pursue graduate degrees in psychology.

The American Psychological Association made the case that psychology is a core STEM (science-technology-engineering-mathematics) discipline because of its “direct scientific and technological innovations, as well as its indirect contributions to education and learning in science and technology” (APA, 2010, p. 2). As we will outline in this report, there are multiple other sources that support the notion that psychology is not only a STEM discipline, but that it is one of critical importance in the 21<sup>st</sup> century. Considering the role human behavior plays in a number of problems currently facing our society, and the benefit to be gained by introducing young students to psychological science, it is imperative to strengthen the scientific nature of psychology as it is taught in high schools.

However, the perception of psychology as a science is inconsistent among the general public and the other sciences, and this perception is reflected in the standing of high school psychology courses in K-12 education. In addition, high school courses vary in their approach to teaching the science of psychology. Partly to address such inconsistencies, the first-ever APA Summit on High School Psychology Education was held July 9-14, 2017, at Weber State University in Ogden, Utah. The mission of the summit was to create the best future for high school psychology education. A total of 70 psychology educators from high schools, community colleges and undergraduate psychology programs participated in the summit. The summit had the following goals:

- Strengthen the value of psychological science through the teaching of high school psychology.
- Strengthen the delivery and assessment of psychological science through the teaching of high school psychology.
- Strengthen the reach of psychological science through the teaching of high school psychology.

Each Summit participant worked in one of eight separate working groups to create specific outcomes related to their assigned focus area. The authors of this document, members of a summit working group on *Psychology as Science*, met routinely in the year prior to the summit to review, collect data about, and discuss the current state of psychology in the high school curriculum. The authors developed this position paper regarding the role of high school psychology in the sciences while emphasizing the importance this course serves in developing

scientific and psychological literacy<sup>1</sup>. The authors address common misconceptions concerning psychology and provide information to help inform the general public concerning the current state of this science and review the growth of the high school psychology course and make many recommendations concerning the treatment and placement of psychology in the high school curriculum. This resource was written to make the case that psychology should be included as a STEM discipline at the high school level, and to provide evidence to allow students to earn science credit, possibly as a science elective course, towards high school graduation after taking the psychology course, regardless of the department under which the course is taught.

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<sup>1</sup> Psychological literacy is defined by McGovern et al. (2010) as “having a well-defined vocabulary and basic knowledge of [psychology]; valuing the intellectual challenges required to use scientific [thinking]; taking a creative and amiable skeptic approach to problem solving; applying psychological principles to personal, social, and organizational [issues]; acting ethically; being competent in using and evaluating information and technology; communicating effectively in different modes and with many different audiences; recognizing, understanding, and fostering respect for diversity; and being insightful and reflective about one’s own and others’ behavior and mental processes” (p. 11).

## Introduction

Psychology is the science that provides insight into behavior and mental processes. There exists some misunderstanding with regard to the scientific basis of psychological research. This misunderstanding compromises the acceptance of psychological science as a source of fundamental knowledge about thought and behavior and a foundation for solutions to personal, interpersonal, and societal issues that arise from problematic thought and behavior. Furthermore, psychological research can be applied to, and add value and improve outcomes in, a wide variety of areas, such as business and industry, design and engineering, education, law, natural and built environments, sports and technology. Psychology is science because it uses the scientific method to collect and analyze data. The potential of psychology will be limited until this truth is fully recognized.

Of note, while psychology's status as a science is sometimes misunderstood, its scientific results are often accepted and applied. Some recognize the utility of psychological research while losing sight of the overarching principle that the findings arose in the context of psychological science. For example, research on the fallibility of eyewitness testimony is being applied to improve the criminal justice system (Wixted, Mickes, Dunn, Clark, & Wells, 2016).

Because of the diversity of subject matter within the field of psychology, some of the scientists who research psychological issues (e.g., cognitive neuroscientists, market researchers, behavioral economists) may refer to themselves by a narrower title that does not actually include the word *psychology*. Work done by these researchers is more easily recognized as science compared to the work and research done by other psychological scientists.

