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A Quasi-Systematic Review on Effectiveness of Social and Cultural Sustainability Practices in Built Environment

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***Abstract*—**With the advancement of knowledge about the utility and impact of sustainability, its feasibility has been explored into different walks of life. Scientists, however; have established their knowledge in four areas viz environmental, economic, social and cultural, popularly termed as four pillars of sustainability. Aspects of environmental and economic sustainability have been rigorously researched and practiced and huge volume of strong evidence of effectiveness has been founded for these two sub-areas. For the social and cultural aspects of sustainability, dependable evidence of effectiveness is still to be instituted as the researchers and practitioners are developing and experimenting methods across the globe. Therefore, the present research aimed to identify globally used practices of social and cultural sustainability and through evidence synthesis assess their outcomes to determine the effectiveness of those practices. A PICO format steered the methodology which included all populations, popular sustainability practices including walkability/cycle tracks, social/recreational spaces, privacy, health & human services and barrier free built environment, comparators included 'Before' and 'After', 'With' and 'Without', 'More' and 'Less' and outcomes included Social well-being, cultural co-existence, quality of life, ethics and morality, social capital, sense of place, education, health, recreation and leisure, and holistic development. Search of literature included major electronic databases, search websites, organizational resources, directory of open access journals and subscribed journals. Grey literature, however, was not included. Inclusion criteria filtered studies on the basis of research designs such as total randomization, quasi-randomization, cluster randomization, observational or single studies and certain types of analysis. Studies with combined outcomes were considered but studies focusing only on environmental and/or economic outcomes were rejected. Data extraction, critical appraisal and evidence synthesis was carried out using customized tabulation, reference manager and CASP tool. Partial meta-analysis was carried out and calculation of pooled effects and forest plotting were done. As many as 13 studies finally included for final synthesis explained the impact of targeted practices on health, behavioural and social dimensions. Objectivity in the measurement of health outcomes facilitated quantitative synthesis of studies which highlighted the impact of sustainability methods on physical activity, Body Mass Index, perinatal outcomes and child health. Studies synthesized qualitatively (and also quantitatively) showed outcomes such as routines, family relations, citizenship, trust in relationships, social inclusion, neighbourhood social capital, wellbeing, habitability and family's social processes. The synthesized evidence indicates slight effectiveness and efficacy of social and cultural sustainability on the targeted outcomes. Further synthesis revealed that such results of this study are due weak research designs and disintegrated implementations. If architects and other practitioners deliver their interventions in collaboration with research bodies and policy makers, a stronger evidence-base in this area could be generated.

***Keywords*—**Built environment, cultural sustainability, social sustainability, sustainable architecture.

I. Introduction

THE issue of sustainability has been a part of major discourses since last few decades in the academia. Being a major contributor of consumption of energy resources, built environment has become more significant for sustainable development [1]. United Nations General Assembly, on the basis of scientific inputs, affirmed that there are three components of sustainable development i.e. Environmental, Social and economic; the proposition was supported well [2]. Subsequent work however moves further to propose culture as a fourth pillar of sustainability [3], [4] while others consider it to be an inseparable part of social sustainability [5]. Researchers reveal that these components of sustainability are intertwined and may not be segregated because of their mutual or common outcomes and manifestations [6], [7]. Until now, however, the approach towards defining the role of culture in sustainable development is quite new and it can be postulated that a real discourse on this issue is taking a shape [8]. While a connection between culture and sustainability is under exploration, a body of research is confirmed about it and their focus is on culture as a distinguished aspect from social sustainability [9]-[11]. The objective outcomes by far have confirmed the contribution of environmental aspects to the field of sustainability in built environment [9]. Although the debate of culture being as a separate component is still on [8] but the socio-cultural aspects contribute significantly along with environmental and economical sustainability in a built environment [12].

