Increasing Interdisciplinary Dialogue about What Matters for K-12 Students' Mental Health

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Recent media coverage spotlights the burgeoning mental health crisis among adolescents and teens, amplifying the need to understand influences on student mental health. This secondary-source research project details findings from built-environment-focused studies of factors found to influence student mental health and studies published in top educational psychology journals examining the relationship of schools' built and learning environments to K-12 students' mental health. The study employs an ecological model as its framework, whereby students are conceptualized as affected by varying levels of environment ranging from micro to macro systems.[1] The influence of the built environment on student mental health is often ignored; existing research linking student mental health to the built environment is scant. Factors in educational environments that impact student mental health include the presence of vegetation or nature, pleasant vistas, day-lighting, noise, material qualities of the environment, and classroom organization. Just as presence of nature and interior materiality have an impact on mental health, so do factors on which educational psychologists focus, such as social relationships, stress, and academic achievement.

Current educational psychology literature fails to address the potential of the built environment for mental health, instead focusing primarily on the learning environment. Broadening the discussion in educational psychology to include built environment factors might reduce students' anxiety levels, among other significant impacts on students' health and wellbeing. Many people, decisions, programs, and initiatives can positively impact student health outcomes. In presenting this research, we hope to increase awareness and fuel discussions about the positive influence that the built environment of schools can have on student mental health and to propagate fruitful interdisciplinary dialogue and initiatives. Collaboration has the potential to engender a situation where students are educated in environments more supportive of positive mental health outcomes and contribute to reversing the mental health crisis among youth.

INTRODUCTION

Mental health of students is now more important than ever. A recently released study of United States emergency room data from 2007 to 2015 found that annual visits for suicidal thoughts and suicide attempts among children age 5 to 18 grew from 580,000 to 1.12 million, nearly doubling in 7 years.[2] According to the CDC, suicide is the second leading cause of death among 10-14 year-olds, behind unintentional injury.[3] The top mental health issues in youth K-12 are depression, anxiety, eating disorders, and ADHD.[4] One in five children and youth have a diagnosable emotional, behavioral or mental health disorder and one in ten young people have a mental health challenge that is severe enough to impair how they function at home, school, or in the community.[5] Yet only about one in five children with mental health problems receives services.[6]

The current study details findings from educational-environment-focused research on physical-environment factors found to influence student mental health. Then, spotlighting school contexts, it analyzes the current state and foci of studies from educational psychology addressing K-12 students' mental health. Guided by built and learning environment terms, this paper's analysis is accomplished through a review of built environment literature and content analysis of top educational psychology journal publications.

Links between students' mental health and school learning and built environments can be understood through an ecological model. Students are affected by varying levels of their environment ranging from their microsystem, or immediate environment, to interaction with macro system.[7] An example of what affects students at each level of microsystem, mesosystem, exosystem, and macrosystem, respectively, are classroom characteristics, teacher/parent interactions, community or school board decisions, and state of current national and/or social conditions. While the primary effects are seen in the microsystem, decisions made in the child's exosystem, for instance those of school administrators and school board, are decisions that result in design elements of the built environment offering either negative or positive influences on children and youth. Architects and educational psychologists are part of the exosystem when they are working with administrators and school boards to design specific educational built environments or create meaningful enriching curricula. These

two fields – architecture and educational psychology – have the potential to overlap, but currently are divided by distinct disciplinary languages discussing built environment on the one hand and learning environment on the other. Examples of mental health linked to the built environment could relate to associations of student anxiety levels with different color classroom walls, while mental health associated with the learning environment could relate to the connection between student depression and bullying.

Bransford et al.[8] describe four different perspectives on learning environments, which this study utilizes as a categorization system for mental health content found within educational psychology literature. The four perspectives are learner-centric, knowledge-centric, assessment-centric, and community-centric. Learner-centric focuses on the student or the learner and what they bring in knowledge, culture, skills and attitudes, and what affects and is related to the student/learner specifically; an explicit example within this study is an association to student stress. Knowledge-centric relates to planning and strategic thinking that can help a student learn; a specific example is an association to institution-prescribed curriculum. Assessment-centric relates to formative and summative assessment along with opportunities for students to receive feedback; an association to academic achievement offers an example from this perspective. Community-centric focuses on learning from and the effect of others within one's community; illustrations include an association to neighborhood organizations or after-school programs.[9]

The learning environment is divided into groups reflecting Bransford et al.[10] in order to sort mental health associations into categories easily compared and analyzed for discussion. Similarly, built environment categories are drawn from a search of literature in architecture and associated fields targeting mental health and the built environment.

