THE INFLUENCE OF OUTDOOR SPATIAL ATTRIBUTES IN LANDSCAPE SETTINGS ON CHILDREN'S BEHAVIOURAL WELLBEING IN SRI LANKAN CHILDCARE SETTINGS

PRIYABHASHINI A.K.G.Y.[1]* & DHARMASENA S.R.[2]
[1,2]University of Moratuwa, Moratuwa, Sri Lanka
[1]priyabhashiniakgy.21@uom.lk, yoshipriyabhashini123@gmail.com, [2]shameend@uom.lk

Abstract: Outdoor spatial environments are increasingly recognized as vital contributors to children's holistic development. In Sri Lanka, however, childcare centres (CCCs) often underutilize outdoor spaces, focusing mainly on indoor routines. This article investigates how outdoor spatial design influences children's behavioral well-being, focusing on two objectives: (1) Document the spatial characteristics and design elements of the outdoor environment in a CCC; and (2) Analyze the relationship between outdoor spatial design and children's behaviors related to autonomy, interaction, exploration, and affective expression. A qualitative case study was implemented at a selected CCC in Nugegoda, observing 24 children aged 1–5 years over four different outdoor zones. Data was collected using structured behavioral mapping, Children's Activity Rating Scale (CARS) scores, and monotony measures. Analysis utilized Minitab software for descriptive statistics and Microsoft Excel to produce graphical representations of the data. The results show that outdoor environments which provided sensory richness and features of diversity supported displays of autonomy, exploration and positive affective engagement. In contrast, monotony or more structured settings resulted in lower levels of engagement which often led to sedentary behavior. The findings highlight the importance of integrating landscape architectural design aspects, especially Herrington's Seven Cs Framework for outdoor space with children in CCCs, to promote children's behavioral well-being.

Keywords: *Outdoor spatial design; Childcare centers; Behavioural well-being; Seven Cs Framework, Sri Lanka*

1. Introduction

In contemporary Sri Lanka, changing family patterns and a prevalence of dual-career parents have increased dependence on childcare centres (CCCs). Children under five years old often spend between 8 and 10 hours in CCCs each day (Kodagoda, 2014; NCPA, 2019). While this institutional care meets custodial-type care requirements, there are still concerns regarding the environment provided for children, especially outside. National childcare guidelines (NCPA, 2019; 2024) recognize outdoor play as an essential component of children's wellbeing, however, not all centers provide meaningful outdoor environments for children to experience, often only providing concrete yards or very minimal play equipment. The importance of outdoor environments for children's behavioral wellbeing is evidenced across the globe.

Outdoor play provides children with the opportunity for independence, allows children to build social skills through interacting with peers, and encourages exploration; this is coupled with the benefits of natural features providing restorative experiences that reduce stress (Chawla, 2015; Wells & Evans, 2003; Fyfe-Johnson et al., 2021). In Sri Lanka, however, research on this important topic remains minimal, with very few existing studies exploring the relationship of children in CCCs with outdoor environments. Shifting family structures and the rise of dual-career parents have significantly increased reliance on childcare centers (CCCs).

This study addresses the gap by focusing on two objectives:

1. To examine the spatial attributes and design aspects of the outdoor environment in a selected CCC.
2. To analyze the relationship between outdoor spatial design and children's behaviors related to autonomy, interaction, exploration, and affective expression.

This study presents evidence of how outdoor design can promote children's behavioral well-being and diminish the cycle of routine monotony in the Sri Lankan childcare context, using Herrington's Seven Cs Framework (2006) as a lens for analysis.

2. Literature Review

The early childhood development literature strongly indicates how environment shapes children's behavioural well-being. Researchers from psychology, education, and environmental design emphasize how spatial characteristics affect autonomy, interaction, exploration, and affect. We know that outdoor environments are important spaces for children to negotiate autonomy and develop social relationships, so this study contributes by analysing children's exploration during play because

*Corresponding author: Tel: +94 767433279 Email Address: priyabhashiniakgy.21@uom.lk, yoshipriyabhashini123@gmail.com
DOI: https://doi.org/10.31705/FARU.2025.59

it can lead to cognitive and emotional development. In the literature there are multiple theoretical premises such as Erikson's psychosocial developmental stages and Bronfenbrenner's ecological systems, as well as practical frameworks like Herrington's (2006) Seven Cs, that can be considered in this study. However, research in the Sri Lankan context has not empirically linked outdoor spatial design with children's behaviour in childcare centres, thereby demonstrating a clear research gap that this study will address.