Findings representing different cultures and geographies across the globe indicate the dynamic existence of social and cultural sustainability in their respective built environments [13]. There are however varying forms and efficacies of social and cultural sustainability in built environment [14]. In some cases it is knotted exclusively to certain local contexts such as responsiveness to social needs, responsiveness to cultural values, quality of life, adaptability, safety, security, participation, and accessibility for a better and harmonious living rather than being a global phenomenon [15], [16]. In other cases, however, it is perceived to be a technology driven,

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replicable lifestyle in a built environment [17]. Certain researchers go on to claim the need of socio-cultural sustainability in shaping government policies while considering certain subtle, intangible aspects e.g. values, customs and quality of life in developing a meaningful environment for present and future generations [3]. Most of the researchers in general follow a cautious approach to claim social and cultural sustainability as established objective variables. They have however used persuasive tools to study these variables and synthesized factors such as contribution of shared values, perception and attitudes to sustainable development, sustainability of culture itself, culture as a critical component of development, cultural development within ecological capacity and socio-cultural values as integrating factors of spatial, social and ritual perspectives. [18]-[21].

Social and Cultural sustainability explore the means to improve human wellbeing which in turn establish practical legacies to govern the attitude of people towards energy resources and sustainable living. In the wake of the fact that the continuity of the present degenerative attitude towards scarce natural resources which might give tough times to the future generations [22], practitioners have lately been intervening their built environments with the aspects of social and cultural sustainability. The status today however does not look sustainable in the long term, but alternative and innovative strategies are taking shape which knowingly or unwittingly contain the aspects of socio-cultural sustainability [23], [24] whether tangible or intangible [25]. The current study follows a quasi-systematic review method, in order to identify those aspects of socio-cultural sustainability delivered in built environment either planned or unplanned and draw out their clear independent effect in the society.

II. Description of the Intervention

Living in built environment while following the aspects of social and cultural sustainability (whether planned or unplanned) plays an important support role in maintaining social well-being, cultural co-existence, quality of life, sustainable environmental behaviour, social capital, creativity, innovation, recreation and leisure, liveability, social and cultural vitality and holistic development [3], [26]. A built environment custom built to promote or facilitate the practice of social and cultural sustainability works as an intervention in this direction. For example, a housing system which ushers the inhabitants to interact, cooperate, congregate and move around is promoting socio-cultural exchanges and physical fitness is termed as intervention [20]. Such interventions help to realize the intended outcomes effective at larger scales in the society.

III. How the Intervention Might Work

Social and cultural sustainability interventions can be used to: enhance self-efficacy (e.g. development of neighbourhood watch area, cooperative/commune living); provide a form of social support (from neighbourhood); healthy living (development of walking paths and Yoga parks); or establish social networks (support groups, neighbour networks). By increasing self-efficacy [27], [28] and providing support mechanisms [29], [30] these interventions may influence health behaviours and enhanced family-management. Likewise, construction of places for social interaction enhance the opportunities to exchange of cultural learning, getting closer to each other, development of mutual understanding and care, enhanced psycho-social support that contributes to the indicators of social and cultural sustainability.

IV. Why It is Important to Do This Review

Although there is ample evidence on the use and effectiveness of environmental sustainability and also economic sustainability methods in various aspects of life and sustainable living, answers to questions regarding the implementation of social and cultural sustainability practices in socio-cultural harmony, healthcare and wellbeing, are unclear. Given the topical nature of the subject, we conducted this review to identify answers to these questions and propose directions for future research and practices.

The overall goal of this systematic review is to identify interventional or practice studies utilizing characteristics of social and cultural sustainability methods specifically in built environment to disentangle their independent or interactive effects on individual outcomes depicting socio-cultural sustainability. Therefore, the primary research question is, “What is the impact of implementing social and cultural sustainability practices in built environment on social, cultural and health outcomes?" Secondary, the review summarizes knowledge on interactions between social and cultural sustainability practices, the built environment and the individual.

V. Methods

A. Criteria for Considering Studies for This Review

Types of studies: We included randomised controlled trials (RCTs), quasi-randomised controlled trials (QRCTs), controlled before and after studies (CBAs), and interrupted time series (ITS) with at least three time points before and after the intervention. We define QRCT as a controlled trial in which the participant allocation is not truly random, such as allocation by date of birth or the order in which participants are included in the study. We included QRCT, CBA and ITS designs because our initial literature searching suggested that only a small number of RCTs on social and cultural sustainability interventions exist.

Types of participants: We included all study participants regardless of age, gender and ethnicity. We included studies in all settings, such as rural communities practicing traditional living at village, district and national level in developing countries. We also included social sub-groups, ethnic communities/tribes and urban settings with modern built environment etc. We did not exclude studies according to the type of intervention providers or builders.