Research on nature generally relates to the effects of the presence of vegetation, green landscape or natural elements within, near or just outside the classroom. Studies examined various situations involving green exposure, including conditions such as plants within a classroom,[11] windows which look onto green landscape,[12] campus green space,[13] nature on or near the playground,[14] and being immersed in nature, taking classes at a forest school or within wilderness therapy.[15] Similarly, daylight, either outdoors or through windows at schools, also relates to the natural environment and how daylight exposure impacts mental health. Beauchemin and Hays[16] note, Seasonal Affective Disorder (SAD) is related to low levels of daylight exposure. Two studies specifically related to schools and daylighting, study the impact of classrooms with and without windows on student health, performance, and sick time.[17] In daylit schools they find decreased sick time and that attending students outperform students attending artificially lighted schools.

Chronic noise and loud noise in the ambient environment may impact student performance and stress levels. More specifically, identified studies analyze how high decibel levels within classrooms effect students. One study notes student-rated annoyance levels[18] and another studies correlation between higher noise levels, stress responses, and diurnal cortisol variability – an indicator of persistent stress response.[19]

The material qualities of the classroom can have an impact on the environmental quality of the room and students' psychological reaction when in the room. Floor material can have direct impact on indoor environmental quality through texture, hardness, color, sound absorption, and other material qualities.[20] On the other hand, white walls within a classroom can create negative feelings in those within the room.[21] The permanent materials of a classroom are not the only ones that make a difference to student's mental health. Access to child-friendly furnishings or other material resources can similarly affect student mental health.[22]

This literature establishes that the built environment affects mental health of students in a variety of ways. Each of these, be it nature exposure or materiality, results from decisions made by an administrator or school board. As part of their promotion of educational success for students, some educational psychologists interact with, advise, and work with school administrators. The advice and research of these educational psychologists toward achieving positive outcomes for students can relate to varied aspects of the individual and school environment.

Figure 1. Trends towards healthier classrooms suggest new design strategies such as vibrant wall paints rather than white and adding comfortable seating to reduce student anxiety.

METHODS

Our research uses content analysis within top educational psychology journals to find and analyze multiple factors, linked to students and their environment, that educational psychologists associate with student mental health. In analyzing the associations between school and mental health made by educational psychologists, this study aims to reveal factors of focus in the learning environment and assess the extent to which built environment factors are considered. In doing so, we hope to increase awareness and discussion regarding the positive influence that the built environment of schools can have on student physical and mental health.

The initial literature search resulting in findings detailed within the introduction, was conducted utilizing the EBSCO database searching for terms in three areas 1) mental health (e.g. Mental health, Depression, Anxiety); 2) students (e.g. school, student, classroom); 3) built environment (e.g. architecture, environment, design, environmental design). The search revealed built environment factors of influence to include presence of nature, daylighting, noise exposure, and classroom organization and materiality.

Using the initial search as a foundation, this research paper analyzes content from five leading educational psychology journals: *Educational Psychology, Educational Psychologist, Journal of Educational Psychology, Learning and Instruction,* and *Child Development*,[23] to identify trends and topics relating to mental health and links to built and learning environments of students in grades K-12. Educational Psychology journals are used to represent the scholarship and discourse of those main influencers and decision makers focused on the general mental health and well-being of students. We conducted the initial literature using the EBSCO database, and then specifically searched within the ERIC database, and the Education Full Text database. In the search, articles were filtered within the database to include the term "Mental Health" and for the source to be one of the five journals noted above. After coding terms were entered, the search was then filtered within EBSCO to omit articles outside the date range January 1st, 2000 to November 6, 2018, the date of final search results. Numerous significant events at the turn of the century, including the Columbine mass school shooting and the Surgeon General's 2000 Conference on "Children's Mental Health: Developing a National Action Agenda,"[24] suggested the year 2000 as an appropriate starting point for assessing trends in the literature .

The initial search resulted in 81 articles, which were filtered as indicated in Figure 2 and resulted in a final total of 28 articles. These 28 were then coded for prevalence of mental health discussion within academic literature of Educational Psychology, and identifying which mental health, race-based, and socio-economic keywords were used most and within what contexts.