2.1 CHILDREN'S BEHAVIORAL WELL-BEING

The notion of children's behavioral well-behavioral well-being is increasingly regarded as a factor of emotional regulation, social competence, autonomy and adaptive behaviors supporting long-term legacies of resilience (Frost et al., 2012; Pollin & Retzlaff-Fürst, 2021). Theories of developmental psychology provide important perspectives on early childhood development. Erikson's (1950) psychosocial theory, for instance, situates children ages one to five within two key stages: Autonomy versus Shame and Doubt (roughly ages 1–3) and Initiative versus Guilt (ages 3–5). The Autonomy stage thrives in environments that foster independence, allowing children to explore, make choices, and act on their own impulses; such supportive contexts build confidence, self-control, and a sense of agency. In contrast, overly restrictive or critical settings can breed shame, doubt, and hesitation, leaving children feeling inadequate or overly dependent (Sokol, 2009). Similarly, the Initiative stage flourishes when caregivers encourage purposeful play, curiosity, and leadership in activities, helping children develop a sense of direction and accomplishment; however, excessive restraint or punishment for bold actions can instil guilt, passivity, and fear of taking risks. Together, these stages underscore the need for balanced, nurturing environments that empower young children to grow into resilient, self-assured individuals.

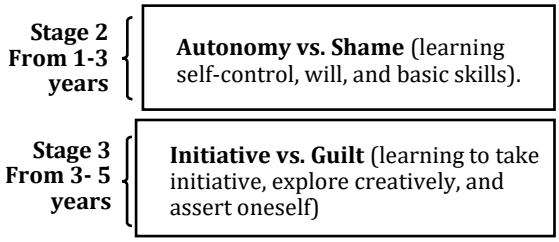

Figure 1*:* Psychosocial stages (Adapted from Erickson's psychosocial theory)

Furthermore, Bronfenbrenner's ecological systems theory emphasizes that development occurs through interactions in multiple environments. The microsystem, including the home, childcare centres, peer interactions, etc., exists in the layer closest to children, and is the most proximal and influential environmental layer for determining behavior (Bronfenbrenner, 1979; Fisher & Lombardi, 2025). From this perspective, because children spend much of their waking hours at childcare centres (CCCs), CCCs represent critical contexts for behavioral well-being, and the physical and spatial qualities of CCC environments may have significant developmental ramifications for psychosocial development.

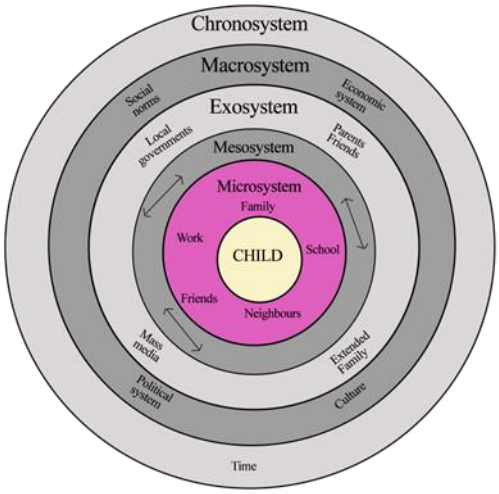

Figure 2*:* Bronfenbrenner's Ecological Systems Theory
(Source: adapted from Guy-Evans, 2024, Simply Psychology)

2.2 OUTDOOR PLAY AS A CATALYST

A wealth of research supports the unique contribution outdoor play makes to children's behavioural well-being. Outdoor environments provide opportunities for moderate-to-vigorous physical activity (MVPA) that can eliminate sedentary time, allowing for various benefits to physical health, concentration, and emotional regulation (Truelove et al., 2018). Outdoor

environments are different than indoor environments as they are much more unpredictable and ever-changing. Outside offers varied stimuli that invite child-led exploration, curiosity, and resilience (Chawla, 2015; Fjørtoft, 2004).

