Using Crime Prevention through Environmental Design to Foster Sense of Safety and Psychological Wellbeing in Schools

[1]Daniel J. Lamoreaux, Ph.D

Marana Unified School District
djlamoreaux@gmail.com

Committee on
Architecture for Education

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Summary

At present, architects and school administrators across the nation are besieged by public voices, political groups, and vendors of security technologies who have proposed a host of solutions to school-based violence. In light of the ongoing discussion surrounding school safety, security, and school violence prevention, this paper discusses literature highlighting the impact of school security measures, the influence of the built environment on student learning and wellbeing, and how the use of Crime Prevention through Environmental Design (CPTED) indicates a potential for creating schools that are both physically safe and psychologically supportive. In addition, gaps in existing literature are identified to provide direction for future research initiatives seeking to inform the planning and design of safe and supportive school facilities.

Introduction

Many of the most visited tourist sites across the world are monuments of architecture. These sites often invoke contemplation, inspiration, and a compelling desire to return. Regrettably, public school buildings rarely offer an experience that fits this description. Instead, schools are often described as being drab, uninspiring, banal, and even neglected. To highlight this, the average age of U.S. public school buildings is around 44 years old (Alexander & Lewis, 2014) and deferred maintenance costs on public schools have been estimated at approximately $271 billion (21st Century School Fund, 2009).

Reflexive reactions to tragic school fatalities have resulted in school administrators and architects who are faced with requests to "harden" the school environment with metal detectors and other security technologies. However, over-emphasizing the physical security of school communities while ignoring other needs is contrary to a learner-friendly environment. This is especially so as empirical literature has confirmed that the built environment can either support or impede cognitive functioning, psychosocial wellbeing, and student learning (see Barrett, Davies, Zhang, & Barrett, 2015; Choi, Van Merrienboer, and Paas, 2014; and Evans, 2006). Considering these findings, a more balanced approach to safe school design is needed. Unfortunately, however, research elucidating the best approach for designing safe schools that also support students' learning and psychosocial functioning is exceedingly limited. This paper proposes that Crime Prevention through Environmental Design (CPTED) offers a promising approach to balance concomitant student needs for safety and psychological wellbeing.

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The Impact of School Design on Learning and Psychological Wellbeing

To conceptualize school design in a way that supports both student safety and psychological wellbeing, key questions must be explored. One such question is: How do specific components of the school's built environment support the psychosocial and learning needs of students? In this regard, existing research can provide many answers. For instance, prolonged exposure to invasive acoustics and elevated ambient noise levels can increase psychological distress and be an impediment to concentration, memory, and learning in classrooms (Evans, 2003; Halpern, 1995). Thus, a need exists for classrooms to have adequate acoustic isolation and noise-reducing installations and strategies. In addition, higher social densities (e.g. over-crowded classrooms)

have been associated with increased agitation and negative emotional states because of a lack of "personal space" (Halpern, 1995). Regarding lighting, classrooms that lack daylight have been tied to illness, impeded body growth, and "fidgetiness," while classrooms with daylight are associated with healthy circadian rhythms and prosocial behavior such as cooperation with peers (Figueiro et al., 2011; Kuller & Lindsten, 1992; Wessolowski, Koenig, Schulte-Markwort, & Barkmann, 2014). The quality of classroom lighting has also been tied to improved cognitive processing speed and concentration (Keis, Helbig, Streb, & Hille, 2014). In this vein, preliminary findings on the influence of classroom views to nature indicate that window views may improve attention, stress recovery, academic performance, and student attitudes (Benfield, Rainbolt, Bell, & Donovan, 2015; Li & Sullivan, 2016). Moreover, one seminal study by Barrett et al. (2015) has found that the collective influence of specific built factors such as natural light, room temperature, air quality, color, and ownership of space has a significant effect on learning and academic progress.