Types of interventions: We included interventions (but not limited to) art, creativity, lifestyle media access,

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walkability/cycle tracks, social/recreational spaces, privacy, improved ventilation, improved interaction of socio-economic classes, cultural & educational institutions, health & human services, barrier free built environment.

Types of Comparisons: We considered 'Before' and 'After', 'With' and 'Without', 'More' and 'Less' interventions as comparisons.

Outcomes: We considered outcomes of social and cultural sustainability such as social well-being, cultural co-existence, quality of life, ethics and morality, sustainable environmental behaviour, social capital, creativity, innovation, sense of place, education, health, development of arts, heritage and history, recreation and leisure, likeability, social and cultural vitality and holistic development.

B. Inclusion/Exclusion Criteria

Intervention studies which followed the designs of total randomization, quasi-randomization, cluster randomization, observational or single studies focusing the outcomes directly or indirectly were used. Considered methods also included econometric analyses, post-investment appraisal reports, technical assessments (e.g. economic/engineering/financial institutions), case studies, sector analysis reports which may or may not depend on cost-benefit analysis, Simultaneous Equation Model, Quantile Regression, Ordinary Least Squares, Generalized Method of Moments, and Principal Components. Researches which studied the targeted outcomes in combination of other outcomes were also included. We excluded papers which studied only economic and environmental outcomes.

VI. Identification of Potential Studies

Search strategy: Four categories of electronic resources were systematically searched with terms for title and abstract screening. First category involved major databases such as ISI Web of Knowledge, SCOPUS ScienceDirect, EBSCO Greenfiles, CINAHL, PubMed, PsycINFO, and Web of Science, second category involved search websites such as google and google scholar, third category involved organizational resources such as CSA Natural Sciences Document Repository, Asian Development Bank (ADB) African Development bank (AfDB), Overseas Development Institute and CEE, fourth category involved directory of open access journals and subscribed journals performing hand searches of key academic journals to capture recently published articles that were not found in database searches. Sources of grey literature were not explored.

VII. Screening of Studies

Applying inclusion and exclusion criteria: The inclusion and exclusion criteria described in the methodology was applied initially to the titles and abstracts of the collected papers. This initial phase of exclusion was conducted conservatively to eliminate only studies that were clearly irrelevant to our review based on examining their title and the abstract. If (i) a study clearly fulfilled our initial inclusion criteria, meaning that we were not able to exclude the paper based on the exclusion criteria, or (ii) more information was needed to make a decision, then the paper was cross-examined and discussed between reviewers. Therefore, if the title and abstract did not provide sufficient information, then the study was not excluded during this initial phase, rather the paper was considered for the next round of applying the exclusion criteria. If the study clearly did not fulfill our inclusion criteria, meaning that it was found to have a characteristic listed in our exclusion criteria, then the paper was not cross-examined and it was marked as excluded from the review. During the next phase, we further examined the 'included' studies if their interventions and their delivery still met our inclusion criteria. At this point, abstracts for several papers were located and a multitude of studies were further excluded based purely on their abstracts – as in the previous step. The remaining papers were reviewed to determine if they would meet the inclusion criteria. This often occurred in several conservative steps. After an initial review of the paper, those that were clearly in violation of inclusion criteria were eliminated and those (i) that appeared to adhere to the inclusion criteria, or (ii) for which additional information was needed (i.e. a more-detailed review of the article, or discussion by the review team) were marked as "included". Beyond indicating the reason for their exclusion, an additional note was made to further clarify the reason for exclusion.