Outdoor play also promotes social development, including cooperation, empathy, and peer relationships. Research exploring outdoor play identifies shared outdoor experiences as significant, whereby children negotiate rules, learn to resolves conflicts, and develop communication skills (Dyment & Bell, 2008; Pollin & Retzlaff-Fürst, 2021). Exposure to greenery has also been correlated with reduced stress, better attention span, and lower aggression (Wells & Evans, 2003; Soga et al., 2016). Taken all together, the evidence indicates that outdoor play, as is, is not some fancy leisure activity, more an essential aspect of development that positively contributes to behavioural well-being in emotional, social, and cognitive dimensions.

2.3 OUTDOOR SPATIAL DESIGN AND THE SEVEN CS FRAMEWORK

The quality of outdoor play spaces is strongly impacted by their spatial characteristics. Herrington and Lesmeister (2006) presented the Seven Cs Framework by identifying seven interconnected principles **of Character, Context, Connectivity, Change, Chance, Clarity,** and **Challenge** with each principle identifying a critical feature of outdoor design. **Character** was related to the richness of the sensory experience regarding its natural variety while **Challenge** suggested worthwhile ways for children to engage in testing their abilities with a safe but provoking edge. **Connectivity** proposed no barriers to the movement between areas, while **Change** included not just seasonal change but possibilities of development across the use of the space. These principles provide a solid theoretical model purposed for the design of child-centered environments for behavioural well-being.

There is empirical evidence that supports the effectiveness of the framework. Herrington and Studtmann (1998) demonstrated that the design of landscapes that employed the principles of the Seven Cs displayed a higher measure of imaginative play and social interaction. Further research has confirmed that such environments experience lower levels of aggression, higher levels of inclusion and developmental outcomes across many contexts (Moore & Cosco, 2007; Raney et al, 2019).

2.4 SRI LANKAN CONTEXT

While the conversations around childcare centres are increasing in importance in Sri Lanka, they remain limited in scope. The National Child Protection Authority (NCPA) has provided regulatory direction in promoting safety and stimulating outdoor environments (NCPA, 2013, 2019, 2024). Interpretation of these guidelines, however, remains inconsistent, particularly in urban environments where space is restricted. Analysis indicates that many centres focus heavily on indoor instruction, with safety and cleanliness taking precedence over outdoor play as well (Kodagoda, 2014). As such, outdoor opportunities are minimal, taking place in limited areas outside the centre that offer little beyond a small yard, or future spaces with limited equipment.

In contrast to these studies, international studies evidently suggest that outdoor spaces are vital for children's wellbeing. As local discourse continues to grow in early childhood education there remain noticeable gaps in our understanding of how outdoor space design influences behavioral outcomes (and thereby educational experience) in Sri Lankan CCCs - an analysis that argue is necessary to situate both policy and practice in regards to outdoor environments used in CCCs, and encourage outdoor spaces to be adopted as foundational, rather than residual parts of the childcare infrastructure.

3. Methodology

This study's methodology is aimed at understanding the intricate connection between children's behavioural well-being and outdoor spatial design in a natural childcare setting. A qualitative case study methodology is chosen as it provides an opportunity to thoroughly examine a context-specific phenomenon embedded in the everyday life of young children (Yin, 2018). A single case study strategy was selected to enable an in-depth, holistic exploration of the phenomenon within a bounded, real-world context, allowing for rich, contextual insights that reveal nuanced relationships between design elements and behaviors—insights that would be diluted in a multi-case approach (Yin, 2018). The location of the study in a real childcare facility allowed the investigation to investigate the children's autonomy, social interactions, exploration, and affective expression in the context of their daily experiences (daily experiences comprises everyday routines and activities). The methodology includes naturalistic observation, behavioural coding, and activity rating, with systematic analysis of the naturalistic observations and behavioural coding aided using Minitab statistical software and graphical representations in Microsoft Excel. Together these approaches maintained analytical rigor and provided clear graphical representations in line with ideal practice for mixed qualitative-quantitative early childcare education research (Creswell & Poth, 2018).

