

HEALTHY CHOICE. HEALTHY CAMPUS.

POINT OF DECISION DESIGN



Northfleet Technology Center - Project Designed by HKS

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Research Team Upali Nanda, PhD Jessica Hedge Giyoung Park, PhD, AIA Sheba Ross, MUD Ileana Rodriguez, March Erin Peavey, March	Research Team Michelle Eichinger, MS, MPA Shelli Dent Consultants Timothy Lalowski, MPH
---	---

Ideation Session Attendees Campus Facilities Kate Pepin University of Michigan, Dearborn + SCUP Caren Easterling H-E-B Ann Wozniak Boise State University Chris Wright Boise State University Thomas Lund University of Texas, Dallas Richard Dempsey University of Texas, Dallas Beth Lewis Texas Women’s University Abby Roberson Texas Medical Center	Design Research Shahin Vassigh Florida International University Whitney Gray Delos Vienna McCleod International WELL Building Institute Upali Nanda HKS, Houston Angela Ramer HKS, Dallas Giyoung Park HKS, Dallas	Student Arsalan Gharaveis Texas A&M University Ohbet Chen Texas A&M University David Rader University of Texas, Arlington Shelli Dent Georgia State University Jessica Hedge University of Houston Heather Roth University of North Texas
Design Bill Bruce CRJA-IBI Chuck McDaniel ASLA Doug Childers HKS, Houston Ileana Rodriguez HKS, Houston David Harper HKS, Miami Sheba Ross HKS, Atlanta Mark Vander Voort HKS, Dallas Dan Arrowood HKS, Dallas Leonardo Gonzalez HKS, Dallas Craig Kolstad HKS, Dallas David Williamson HKS, Dallas	Public Health Juliet Rogers University of Michigan Michelle Eichinger Designing4Health	Sponsor Susan Homan Dupont Corian Jen Kin Patcraft
	Student Health Jeremy Beer H-E-B Susan Hochman University of Texas, Austin + ACHA	Communications Mary Seale HKS, Dallas

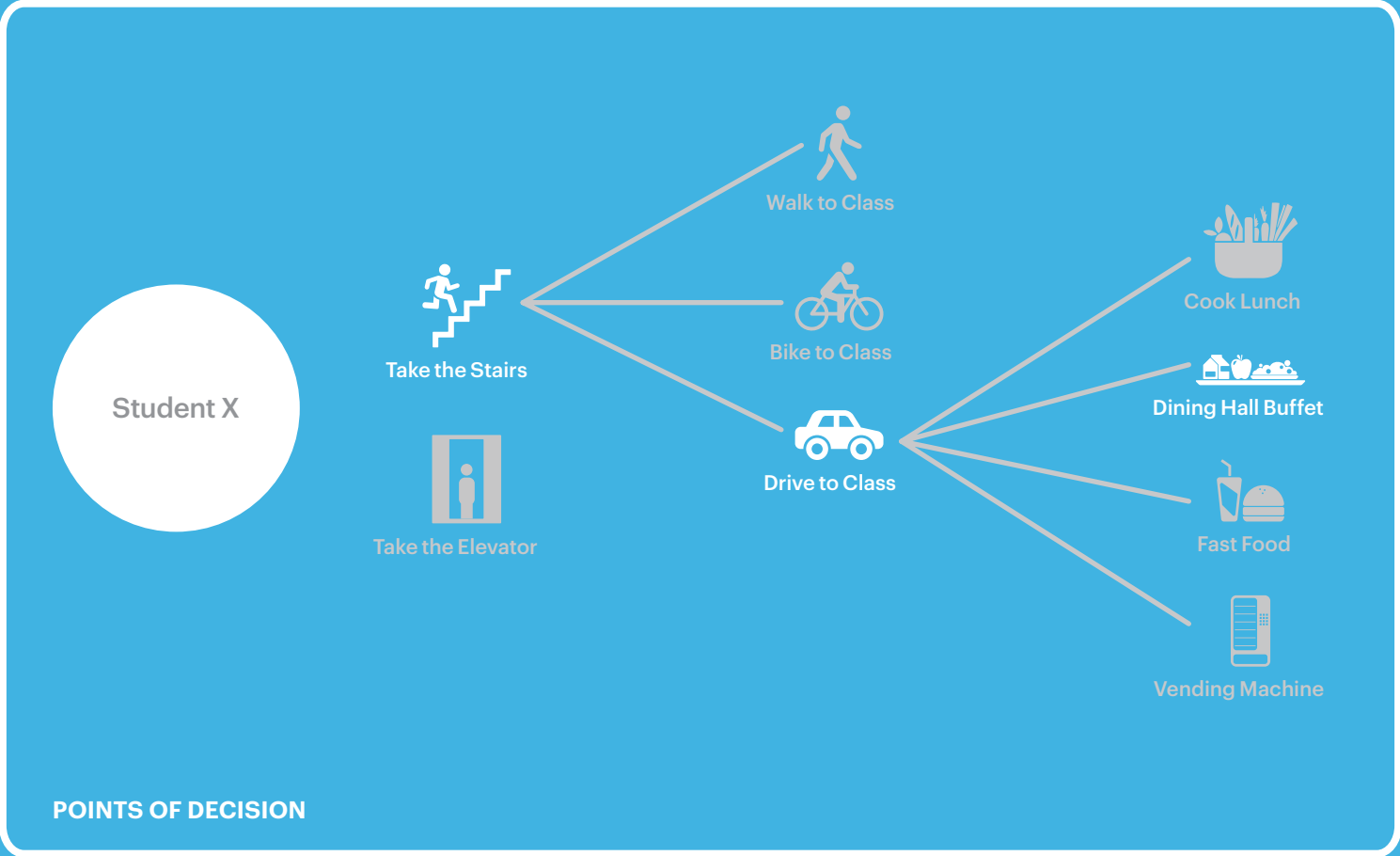
CONTENTS

EXECUTIVE SUMMARY.....	01	Attendees.....	15
		Agenda.....	15
		Persona Exercise.....	16
		Campus Planning Exercise.....	16
		Survey.....	16
		Visual Design Guide.....	26
REPORT.....	04	Results.....	18
		Persona Exercise and Journey Mapping.....	18
Background.....	04	Design Strategies.....	20
Obesogenic Environments.....	04	Feedback to Ideation Session.....	23
Design for Health.....	06	Visual Design Guide Generation.....	25
The Choice Conundrum.....	06	Summary Findings.....	25
Factors Influencing Choice.....	09		
Campus Settings.....	12		
Research Question.....	14		
Project Objectives.....	14		
Methods.....	15		
Ideation Session.....	15		



[Click Here to Check out the Visual Design Guide for Point of Decision Design](#)

CAN DESIGN PROMPT COLLEGE STUDENTS TO MAKE HEALTHIER DECISIONS?



EXECUTIVE SUMMARY

Challenge

US college campuses can be considered obesogenic environments given the high levels of obesity prevalent today. This is highly impactful on students’ mental health and academic performance. Habits formed in college can define post-college life, establishing a critical window of influence that deserves our attention. A key challenge for students is poor decision making regarding healthy choices on basic issues like physical activity and diet. Can design help in this critical decision making?