MEASURES

The content analysis, guided by 198 questions organized within 10 key categories derived from the two fields (Educational Psychology and Architecture), sought mentions of target terms at the article level and was specified to exclude target terms mentioned within tables, charts, and figures. After conducting

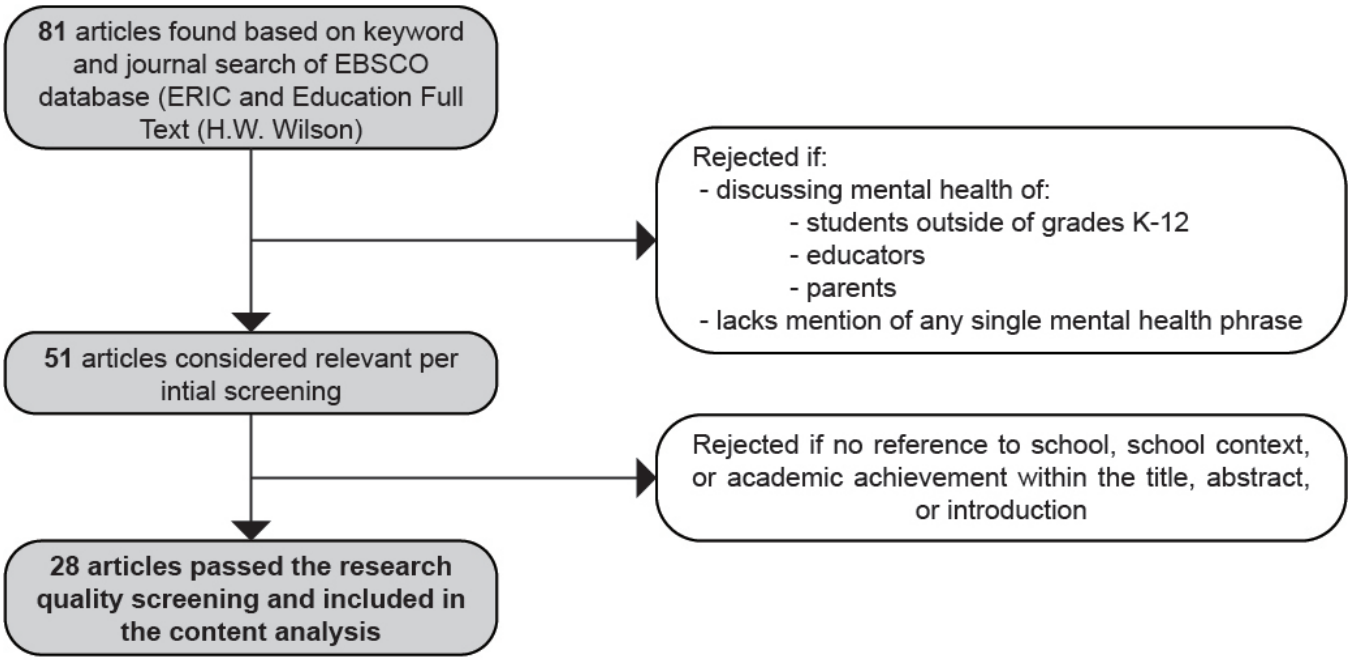

Figure 2. Search and screening process

the initial search, more detailed analysis revealed that the phrase "mental health" occasionally was not within the article; rather it was associated with the credentials of authors or donors. For this reason, for the specific question querying the article content, the content analyzed was changed to include descriptors within the credentials section of authors and/or donors. This modification was important to the study in order to recognize that if the article was funded or written by a mental health professional or organization, that the article had a mental health or well-being focus.

The 10 key categories for which the final 28 total articles were coded included source journal, publication date of article, grade level of students, mental health keyword-association to built-environment, student-centric learning environment, knowledge-centric learning environment, assessment-centric learning environment, community-centric learning environment, mention of stigma, mention of race, and mention of SES. Because experts note them as top mental health issues in youth K-12, the target terms, or mental health key words and phrases, that were coded for environmental associations included "mental health", "depression", "anxiety", "ADHD", "eating disorder", and "suicide".