The above findings, when taken together, suggest that schools should be designed with ample space and a sense of openness, green landscaping for mental restoration, and substantial classroom window lighting to optimize cognitive functioning and psychophysiological health. These findings highlight the importance of establishing a balance between school safety and comfort. This is especially relevant in light of current school safety solutions that often aim to close off and reduce vulnerable spaces, minimize or cover windows, and add visible security measures that increase anxiety rather than reduce it (Perumean-Chaney & Sutton, 2013; Schreck & Miller, 2003).

Relationships Between School Security Measures, Sense of Safety, and the Learning Environment

With ever-increasing security measures being inserted into the visual environment of K-12 schools (see Robers, Zhang, Morgan, & Musu-Gillete, 2015), research has found that such measures may be antithetical to a learner-friendly environment. Many studies have found that visible security measures such as metal detectors, locked doors, and hall monitors lead students to worry more about their safety, potential crime, and violence (Hankin, Hertz, & Simon, 2011; Perumean-Chaney & Sutton, 2013; Schreck & Miller, 2003). Not only do visible security measures negatively impact student perceptions, but there is little research indicating that they

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are effective at reducing school crime and violence (NASP, 2013; Phaneuf, 2009). In fact, campuses with greater security have been associated with an increase in school violence in some cases (Nickerson & Martens, 2008). Another unfortunate reality of school fortification approaches to safety is that students' academic performance and learning can be diminished as a result of their reduced perceptions of safety (Milam, Furr-Holden, & Leaf, 2010). Furthermore, students who feel unsafe at school are at greater risk for experiencing mental health and psychosocial difficulties (Nijs et al., 2014), and research demonstrates that students perceive certain elements of the physical environment, such as graffiti and lack of adult supervision in certain spaces, to be associated with school violence (Lindstrom Johnson, Burke, & Gielen, 2012). Therefore, creating a perceived sense of safety may be just as critical to student wellbeing as actual protection from harm, particularly since the cumulative effects of day-to-day safety perceptions stand to impact a much wider population of students than the rare school shooting, however devastating it may be. However only a small body of research has investigated how school planning and design might contribute to perceived safety at school.

When considering that a joint investigation by the Secret Service and U.S. Department of Education found that commonly occurring factors among school shooters include experiencing a recent loss, attempting suicide, and feeling bullied (Vossekuil, Fein, Reddy, Borum, & Modzeleski, 2002), one could argue that schools would benefit greatly from design elements that support students' mental health and psychosocial needs. In this way school design could provide a needed pillar of support within multi-faceted violence prevention efforts. Indeed, research indicates that aspects of the physical environment contribute to a welcoming school environment (Maxwell, 2000), and in turn, feeling welcome at school has been shown to be a robust predictor of overall sense of safety in the school environment (Skiba et al., 2004). Overall, this reinforces the notion that schools would likely benefit from a built environment that supports students' sense of inclusion and integration within the social environment, which would thereby support their sense of safety.

Considering the former, it is important to note that there has been some initial research on the impact of the built environment on school climate, a term which encompasses perceptions of feeling welcome, safe, and supported at school (Bosworth, Ford, & Hernandaz, 2011; Bradshaw, Waasdorp, Debnam, & Johnson, 2014). Research has suggested that high quality school facilities can positively impact school climate, which in turn supports students' academic achievement (Uline & Tschannen-Moran, 2008). In addition,

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designing schools to support a healthy psychosocial climate could also make them safer because a positive school climate has been associated with reduced bullying, crime, and violence at school (Johnson, 2009). However, apart from a few exceptions (see Maxwell, 2000), very little empirical literature has explicitly explored ties between school architecture, social climate, and sense of welcome. Therefore, research into how schools can be designed to cultivate a sense of welcome, social inclusion, and belongingness should be pursued more rigorously and at greater depth.
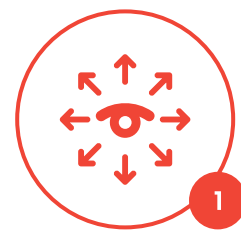
Crime Prevention through Environmental Design (CPTED)

Given the measurable impact of built space on student learning and wellbeing, this calls into question current trends in school safety that aim to "harden" campuses with cameras and metal detectors, as well as to enclose students in plain, austere environments. The challenge in designing schools that are both physically secure and psychologically supportive, however, is that these two priorities may impinge on one another when taken to extremes. For example, as previously discussed, although metal detectors can make schools more physically safe, they are also associated with negative psychosocial impacts on students (Hankin, Hertz, & Simon, 2011).