Premise

Utilizing a socio-ecological approach that takes advantage of human interactions within our environments, we see opportunities for providing environmental modifications that make healthy living, easy living. Students face many choices every day, including physical activity and diet, which directly impact their health and wellbeing. The premise behind developing our concept, *point-of-decision design* (PODD), is that healthy decision-making can be “prompted” by our physical environments through the implementation of effective design intervention strategies at critical *points-of-decision* throughout the college campus. In many ways, this study focuses on the “tipping point” defined in the dictionary as “the point at which a series of small changes or incidents becomes significant enough to cause a larger, more important change”. So, what is the tipping point for students to make a healthy decision? This is what we are calling the *point-of-decision design*.

Research Question

How can design influence college student health choices by targeting the critical *points-of-decision*?

Project Objectives

- To understand the chronic problem of obesity on college campuses and the link to diet and activity decisions
- To discern how and “where” college students make decisions about physical activity and nutrition
- To synthesize design strategies implemented at these *points-of-decision* to prompt healthy decisions amongst the myriad choices on typical college campuses
- To generate a design guide for practitioners to aid *point-of-decision* design for college students
- To develop a research concept for future research bringing together the fields of public health and architecture around *point-of-decision design*

Process

A preliminary scan of the literature was conducted to compile and assess previous design strategies utilized in health-promoting college campuses and explore any research linking design to decision making amongst students. Design strategies identified were then summarized. This preliminary review found that *point-of-decision design* has been used by the CDC for tobacco cessation, and later stairwell use, but has not been extensively incorporated by the design community to assess critical points of the most impact. Informed by the literature review, a cross-disciplinary Ideation Session was arranged, inviting 36 participants from all over the US, including: campus facilities planners, architects, designers, public health and student health experts, and undergraduate and graduate students. The basis of the Ideation Session was to discuss critical *points-of-decision* on college campuses and deliberate upon design strategies at these PODs that can promote healthy choices. A follow-up survey was sent to all attendees to clarify themes emergent from the session. Integrating prior research and the session results, a set of visual design guidelines was generated and included in this report.



Key Findings

- 1. Current literature on designing healthy campuses is more biased towards movement and physical activity than diet. A gap exists that is an opportunity for future design research.
- 2. Using design for better decision-making is not a very well understood construct. Literature focuses on how a healthy context can be created, but not as much on how design can be a catalyst for healthier decisions.
- 3. Current thinking on healthy colleges focuses on urban design and campus planning strategies, whereas our findings show that decisions about activity/ diet could be made by students before ever stepping into campus. Leveraging technology/ smartphones as part of the design solution is imperative.
- 4. *Point-of-decision* is a person-centric– not a place-centric, construct across settings. Understanding diverse user personas and mapping their journeys can aid in determining points of decision. Key points of decision emergent from this literature review include: the smartphone, path, home, dining facility, courtyard, bed, car, corridor, recreation center, classroom, parking location, public space, workstation and online.
- 5. Behavioral decisions students make are often influenced by a range of factors; such factors can be sorted into 4 key constructs: Availability, Access, Affordability, and Appeal.
- 6. Design strategies to address a person-centered framework that can respond to a myriad of dynamic influences must be considered along a design continuum ranging from information and product design to interior, architecture and urban design. Some strategies emergent from the lit review and ideation include: farmers’ markets, communal kitchens, healthy food offerings and placement, hydration stations, recharge zones, open flex spaces, mixed use buildings, lighting strategies, street trees, bike parking systems, and street furnishings.

Deliverables

A visual design guide for point of decision design that can be found on the CADRE website.
<https://tinyurl.com/VisualDesignGuide>

Limitations and Next Steps

This research project had a relatively small scope, limited by an insufficient library of literature and a one-time ideation session funded by a seed grant. Although the Ideation Session was more cross-disciplinary than many others, a few disciplines such as product design and behavioral economics can be included for more comprehensive future sessions. Additionally, more empirical research on student decision making, the role of the environment in these decisions, and robust case studies are needed at a much larger scale if we are to change our thinking about design as not only a latent context, but an active trigger, in changing health across our college communities.

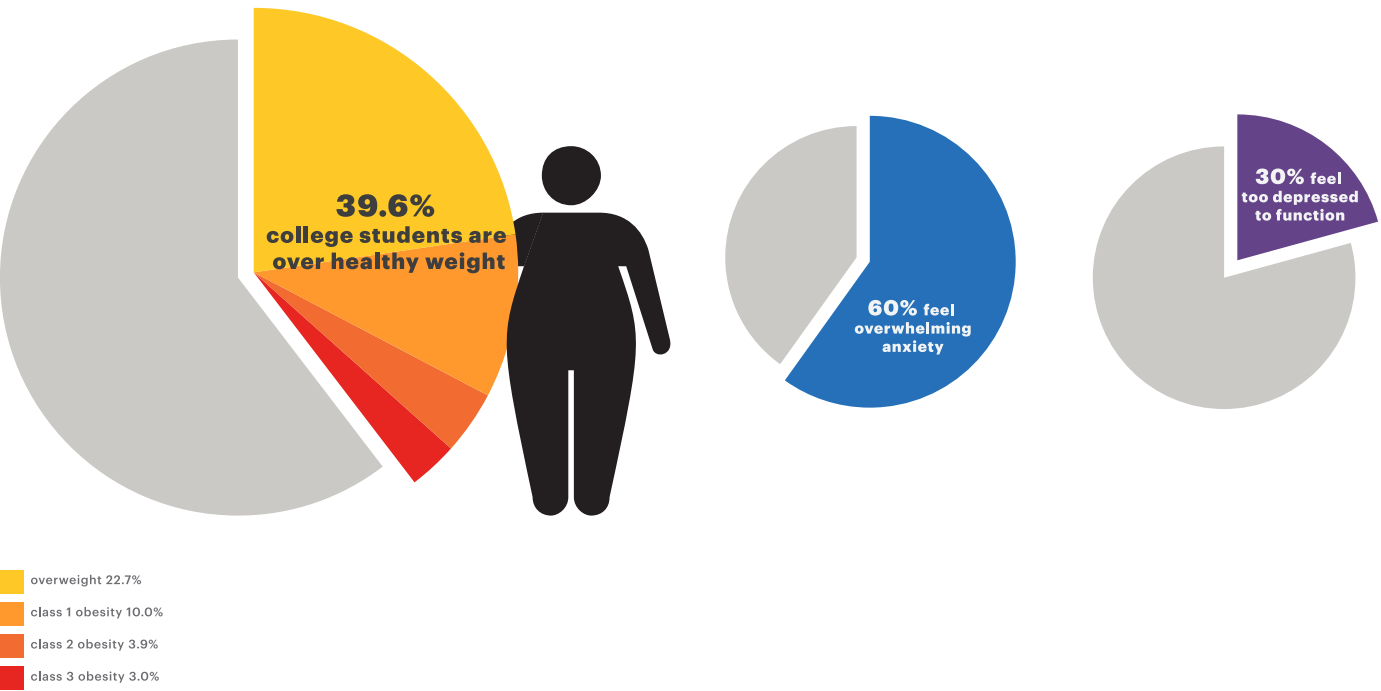
REPORT

Background

Obesogenic Environments

More than one-third of American adults are now obese, which has nearly doubled since the 1960’s, and another third are overweight (National Center for Health Statistics, 2016, p. 200). Obesity is a condition in which the body mass index (BMI)—that is weight divided by squared height (kg/m2)—is 30 or greater whereas normal weight BMI is 18.5-24.9. Overweight is a BMI of 25-29.9. Obesity is related to several leading causes of death including heart disease, diabetes, stroke, and some cancers (National Center for