The built environment categories were influenced by the initial literature review and included connection with nature, interior materiality, and ambient environment conditions. The learner-centric terms included trauma, bullying, stress and social relationships. The knowledge-centric content included references to individual teaching style and institutional curriculum. The assessment-centric content included academic achievement and school policy. The community-centric content included neighborhood characteristics and local, state or national policy. The entire list of categories and terms is included in Figure 3. Associations were defined by whether or not the specific environment term appeared within the sentence of, directly before, or directly after the mental health term. Associations also were counted if located in a section where the heading or subheading included the mental health term.

A 198-question codebook was created to facilitate content analysis. Coders were required to enter into a spreadsheet a numerical answer to each question. For example, in the event of a yes or no question, if the answer to the question was no, the coder would input 1. If the answer was yes, the coder would enter 2. Both members of the research team initially coded three articles to establish inter-coder reliability, resulting in 95 percent reliability. After this point, a single coder was utilized for the remaining articles. After initial coding of the 28 articles revealed no association to the built environment, six were closely reviewed in their entirety specifically seeking any mention of built environment content within the article. The six articles selected for reanalysis were chosen for their high number of mental health term mentions and more general focus on mental health.

RESULTS

All five of the examined educational psychology journals were represented among the 28 articles remaining after

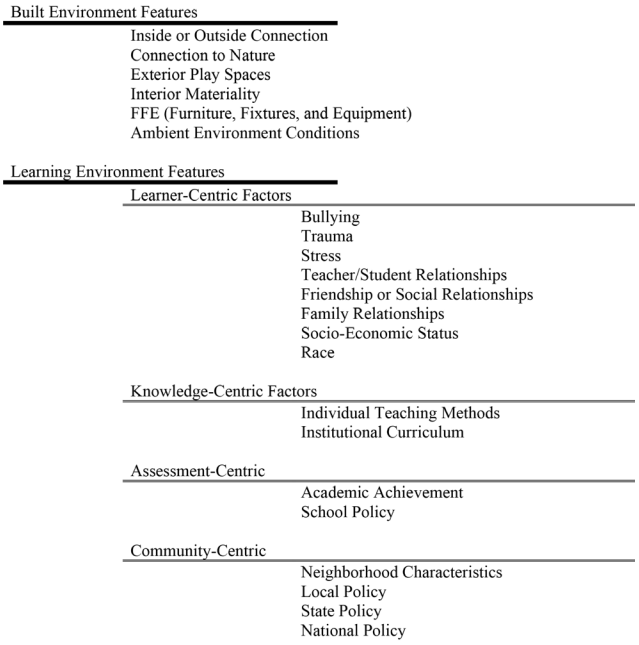

Figure 3. Categories of the built and learning environments and associated influential factors used to analyze study data.

the screening process noted in figure 2. *Child Development* published 16 of these 28 articles. *Journal of Educational Psychology* published six of the articles. The remaining three journals, *Educational Psychology, Educational Psychologist,* and *Learning and Instruction*, each published two articles that fit within study parameters.

The grade level of students featured in the 28 articles ranged from being inclusive of K-12, to also including K-2, 3-5, 6-8, and high school subsets. The findings showed that older student groups were more likely to be discussed in research addressing mental health. The two groups of 6th-8th grade and high school each were the focus of 13 articles, while K-2 and 3-5 were the focus in seven and eight articles, respectively. This coincides with previous research which concludes diagnoses of depression and anxiety are more common in adolescents at the older end of the age spectrum.[25]

As the overarching criterion for inclusion in the study, the phrase, "mental health" appeared in every article, thus also in the content analysis. As previously mentioned, some articles featured the term "mental health" within the credentials, funders, or acknowledgements section of the paper. Seven articles featured "mental health" only within the acknowledgements, funders, or credentials section, while nine articles

included the term "mental health" in both the article text and the credentials, funders, or acknowledgements.

The results of the content analysis produced zero associations between mental health keywords and the built environment discussed in the context of K-12 educational settings in articles from the top five educational psychology journals between 2000-2018. More specifically, when a mental health term was mentioned, there was no trace of a built environment factor within the sentence of, directly before, or directly after the mental health term and there was no trace of built environment factors within a section where the heading or subheading included the mental health term. The six articles, which were reanalyzed for mention of the built environment within the entire article, also produced no results. The only mention linked to the built environment was an author who summarized work by Rowling.[26] The summary noted, "[p]ersonal, social, cultural, economic, and broader environmental factors have the potential to impact adolescent mental health".[27] While Rowling (2006),[28] a chapter in an edited volume, does specifically have a section related to the association between mental health and the built environment, Rose (2014)[29] does not, and summarizes the built environment into the phrase "broader environmental factors." This summary does not fit the criteria for this content analysis as it lacks the specificity of built environment terms this study's coders were seeking.

Content analysis focused on learning environment categories led to entirely different results. Displayed below, Figure 4 features a graph depicting associations between mental health terms and the main built and learning environment categories. Among learning environment categories, both learner-centric and assessment-centric were featured more often than knowledge-centric and community centric.

Figure 5 provides greater detail through its depiction of associations between each mental health term and the four learning environment categories, identified by subcategory factors. Depression as a mental health term features substantially more often than any other specific term falling under the broad phrase "mental health".

Found within 14 articles of 28 articles, the greatest number of coded associations among mental health terms and learning environment categories was noted between the term "mental health" and the assessment-centric subcategory of "academic achievement". Coders were seeking references to negative or positive student GPA, test scores, and/or overall performance in academic based assessments. Actual findings resulted in articles examining academic outcomes,[30] drop-out rates,[31] and the achievement gap between advantaged and disadvantaged students[32] in relation to mental health. The association between "depression" and academic achievement presented similar findings, including one coded passage featuring incidence of depressive disorder in relation to dropout rates.[33]

Similarly, another codebook question with substantial associations noted in the data asked coders to indicate if the phrase "depression" was mentioned in association to social relationships or friendships. Specific findings included articles about cross-ethnic or diverse friendships[34] and social integration of black adolescents.[35] The specific article titled, "Race/Ethnicity and Social Adjustment of Adolescents: How (Not if) School Diversity Matters",[36] is a key recent article hypothesizing

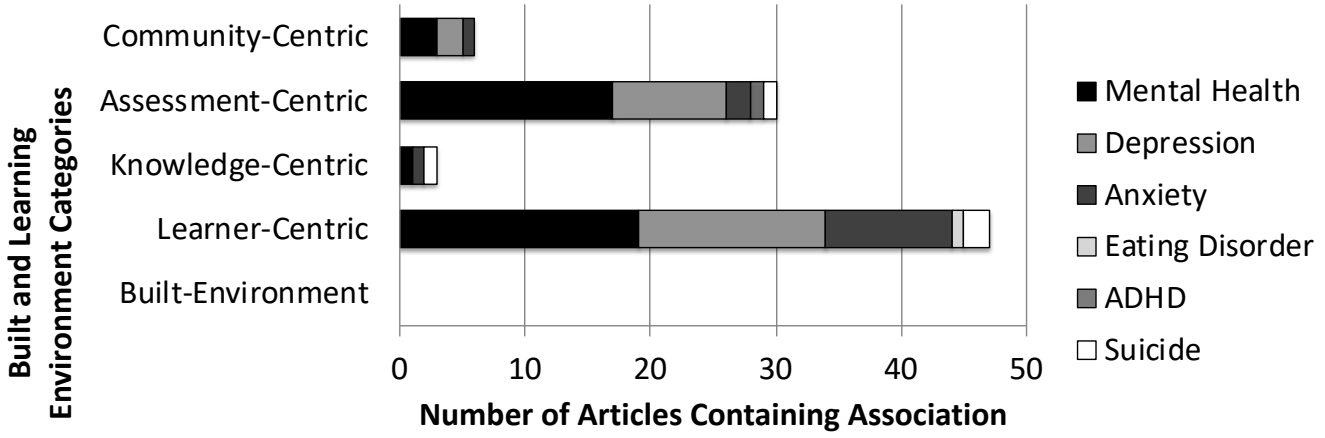

Figure 4. Number of articles containing association to each of the built and learning environment categories distributed by mental health term.