3.1 RESEARCH DESIGN

A qualitative case study approach was adopted to allow an in-depth exploration of the relationship between outdoor design and behavior. Data collection was guided by the Seven Cs framework and focused on naturalistic observation.

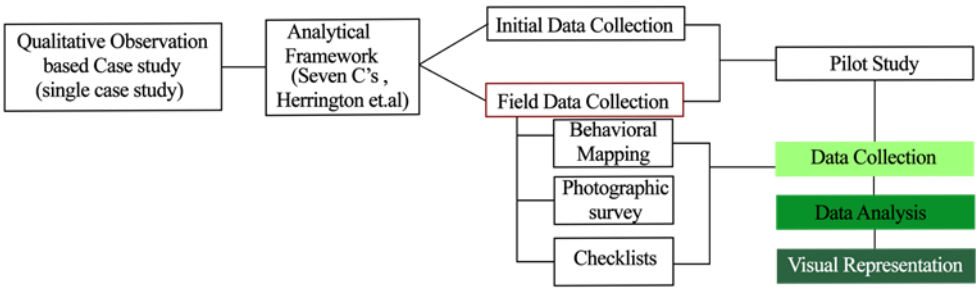

Figure 3: Research Design process
(Source: Compiled by Author)

3.2. STUDY SITE

This research is based on a single case study of **Kidsdom Preschool and Daycare** in Nugegoda, Colombo. Kidsdom was selected as the case study site due to its urban context and its diverse outdoor environment. Unlike many inner-city childcare centers with limited play space, Kidsdom offers multiple distinct outdoor zones within one facility. This made it an ideal setting to examine how different spatial typologies can influence young children's behaviours. The centre caters to children aged 1–5 (early childhood) in a full-day childcare program, combining preschool education with daycare services. In this urban Sri Lankan context, dual-career families rely on facilities like Kidsdom to provide not only supervision but also enriching experiences for children throughout the day.

The case study was conducted at Kidsdom Preschool and Daycare, Nugegoda, chosen for its relatively diverse outdoor setting compared to other urban CCCs. The site featured four distinct zones:

- Garden
- Animal Area
- Water Play
- Open Field.

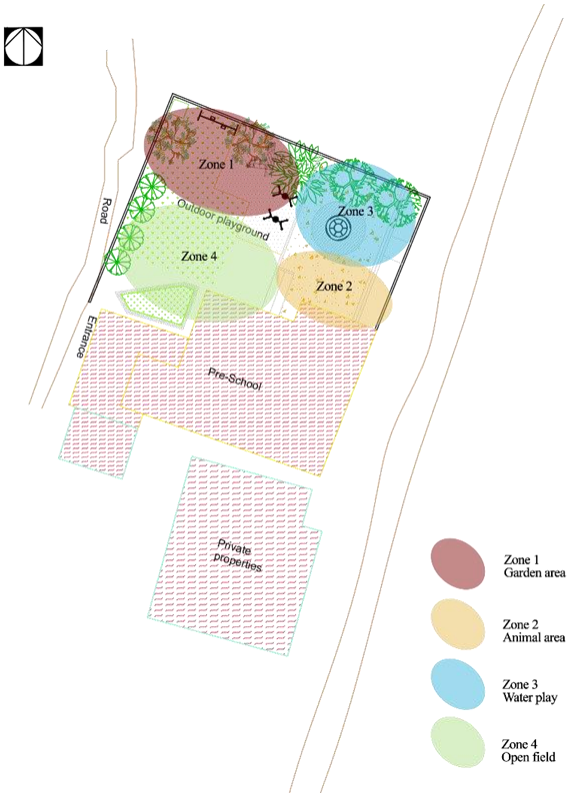

Figure 4: Layout map of Kidsdom preschool Nugegoda
(Source: Compiled by Author)

3.3 PARTICIPANTS AND DATA COLLECTION

Twenty-four children aged 1–5 years were observed over five consecutive weekdays in August 2025 (8:00 AM–5:30 PM). Using a structured observation sheet, behaviors were coded across four key indicators—autonomy, interaction, exploration,

affective expression—alongside sedentary time. Physical activity was quantified using the **Children's Activity Rating Scale (CARS)** (Puhl et al., 1990).