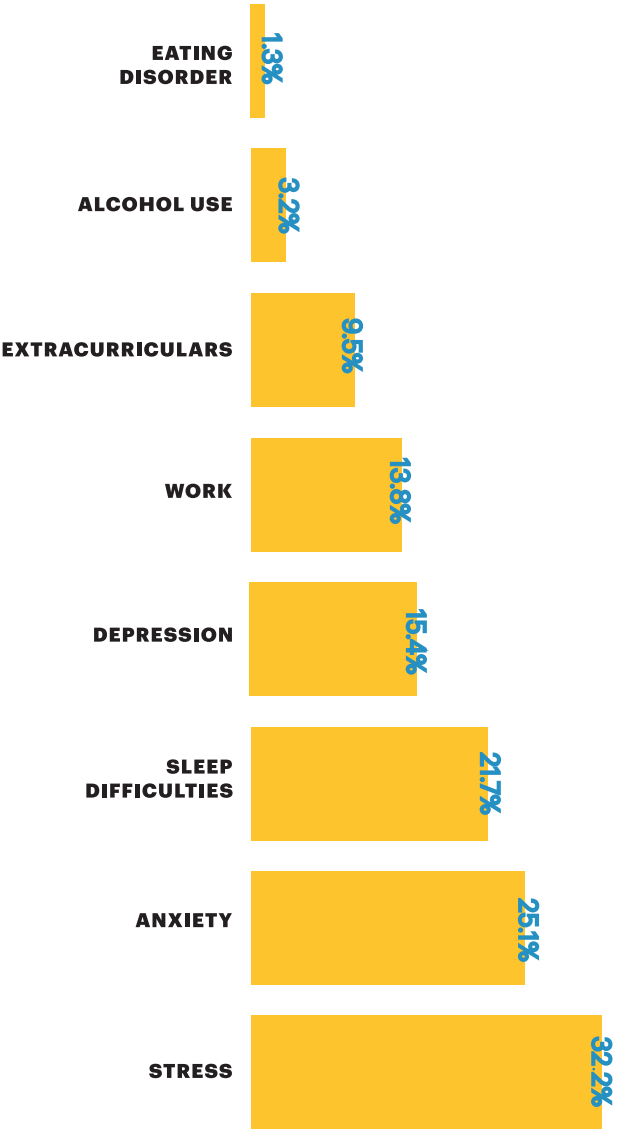
Health Statistics, 2016). Heart disease, the leading cause of death in the United States, primarily results from poor diet and physical inactivity (National Center for Health Statistics, 2015). Furthermore, a recent review study found bidirectional associations between depression and obesity—depressed and obese people are far more likely become obese or depressed, respectively, over time (Luppino et al., 2010). Therefore, obesity is not merely a physical health concern but also one related to mental wellbeing.



Adapted from ACHA 2016 ©CADRE2016

Figure 1. Overweight and obese rate and self-reported psychological distress symptoms among college students (Source: ACHA, 2016)

Collegiate young adults experience transition from adolescence to adulthood, including making personal lifestyle choices on their own (Sparling, 2007). However, the greatest increases in obesity across the lifetime occur between the ages of 18 to 29 years (Mokdad, Marks, Stroup, & Gerberding, 2004). Many in this age group do not meet current physical activity recommendations (Adams & Rini, 2007; Nelson, Kocos, Lytle, & Perry, 2009; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). A recent nation-wide survey revealed 23.6% of students had not performed 30-minutes of moderate-intensity cardio/aerobic exercise within the past seven days, and 43.6% had not performed at least 20-minutes of vigorous-intensity cardio/aerobic exercise (American College Health Association, 2016). In the same study, 23% of respondents reported being overweight and 17 percent being obese (BMI 35 – 39.9) (Figure 1). Given the greater autonomy in lifestyle choices and the challenges to adjusting to college life, students can experience an increase in stress and sleep disturbance, which can result in physical inactivity, poor dietary choices, increased caloric intake and elevated alcohol consumption, given the greater autonomy in lifestyle choices (Macht, Haupt, & Ellgring, 2005; Patel & Hu, 2008; Plotnikoff et al., 2015; Serlachius, Hamer, & Wardle, 2007). Heavy academic workload and being away from home, for example, can threaten college students’ mental wellbeing. Nearly 60% of students reported feeling overwhelming anxiety within the last twelve months and about one-third students had felt so depressed that it was difficult to function (American College Health Association, 2016) [Figure 1]. College students indicated anxiety (25.1%), depression (15.4%), sleep difficulties (21.7%), and stress (32.2%) among major factors interrupting their academic performance [Figure 2]. College campuses are where students live, work, play and learn. The greater duration and frequency of time spent on the campus results in greater impacts on students’ wellbeing and academic performance (Park & Evans, 2016).



Adapted from NCHA-II 2015 ©CADRE2016
Figure 2. Factors interfering college students’ academic performance (source: ACHA, 2016)

Design for Health and the Importance of Choice

The Choice Conundrum

College life is about a myriad of choices. From coursework to who to sit with at lunch, college students are introduced to a new context full of independent choices, and this transition has a substantial impact on the decisions college students make. Their new-found independence, with a new social and physical environment, conjointly shapes those decisions. When it comes to decisions about activity and diet, most college students have recently gained an immense level of freedom (El Ansari, Stock, & Mikolajczyk, 2012), this freedom from their parents'/guardians' household changes their decision-making patterns. A critical component of college life is the autonomy in making independent decisions— for many students for the very first time in their lives. In the newly acquired stress of college, life choices about diet and exercise tend to surrender to other motivators. **Diet and exercise decisions among college students has been associated with type of residency** (on campus/ off campus) and **students' classification/year** (freshmen, sophomore, junior, senior, graduate/professional school) with food and vegetable intake, and type of diet on college campuses (Reed & Phillips, 2005). This demonstrates the impact of their new-found

independence. With increased autonomy, college students' behavioral decisions become more independent compared to K-12 students whose behavior more likely results from family and school systems. Theory of reasoned action (TRA) asserts that the most important determinant of behavior is intention, whereas direct determinants of an individual's decisions are their attitudes towards the behavior and subjective norms associated with the behavior (Fishbein & Ajzen, 1975). Additionally, in their Theory of Planned Behavior (TPB), the notion of perceived control is supplemented to account for deprived voluntary control over a behavior (Ajzen, 1985). TRA and TPB both were assessed on predictive validity for college nutritional and exercise decisions, indicating a good model of fit (Bruijn, 2010; Deshpande, Basil, & Basil, 2009; Hagger, Chatzisarantis, & Biddle, 2002), however, TPB accounted for more variations in decisions (Hagger et al., 2002). Figure 3 illustrates how multiple factors lead to behavioral outcomes. Background factors including individual, social, and environmental information mediate three different contributing behavioral, normative, and control beliefs to intention. The three beliefs are further discussed below.