Typifying "included" studies: After the exclusion process, the remaining "included" studies were coded in order to simplify the synthesis of review findings. The papers were coded into six main categories of study characteristics: (i) researcher and reference details, (ii) programme details (objectives and aims), (iii) study methods and quality of methodology, (iv) participants, (v) study context, and (vi) outcomes. The first category, researcher and reference details provide a description of the organisations and institutions involved with the implementation of the programme and its evaluation. Beyond simple information gathering, knowing the type of publication and the individuals or organisations involved with the study gives us an idea of possible publishing or reporting biases. We collect this information to ensure that these possible biases are acknowledged and addressed. The second characterisation category, programme details provides a description of the intervention i.e. development of a built environment along with components of social and cultural sustainability. This explains the logic or theory of change behind the implemented intervention. Descriptions of the causal mechanisms through which the programme was intended to promote socio-cultural sustainability and the roles of the context and the built environment in implementing the intervention are helpful in understanding the difference between an ineffective built environment and one that had poor effect. Furthermore, the intervention details indicate the built environment's cost-effectiveness and whether any circumstances were particularly helpful or harmful to its implementation or success. Next, it was important to examine the study methods and quality of their identification strateg in order to ascertain that the included studies were consistent with our requirements. In this section of the characterisation

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process, we rigorously evaluated the methodology and identification strategy used to determine whether the intervention in question was successful. Special attention was also given to the identification of any possible biases that could cause a misinterpretation of results. We often were faced with interventions i.e. built environments which had components of social and cultural sustainability along with other components or factors. In such situations, we did not exclude the studies but tried to separate the exclusive effect of socio-cultural sustainability out of the entire picture of the research. Overall, this characterization section helped to inform the usefulness of the study's outcomes in drawing conclusions or policy recommendations. Information collected on participant and study context allowed the reviewers to consider situations (e.g. social, economic, political and geographical) where the implemented strategies may not be effective or appropriate. Demographic information also indicates whether the intervention actually served the intended population and the surrounding ecology. The final category, outcomes, includes information on the findings and effectiveness of the intervention in question. This is helpful to arrive on the conclusion about the factors that could contribute to a successful realization of social and cultural sustainability.

Quality assurance process: Our search process was comprehensive, transparent, unbiased in scope & implementation and quality controls were put into place. The coders independently applied the inclusion and exclusion criteria to the randomly selected studies and compared their results to make sure that they were all in agreement on the process of applying the criteria. Both the reviewers independently applied the exclusion criteria to the selected studies. In case of disagreement, the studies were discussed again to level out any difference. Similar quality assurance procedures were followed when typifying the included studies. After this, the studies qualified to be included and analysed.

TABLE I
WHY THE REVIEW IS QUASI-SYSTEMATIC?

1.	Has the protocol of the systematic review been registered?	No
2.	Has the protocol of the systematic review been developed?	Yes
3.	Has the protocol been registered and published?	No
4.	Did reviewers used a double-abstraction process and corrected differences?	Yes
5.	Were the data extractors blinded to authors, institutions, and journals?	No
6.	Were core and specialized bibliographic databases searched	Yes
7.	Was hand searching of major journals done	Yes
8.	Was grey literature searched	No
9.	Was the log of excluded studies kept? with reasons for exclusions.	Yes
10.	Was an approved tool used to do critical appraisal of the included studies?	Yes
11.	Was a guideline followed to write the report	Yes
12.	Was a quantitative assessment of risk of bias done?	No
13.	Was meta-analysis performed?	Yes
14.	Did all variables from all included studies formed the meta-analysis?	No

Included studies were described in table-II specifying outcome, country, considered factors of built environment and identified components of social and cultural sustainability, and other related outcomes. In a qualitative analysis independent and interactive effects of the built environment and social cultural sustainability towards the related outcomes were visualized. All variables with a p-value <0.05 in the study reported as statistically significant. Quantitative data was extracted to conduct meta-analysis. Since the data could be extracted in partial form therefore a partial meta-analysis was carried out. No quantitative assessment for risk of bias in individual studies was performed. However, in each study sample size, number of observations per built environment was checked.

VIII. RESULTS

After removing of duplicates 236 records were taken into account for abstract screening. 215 records were excluded based on abstracts and titles. There was a disagreement on 3 studies between the two independent reviewers. 18 records were included into full text analysis, and 13 studies finally met all inclusion criteria. These studies were considered for quantitative and qualitative analysis.

Description of studies: Seven of the included studies had followed cross-sectional research design, two were evaluations, two case studies, one focus group study and one followed exploratory design. These studies were carried out in USA (n=6), Canada (n=2), Middle East (n=3), Germany (n=1) and Australia (n=1). Seven studies investigated primary or secondary outcomes which directly or indirectly manifested the implementation of social and cultural sustainability. All of these studies were conducted in the context of some built environment which had its measured impact as an exclusive variable.