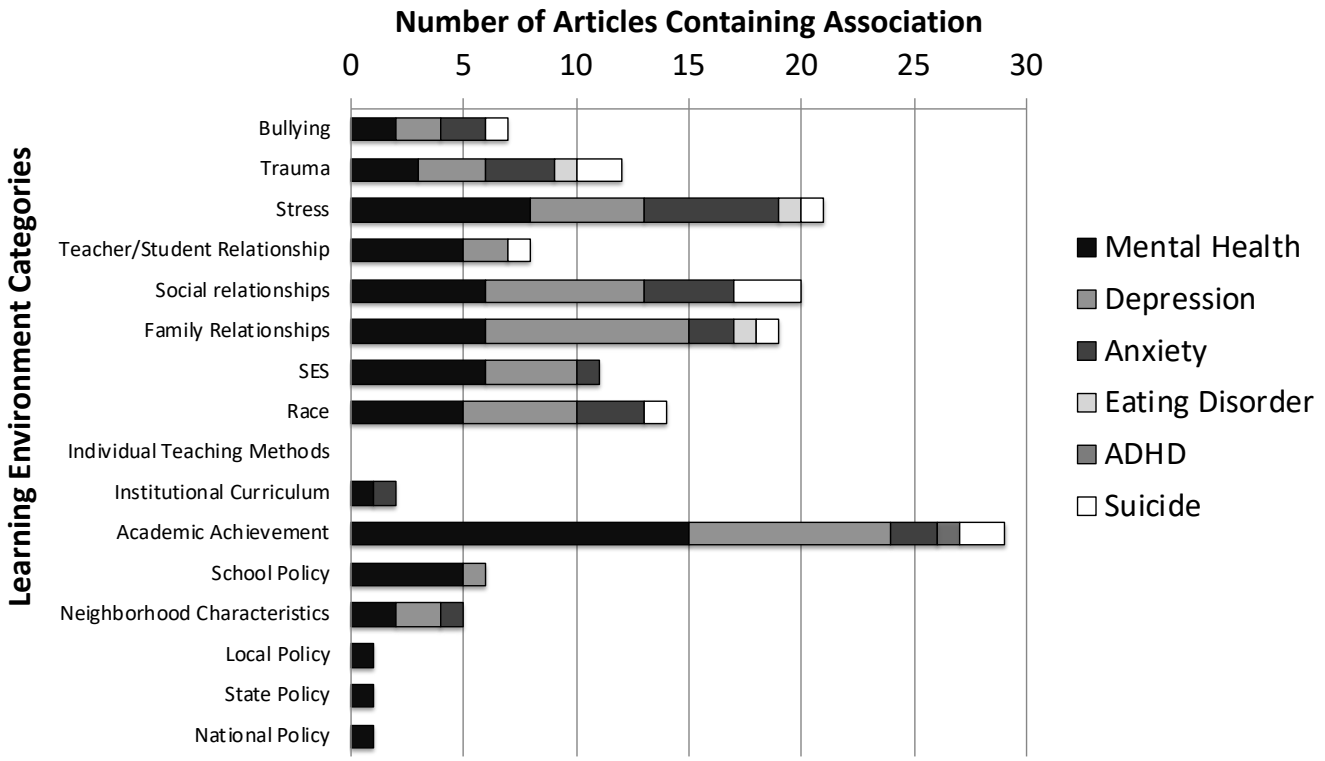

Figure 5. Number of articles containing association to each of the specific learning environment categories distributed by mental health term.

the positive effect on student depression and mental health when students' perceived vulnerability decreases. Decreasing perceived vulnerability is discussed and attributed to increased ethnic diversity within a school, with the study featuring a working hypothesis that "diversity promotes less vulnerability because there is a greater numerical balance of power between different ethnic groups".[37]

Race or ethnicities were mentioned in 20 of the 28 articles, but only five of these articles featured race or ethnicity discussed in association to mental health or depression. Hispanic, Black, and White were the races most often mentioned. Mentioned above, one article associated depression to drop-out rates of black students.[38] Another specific example mentioned race in relation to a mental health term in the article's title, "Social Integration and the Mental Health of Black Adolescents". The coders identified this as a direct association between the influence of social contexts and black adolescent mental health.[39]

Similarly, socio-economic status was mentioned in 21 of the 28 articles, but only 10 of these articles incorporated SES in association to student mental health. Working class, lower class, lower income, in poverty, and poor socioeconomic status were synonyms utilized to describe the low SES category and were featured more than middle-income or upper income SES. One prime example of SES being discussed in relation to a mental health term is an article titled, "Locating Economic Risks for Adolescent Mental and Behavioral Health: Poverty and Affluence in Families, Neighborhoods, and Schools", which directly addresses associations between family SES and adolescent depression.[40]

DISCUSSION

Our research sought to highlight the potential to more impactfully address K-12 student mental health through increased dialogue between the fields of architecture and educational psychology. Increasing interdisciplinary dialogue could strengthen the theoretical and research overlap of built and learning environment concepts. With this overlap, mention of the built environment could be easily integrated into current educational psychology discussions, as mental health is a topic prevalent within both fields.