## Psychological Science

### *Psychology is a Scientific Discipline that Relies on Empirical Data Collection*

Psychology is relatively new to the sciences, having been brought into the laboratory by Wilhelm Wundt in 1879 (The modern science of psychology, 1919). Its prescientific past, rooted in introspection and examination of unconscious forces, contributes to common misperceptions of this diverse field today. While few judge chemistry by its roots in alchemy or physics by the work of the ancient Greeks, psychology is often primarily framed in terms of its more philosophical past.

To better understand the nature of contemporary psychology, it is necessary to recognize what it shares with other sciences. For example:

- Psychological science is engaged in the development and testing of theories and models.
- Psychological science uses a variety of empirical methods (e.g., experiments, correlational studies, systematic observations of naturally-occurring behavior) to collect data.
- Psychological science encompasses both quantitative and qualitative methods and relies on statistical analysis in drawing conclusions.

- Psychological science engages in systematic observation and data collection across a variety of settings including field settings, institutional settings, and laboratory settings.

### *Psychological Science Focuses on Questions about Behavior and Mental Processes*

Psychological research examines behavior and mental processes and the factors that influence them, including the social, cultural, environmental, and genetic contexts in which behavior occurs. Psychologists examine behavior with different frames of reference, including:

- Biological bases of behavior (e.g., brain and nervous system mechanisms, genetic and evolutionary processes, hormonal mechanisms, and sensory and perceptual mechanisms and processes)
- Individual behavior (e.g., learning, cognition, emotion, motivation, and personality)
- Group behavior (e.g., social, cultural, and group processes)

Psychological research contributes to basic knowledge, but we can also apply this new knowledge to solve problems in many areas, including (APA, 2010):

- Promoting public safety (e.g., high mounted automobile brake lights)
- Improving public health (e.g., smoking cessation)
- Developing new technologies (e.g., computer interfaces)

### *Psychology as a Cross-cutting Discipline*

Psychology integrates and influences various scientific disciplines leading to its classification as one of the seven hub sciences (Boyack, Klavans, & Börner, 2005). Along with mathematics, physics, chemistry, earth sciences, medicine, and the social sciences, psychology emerges as a field whose scientific findings are often referenced by researchers in other fields. Psychological research findings shed light on behavioral and cognitive processes and lead to developments in other disciplines (Cacioppo, 2007). In addition, many cross-cutting fields, such as behavioral and cognitive neuroscience, behavioral economics, and the science of learning, focus on behavioral and cognitive processes and thus are traditionally part of psychology's content. This interdisciplinary status indicates that other sciences build on the methodologies used in psychology for examining behavior in controlled laboratory settings and in complex natural settings, at levels ranging from the neuronal to the societal, and extending across the lifespan and involving typical and atypical responses.

We now turn our attention to the high school psychology course. How well does high school psychology reflect the scientific nature of psychology? Why is it important that it do so?

## **High School Psychology**

### *History and Current Status of High School Psychology*

Psychology has been a part of the high school curriculum since the 1830s (Benjamin, 2001), and by the late 1950s psychology courses were being taught in 49 of 50 states (Thornton

& Clover, 1967). The high school psychology course began as an examination of personal adjustment issues, rather than a course centered on a scientific approach to the study of behavior and mental processes (Benjamin, 2001; Keith, Hammer, Blair-Broeker, & Ernst, 2013). Indeed, the high school psychology course often ended up in social studies and social science departments rather than in science departments. Since the late 19th century there has been a slow but steady shift from the teaching of psychology as adjustment to the teaching of psychology as science, but there has not been a corresponding shift moving the course to the science department.

Several significant events in the 1990s prompted a shift to a course more reflective of the scientific nature of the field:

- In 1992 the APA Teachers of Psychology in Secondary Schools (TOPSS) was founded. As the voice for high school psychology teachers at the APA, TOPSS' primary mission is to promote the highest standards in teaching of psychology both as a science and discipline.
- The Advanced Placement Psychology Examination was also first administered in 1992. Exam questions assess students' understanding of central psychological concepts and the scientific methods linked to the various subfields in psychology (Keith et al., 2013).
- As part of the TOPSS mission, the *National Standards for the Teaching of High School Psychology* (currently the *National Standards for High School Psychology Curricula*, APA, 2011) were first approved as APA policy in 1999. The psychology standards recommended that high school psychology teachers promote the development of scientific attitudes and skills, including critical thinking, problem solving, and an appreciation for scientific methodology as a major theme in their courses while identifying core psychological concepts that should be taught in the high school course. The standards are revised every seven to ten years by an APA/TOPSS working group appointed by the APA Board of Educational Affairs.