Eight studies (seven cross-sectional and one focus group, all conducted in USA and Canada) studied the impact of various types of built environments exclusively on health indicators or outcomes such as Body Mass Index (BMI), mental and physical quality of life, depressive symptoms, perinatal health outcomes, self-rated health, smoking, socio-economic characteristics of the neighbourhood population measures of income, education, poverty or unemployment. Three studies from middle-east and one from Germany followed evaluation and case study methods and considered socio-cultural and constructional features of housing, contemporary architecture and educational campuses and evaluated important social and cultural outcomes. One study from Australia quantitatively explored sustainable behaviour as an outcome of sustainable school building.

The built environment was described with a variety of measures. Indices for walkability, land use mix and urbanity were calculated. Single land use types were also considered, such as retail, recreational areas, restaurants, fast food outlets, cultural and education institutions, or health and human services. Environmental pollution, such as from traffic or waste sites, was mainly investigated in studies focusing on perinatal health, mental health or self-rated health. The quantitative studies showed great amount of heterogeneity which was manifested in the meta-analysis too. This was mainly due to variable sample size both of individual

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observations and built environment. However, due to missing information in many studies about the range of individual observations we could not assess whether these effect estimates could be biased.

Partial meta-analysis: Normally a meta-analysis forms the core of a conventional systematic review whereby it collates the effect sizes and other quantitative merits of the included studies. Our meta-analysis was partial because of two reasons. First, all of the included studies did not represent quantitative data to be included into the meta-analysis. Second, the included quantitative studies did not study the direct relationship of socio-cultural sustainability and the targeted outcomes. Therefore, only the extracted parts of some of the studies were included into the meta-analysis.

Fig. 1 illustrates forest plot which depicts the indices of partial meta-analysis. As many as eight variables out of six studies formed this partial meta-analysis. One study measuring the effect of sustainable schooling on socio-culturally sustainable behaviour (effect size = -.138, 95% C.I. -.563 to -.287) showed favouring effect to the intervention. The individual effect size of two of its sub-populations i.e. parents (effect size = -.369, 95% C.I. -.614 to -.124) and teachers (effect size = .093, 95% C.I. -.511 to .698) were different from each other in terms of effect. Further studies showed moderate effect on physical activity (e.s. = .403, 95% C.I.-.308 to .499), body mass index (e.s. = .297, 95% C.I. 0.176 to 0.417), overweight (e.s. = .165, 95% C.I. .044 to 0.286) and obesity (e.s. = .234, 95% C.I. 0.065 to 0.403). Two other studies report the favouring effect of intervention on self-rated stress (e.s. = -.497, 95% C.I. -.559 to -.436) and birth weight (e.s. = -.409, 95% C.I. -.648 to -.171). The average effect size favoured the intervention (e.s. = -.128, 95% C.I. -.172 to -.084, $p<.001$). The level of heterogeneity is high in this meta-analysis ($I2 = 98.5\%$) which indicates that these results do not qualify the generalizability.