3.4 ANALYTICAL TOOLS

The dataset comprised 84 observation instances, organized by spatial zones and Seven Cs categories. Analysis followed three steps:

1. **Data coding and aggregation** in binary form (presence/absence of behaviors).
2. **Descriptive statistics** generated using **Minitab software**, producing frequency tables and percentage distributions for each behavioral indicator.
3. **Graphical representation** in **Microsoft Excel 2016**, creating bar charts and comparative visuals to interpret patterns of autonomy, interaction, exploration, affective expression, monotony, and CARS scores.

This dual approach combined the precision of statistical software with the clarity of visual representation, making the results both analytically rigorous and communicable.

4. Findings and Analysis

4.1 SPATIAL ATTRIBUTES OF OUTDOOR ENVIRONMENT

All Kidsdom's outdoor zones possessed unique traits that influenced how children interacted with the space and with each other. The Garden Zone provided natural features, textures, and animal stalls, which promoted sensory exploration and imaginative and creative play. The Animal Area facilitated direct encounters with animals such as rabbits, guinea pigs, and ducks, which stimulated curiosity, empathy, and unpredictability among the children. The Water Play Zone contained the fish tanks and channels that encouraged exploratory and affective behaviours based on tactile and dynamic touch. The Open Field, which was primarily a grassy area, encouraged group play, movement, and social interactions.

These spatial attributes align with Herrington's Seven Cs Framework (Herrington & Lesmeister, 2006), which identifies seven key principles for child-centered outdoor design.

At Kidsdom Preschool, these principles were articulated in various ways throughout the outdoor environment. The Garden Zone illustrates Character and Chance, as seen through its biodiversity and the discoveries of chance. The Animal Area gave children the opportunity to explore Challenge and Chance, in that children were invited to interact with living creatures that acted on their own, with unpredictability. The Water Play Zone illustrated Change, as the nature of the playing experiences were dynamic, fluid and changed throughout the course of the day. Finally, the Open Field illustrated Context and Connectivity, which acted as a public, legible space for group interactions and physical activities that allow children to extend their physical and cognitive abilities.

4.2 BEHAVIORAL OUTCOMES

The analysis of the behavioural outcomes was based on four indicators of behavioural wellbeing —autonomy, interaction, exploration, and affective expression— as well as indicators of monotony and intensity of physical activity (as measured by CARS scores). The four indicators were selected as they directly reflect children's behavioural well-being and demonstrate a measurable connection between spatial design and developmental outcomes. The examination of activity level and frequency across the four outdoor regions highlights the spatial characteristics that promote or regulate different behavioural responses. The distribution of the behavioural indicators also varied considerably among the Seven Cs, suggesting that design principles, specifically Character, Chance, Change, and Challenge, have a consistent relationship with positive behaviours (more positive behaviours observed), while Clarity and static Context were more often followed by monotony or low activity.

The findings are presented using descriptive statistics, and visualizations are included using clustered bar charts, pie charts, line graphs, and comparisons of the Seven Cs to present clarity and depth of interpretation.

4.2.1 Zone-Based Behavioral Outcomes

Autonomy was recognizable in 85.7% of the sessions, with the greatest level of autonomy in zones representing **Challenge and Change**. This indicates that dynamic and multifaceted settings enable children to gain greater autonomy. Interaction was present in 79.8% of the sessions, with the highest level observed at 100% in the Open Field; **interaction** is specifically supported in unstructured, peer-based play with collaborative interactions and decision-making as a group. **Exploration** was exhibited in 80.9% of instances and featured mainly in zones representing **Chance** (100%) and **Character** (93%), in which exploration is representational of both newness and natural variety, sparking curiosity and investigative play. The positive affective expression (i.e., positive emotions, smiles, and laughter) was displayed in 89.3% of observations, with universally high volumes in three of the zones (Garden, Water Play, and Open Field), contributing evidence that sensory-rich experiences and events enhance a child's joy and emotional wellness.