This shift towards a more scientific approach to high school psychology courses has also been accompanied by steady growth in the number of high school students who take a course in psychology:

- By the year 2000, over a million students a year were taking high school psychology courses (Ernst & Petrossian, 1996).
- In 2018, over 313,000 students took the Advanced Placement (AP) Psychology exam, compared to about 4,000 in 1992. As of 2018, Psychology was the 6<sup>th</sup> largest AP exam. More students take the AP Psychology exam than take any of the AP Science courses (College Board, 2018).
- Over 21,000 students took the International Baccalaureate (IB) Psychology Examination in 2018.

- In 2009, the most recent year of available data, the National Center for Education Statistics reported that 30 percent of graduating students earned credits in a psychology course during their four years in high school (U.S. Department of Education, 2011). These numbers were corroborated by College Board, which reported that 32 percent of all graduating high school students in 2015 who took the Scholastic Aptitude Test (SAT) took a psychology course during high school (College Board Research & Development, 2015).

Although the number of students exposed to high school psychology continues to increase, there is an apparent inconsistency between the scientific nature of the field and its role in K-12 education. According to an APA survey conducted in 2016, approximately 80 percent of high school students who complete a psychology course earn social studies credit rather than natural science credit toward high school graduation because the course is taught in the social studies department (APA, 2016).

Teacher training and certification also reflects the impact of the social studies department, where psychology teachers are placed 90 percent of the time (APA, 2016). As reported in an APA survey conducted in 2016, only one percent of the teachers teaching high school psychology report being certified to teach science. An additional 24 percent report specific certification in psychology. However, the requirements for this certification vary widely from state to state (Weaver, 2014). Many high school psychology teachers have worked hard to prepare themselves to teach the course, but there is a need to make sure that all teachers in the course have the preparation to do the job well. That does not appear to be the case at the present time, given the current credentialing status in the United States where 24 states have no psychology teaching credential and 14 states do not require the psychology teaching credential to teach the course (see Weaver et al., 2018, for additional information).

Instructors teaching natural science courses can consult the *Next Generation Science Standards* (NGSS) in designing curricula (NGSS Lead States, 2013). The National Research Council, in its *Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas*, acknowledges that psychology as a discipline, along with other social and behavioral sciences, is closely allied to the other sciences (National Research Council, 2012). This group did not develop specific standards for psychology due to a lack of psychology content in grades K-8 (the NGSS cover all of K-12) as well as the intended scope of the document. Groups such as TOPSS, the APA Summit on High School Psychology Education participants, and the Society for the Teaching of Psychology can provide leadership for the teaching of psychology as a science, focusing on the processes involved in studying behavior and cognition as an empirical discipline. Indeed, the current APA National Standards Working Group (2018-2021) plans to align psychology to the cross-cutting concepts and science practices from the NGSS as it develops the next revision of the high school psychology standards by 2021.

### *Positive Outcomes of Teaching Psychology as Science*

Enhancing the scientific basis of high school psychology courses yields a number of benefits. Scientifically-based courses:

- Are an ideal vehicle for teaching the scientific method with subject matter that is inherently relevant and that most students find interesting. Students leave psychology courses with a greater working knowledge of research methods, numbers, and probability (Keith & Beins, 2017).
- Promote scientific literacy and critical thinking. Most high school psychology students will not go on to careers in research, but all citizens must be sophisticated consumers of research to know how to properly evaluate media reports of scientific findings (APA, 2011; Keith & Beins, 2017). Scientific thinkers are critical thinkers, with enhanced appreciation of possible pitfalls associated with the misunderstanding the conclusions of various research methods and better protected against the persuasive techniques and biases we encounter in our daily lives.
- Help students understand their own behavior and cognitive processes and those of others. It is important for people to know how learning and memory function, the impact of social situations on the individual, the intricate relationship between our brain and our environment, the factors that guide our lifelong developmental journey, and more.
- Make psychological science an appealing introduction to more advanced study of science in general and specifically in STEM areas, particularly for students who may not have a strong initial interest in the sciences. A psychology course that focuses on the scientific basis of the discipline can be an ideal vehicle for helping students develop scientific literacy skills.
- Enhance public appreciation for the ways psychology improves human lives and for psychology's potential for contributing solutions to society's vexing problems, which are often based in part if not wholly on the ways people think and behave.
- Assist in educating the public about psychological science.

### **Myths and misconceptions about psychology**

Several common misperceptions lead people to believe that psychology is not a science. For example, in a recent survey only 30 percent of the respondents agreed that psychologists attempt to understand how people behave through scientific research (APA, 2010). Here are some issues that lead to commonly held misconceptions:

**Psychology and common sense.** One such misconception is that knowledge in psychology is just common sense; that psychological research is not necessary to establish something that everyone knows. However, common sense is often contradictory. For example, everyone knows that opposites attract, yet we've also been taught that birds of a feather flock together. These contradictory beliefs often exist because there is anecdotal evidence to support both sides. Only controlled research can help us determine under what circumstances one is true and under what circumstances the opposite is true.

In addition, many people do not realize that psychological research has demonstrated that some commonly believed "truisms" are false, such as the belief that "You only use 10% of your brain" (Lilienfeld, Lynn, Ruscio, & Beyerstein, 2010). Psychological research has also demonstrated findings that may be counterintuitive. For example, due to the bystander effect,



you can expect less help when you are in a large crowd than when there are only a few people present (Darley & Latané, 1968).

**Nomenclature.** The wide variety of subfields within psychology sometimes confuses the public regarding what is and what isn't included under the broad heading of psychology. Scientific research by psychologists often appears in media reports with citations that lack any version of the word psychology (e.g., behavioral scientist, cognitive neuroscientist, behavioral economist). The public may not realize that descriptors incorporating "behavioral," "cognitive," or "neuro" are all branches of psychology. The average person is likely aware that a pediatrician and a cardiovascular surgeon are both doctors. A similar recognition needs to occur for the diverse fields under the umbrella of the profession of psychology in order to help build awareness of the value of psychological science among the public and other important decision makers.

**Scientific methods and psychology.** Many people are unaware of or skeptical regarding psychology's status as a science. Other people believe that because they are social scientists that their results are somehow less scientifically rigorous than the results of other scientists (Ferguson, 2015). Popular media depictions may portray psychologists primarily in clinical or counseling settings, rather than engaged in activities that match stereotypical ideas of what science looks like in practice. In fact, psychologists are scientists trained to systematically study thought and behavior. Psychological knowledge is based on scientific investigation of concepts, theories, principles, and models, as it is in other sciences. The distinctions that are sometimes drawn between social science and natural science, or between "hard science" and "soft science," relate more to the subject matter being studied than they do to the core of methodological and statistical tools used by all scientists.

**Reproducibility.** Good science requires replication, an issue of importance across sciences ranging from biology (Lighgow, Driscoll, & Phillips, 2017) to computational science (Peng, 2011) to high energy physics (Chen et al., 2019). For example, biomedical research successfully replicates less than 25% of the time (Begley & Ioannidis, 2015). In 2015, psychologist Brian Nosek published findings from the Reproducibility Project (Open Science Collaboration, 2015). He and his colleagues reported that in the attempts to replicate 100 published psychological studies, only  $\frac{1}{3}$  reproduced the original findings. Scientists don't all agree on the severity of this problem, but psychological scientists are working to resolve the issue (Gilbert, King, Pettigrew, & Wilson, 2016). While this debate continues, it is important to recognize that reproducibility issues are relevant to many domains, such as biomedical science. For example, only 6 out of 53 classic cancer studies have replicated (Ioannidis, 2005). All sciences struggle with these issues because when investigators are at the boundaries of knowledge, uncertainties exist, and conclusions are always provisional. The hallmark of science is that it is verifiable and self-correcting, central aspects of today's psychology.