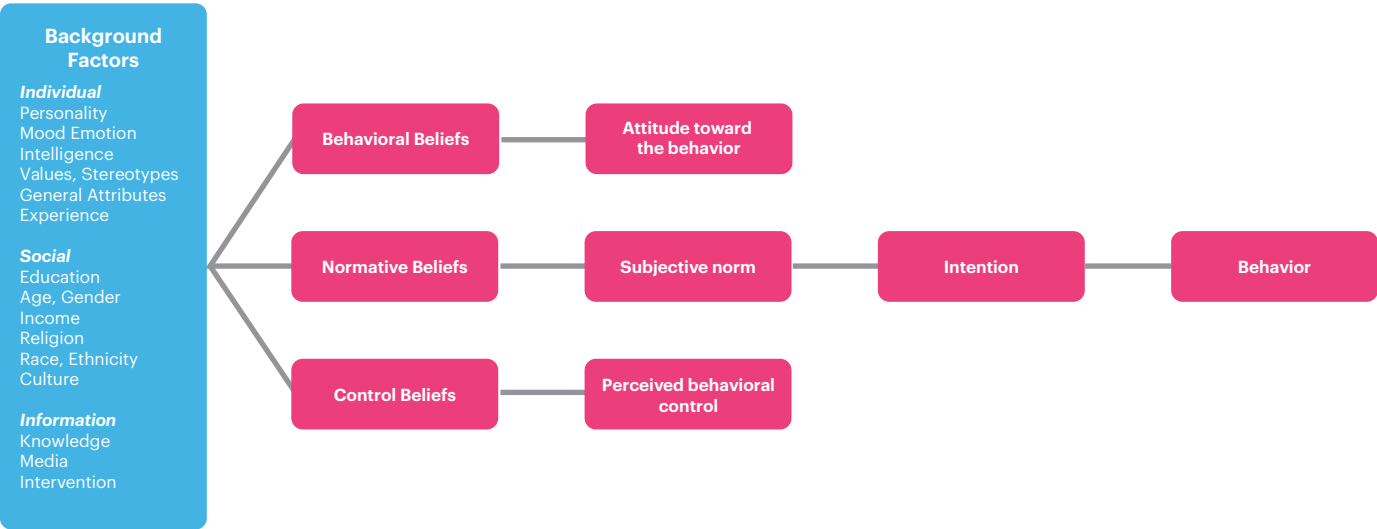


Figure 3. Theory of Planned Behavior (Ajzen & Fishbein, 2005)

Behavioral Beliefs

Behavioral beliefs formulate an individual's attitude towards the behavior based on one's evaluation of the risks and benefits associated with the outcome such as the health impact of diet and exercise. Behavioral Beliefs encompass two perceptions: benefits and risk, and it is the evaluation of these two components against each other which determine the overall attitude towards a health decision. Several studies have examined the relationship between behavioral beliefs and decision outcome, however almost dominantly within nutrition. For example, weight concerns were the most prevalent modifier in dietary decisions (Mooney & Walbourn, 2001). In order to study the effect of behavioral beliefs on decision outcomes, two interventions have been explored: nutritional information at point-of-purchase (Conklin, Lambert, & Cranage, 2005; Freedman & Connors, 2011; Gerend, 2009; J. Kolodinsky, Green, Michaelhelles, & Harvey-Bernino, 2010) and nutrition courses (Ferrara, 2009; Ha & Caine-Bish, 2009; Kahn, Ramsey, Brownson, & Corso, 2002; Lua & Elena, 2013). J Kolodinsky, Harvey-Berino, Berlin, and Reynolds (2007) also examined the initial nutritional knowledge against diet decisions, finding that individuals with greater nutritional guideline knowledge made healthier diet decisions. Ultimately, the consensus states that **merely having greater knowledge of nutritional benefits and risks contributes to healthier decisions** (Freedman & Connors, 2011; Ha & Caine-Bish, 2009; Hsieh, 2004; J Kolodinsky et al., 2007).

Normative Beliefs

Normative beliefs are perceived normative behavior in a given social environment, which motivates individual's compliance to the norm—in college settings, peers' behavior primarily creates norms. The dominant drivers of college student diet and exercise decisions are most certainly the stark differences between genders. Males are typically more motivated towards physical activity while females are typically more motivated towards healthy eating habits (Buckworth & Nigg, 2004; Gerend, 2009; LaCaille, Dauner, Krambeer, & Pedersen, 2011; Leslie, Owen, Salmon, & Lo, 1999; Levi, Chan, & Pence, 2010). Furthermore, **initiatives geared towards exercise typically have higher success rates in men** (Buckworth & Nigg, 2004; Leslie et al., 1999), **whereas initiatives geared towards diet have higher success rates in women** (Gerend, 2009; Levi et al., 2010). Gender has even been associated with vegetable intake and type of diet on college campuses (Reed & Phillips, 2005). Majority of these differences have been attributed to perceived social norms which dictate the expected behaviors of young men and women, vying for acceptance among their peers (Levi et al., 2010).

Control Belief

Control beliefs formulate their perception of individual control over the behavior, pertaining to access and choice. However, these are always then mitigated by the reality of the individual's actual control, or their skill, ability, knowledge, and environment (Ajzen, 1985). Access and availability typically commandeer the control belief sector of health behavior intention. Albeit **actual access or just perceptions, this has been cited as the largest barrier to diet and exercise decisions for college students** (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014; Greaney et al., 2009; Hsieh, 2004). Access to large portions, multiple helpings, and meal plans with all-you-can-eat style dining environments all create a context which promotes over-indulgence of unhealthy foods (Greaney et al., 2009). Bruijn (2010) suggested that beliefs about the controllability of fruit consumption were the most consistent discriminating beliefs, and Deliens et al. (2014) showed that **availability and accessibility, both physically and financially were the most impactful modifiers of nutritional decisions among college students**. When it comes to physical activity, three factors reign supreme: safety, access, and self-efficacy. The perception of safety on bike paths and walking trails is associated with their use (Ferrara, 2009), the proximity of physical activity centers is associated with levels of physical activity across the board (Reed & Phillips, 2005), and an individual's perception of physical success mediates their motivation to participate (Boyle & LaRose, 2009).

Introducing Point of Decision Design

A study identified 200 daily decisions people overlook regarding food alone and noted these are only a small subset of the food decisions we make, furthermore, the influence of the environment on such decisions is largely unknown (Wansink & Sobal, 2007). Because choices are so important, a significant amount of research has looked at point-of-purchase interventions. The point-of-purchase scheme is traditionally employed in marketing as a means to push last minute impulse purchases before checkout. However, public health officials have recently begun utilizing this method in or to motivate positive health choices, placing informational placard or signs in their place (Chandon, Hutchinson, Bradlow, & SH, 2009). This concept has been studied extensively and successfully relating to dietary information placement in college cafeterias (Conklin et al., 2005; Freedman & Connors, 2011; Graham & Laska, 2012; J. Kolodinsky et al., 2010) and in exercise related to stairwell usage (Ferrara, 2009; Kahn et al., 2002; Soler et al., 2010). Furthering this concept to involve both diet and exercise in the holistic college setting, provides point-of-decision design (PODD, herein), which postulates that **healthy decision-making can be “prompted” by our physical environments through implementing effective design intervention strategies at critical point-of-decision throughout the college campus**.