Zone	Autonomy (%)	Interaction (%)	Exploration (%)	Affective Expression (%)
Garden	93	82	93	90
Animal Area	87	78	95	88
Water Play	90	75	89	92
Open Field	80	100	75	90

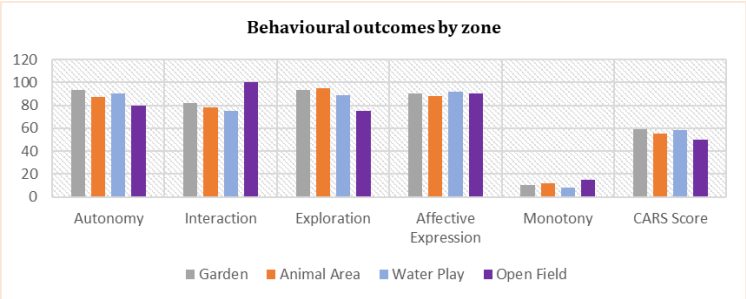

Figure 5: Behavioural outcomes by zone (Data Source: Table 1 above)
(Source: Compiled by Author)

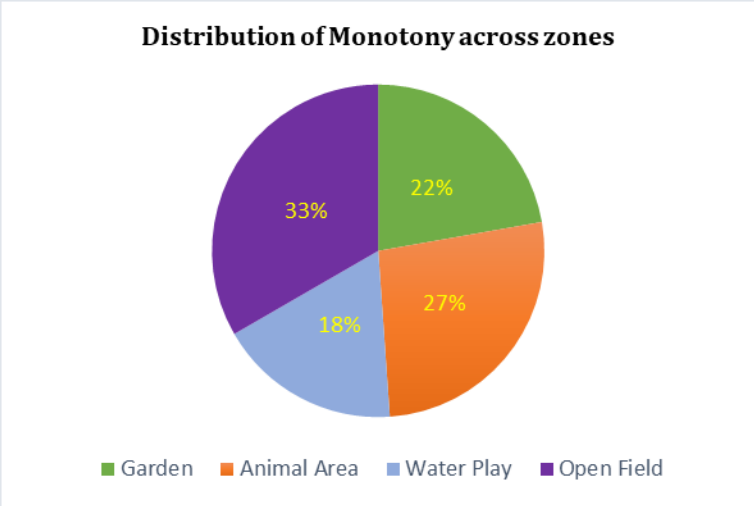

Figure 6: Distribution of Monotony across Zones
(Source: Compiled by Author)

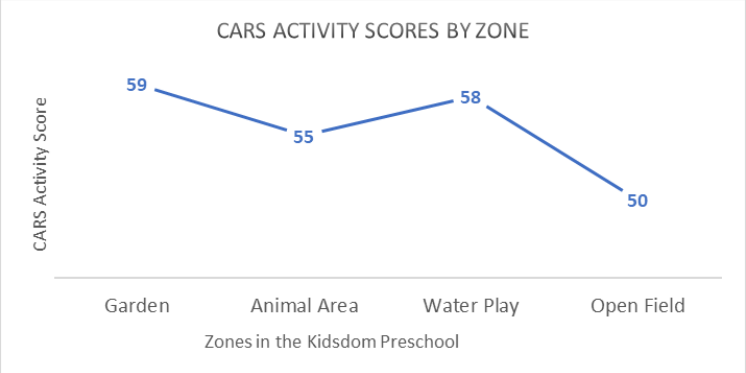

Figure 7: CARS activity scores by zone
(Source: Compiled by Author)

In contrast, **monotony** was most prevalent in structured areas dominated by *Clarity* and static *Context*. As illustrated in **Figure 6**, the pie chart showed that monotony was concentrated in the Open Field (33%) and Animal Area (27%), demonstrating that repetitive or overly rigid settings reduced children's engagement. The Children's Activity Rating Scale (CARS) provided further evidence: activity intensity peaked in *Character*-rich zones (59) and dropped in *Clarity*-based settings (40), as shown in Figure 7. This confirms that sensory-rich, identity-driven environments stimulate vigorous activity, while uniform spaces restrict physical engagement.