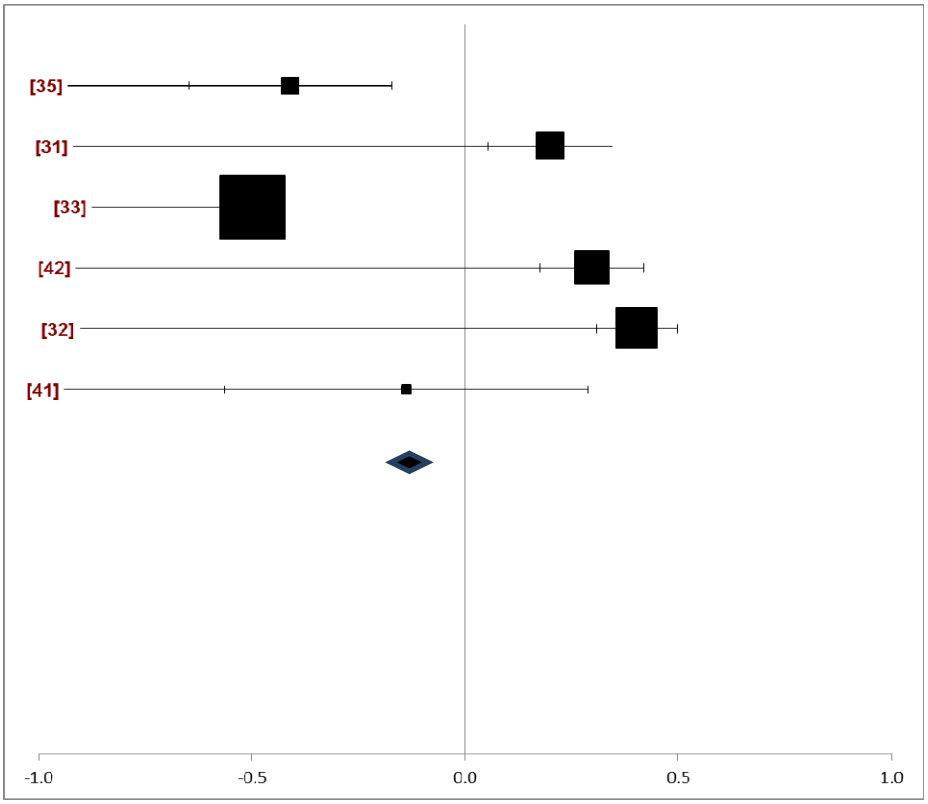

Fig. 1 Forest plot depicting effect size and weight of included data in the partial meta-analysis

A. Associations between Socio-Cultural Sustainability Outcomes and Built Environments

Our selected studies homogeneously indicated good association between built environment and socio-cultural sustainability. Although the studies followed different research designs implying that built environments were either used as interventions or their impact was explored, but the identified associations help to achieve the objective of this review. For example, built environments providing greater opportunities to walk are having direct effect on physical activity and overall health indicators. Likewise, exposure to traffic and resultant pollution has bearing on infant health and birth weight. A deliberate construction of sustainable schools also indicated development of sustainable behavior on students, their parents and teachers. The case study conducted on Kuwait clearly indicates a need of traditional and cultural sustenance in and by the built environment. One of the architects in Kuwait expresses “the traditional desert architecture, characterized by its courtyards and adobe style construction, should be the source of architectural identity in Kuwait.” Likewise, study

conducted in Al-Ain emphasized responsiveness to cultural values and quality of life in direct relation to designing of houses. Finally there is customization of educational campuses which influences the form of future learning.