Factors Influencing Choice

A robust body of public health literature suggests that disease prevention and public health promotions are more effective when approached with an ecological perspective as its key strength lies in factoring multiple levels of environments in behavioral and health outcomes (Koplan, Liverman, & Kraak, 2005). The ecological model considers various environments around a target behavior encompassing individual and interlinked micro-level physical environments, larger environments nesting such micro-environments (e.g. neighborhood nesting individual dwellings), infrastructure and resources, and social norms and societal values in addition to predisposing factors (e.g. biological factors and individual background). Behavioral and health outcomes are partially from predisposing factors and partially from environmental factors—in other words, nature and nurture. **It is critical for researchers to analyze how healthy choices are made during college, because of the potential for behaviors to continue into post-college and adulthood** (Arnett, 2001). In 2011, 29.9% of college students were found to be overweight or obese (Meckel, Galily, Nemet, & Eliakim, 2011), which has been attributed to a drastic decline in physical activity and poor nutritional diet in comparison to high school (Meckel et al., 2011; Strong, Parks, Anderson, Winett, & Davy, 2008). Furthermore, longitudinal studies highlight how overweight youth have an increased likelihood of being overweight adults and potentially developing chronic diseases later (Arnett, 2001; Guo, Wu, Chumlea, & Roche, 2002).

Public health promotions focus on the nurture aspect of life, as the nature is often impossible to change. This model can be adapted to the college context using the following key constructs: active living and healthy eating behaviors aimed

at obesity prevention. Two of the layers in Figure 4, campus settings (micro settings such as a gym and a cafeteria) and land use/campus planning (e.g. campus master plan) are physical environments. On the other hand, advocacy and social norms can be institutional-level norms and advocacy—for instance, policies that provide opportunities for healthy eating and prioritize campus walkability in facilities planning. Therefore, the advocacy and norms are not separated from the physical environment but can support building healthy campus environments. The built environment of various scales—encompassing product and interior design, architecture, and urban design and planning—contribute to shaping environmental context and influence many decisions around physical activity and food intake.

This project features four key constructs around physical activity and diet decision making: availability, affordability, accessibility, and appeal—the 4A's. The first three were discussed for obesity more widely (Backholer et al., 2014; Gans et al., 2010); and appeal has been discussed to a lesser extent (Giles-Corti & Donovan, 2003; Handy, Boarnet, Ewing, & Killingsworth, 2002; Sedibe et al., 2014). Often diet and activity behavior seem to be associated with cost and convenience, but looking at this more closely, these 4A's allow us to explain behavior influences, especially as it relates to identifying equitable approaches. These influencing characteristics need to be considered in the context in which the desirable behavior is taking place—at home in their community, at school or learning environment, at the workplace and in its community, and at places of play, leisure and recreation and their environments.

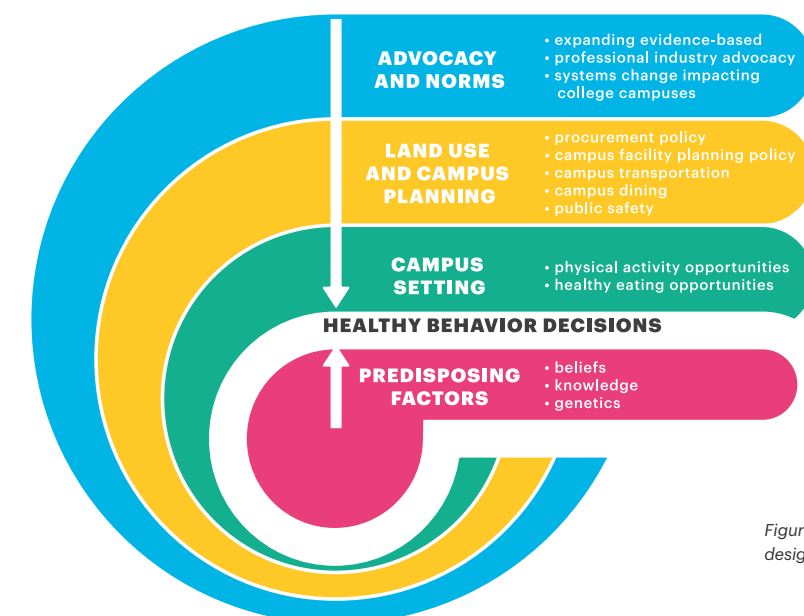


Figure 4. Ecological model for healthy campus design (Adapted from Koplan et al. 2005)



Availability

Opportunities to engage in healthy in behaviors, such as healthy eating and active living need to be available in the context in which behaviors take place. Sometimes these amenities, such as healthy food options or infrastructure to support physical activity, are not always available. For example, vending machines provide quick, convenient snacks, which often are unhealthy, in the work place and schools. Healthy vending offerings give people choice to have a healthy alternative (Keener, Goodman, Lowry, Zaro, & Kettel Kahn, 2009). In communities, recreation facilities and parks provide an opportunity for physical activity, but when not available, limit opportunities to engage an active lifestyle.

Affordability

Cost has been a prohibitive factor in healthy living, especially as it relates to diet choices and physical activity, increasing health inequality. In terms of diet, there is a cost disparity between nutrient-rich foods and less healthy food options (Monsivais, McLain, & Drewnoski, 2010). Grains, added sugars, and added fats are inexpensive, good-tasting, and convenient. Their consumption has been linked to lower quality diets and lower diet costs. Physical activity opportunities may also come with a cost which can present a barrier toward the active living lifestyle. Fitness center memberships and recreation fees can be prohibitive to participation.

Accessibility

While a healthy choice may be available, is it accessible to everyone? The term “accessible” is broad, but in this document the term will focus on the ability to get to destinations via

transportation. Community design and the built environment can foster walkable and bikable destinations. This not only allows for transportation alternatives but the ability to walk and bike to places provide an opportunity itself for physical activity. Distance to playgrounds and parks has been associated with their use.

Mixed-used community design that combines residential, commercial and institutional uses has been recommended to increase opportunities for physical activity (Keener et al., 2009). This allows for walkability and use of transit. Regular transit use is associated with higher physical activity (Saelens, Vernez Moudon, Kang, Hurvitz, & Zhou, 2014). Public transit provides accessibility opportunities especially for the elderly, low-income and those with disabilities. As it relates to healthy eating and physical activity, public transit that connects residential to grocery and farmers’ markets increases access to healthy food. In rural areas, often public transit is limited, but there is a desire for improved transportation systems to recreation places (Moore et al., 2010).

Appealing

Appealing in this context is an umbrella term that identifies other factors which contribute to engaging in healthy behaviors. There are many factors that contribute to appeal including safety, addressing stigma and cultural-sensitivity. Community safety, whether perceived or real, has been associated to impact physical activity. While we want to promote more green space, parks and playgrounds, it is important to identify safe, convenient and comfortable strategies in the context of neighborhoods and communities (Bennett et al., 2007).



Figure 5. Four categories of influential factors on behavioral choices



The Ohio State University North Residential District Transformation - Project Designed by HKS

Stigma presents a barrier for eligible individuals to participating in the USDA's Supplemental Nutrition Assistance Program (SNAP). For example, students understand that participation is income based and that low-income and poverty are associated with feelings of shame and embarrassment (Stein, 2008). These feelings may prevent students from participating since peers recognize a social order and hiding their status is preferred. There are several strategies to reduce stigma or eliminate identification in participating in these programs, including avoiding separate lines between competitive foods and food programs and implementing a cashless system for all students (Centers for Disease Control and Prevention – Division of Community Health, 2013). For adults, a cashless point-of-sale system at farmer's markets accepting SNAP, such as the use of tokens for all purchases for everyone, reduces identification of those participating in SNAP.