4.2.2 Behavioral Outcomes According to the Seven Cs

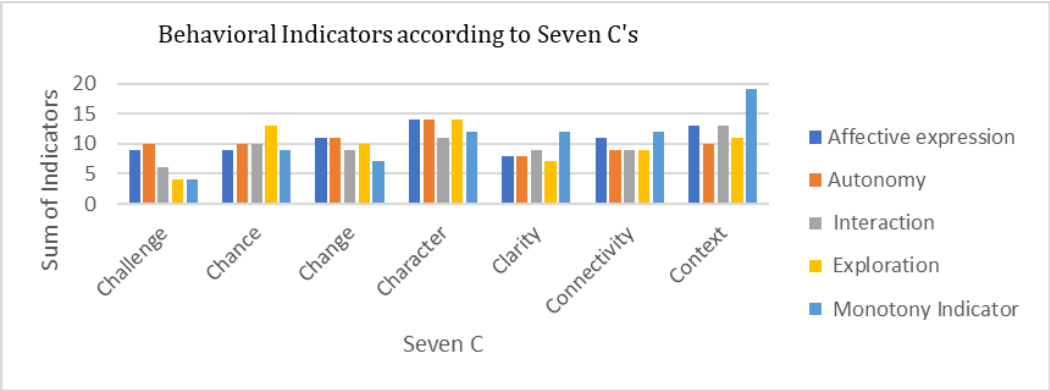

Figure 8: Behavioral Indicators across the Seven Cs Framework
(Source: Compiled by Author)

Table 2: Behavioral Indicators across the Seven Cs Framework
(Source: Compiled by Author)

Seven Cs	Autonomy	Interaction	Exploration	Affective Expression	Monotony
Challenge	High	Moderate	High	Moderate	Low
Chance	High	Moderate	High	High	Low
Change	Moderate	Moderate	Moderate	High	Low
Character	High	Moderate	High	High	Low
Clarity	Low	Low	Low	Moderate	High
Connectivity	Moderate	High	Moderate	Moderate	Moderate
Context	Moderate	High	Moderate	Moderate	High

To better understand the relationship between spatial design and behaviour, results were compared to Herrington's Seven Cs Framework. The results are seen in Figure 8 and Table 2, where spatial design and behaviours differed across classifications. Autonomy and exploration were most strongly shown in Chance and Character, as novelty, nature, and richness in sensory experience supported independent and investigative behaviours. Interaction was always greater in Connectivity and Context due to the possibility of using open, legible spaces where children commonly engaged in social play, negotiation, and cooperation. Affective expression was most evident in Change and Character because elements of motion and strong sense of identity resulted in laughter, smiles, and a positive emotion. Monotonous characteristics of behaviour were most strongly associated with Clarity and Context, which were followed by predictable and structured spaces, indicating little engagement from children.

This layered analysis shows that outdoor spatial design is not neutral or simply a backdrop but an active contributor to children's well-being. The match between observed behaviours and the Seven Cs suggests that environments constructed intentionally to have character, be course changing, allow for chance and challenge, allow opportunities for autonomy, exploration, identity interaction, and affective expression enables children to thrive. Environments that are overly prescriptive or monotonous disengages opportunities which supports the need for childcare centers in Sri Lanka to design outdoor space around more diverse, dynamic and child-centered opportunities.

4.3 INTERPRETATION

The findings affirm that spatial design directly influences behavior. Natural and varied zones promoted autonomy, Interaction, Exploration, and Affective expression, while monotonous or rigid spaces risked disengagement. The combination of **Minitab statistical summaries** and **Excel visualizations** strengthened the analysis by showing clear quantitative and graphical evidence of these relationships.