**Measurement of psychological variables.** One misconception about the scientific rigor of psychology is that psychological phenomena such as behavior or emotions cannot be quantified and therefore cannot be reliably measured and studied (Berezow, 2012). The perception may be that psychologists use arbitrary scales or do not clearly define a variable before making observations. Some of the variables studied by psychologists can be difficult to

measure. For example, how do you measure happiness? However, psychological research always involves unambiguous operational definitions of each variable, which are published along with research results. As in any other scientific field, work is open for rigorous peer review to ensure the validity of the research.

**Psychology and therapy.** Another common misconception surrounding the field of psychology is the idea that all psychologists are therapists. Although it is true that many psychologists work in fields traditionally related to therapy (e.g., clinical and counseling psychology), the aims and interests of psychological science extend well beyond therapy and issues of mental health. The APA has 54 affiliated divisions representing a wide range of subject areas including experimental psychology and cognitive science, quantitative and qualitative methods, developmental psychology, applied experimental and engineering psychology, psychopharmacology and substance abuse, health psychology, and clinical neuropsychology; less than one fifth of the APA divisions' specialties directly involve providing some aspect of therapy to clients (APA, 2019). Just as all biological scientists are not physicians, all psychological scientists are not therapists. It is important to note though that all psychologists, even those who work in clinical setting, apply the scientific method to their work, and most clinicians have been trained as scientist-practitioners.

**Freud's influence.** Sigmund Freud looms large over the public's perception of psychology. Many individuals incorrectly assume that Freud's theories dominate psychological science. In most psychological research, Freud's influence is limited and is primarily of historical interest. One recent study showed the principles of psychoanalysis were more likely to be taught in departments other than psychology, often in regard to literary and art criticism (Redmond & Shulman, 2008). In short, the public's familiarity of Freud's name and work often lead him to be an easily recalled figure in the field, even though the most contemporary research and practice is cognitive, behavioral, and neuroscientific (Spear, 2017).

## **Conclusions and recommendations**

High school students today face a future guaranteed to grow in complexity, a future that will require them to be critical thinkers and consumers of scientific knowledge. Educators must help them develop the tools they need to make sound decisions. Simply, our students need to become scientifically and psychologically literate.

The National Academy of Science has stated that scientific literacy involves "knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity" (National Research Council, 1996, p. 22). Psychology is one of the sciences that can provide such preparation. Not only does it provide insight into important issues ranging from the personal to the societal, but as a hub science it is closely connected to other sciences that are important for our lives. Psychology, like the other sciences, relies on shared methodology and objective data analysis. This leads to knowledge that facilitates sound decision making, which is the heart of scientific literacy.

High school psychology is an ideal vehicle for introducing students to principles of

scientific thinking that can be applied to the complex issues they face. Well-constructed psychology courses promote quantitative literacy as students collect and analyze data and facilitate the development of critical thinking as students learn the importance of using data and sound reasoning to reach decisions.

Psychology, under various names, has been taught in high schools for over 150 years. At first, the course emphasized philosophy and adjustment. This was an accurate reflection of psychology at the time. The scientific nature of psychology became dominant in the second half of the 19th century; however, the high school course often remained focused on personal adjustment. APA, TOPSS, the College Board's Advanced Placement Psychology examination, the *National Standards for High School Psychology Curricula*, and other factors have helped move the high school course toward a more scientific foundation. However, the psychology course's traditional placement in social studies departments, public misunderstanding of the nature of psychological science, school tradition, the complexity of improving teacher preparation and certification, and the lack of availability of science graduation credit on a state-by-state basis have hindered psychology being taught as a science course in schools across the country.

We believe the case for recognizing psychology as a science is sound and critically important. The major science institutions in the United States recognize the role that psychology plays in the scientific realm. For example, the National Science Foundation, the National Academy of Sciences, and the American Association for the Advancement of Science all have sections devoted to behavioral science. Further, the Association of American Medical Colleges has revised the MCAT so that a quarter of its content involves behavioral and social science.