Whether it is age, race, ethnicity, or disability, factoring cultural sensitivity can facilitate healthy behaviors. For example, social networks of common demographics, especially among minority populations are known enablers to physical activity (Eyler et al., 1998). There are no uniform criteria for culturally-appropriate interventions to support healthy behaviors (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2002). Instead, **it is important to explore and understand culturally-appropriate characteristics in the context of behavior in a community that will be appealing to population groups.**

Campus Settings

Many American campuses and surrounding communities are live-work-play environments where students spend a significant portion of daily life. The socio-ecological model clearly outlines the potential role of the campus settings in influencing healthy behaviors. Research suggests that various environmental attributes on campus can increase physical activity. A majority of the literature is focused on urban dwellers in developed societies, where people spend 90% of their time indoors including time in transportation (European Union, 2003; US EPA, 1989). Active transport options—for example, walk, bike, public transportation vs. driving—are particularly beneficial to cardiovascular health among other health outcomes; yet,

urban planning and community design have been favoring automobile traffic over walking or biking (Wilkinson, Eddy, MacFadden, & Burgess, 2002). A sample of thirteen American university campuses indicated bike rack availability is below 20% (Horacek et al., 2014). Adequate sidewalk and crosswalks, bike lanes, lighting, traffic signals, and signage contribute to the degree of perceived safety that can influence transport modal selection (Fraser & Lock, 2010; Lockett, Willis, & Edwards, 2005; Painter, 1996; Pikora, Giles-Corti, Bull, Jamrozik, & Donovan, 2003; Project For Public Spaces, 2009; Pucher, Dill, & Handy, 2010; Rodriguez & Joo, 2004) contribute to the degree of perceived safety that can influence transport modal selection, especially among women (Reed & Ainsworth, 2007). Denser street structures and mixed-use development are among salient contributors in non-motorized transport selection, and the presence of bike lanes are particularly important for those who consider bike-commuting (Heinen, van Wee, & Maat, 2010). In addition to transport, accessibility and quality of recreational facilities and services/programs on campus are important aspects to consider when designing with the intention of increasing active living among college students (Reed & Phillips, 2005). Significant percentages of college students, particularly among freshman, were not aware of campus recreation facilities in their university (Reed, 2007). In addition to availability, better access to such recreational facilities from home is linked to reduced obesity and overweight (Sallis & Glanz, 2009). Lastly, features contributing to appeal include parks and greenery, natural light, limited pollution, street maintenance, and a diversity of well-designed architecture and landscaping elements (Pikora et al., 2003). Contact with nature has proven beneficial to physical, mental and social well-being (Hartig, Mitchell, Vries, & Frumkin, 2014).

While a majority of the discussion has been around physical activity linked to obesity, there is also some narrative around diet and nutrition that bears mention. For example, the presence of a grocery store near residence has been associated with lower neighborhood obesity rates (Morland, Roux, & Wing, 2006). People living in communities with greater availability of fresh food likely have healthier diet (Sallis & Glanz, 2009). Eating behaviors are vital to student health due to strong associations between diet and weight gain (Center for Disease Control, 2016). For students, “on the go,” food choice is likely selected based on cost and



Need for More Research

In fact, types of residency for students have notable implications for student health behaviors and outcomes. Students’ classification/year (freshmen, sophomore, junior, senior, graduate/professional school) and proximity to health resources have also been associated with health decision outcomes (Reed & Phillips, 2005). Housing may also be a contributing factor to weight gain because students residing on campus have been proven to gain more weight than those off-campus studies show that living in residence halls with on-site dining halls improved males’ dietary quality, but stimulated weight gain for females (Brunt & Rhee, 2008; Nelson & Story, 2009; Pliner & Saunders, 2008); this gender difference is potentially due to the social norms driving health decisions discussed previously.

There are many factors with weight gain among college students. These include changes in eating patterns, such as emotional eating and increased consumption of low nutrient value foods and alcohol. In addition, there is increased sedentary behavior and less occupational, recreation, and leisure physical activity. (Crombie, Ilich, Dutton, Pantan, & Abood, 2009). Students starting college must adapt to their new environment. These adaptations may influence change in eating habits. For example, those living on campus are more likely to eat in the dining halls where the buffet style dining increases the likelihood of increased calorie consumption. In addition, the stress and change in social support contribute to behaviors that may not be as healthy, such as increased alcohol consumption or emotional eating. These eating patterns tend to increase caloric intake, thus increase in weight gain. Similarly, adapting to living in a college environment influences change in physical activity patterns. In the transition to adulthood, there is a decrease

in physical activity and increase in inactivity, or sedentary behavior, such as computer use. However, the level of physical activity change has not been associated with weight gain, but rather the increase in caloric input. At a more micro scale, research suggests that large portions and multiple helpings are common barriers to weight control for students (Greaney et al., 2009). The implications for the common buffet-style dining on portion control are significant. Some schools mandate on-campus residents to purchase meal plans, which may consist of unhealthy options such as “all-you-can-eat” style dining environments.

Research has been primarily at two ends of the spectrum—at the macro policy and urban planning scale, and at the micro (information design and product scale). There is, in fact, very little on interior design and architecture related to issues of healthy eating and physical activity. A gap remains—in terms of 1) the order of magnitude where systemic solutions are not proposed across a design continuum (from information and product design- all the way to the urban design and planning of the campus and neighborhoods), and 2) in the overlap of physical environment and human experience in decision making. In many ways, this study focuses on the “tipping point” defined in the dictionary as “the point at which a series of small changes or incidents becomes significant enough to cause a larger, more important change”.

So, what is the tipping point for students to make a healthy decision? This is what we are calling the point-of-decision design, and we address this point-of-decision as a systemic environmental design challenge along a design continuum ranging from information, product, interior design, architecture, to urban realm.



Figure 6. The Design Continuum



Ideation Session at HKS

Research Question

How can design influence college student health choices by targeting the critical *points-of-decision*?

Project Objectives

- To understand the chronic problem of obesity on college campuses and the link to diet and activity decisions
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- To develop a research concept for future research bringing together the fields of public health and architecture around *point-of-decision design*

Methods

A preliminary scan of the literature was conducted to compile and assess previous design strategies utilized in health-targeting college campuses and explore any research linking design to decision making amongst students. Following an extensive review of the literature, including industry and peer-reviewed academic publications, prevalent design strategies were summarized and synthesized into the Ecological Model [Figures 4 & 5]. A design continuum (Figure 6) was developed to capture research supported strategies along different scales of design. Based on insights from the literature review, it was determined that there is insufficient knowledge on point-of-decision design on college campuses, accordingly, a cross-disciplinary Ideation Session was arranged, inviting 36 participants from all over the US, including: campus facilities planners, architects, designers, public health and student health experts, and undergraduate and graduate students. The basis of the Ideation Session was to discuss critical points-of-decision on college campuses and deliberate upon design strategies at these PODs that can promote healthy choices. The full-day charrette formatted session included discussion, a persona exercise, and a campus planning exercise. A follow-up survey was sent to all attendees to clarify themes emergent from the session.