In this paper's introduction we discuss the impact of presence of nature on student mental health. Several noted studies, detailing impact of presence of nature, cite Ulrich (1991)[41] and Kaplan (1995)[42] and their stress reduction theory and attention restoration theory, respectively. The literature-search-identified articles feature discussion of academic outcomes such as test improvements after a pause to look out the window or spend time outdoors,[43] or decreased anxiety levels associated with stress when leafy plants are present in the classroom.[44] These theories have direct applications to both academic achievement and stress, which were found in the results of

this content analysis to be the top two current associations to mental health terms being made by educational psychologists writing with a focus on K-12 students in educational settings. Stress reduction and attention restoration are associated with ideas of nature, and there are other areas where the goals of architects and educational psychologists overlap.

Within society, a stigma still surrounds the phrase mental health and those terms associated to it. Educators, architects, and educational psychologists should be working together to end this stigma by talking about it and encouraging the creation of learning and built environments that support improved mental health outcomes for students. This content analysis brought to light articles which were funded by mental health organizations, such as NIMH, but which failed to mention the phrase mental health within the entire article, nor any similar of more specific mental health terms. While the funding, or department that the author or article is supported by is important and implies the intention to have a health, or mental health focus, this raises questions of why the term is not used and what is being used in its place within the literature. It is unlikely that a study with funding from a mental health organization has no direct association to mental health; use of the term would help to normalize discussions of the topic.

Mental health research within the built environment is scant as it stands. Mental health research within educational psychology is more prominent, but still limited as our study demonstrates. The fact that top educational psychology journals between 2000-2018 only had 28 total articles that discussed mental health in a K-12 school setting in a 19-year time span suggests a weakness. The fact that these journals additionally did not feature one single mental health association to the built environment speaks to the necessity for collaboration and discussion amongst educators, administrators, architects, and educational psychologists in order to incorporate built environment features that can positively support student mental health.

This content analysis has limitations; the greatest of which was determining the quantity of content to code. A codebook featuring 198 questions examined with respect to each article, was limiting but at the same time represented a substantial undertaking for the coders. Categories the authors believe would be valid and beneficial for inclusion in a further study are associations to terms "disadvantaged" or "at-risk", gender, LGBTQIA status, mental health services, and personal student emotional state. While it was meaningful to determine racial, ethnic, and socioeconomic associations to mental health, the coders noted a trend, as the study advanced, of the appearance of the terms "disadvantaged" and "at-risk", sometimes in place of racial or ethnic terms.[45] Similarly, presence of mental health services or taking account of a student's individual emotional state did not easily fit into any of the existing categories for which the study's researchers coded.

CONCLUSION

Student mental health is a conversation unlikely to disappear in the foreseeable future. Recent media coverage spotlights the burgeoning mental health crisis among today's adolescents and teens, amplifying the need to understand influences on student mental health. In May of 2018 the New York State Education Department Board of Regents adopted amendments to the Commissioners Regulations that requires health education in the state to include instruction in mental health. The proposed amendment states a part of their reasoning, "when young people are educated about mental health, the likelihood increases they will be able to effectively recognize signs and symptoms in themselves and others and will know where to turn for help".[46] While policymakers and media are making strides to positively impact student mental health, academics, architects and educational psychologists also have the power to positively contribute to the mental health movement.

Research within built-environment fields demonstrates that the built environment plays an important role in student mental health, primarily through nature and surroundings that effect stress and anxiety. Our study identifies the prominent role educational psychology places on the learning environments and the association between mental health and academic achievement, amongst other categories such as social relationships and bullying. This research identifies a significant gap in what should be included in discussions about student mental health. The influence of the built environment is important and currently understudied as a part of the body of knowledge for educational psychologists. All concerned groups need an all-points effort to tackle student mental health from every possible angle. It is time for architecture and the built environment to contribute and for design practitioners to take an active role in the conversation alongside educational psychologists, school administrators, and teachers. Through the study reported here, the authors hope to encourage meaningful and productive discussion in this area.

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