The primary responsibility for publicizing this case and developing an agenda for making necessary changes in high school psychology courses rests with TOPSS and the APA's Education and Science Directorates. This agenda must include a continued emphasis on assisting educators in developing courses that teach the science of psychology. A primary goal of the APA has been to increase the recognition of psychology as science. As such, we call for the active support of all those in APA to advance the declarations and recommendations made in this document. We also invite all psychologists and psychology educators at all levels to personally advocate for recognition of psychology as science within their communities.

APA and TOPSS must also advocate among other national science and science education organizations and should solicit the assistance of these organizations in the effort to increase emphasis on the scientific nature of all high school psychology courses.

We also urge all of those interested in promoting scientific literacy to assist us in moving this cause forward, including our colleagues at national, state, and local science and science education organizations, state and local governments, state boards of education, state offices of education, curriculum directors, administrators, and science educators at all levels. A scientifically literate citizenship is a shared and reachable goal, but we must unite to further our common interests.

## Recommendations

### *Recommendations Internal to APA:*

- The authors propose that APA and TOPSS recommend that **schools incorporate the term *psychological science*** as their departmental designation for psychology.
- The authors urge TOPSS to work in partnership with the APA Committee on Associate and Baccalaureate Education's (CABE) Introductory Psychology Initiative in **establishing the curricular connections** between high school and college-level introductory psychology courses.
- High school teachers must be adequately trained to teach the science of psychology. Most teachers are traditionally trained in social studies. Teacher certification is a complex issue as each state/district has differing requirements (see Weaver et al, 2018, for advocacy recommendations for supporting a psychology teaching credential in all 50 states). The authors suggest that if a teacher is deemed qualified to teach psychology, their department is not the key issue, but strongly recommend that appropriate **professional development be made available** to all psychology teachers. The authors believe that APA, with recent advances in online education and training, is in a strong position to offer such vital training to teachers.
- Many students are exposed to the science of psychology in high school. The authors recommend that the **APA investigate ways to introduce psychology to elementary and middle school students** by publishing short teaching modules, picture books or textbooks.
- The authors suggest that TOPSS is ideally placed to help **develop and disseminate effective laboratory exercises** that parallel the *Next Generation Science Standards* for high school psychology classes (see second point in following section).
- *Statement of support:* To bring the high school curriculum in line with the other sciences, the authors support the work that started at the APA Summit for High School Psychology Education that **linked the APA's National Standards for High School Psychology Curricula to the Next Generation Science Standards** and look forward to the completion and dissemination of the revised document by the National Standards Working Group in 2021.

### *Recommendations External to APA:*

- Because of the relationship among psychological, life, and medical sciences, the authors recommend that teachers, administrators, and departments **include psychology as a STEM discipline at the high school level**, just as bodies such as the National Science Foundation recognize it.
- Because students in empirical disciplines must learn the techniques of developing and

testing hypotheses, analyzing data, and drawing valid conclusions from the data, the authors recommend that all psychology courses in high schools should **include laboratory exercises**. Fortunately, psychological science does not always depend on complex instrumentation, and teachers can incorporate laboratory work into their classes quite easily (see the [Online Psychology Laboratory](#) and Miller, 2018, for current examples).

- With a strong science-based curriculum, the authors recommend that high school psychology courses migrate from its usual placement in the social studies department to its **logical home in the science department**, and the full inclusion of high school psychology in STEM initiatives. This would allow students to earn science credit, possibly as a science elective course, towards high school graduation.

*Recommendations involving both APA and External Groups:*

- The message of psychology's scientific status would be further enhanced if the College Board and the International Baccalaureate Organization (IBO) were to **rename the AP and IB Psychology Exams as the Psychological Science Exams**. We urge the APA and TOPSS to collaborate with the College Board and IBO in developing a scientifically based curriculum for all high school Psychology courses.
- We also recommend that APA, the National Science Foundation (NSF), and/or other interested parties, reinstate the month-long or week-long **teacher enhancement programs for high school teachers**. These events, funded by NSF in the 1990's and held at several institutions of higher education, were vital in training a generation of teachers in the science of psychology.

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## Additional Resources for Teachers and Advocates

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