Crime Prevention through Environmental Design (CPTED) is one architectural approach that could adequately balance the priorities of students' physical safety and psychological wellbeing at school. Contemporary conceptualizations of CPTED coalesced in the 1970's with the work of C. Ray Jeffrey, Jane Jacobs, and Oscar Newman (Cozens & Love, 2015). Three CPTED principles that are of particular relevance to school design are natural surveillance, access control, and territoriality. Leveraging these concepts, CPTED strives to deter crime and violence by reducing opportunities for said acts and by influencing potential offenders to make alternative behavioral decisions.
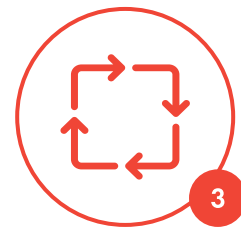
CPTED Principles

Natural surveillance refers to the use of sight lines, windows, and permeable barriers (i.e. fencing) to facilitate passive monitoring of spaces. Access control is the use of barriers and entry/exit points to restrict who is allowed in and out of the designated space. The principle of territoriality outlines the need for visual delineation of spaces serving different purposes and functions such as the use of landscaping elements (i.e. plants and shrubs) to mark perimeters or the use of signage to establish expectations for the space. By

1

Natural Surveillance

2

Access Control

3

Territoriality

visually demarcating the school's spaces, visitors may feel like they fit in and have a sense of personal connection in familiar spaces. Additionally, clearly demarcating school spaces makes it easier to identify intruders or non-authorized individuals at school because they "stand out" (Hellman, 2015). Cleanliness and maintenance of space is also considered a component of territoriality, as disorderly and deteriorating spaces are associated with neglect and delinquency (Schneider, 2010). It is important to note that CPTED has been described as a process rather than a collection of prescribed design elements (Cozens & Love, 2015), which lends its principles to an extensive variety of potential applications and settings.

A CPTED approach to safe school design offers several advantages. First, such an approach promotes subtle, covert methods of crime prevention as opposed to overt, visible security measures such as metal detectors and security cameras. This allows for a softened physical environment where students can focus on learning, in contrast to hardened school environments where students may be distracted or distressed by the visual cues in their environment. Second, CPTED principles are mostly compatible with research-based suggestions related to creating both physically safe and psychologically comfortable school environments. In this regard, natural surveillance encourages windows and openness, which promotes classroom daylighting and nature views. Also, territoriality/maintenance promotes cleanliness, visual orderliness, and use of vegetation and stress-reducing natural elements (i.e. rocks, trees, shrubs) to mark boundaries, which would also foment mental restoration on campus. In short, a CPTED approach encourages the use of design elements that further soften the school environment and lend support to psychological and social wellbeing. A third advantage of using CPTED principles in school design is the cost-effectiveness of these methods. Implementing CPTED does not necessitate the purchase of expensive security equipment or extra security personnel. When planned, the cost of building schools consistent with CPTED principles generally is comparable to the cost of constructing non-CPTED schools (Philpott & Kuenstle, 2007), though exact estimates have not yet been established in this regard.

Research on CPTED in Schools

To date, CPTED has received considerable research attention related to its efficacy in deterring criminal acts in a range of commercial and public contexts (Casteel & Peek-Asa, 2000; Cozens & Love, 2015). However, research on its implementation in K-12 settings is still emergent and consists of only a handful

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of studies. Preliminary investigations have found that perceptions of school disorder, physical comfort, and adequate lighting (which supports the use of natural surveillance), each have an indirect impact on school violence levels (Bradshaw et al., 2014; Johnson et al., 2017). However, empirical findings further clarify that lighting and improvements to the physical environment may only reduce student violence if the improvements lead to changes in student perceptions of the environment (Johnson et al., 2017).