TABLE II
DESCRIPTION OF INCLUDED STUDIES

Reference	Country	Design	Built environment	Outcomes studied (primary or secondary)
Sallis, 2009[31]	USA	Cross-sectional	Walkability index (residential density, retail floor area ratio, mixed land use, intersection density)	Physical activity, walking for leisure and transportation, Body Mass Index, Obesity, physical quality of life, mental quality of life, depressive symptoms.
Prince et al, 2011[32]	Canada	Cross-sectional	Number of winter indoor/ outdoor facilities and summer outdoor facilities, green space and park area; bike/walking path length; number of grocery stores, fast food outlets, convenience stores, restaurants, and speciality food stores	Reported physical activity: inactive and moderately physical activity vs. high physical activity; 2. Under-/normal weight vs. overweight/obesity
Yang, 2010 [33]	USA	Cross-sectional	Daily vehicle miles travelled based on length of road and average daily traffic estimate; toxic release inventory sites and residual waste operation sites	Employment status, education, poverty, food insecurity, health score, religiosity, trust in neighbourhood people, crime, residential stability.
Williams, 2007 [34]	USA	Cross-sectional	Average atmospheric concentration of sulphur dioxide, lead and fine particulates around infant´s home; number of hazardous waste sites in a 5 kilometre radius around infant´s home	Birth weight, hypertension, non-live births, smoking, other maternal risk factors.
Zeka et al, 2008 [35]	USA	Cross-sectional	Cumulative average daily traffic; individual distance to major highways from home address; percentage of open space designed for recreation, conversation, water supply, and forestry	maternal education, prenatal visits, gestational age, smoking during pregnancy, birth weight, preterm birth, chronic or gestational conditions
Galal, 2011[16]	UAE	Qualitative evaluation	Housing featuring accessibility, spaciousness and ease of access, zero step entrance, good airflow and appropriate natural lighting, open design of houses	Improved family life, quality of life, wellbeing elevated, security safety and privacy, easier access and movement for all.
Mahgoub, 2007 [36]	Kuwait	Case study	Contemporary architecture featuring cultural Identity and visual culture	Continuity of cultural and social values, familiarity to the built environment
Schakib-Ekbatan et al, 2010 [37]	Germany	Post-occupancy evaluation	Office building featuring Overall building index, thermal, visual and aural comfort, air quality and options for occupants' control (e.g. operable windows) as well as safety and security	Comfort parameters like Furniture/Layout of work place, lighting condition, spatial condition, temperature, air quality, acoustics and noise, visual comfort.
Hayward et al, 2015 [38]	USA	Focus group study	Public housing featuring recreational areas, availability of grocery areas, sanitation, outdoor activity area for children, social isolation, social capital	Health outcomes, diseases like obesity, drugs and crime, lack of trust in relationship, social wellbeing, asthma in children in public housing, quality of life, crime reduction,
Mahgoub, 2009 [39]	Kuwait	Case study	University campus featuring separation of students sexes, automobile traffic and parking,	future learning environments, socio-cultural synergy
Chuang et al, 2005 [40]	USA	Cross-sectional	neighbourhood levels and convenience store concentration	Individual level smoking
Ezadpanahi & Elkadi, 2014 [41]	Australia	Exploratory	Schools featuring physical environment, spatial settings, sustainable school	Educational outcomes like environmental awareness and development of sustainable behaviour amongst students, teachers and parents.
Ross et. al (2007) [42]	Canada	Cross-sectional	Built environment featuring dwelling density and walkability.	Body mass index and its correlates such as income, educational attainment, and health related behaviours e.g. smoking, physical activity and diet.

IX. DISCUSSION

This systematic review followed quantitative as well as qualitative approaches to analyse studies which saw effect of built environment on social and cultural sustainability outcomes. The studies were grouped on the basis of the similarities of outcomes. An assessment of built environments and their socio-cultural features provided further groupings to the reviewed studies. The most frequently analysed outcomes were measures of BMI, physical activity, overweight and birth weight which were greatly influenced by the built environment [34], [35].Other studies, however, emphasized on more outward features which provide a manifestation of culture in the society. An amalgamation of social and health outcomes adds great quality to the findings put together here. The major role of interactions was manifested in this review qualitatively as well as quantitatively. Our failure to draw out clear and direct effect of social and cultural sustainability aspects in built environments was due to the interaction effects of outcomes. This gives strength to the theories that aspects of social and cultural sustainability are intertwined, interdependent and their effect cannot be separated.

This review lacks on the opportunity to compare the effects of interventions. This is however a guiding feature for future research in this area which urges us to design focused interventions and deliver them in comparative design. The results of this review show inconsistency because environments and socioeconomic neighbourhood structures vary across countries and continents. This gives us a lesson to design interventions which conform to the local customs but consist of social and cultural sustainability based on their universal principles.

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A. Limitations

One of the major limitations of this study was difficulty to access evidence in a synthesizable form. Since the area of socio-cultural sustainability is still emerging, there is a paucity of proper intervention programs being run and thus studies reported. The second limitation specific to this study was operationalization of variables was too heterogeneous across studies to perform meaningful quantitative comparisons. The third limitation is that our studied area is vast and the intertwined with many disciplines which might have been represented in different and perhaps less known terms. Therefore, our search strategy was perhaps not sensitive and specific enough and could not identify all relevant studies. To reduce this limitation, we checked all references of included studies. We assumed that there were no relevant studies in grey literature. Therefore, we did not perform a separate search in sources of grey literature.

X. Conclusion

This quasi-systematic review showed that a simultaneous consideration of qualitative and quantitative studies is able to provide assessment of common outcomes of built environment. The review remains limited in terms of providing loud and clear findings of effectiveness. This is, however; not due to the weakness in the causation but clearly due to lack of rigorous research designs and infeasible implementation. There is a need of further research using stronger research designs in varied cultural systems. It is recommended that involvement at the level of government as well as stakeholders be promoted and required infrastructure, research facilities and interventional freedom be provided.

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