Ideation Session

Attendees




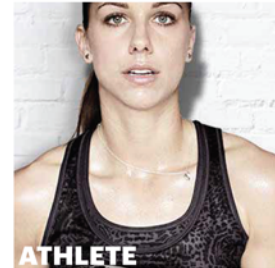








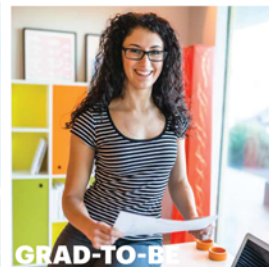
Thirty-six participants joined the session, including seven campus facilities planners/architects in US higher education institutions, eleven architects and designers, five design researchers, three in public health or university health services, two from industry sponsors, and six undergraduate or graduate students. Four from the organizers volunteered to be moderators aiding activities while participating in the session. [See Acknowledgements for list of attendees.]

Agenda

The Ideation Session was planned as a full day charrette from 11 AM to 4:00 PM. Two groups were created: “Move by Design” and “Diet by Design”, with 8-12 attendees in each group. Two tables were created for each group with one facilitator. Two hands-on activities were included: 1) a persona exercise and 2) a campus planning activity. The agenda was as follows:

- Welcome and introduction of session organizers (15min)
- Introduction of the session and context (1hr 45min)
- A summary of literature review during lunch (30min)
- Assign groups to “Diet by design” or “Move by design” (10min)
- Persona exercise (pairs) throughout a day identifying where decisions and actions of diet or movement occur; Translate the results to design strategies (1hr 45 min)
- Office tour and coffee break (20min)
- Campus planning exercise promoting healthy diet or move choices (1hr 45min)
- Open discussion + Voting (1hr)
- Closing Notes

Table 2. Personas used for the journey maps

 MOMMY	 WORKAHOLIC	 DESIGNER	 ATHLETE	
A full-time student and single mom with a toddler. Time strain because of the baby; only go to campus when I have class.	Full-time day-time job; classes at night. 5 hours of sleep on a good night.	Prefer space I can roam and flexibility in social interaction. Instant decision making, rather than pre-planned.	On a strict training schaedule for being on the school soccer team. Eat a lot after games but normally healthy meals to stay in shape.	
 SLEEPYHEAD	 PARAPLEGIC	 BELIEVER	 NEW KID	 CONSUMER
Daily video games and movie watching. Keep some food from the campus convenience store in my room	A wheelchair user. Some of the food locations on campus get too crowded. Like to go to the dining halls best with my friends because there is a variety of food and tables.	Try to avoid the corners and locations where people yell out political propaganda to avoid criticism. Eat most of my meals at the dining hall for its large variety of foods to choose for vegetarians.	Freshman. Dorm and a meal plan. Gym a few times a week + ride my bike everywhere.	College junior, gained 60 lbs. in college. Never learned how to cook and there's no kitchen in my dorm. Always resort to the fast food on campus. I don't really like to exercise because people judge me.
 GENERATION X	 ALL-NIGHTER	 INTERNATIONAL	 GRAD-TO-BE	
Working professional, back to school, to finish a college degree. Half my classes on campus and half online. I cook, eat, and sleep at home with my family, and I exercise every afternoon at the local YMCA.	Procrastinator; sleepless nights toward the end of the semester. During end of semester, fast food and a lot of coffee to stay awake.	Second year in the American university language and cultural barriers. Many Korean restaurants and people around campus. No car.	A senior working part-time internship due to less course load Internship 20 minutes away from class. Live in a nearby apartment with two roommates. Try to pack my food for the day in the morning.	

Results

Persona Exercise and Journey Mapping

Seven personas were selected for “Move by design” and eight for “Diet by design”. Among them, two personas, Believer and Handicap, were chosen both in “Move by design” and “Diet by design”, and one pair created a persona. Table 2 shows the personals selected/ created by the teams. Fifteen scenarios were generated during this exercise.

Insights from journey maps were then translated visually to a “node” graphic annotating key points-of-decision and key destinations. Twenty-one points-of-decision (POD) were identified for each “Move by design” and “Diet by design”. Five of “Move by design” PODs and nine of “Diet by design” PODs did not get any votes. Due to the open-end nature of this exercise, several PODs were the same or similar. If the words were the same or equivalent—such as home and house—they were combined. However, if they

could be interpreted in different ways—for example, [on the] bus and [at the] bus stop—they were counted separately. Smartphone/ phone-social-media was ranked as the top POD for both “Move by design” and “Diet by design” [Table 3]. Several other PODs—home, dorm room, bed/dorm bed, car, dining hall, and classroom—were ranked both in “Move by design” and “Diet by design”. Some PODs are places (e.g. home) while others are transit (car or path). It is not surprising that online resources are influential in daily decision making, especially if the decision makers are millennials. However, in most cases, the participants were not able to connect such online resources (e.g. smartphone or social media) to physical locations where students would look up relevant information. A spreadsheet based analysis was conducted by the research team to identify key points-of-decision, and destinations, for the students. A 4 step process for determining PODs was developed and is shown in figure 8.

Table 3. Key points-of-decision (PODs) identified and rated by the ideation session participants

Move	Votes	Diet	Votes
Smartphone	9	Phone-social media	9
Path	8	Dorm room	7
Home	6	Stairs	6
Dining/ Dining hall	5	Dining hall	4
Courtyard	4	Buffet line. Food station	3
Corridor	3	Vending machine	3
Rec. center	3	Home/car	2
Bed	3	Bike rack (outside gym)	1
Car	3	Classroom	1
Classroom	2	Dorm bed	1
Parking	2	Library	1
Public space	2	Vending machine (near classroom)	1
At night at my work, workstation with my computer	1		
Online	1		
Fast food restaurant	1		

Design Strategies

Following the persona exercise, the groups were asked to consider design strategies that could be effective in prompting healthier choices at points-of-decision and all participants voted on these. The data from these votes, written on sticky-notes, was also analyzed and transferred to a spreadsheet. The session generated 103 strategies for “Move by design” and 83 for “Diet by design”; and the strategies received 53 and 39 votes, respectively. Among the strategies, top 20 were included in Table 4. Unlike PODs (point of decisions), none of the top strategies were suggested for both “Move by design” and “Diet by design”. Some of the strategies were not specific enough. For example, ‘wayfinding,’ which got three votes, is very general—but was a recurring theme. Most strategies are consistent with previous studies; and there are

a few new items that no related studies have been identified. For example, communal kitchen has been examined in mainly co-housing contexts but not in college settings. The idea of a “learning kitchen”- where students can not only cook, but learn to cook, was a creative idea that received a lot of votes. Figure 10 summarizes the top 20 design strategies that emerged from the two groups.

In the campus planning exercise, teams had an opportunity to apply these design strategies to key points-of-decision. Because this exercise was a “tabula rasa” or blank slate exercise- there were no constraints of space and scale. The solutions that emerged were interestingly convergent in some core concepts with some new ideas that emerged are summarized in Table 1.

POINT OF DECISION DESIGN

#1 KNOW YOUR STUDENTS

Who is making decisions? Identify user personas and key destination points through campus-wide surveys, interviews and first-hand observations to understand personalities and cultures.

#2 LOCATE STUDENT POINTS OF DECISION

Where are students making decisions? Use your students personas to create journey maps and mark out the most popular and most influential points of decision.

#3 IDENTIFY INFLUENTIAL FACTORS

Which factors can influence their decisions? Identify influential factors at each point of decision based on student feedback, and identify which factors fall under campus setting (design) or predisposing factors (control).

#4 DEFINE YOUR DESIGN STRATEGIES

How can we design across scales to prompt a healthy decision? Use the visual design guide and other resources (critical links document) to apply design strategies to campus setting factors at each point of decision.

Figure 9. 4 Steps to Point of Decision Design

Table 4. Key strategies for Move and Diet based on the Ideation Session

Item	Strategies	Move	Diet
1	Communal kitchen		18
2	Food choices-easy and culture related		14
3	Recharge zones, mind, body, spirit!	12	
4	Hydration station (2)		11
5	Bike parking		10
6	Flex space for farmers' market/ food vendors		10
7	Pedestrian spine	10	
8	Central green space to serve as a farmer's market		9
9	Increase visibility of choices	9	
10	Mixed use building		8
11	Seating integrated with landscape	8	
12	Social spine	8	
13	Lighting strategies	7	
14	Natural lighting	7	
15	Kitchen is a training? Part of the curriculum		6
16	Learning kitchen		6
17	Tree-lined walkways	6	
18	Design of transition spaces	5	
19	Green roofs	5	
20	Make it "cool"		5



Figure 10. 20 Design Strategies



Ideation Session at HKS

Feedback to Ideation Session

A survey was sent to Ideation Session attendees after the event. Forty-four percent of the participants (16 out of 36) completed the survey. The participants indicated they understood the objective of the ideation session (73.33% agree or strongly agree); the impact of built environment on obesity (93.33% agree or strongly agree); and the impact on student health and academic performance (80% agree or strongly agree). All of the respondents agreed or strongly agreed with the relevance of the points-of-decision to campus design. Eighty percent of them reported they felt they had contributed to the persona and journey map exercise, and the equivalent responses for the campus master plan activity. When asked about their most satisfying aspect of the session, the top answer was the cross-disciplinary nature, followed by hands-on activities such as the persona exercise or campus planning activity. Conversely, the divergent backgrounds may slow progress from an interdisciplinary team, as several pointed out limited time. While one survey participant responded, "Fun to start with a blank state," another suggested emailing out some materials in advance.

Respondents were asked to share three key takeaways from the session. Forty-seven items were generated, and they were mostly positive. Many selected the importance of environmental design around students' health. Some suggested the importance of walkability and natural elements on campus while others indicated the needs for greater availability and affordability of healthy diet choices.

Responses mentioned a paradigm shift in education institutes including the criteria of selecting food suppliers on campus. There were suggestions regarding mobile technologies and virtual environments in research and planning. Lastly, the participants indicated they would appreciate the design guidelines and the literature review as deliverables of the session. A set of visual design guidelines was provided in this report.

In analyzing the feedback of the participants, we see the 4 A's theme consistently emerge, validating the influence of availability, affordability, accessibility and appeal on health decisions.

Some key quotes about the Ideation Session are shared below:

"WIN-WIN SOLUTIONS SUCH AS OFFERING COOKING CLASSES FOR STUDENTS WHERE THEY PREPARE THEIR OWN MEALS ARE SEVERELY LACKING ON CAMPUSES. SUCH PROGRAMS CAN EDUCATE STUDENTS ON HEALTHY EATING HABITS AND SAVING MONEY WHILE FEEDING THEM."

"NOT A 'ONE SHOE FITS ALL' - COMPLEX PROCESS TO GET TO AN OPTIMAL STATE CONSIDERING MANY 'PERSONALITIES' - THERE IS UNLIKELY TO BE A SINGLE PERFECT DESIGN SOLUTION. ... GETTING INSIDE THE HEAD(S) OF CAMPUS USERS IS CRITICAL TO CREATE THE MOST VALUED ENVIRONMENT."

"STUDENTS COULD DEFINITELY MAKE BETTER DIET CHOICES IF THERE WERE HEALTHIER OPTIONS AT AT REASONABLE PRICES. THE MAJORITY OF STUDENTS EAT WHAT IS CHEPA AND FAST SO THIS HAS TO BE A TOP PRIORITY IN DIET."

"THE CHALLENGE IS WITH ASSUMED STANDARDS OR BEST PRACTICES THAT GET ROLLED OUT COOKIE CUTTER STYLE TO PROJECTS AS 'SOLUTIONS' WITHOUT CONSIDERING THE LARGER CONTEXT OF THE USER POPULATION AND THE ENVIRONMENT OF THE SITE."

"GPS/LOCATION AND INFORMATION-BASED TECHNOLOGY SOLUTIONS ARE WOEFULLY UNDERUTILIZED AS A MEANS OF FACILITATING SOLUTIONS. SINCE MOST STUDENTS LIVE AND DIE BY THEIR SMARTPHONE BEING IN THEIR PRESENCE, WHY NOT LEVERAGE THAT MORE? WE'RE MISSING MAJOR OPPORTUNITIES HERE."



The Ohio State University North Residential District Transformation - Project Designed by HKS

Visual Design Guide Generation

Insights from the literature review and ideation session deliverables were analyzed and synthesized into a summary “visual design guide” document to serve as a “how to” for point-of-decision design. The Guide has three parts. Part 1 makes the case for point-of-decision design by analyzing the choice conundrum that students must navigate in their daily lives. Part 2 dictates a 4-step process for planners and policy makers to implement design strategies at points-of-decision. Part 3 illustrates point-of-decision design based on insights from the Ideation Session and Literature Review.

<https://tinyurl.com/VisualDesignGuide>

Summary Findings

- 1. Current literature on designing healthy campuses is more biased towards movement and physical activity, than diet. A gap exists that is an opportunity for future design research.
- 2. Using design for better decision-making is not a very well understood construct. Literature focuses on how a healthy context can be created, but not as much on how design can be a catalyst for a healthier decision.
- 3. Current thinking on healthy colleges focuses on urban design and campus planning strategies, whereas our findings show that decisions about activity/ diet could be made by students before ever stepping into campus. Leveraging technology/ smartphones as part of the design solution is imperative.
- 4. Point-of-decision is a person-centric- not a place-centric, construct across settings. Understanding diverse user personas and mapping their journeys can aid in determining

points of decision. Key points of decision emergent from this literature review include: the smartphone, path, home, dining facility, courtyard, bed, car, corridor, recreation

center, classroom, parking location, public space, workstation and online.

5. Behavioral decisions students make are often influenced by a range of factors; such factors can be sorted into 4 key constructs: Availability, Access, Affordability, and Appeal.

6. Design strategies to address a person-centered framework that can respond to a myriad of dynamic influences must be considered along a design continuum ranging from information and product design to interior, architecture and urban design. Some strategies emergent from the lit review and ideation include: farmers’ markets, communal kitchens, healthy food offerings and placement, hydration stations, recharge zones, open flex spaces, mixed use buildings, lighting strategies, street trees, bike parking systems, and street furnishings.

Limitations and Next Steps

This research project had a relatively small scope, limited by an insufficient library of literature and a one-time ideation session funded by a seed grant. Although the Ideation Session was more cross-disciplinary than many others, a few disciplines such as product design and behavioral economics can be included for more comprehensive future sessions. Additionally, more empirical research on student decision making, the role of the environment in these decisions, and robust case studies are needed at a much larger scale if we are to change our thinking about design as not only a latent context, but an active trigger, in changing health across our college communities.

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