In addition, more targeted investigations on the impact of CPTED school designs on violence levels and student perceptions are emerging, though increased research attention is needed. Researchers with the Centers for Disease Control and Prevention (e.g., Vagi et al., 2018) have found that school facilities with closer adherence to CPTED principles tend to have lower reported rates of violence and aggression, confirming previously identified links between the physical environment and school-based crime and misconduct (Wilcox, Augustine, & Clayton, 2006). Also, schools with greater use of CPTED design report lower rates of absenteeism, ostensibly because concerns for personal safety were reduced in schools adhering to CPTED principles (Vagi et al., 2018).

In support of these findings, Lamoreaux and Sulkowski (2018, under review) found that middle and high school students perceived CPTED-based school designs as being safer than schools lacking CPTED elements. The same study also investigated whether students felt that CPTED school designs were "psychologically comfortable," a construct that encompasses a state of low stress in which students are mentally available to learn. Study results indicate that students are more likely to prefer schools with CPTED designs over schools lacking CPTED for the perceived psychological comfort they afford. Study findings also suggest that there may not necessarily be a tradeoff associated with trying to meet both physical safety and psychological comfort needs in schools. Rather, the use of CPTED principles may provide the means for securing school campuses and increasing student sense of safety, while simultaneously softening the built environment in a way that supports comfort and mental wellbeing. Though promising, the aforementioned studies are the only empirical investigations that have been conducted regarding CPTED use in school design. Thus, findings from these studies are preliminary and await corroboration from additional research.

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Conclusions

Research reviewed in this paper indicates that the school built environment has a measurable impact on student functioning. Namely, the school's physical design characteristics influence student stress levels, attention and concentration, psychosocial wellbeing, and sense of safety. Consequently, heavy-handed approaches to school security and excessive demands from public and political voices to "harden" school campuses manifestly ignore what is known about the effects of the school built environment.

As dialogue surrounding safe school design continues to gain momentum, a softer, more balanced approach is needed that considers the full range of student needs rather than prioritizing safety alone, as the neglect of other important factors such as school climate, psychosocial health, and mental wellbeing will result in school facilities that impede learning. While the literature discussed here establishes important empirical precedents favoring the use of CPTED in school architecture, the handful of studies devoted specifically to CPTED in school design is lamentably small and findings need replication and validation. Additional gaps in current research include the role that the school physical environment can play in promoting inclusion, social cohesion, and school climate. As school safety and security is of paramount concern across diverse sectors and disciplines, we strongly advise that increased focus on interdisciplinary conversation and collaboration between school planners, architects, educators, and researchers be devoted to the role of the school physical environment and its influence on student sense of safety and psychological wellbeing. By using a multi-pronged, interdisciplinary effort to promote dialogue and fund critical research, we can begin to effectively design safe schools with additional benefits to support students' learning and psychosocial wellbeing.

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References

21st Century School Fund. (2009). Repair for success: An analysis of the need and possibilities for a federal investment in PK-12 school maintenance and repair. Memo to Economic Policy Institute from the 21st Century School Fund. Retrieved from http://www.bestfacilities.org/best-home/docuploads/pub/211_PreK-12MaintenanceRepairRenewalInvestment_21CSF(3).pdf

Alexander, D., and Lewis, L. (2014). Condition of America's Public School Facilities: 2012–13 (NCES 2014-022). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved [date] from http://nces.ed.gov/pubsearch.

Barrett, P., Davies, F., Zhang, Y., & Barrett, L. (2015). The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis. Building and Environment, 89, 118-133. https://doi.org/10.1016/j.buildenv.2015.02.013

Benfield, J. A., Rainbolt, G. N., Bell, P. A., & Donovan, G. H. (2015). Classrooms with nature views: Evidence of differing student perceptions and behaviors. Environment and Behavior, 47(2), 140-157. https://doi.org/10.1177/0013916513499583

Bosworth, K., Ford, L., & Hernandaz, D. (2011). School climate factors contributing to student and faculty perceptions of safety in select Arizona schools. Journal of School Health, 81(4), 194-201. doi:10.1111/j.1746-1561.2010.00579.x

Bradshaw, C. P., Waasdorp, T. E., Debnam, K. J. and Johnson, S. L. (2014). Measuring school climate in high schools: A focus on safety, engagement, and the environment. Journal of School Health, 84: 593–604. doi: 10.1111/josh.12186

Casteel, C., & Peek-Asa, C. (2000). Effectiveness of crime prevention through environmental design (CPTED) in reducing robberies. American Journal of Preventive Medicine, 18(4), 99-115. doi: 10.1016/S0749-3797(00)00146-X

Choi, H. H., Van Merriënboer, J. J., & Paas, F. (2014). Effects of the physical environment on cognitive load and learning: towards a new model of cognitive load. Educational Psychology Review, 26(2), 225-244. https://doi.org/10.1007/s10648-014-9262-6

Cozens, P., & Love, T. (2015). A review and current status of crime prevention through environmental design (CPTED). Journal of Planning Literature, 30(4), 393-412. doi:10.1177/0885412215595440

Evans, G. W. (2003). The built environment and mental health. Journal of Urban Health, 80(4), 536-555. doi:10.1093/jurban/jtg063

Evans, G. W. (2006). Child development and the physical environment. Annual Review of Psychology, 57(1), 423-451. doi:10.1146/ annurev.psych.57.102904.190057

Figueiro, M. G., Brons, J. A., Plitnick, B., Donlan, B., Leslie, R. P., & Rea, M. S. (2011). Measuring circadian light and its impact on adolescents. Lighting Research & Technology, 43(2), 201-215.

Halpern, D. (1995). Mental Health and the Built Environment. London: Taylor and Francis.

Hankin, A., Hertz, M., & Simon, T. (2011). Impacts of metal detector use in schools: Insights from 15 years of research. Journal of School Health, 81(2), 100-106. doi:10.1111/j.1746-1561.2010.00566.x

Hellman, G.V. (2015). Developing a comprehensive approach to school safety. School Business Affairs, July/August 2015: 27 - 29.

Johnson, S. L. (2009). Improving the school environment to reduce school violence: A review of the literature. Journal of School Health, 79(10), 451-465. doi:10.1111/j.1746-1561.2009.00435.x

Johnson, S., Waasdorp, T., Cash, A., Debnam, K., Milam, A., & Bradshaw, C. (2017). Assessing the association between observed school disorganization and school violence: Implications for school climate interventions. Psychology of Violence, 7, 181–191. doi:10.1037/vio0000045

Keis, O., Helbig, H., Streb, J., & Hille, K. (2014). Influence of blue-enriched classroom lighting on students cognitive performance. Trends in Neuroscience and Education, 3(3-4), 86-92. https://doi.org/10.1016/j.tine.2014.09.001

Küller, R., & Lindsten, C. (1992). Health and behavior of children in classrooms with and without windows. Journal of Environmental Psychology, 12(4), 305-317. doi: 10.1016/S0272-4944(05)80079-9

Lamoreaux, D.J. & Sulkowski, M.L. (2018). Students' perceptions of Crime Prevention through Environmental Design (CPTED): Balancing competing needs for physical safety and psychological comfort at school. Under review.

Li, D., & Sullivan, W. C. (2016). Impact of views to school landscapes on recovery from stress and mental fatigue. Landscape and Urban Planning, 148, 149-158. https://doi.org/10.1016/j.landurbplan.2015.12.015

Lindstrom Johnson, S., Burke, J., & Gielen, A. (2012). Urban Students' Perceptions of the School Environment's Influence on School Violence. Children & Schools, 34(2), 92–102. http://doi.org/10.1093/cs/cds016

Maxwell, L. E. (2000). A safe and welcoming school: What students, teachers, and parents think. Journal of Architectural and Planning Research, 271-282.

Milam, A. J., Furr-Holden, C. D. M., & Leaf, P. J. (2010). Perceived school and neighborhood safety, neighborhood violence and academic achievement in urban school children. The Urban Review, 42(5), 458-467. doi: 10.1007/s11256-010-0165-7

National Association of School Psychologists. (2013). Research on school security: The impact of security measures on students. NASP, Bethesda, MD. Retrieved from http://www.audioenhancement.com/wp-content/uploads/2014/06/school-security-by-NASP.pdf

Nickerson, A. B., & Martens, M. R. (2008). School violence: Associations with control, security/enforcement, educational/therapeutic approaches, and demographic factors. School Psychology Review, 37, 228-243.

Nijs, M. M., Bun, C. J., Tempelaar, W. M., de Wit, N. J., Burger, H., Plevier, C. M., & Boks, M. P. (2014). Perceived school safety is strongly associated with adolescent mental health problems. Community mental health journal, 50(2), 127-134. doi: 10.1007/s10597-013-9599-1

Perumean-Chaney, S. E., & Sutton, L. M. (2013). Students and perceived school safety: The impact of school security measures. American Journal of Criminal Justice, 38(4), 570-588. doi:10.1007/s12103-012-9182-2

Phaneuf, S. W. (2009). Security in schools: Its effect on students. El Paso: LFB Scholarly Pub. LLC.

Philpott, D., & Kuenstle, M. W. (2007). Education facility security handbook. Lanham, MD: Government Institutes.

Robers, S., Zhang, A., Morgan, R.E., and Musu-Gillette, L. (2015). Indicators of School Crime and Safety: 2014. National Center for Education Statistics, U.S. Department of Education, and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice. Washington, DC.

Schneider, T. (2010) CPTED 101: Crime prevention through environmental design — The fundamentals for schools. National Clearinghouse for Educational Facilities. Retrieved from http://www.ncef.org/pubs/cpted101.pdf.

Schreck, C. J., & Miller, J. M. (2003). Sources of fear of crime at school: What is the relative contribution of disorder, individual characteristics, and school security? Journal of School Violence, 2(4), 57-79. doi: 10.1300/J202v02n04_04

Skiba, R., Simmons, A.B., Peterson, R., McKelvey, J., Forde, S., & Gallini, S. (2004). Beyond guns, drugs and gangs: The structure of student perceptions of school safety. Journal of School Violence, 3(2), 149-171. doi:10.1300/J202v03n02_09

Uline, C., & Tschannen-Moran, M. (2008),"The walls speak: the interplay of quality facilities, school climate, and student achievement", Journal of Educational Administration, 46(1), 55-73. doi: 10.1108/09578230810849817

Vagi, K. J., Stevens, M. R., Simon, T. R., Basile, K. C., Carter, S. P., & Carter, S. L. (2018). Crime Prevention Through Environmental Design (CPTED) characteristics associated with violence and safety in middle schools. Journal of School Health, 88, 296–305. doi: 10.1111/josh.12609

Vossekuil, B., Fein, R. A., Reddy, M., Borum, R., & Modzeleski, W. (2002). The final report and findings of the Safe School Initiative: Implications for the prevention of school attacks in the United States. US Secret Service and Department of Education, Washington, DC.

Wessolowski, N., Koenig, H., Schulte-Markwort, M., & Barkmann, C. (2014). The effect of variable light on the fidgetiness and social behavior of pupils in school. Journal of Environmental Psychology, 39, 101-108. https://doi.org/10.1016/j.jenvp.2014.05.001

Wilcox, P., Augustine, M. C., & Clayton, R. R. (2006). Physical environment and crime and misconduct in Kentucky schools. Journal of Primary Prevention, 27(3), 293-313. https://doi.org/10.1007/s10935-006-0034-z