5. Conclusion

This study has illustrated that outdoor spatial design is an influential factor that can shape children's behavioral well-being within childcare centres. Using four behavioral indicators: **autonomy, interaction, exploration and affective expression** alongside the boredom and activity intensity measurements, it was evident from the evidence that natural, diverse and dynamic environments directly promote positive developmental outcomes. **Character, Chance, Change, Connectivity,** and

Challenge zones consistently reinforced independence, curiosity and joyful expression, whereas **the Clarity** and static **Context** zones supported disengagement and diminished activity.

With respect to statistical analysis (type from Minitab) and communication of results (via visual and colour in Excel spreadsheets), the analysis produced both quantitative representation and visual communication of the data and observational analysis that underpinned theoretical interpretation. Mapping outcomes on Herrington's Seven Cs reinforced the value of the framework as a design guide and emphasized that outdoor spatial design with forethought can enhance autonomy, interaction and exploration, and minimize monotony.

For Sri Lanka, where outdoor environments in childcare centers tend to use safety and hygiene as the primary focal points rather than experiential richness, the research findings have highlighted the need for child-centered design. When designers are aware of the Seven Cs, they can create outdoor spaces that not only protect children, but support cognitive, emotional, and social learning. Therefore, childcare centres should view outdoor environments as an opportunity to embrace design variability, sensory richness, and opportunities for reasonable risk so that active outdoor play environments can contribute to children's well-being.

6. References

Chawla, L. (2015). Benefits of nature contact for children. *Journal of Planning Literature*, 30(4), 433–452.
Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage.
Dyment, J. E., & Bell, A. C. (2008). Grounds for movement: Green school grounds as sites for promoting physical activity. *Health Education Research*, 23(6), 952–962. https://doi.org/10.1093/her/cym059
Erikson, E. H. (1950). *Childhood and society*. W. W. Norton & Company.
Fisher, K., & Lombardi, J. (2025). *Ecological approaches to child development in early education*. Routledge.
Frost, J. L., Wortham, S. C., & Reifel, S. (2012). *Play and child development* (4th ed.). Pearson.
Herrington, S., & Lesmeister, C. (2006). The design of landscapes at childcare centers: Seven Cs. *Childcare Information Exchange*, 164, 22–27.
Kodagoda, N. (2014). Early childhood education in Sri Lanka: Status, challenges and opportunities. *Sri Lanka Journal of Child Health*, 43(3), 127–132.
National Child Protection Authority (NCPA). (2019). *Guidelines for childcare centers in Sri Lanka*. Colombo: Government of Sri Lanka.
Pollin, R., & Retzlaff-Fürst, C. (2021). Outdoor play and children's social development: A review. *International Journal of Early Childhood*, 53(2), 213–231. https://doi.org/10.1007/s13158-021-00285-7
Puhl, J., Greaves, K., Hoyt, M., & Baranowski, T. (1990). Children's Activity Rating Scale (CARS): Description and calibration. *Research Quarterly for Exercise and Sport*, 61(1), 26–36. https://doi.org/10.1080/02701367.1990.10607475
Raney, T., Hendrickson, C., & Herrington, S. (2019). Evaluating outdoor childcare environments using the Seven Cs framework. *Children, Youth and Environments*, 29(1), 46–67. https://doi.org/10.7721/chilyoutenvi.29.1.0046
Soga, M., Gaston, K. J., & Yamaura, Y. (2016). Gardening is beneficial for health: A meta-analysis. *Preventive Medicine Reports*, 5, 92–99.
Truelove, S., Vanderloo, L. M., & Tucker, P. (2018). Defining and measuring active play among young children: A systematic review. *Journal of Physical Activity and Health*, 15(2), 155–166. https://doi.org/10.1123/jpah.2016-0628
Wells, N. M., & Evans, G. W. (2003). Nearby nature: A buffer of life stress among rural children. *Environment and Behavior*, 35(3), 311–330. https://doi.org/10.1177/0013916503035003001
Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage.