

DO THE SURROUNDING CONDITIONS OF JOGGING TRACKS CREATE STRESS IN JOGGERS? A CASE STUDY OF JOGGING TRACKS IN SUBURBAN SRI LANKA

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Abstract

Urbanization has brought half of the world's population into urban areas while transforming the way people live, work, travel and building network. Similarly, the urbanization made a significant impact on lifestyles in urban and sub-urban Sri Lanka. However, urbanization often brings stress to people's lives, and jogging has been found as one way of avoiding such busy environments. In Sri Lanka, there are few dedicated tracks for jogging in urban and suburban areas. Unfortunately, the absence of proper design and surroundings of a jogging track may result in increased stress of its users, i.e., joggers. This study examines the impact of design conditions and landscape features of jogging tracks in Sri Lanka towards the level of stress of joggers.

We selected two jogging tracks in the capital of Sri Lanka, Sri Jayewardenepura Kotte as our case study. Further, we used online surveys and face to face interviews with joggers as data collection methods. We triangulated our data with experts' opinions that are gathered from park managers and landscape architects in government authorities. Mixed methods are used to analyse the collected data. Our results identify six main factors that increase the level of stress of joggers, namely, temperature, seeing amphibians in the surrounding, excessive traffic noise, vehicle smoke, dust particles in the atmosphere, and level differences of the jogging tracks. This research further presents a set of recommendations for maintaining, restructuring, and developing jogging tracks in Sri Lanka in order to reduce the stress of joggers.

Keywords: Urban health, Leisure activities, Jogging tracks, Surrounding conditions, Stress, Sri Lanka.

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Introduction

People do activities such as Jogging, cycling, walking, running, and outdoor gym exercising to either maintain or improve their physical and mental health. People who live in cities and suburban areas are tend to do these activities more as a part of the daily routine. Jogging is found as one of the everyday activities among Sri Lankans who live in urban and suburban areas. Sri Lanka has developed several dedicated places to facilitate these people.

However, the poor conditions and the surroundings of these jogging tracks might raise issues as they badly affect the physical and mental health of joggers. This research focuses on the part of the mental health, in particular,- the level of stress of joggers.

Further, the research studies on two main factors that affect the level of stress of joggers, namely, (a) surrounding factors of the jogging tracks, (b) jogging track conditions/facilities. Jogging tracks (two tracks) situated in the capital of the country are selected as case study areas. The results reveal key factors that affect the level of stress of joggers. Finally, the author provides a set of recommendations to improve the surroundings and conditions of jogging tracks in Sri Lanka while making them less stressful to their users.

Literature Review

Theoretical Background

Proulx (2017) explains mental health as "the condition of your mind and your ability to balance your emotions". Stress is considered as one of the most factors that affect peoples' mental health. According to the MedlinePlus Medical Encyclopaedia (n.d.), stress is a feeling of emotional or physical tension which can be a result of many different ways, such as the feeling of anger, nervousness, or frustration. *Acute stress* and *Chronic stress* are considered as the main two types of stress, which categorised based on immediate reason, feelings, emotions, and the time of the day. Acute stress is occurring while facing events and pressures situations at present. On the other hand, chronic stress is a stress that builds up when we are exposed to a high-pressure situation over a longer period (MedlinePlus Medical Encyclopaedia).

It is known that natural surrounding calms down people. This general observation is scientifically proved by Ulrich et al. (1983) who introduced the Stress Reduction Theory (SRT). SRT focuses on the way natural environments reduces physiological stress and aversive emotion. Moreover, SRT explains that interaction with the environment starts with a physiological and initial affective response and then, continue with more elaborated affective, cognitive, and behavioural changes (Ulrich et al., 1991; Hartig et al., 2003). Stress plays a vital role in this theory as affective and physiological restoration presumes that the participant is in an initially stressed, highly aroused state that a natural environment helps to restore (Ulrich et al., 1983). Similarly, contact with natural environments has consistently been shown to improve psychological and cognitive outcomes (Hartig et al., 2014). Hartig et al. further explain the way of interaction between the natural environment and the human mindset improve human psychology. Following the lead, many pieces of research found that the natural environment and surrounding conditions helps to control the stress levels of people. In this research, SRT is used as one of the main theories to inform its theoretical approach. Specifically, we assume that the natural environment and the surrounding conditions of jogging tracks affect the level of stress of joggers based on SRT.

Related works

There is a limited amount of research has carried out on jogging tracks and their users in Sri Lanka. Hettiarachchi and de Silva (2016) explains human behaviour is defined as a result of human perception and cognition which change from person to person and situation to situation according to their needs, preferences and attitude. Moreover, they discussed urban recreational landscape designs are created with the intention that the users would obtain the maximum benefit out of them. Hettiarachchi and de Silva (2016) identifies design weaknesses like less convertibility, lack of safety, uncomfortable scale, isolation and less permeability may lead to a stressed and unwell mindset of people who live among those places.

The study adopted a mixed method which is twofold, namely a literature survey and a case study. A literature survey was carried out to identify theories and arguments related to the subject area. The factors which contribute to effective urban public spaces recommended by different scholars which apply to urban recreational landscape designs were analysed to identify the significantly common factors to investigate further. Our research study employees a similar methodology to investigate the natural and designing factors of jogging tracks which affect the level of stress of joggers.

Kalansooriya (2015) explains structural constraints that affect joggers in Sri Lanka such as accessibility, natural environment, safety & maintain, characteristic of places, aesthetic and scenery, location of area and cleanliness and lighting condition. The methodology of this research involved qualitative data analysis of 30 interviews from randomly selected joggers. However, to better inform the results, the author used observations and secondary data sources. We discuss the way these structural constraints factors and the methodology are considered in our research in the methodology section.

Jogging tracks, surroundings and their conditions are also examined outside Sri Lanka. Agarwal, A.G (2020) explains exercising in nature or green environments, also referred to as 'green exercise', has been associated with greater physical and mental health benefits, including lower blood pressure, stress reduction, and with improving mood, self-esteem, perceived health and wellbeing. However, to the best of our knowledge, there is no research study which examined stress factors in jogging tracks in Sri Lanka.

Theoretical and Conceptual Framework

After a careful study of urban health, mental health, SRT, and urban leisure literature, we created a theoretical framework (See, Fig. 1) and its application as a conceptual frame.

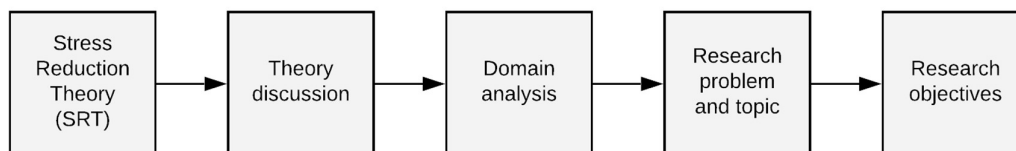


Figure 1: Theoretical Framework
Source: Author

The main research objective of this research is to identify the factors that affect the level of stress of joggers in sub-urban Sri Lanka. To achieve this final outcome, two hypothesis were designed aligning with the theories consulted.

- H1:** There is a relationship between jogging track surrounding and the level of stress of users.
H2: There is a relationship between jogging track conditions and the level of stress of users.

These hypothesis were transformed into two main research questions to be answered in this research.

- RQ1:** What are the surrounding factors that affect the level of stress of joggers?
RQ2: What are the jogging track conditions that affect the level of stress of joggers?

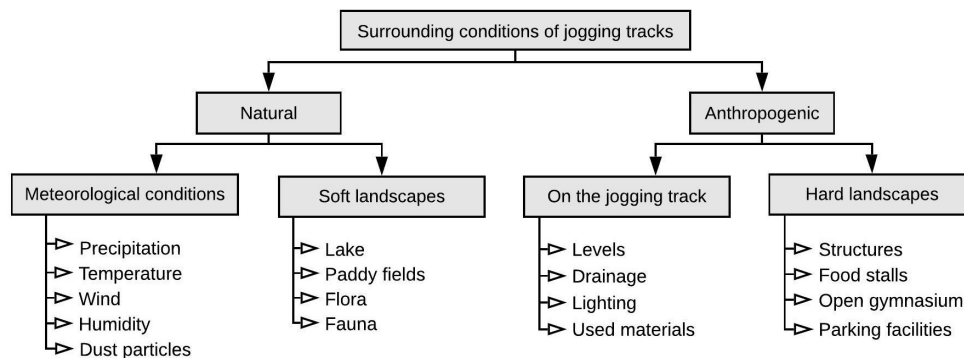


Figure 2: Conceptual Framework
 Source: Author

Aligning with the literature (Kalansooriya, 2015), these factors were derived from two main categories (See, Fig. 2). The initial list of factors are decided based on the related studies and further refined based on the several visits to the selected case study area. We further discuss this process in the methodology section.

Methodology

This research investigates the impact of surrounding conditions of jogging tracks on the level of stress of joggers. Further, the surroundings of the jogging tracks are investigated under two main parts, namely, track conditions and track surrounding. Interviews and a survey were used as the primary data collection techniques. We further interviewed experts to triangulate the data we gathered. Both quantitative and qualitative analysis were used to derive the results. Figure 3 depicts the methodology as an overview and important steps of the methodology is further discussed in the following subsections.

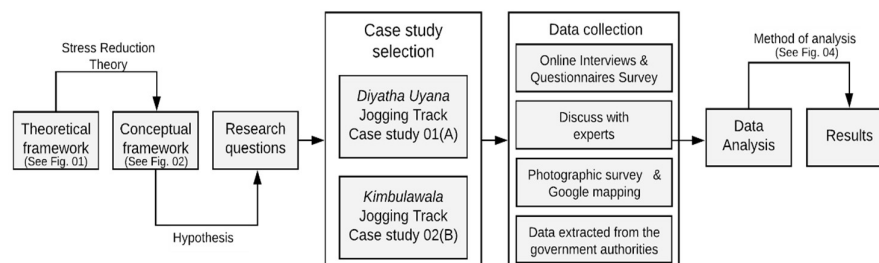


Figure3: Methodology
 Source: Author

Case Study Selection Procedure

First, six pilot visits were conducted to jogging tracks which are well known in urban and suburban Colombo to observe the surroundings, joggers, and observation data gathering for the research. Most of them were under-occupied due to the prevailing COVID 19 pandemic restrictions at the time of writing. Out of these sites, Diyawanna lake jogging track and the Kimbulawela jogging tracks were selected as the case study areas. This decision was motivated by the fact that these were comparatively more occupied during the visit times. Further, these two tracks situated next to each other on the sides of the main access road. Moreover, both tracks had several different surrounding factors which made them good representative of other tracks observed. Easiness to access the joggers for data collection also considered as the jogger's club of Diyawanna lake agreed to distribute the survey among their members who are regular users of these two tracks.

Case Study Areas

The selected jogging tracks are situated in the capital of Sri Lanka, Sri Jayewardenepura Kotte (60°52'46" N, 79°55'35" E). The Diyawanna jogging track (See, Fig. 4 - A) is a line track of approximately 1.8 km length which situated along the Diyawanna lake. It is faced with the Diyawanna water body. On the other hand, the Kimbulawela jogging track (See, Fig. 4 - B) is a circular track of approximately 3.5km length around Kimbulawela paddy fields.

After selecting the case study areas, a second observation visit was carried out to gather further observations. Both surrounding landscape character merges with the lush blue-green vegetation and the urban fabric. The tracks face some of the busiest traffic junctions and the main access road links among several main towns in the city. One of the main observation was that joggers occupy both tracks around the clock, unlike many other tracks which are mostly occupied only during peak hours. Further, different natural settings with flora and fauna were observed which play a vital role in these tracks. Also, man-made facilities such as car parking areas and mobile food stall were found around the jogging tracks. To better understand the surroundings of these tracks, visual data analysis was carried out through Google maps and Google earth images (See, Fig. 4).

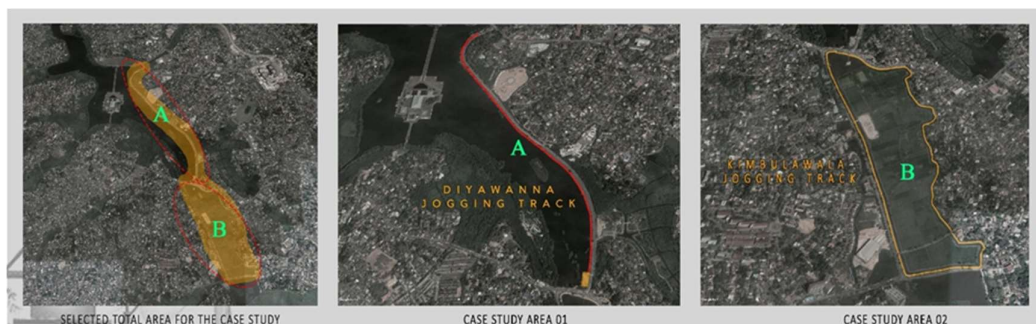


Figure 4: Selected case study jogging tracks, a google image bird view
(A – Diyawanna lake jogging track; B – Kimbulawela jogging track)
Source: Google Earth (<https://www.google.com/earth/>)

Survey Design and Data Collection

The survey included five sections as (a) description, (b) collection of personal information, (c) questions based on the natural surrounding around the jogging track, (d) questions based on the track conditions, and the (e) comments/suggestions. Section (c) and (d) was designed based on the conceptual framework of this study. However, surrounding factors and track conditions were refined based on the observations from site visits and visual data analysis. A third-visit to the selected sites was carried out to refine these factors based on the expert opinions of jogging track managers and the manager of the jogger's club of Diyawanna Lake. Then, the final version of the survey was created using Google Form service.

The questions about surrounding factors are designed following a well-known survey technique, which is providing a statement and asking their level of agreement with the given statements. The positive direction of the statements was used as the way of expressing the opinion. For example, one of the statements is "Increased temperature is increasing my level of stress while jogging". Participants can give their feedback on a five-level Likert scale as strongly agree, somewhat agree, neutral, somewhat disagree and strongly disagree. Not applicable also added as the sixth option where necessary.

Finally, the survey was distributed among the joggers of these tracks through emails and the contact list obtained from the jogger's club of Diyawanna Lake.

Similar to Kalansooriya (2015), this research carries out a fourth and final site visit to conduct a face-to-face interview with random joggers in the tracks. This step was motivated to identify factors, if any, which are not covered in the survey. Ten interviews were conducted with randomly selected joggers. All interviews were taken while they were jogging, therefore, the responses were recorded as researcher notes. The questions of the interviews were mostly open-ended, and question topics were similar to the survey.

Method of Analysis

Qualitative and quantitative analysis techniques were used to derive the results of this research. Automatic quantitative analysis of Google forms is used for the survey data while manually examining the suggestions and comments (section (e) of the survey) from participants. Moreover, qualitative analytic techniques such as theme identification are used to analyse the interviews with joggers and experts.

Results and Discussion

This section presents the results of this study based on the 40 responses received for the survey distributed. The observations and other collected data inform the discussion around these results. The survey received 40 responses representing age 15 to 70. Out of the 40 participants, 18 were male, and 17 were female, while 5 of the participants preferred not to reveal their gender.

Participant-Track Distribution

Majority of the participants (85% [32 out of 40]) used the Diyawanna jogging track while the rest of the participants used Kimbulawela jogging track. Our results show that the 'more natural surroundings', 'distance from the residence', and 'more facilities' are the main reasons for the skewed preference for the Diyawanna jogging tracks over the Kimbulawela jogging track. Nearly

half of the participants (47.5% [19 out of 40]) went with the natural surrounding as the key factor of choosing the jogging track (See, Chart 1). This comparison depicts that joggers are concerned about the surrounding of the tracks and, therefore, it might affect their preference of using one track over the other.

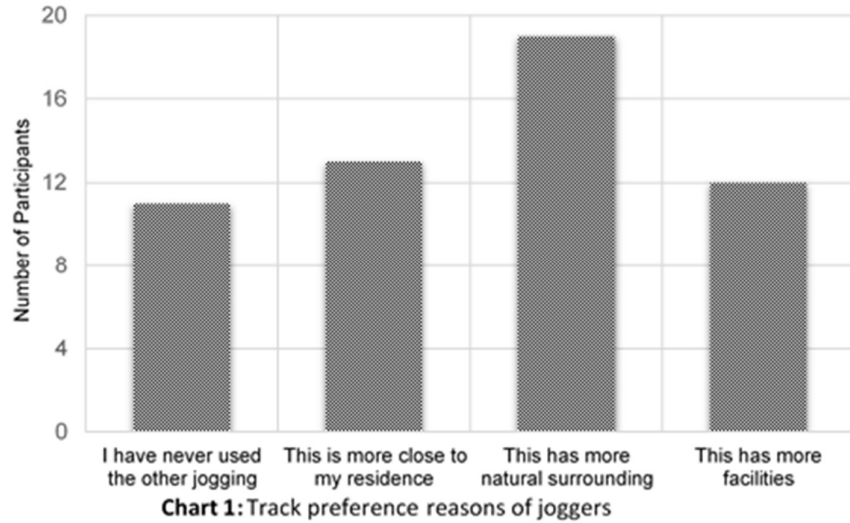


Figure 5: Diyawanna Jogging track parking space (A) (above), Kimbulawela jogging track parking space (B) (bellow)

Source: author

During field visits, convenience to park vehicles is identified as a potential cause of track preference. Though both tracks have dedicated parking areas, car parking lots of Kimbulawela jogging track were filled with mobile food stalls and the mobile food vehicles during the peak hours (See, Fig.5). If the joggers of Kimbulawela track are to use the car parking of Diyawanna jogging track, they have to cross a four-lane main road (Pitakotte- Thalawathugoda road), which is inconvenient during the busy hours.

Answering RQ1: Main Surrounding Factors that affect the Level of Stress of Joggers

In this sub-section, we discuss the surrounding (natural) factors that affect the level of stress of joggers. This sub-section focuses on three main surrounding categories, namely, (a) metrological conditions, (b) flora, fauna and wetlands, and (c) situational surrounding (such as vehicle smoke and dust).

(a) Meteorological Conditions

We examined four meteorological conditions (rainfall, temperature, wind and humidity) against the level of stress of joggers. Among these conditions, increased temperature is found as the main meteorological factor that increases the stress of the joggers. This is generally supported by 65% [26 out of 40] of the participants. Out of these 26 participants, 10 participants strongly agreed that increased temperature increases their stress (See, Chart 2). One interesting respond strongly disagree with this opinion. A micro-level analysis showed that this particular participant uses the Diyawanna jogging track mostly between 5 – 7 p.m. This analysis gives us further confidence in our results as the evening times are usually with fewer temperatures in these tracks.

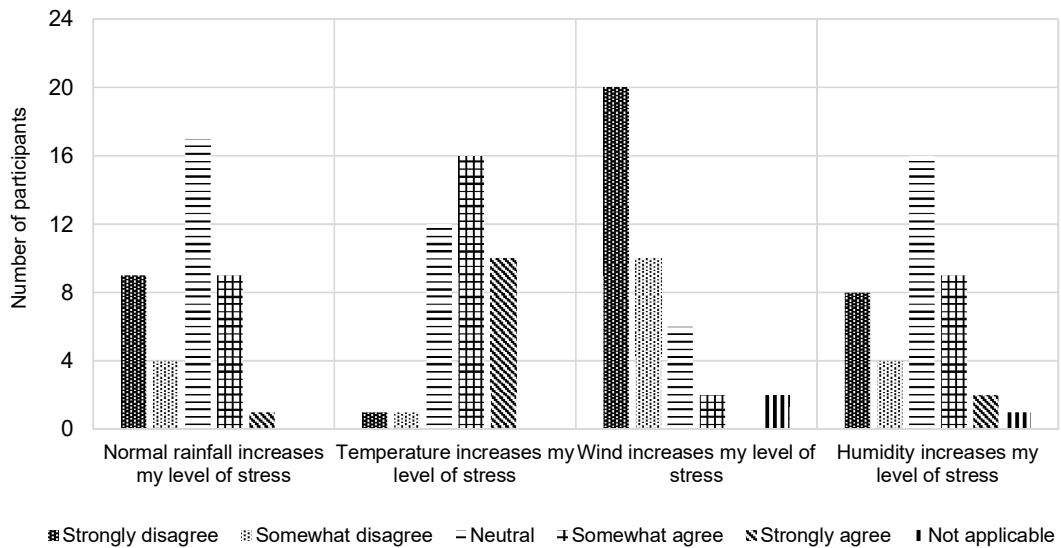


Chart 2: Meteorological conditions against the level of stress of joggers

Increasing humidity is identified as the second most contributing meteorological condition to the level of stress of joggers. Twelve participants (30%) agreed with this opinion; however, sixteen (40%) participants remained neutral to this statement. Interview participants were in favour of the idea of increasing humidity causes stress as it increases sweating, which creates discomfort to the joggers. On the flipped side, comparatively, rainfall and wind do not increase joggers' stress level as 75%, and 90% of the participant respectively responded either neutral or disagreed to the idea of increasing stress against rainfall and wind.

(b) Flora, Fauna and Wetlands

The flora, fauna and wetlands that are in the surrounding area can affect the joggers' level of stress. Seven factors were examined under this category as seeing crocodiles living in Diyawanna lake (adjourn to the jogging tracks), birds and their noise, seeing four-limbed animals (e.g., dogs), location of trees and creepers, shade from trees, the aroma of flowers and seeing the paddy fields around Diyawanna lake (adjourn to the jogging tracks). We found that seeing crocodiles living in Diyawanna lake is the main factor that increases the level of stress of joggers. This was supported by 14 participants (35%), and 14 remained neutral (35%) (See, Chart 3). In contrast, according to our results, birds and their noise, shade from trees, the aroma of flowers and seeing the paddy fields are decreasing joggers' level of stress. Seeing four-limbed animals (e.g., dogs) and the location of trees and creepers received mixed feedback compared to the other factors (See, Chart 3).

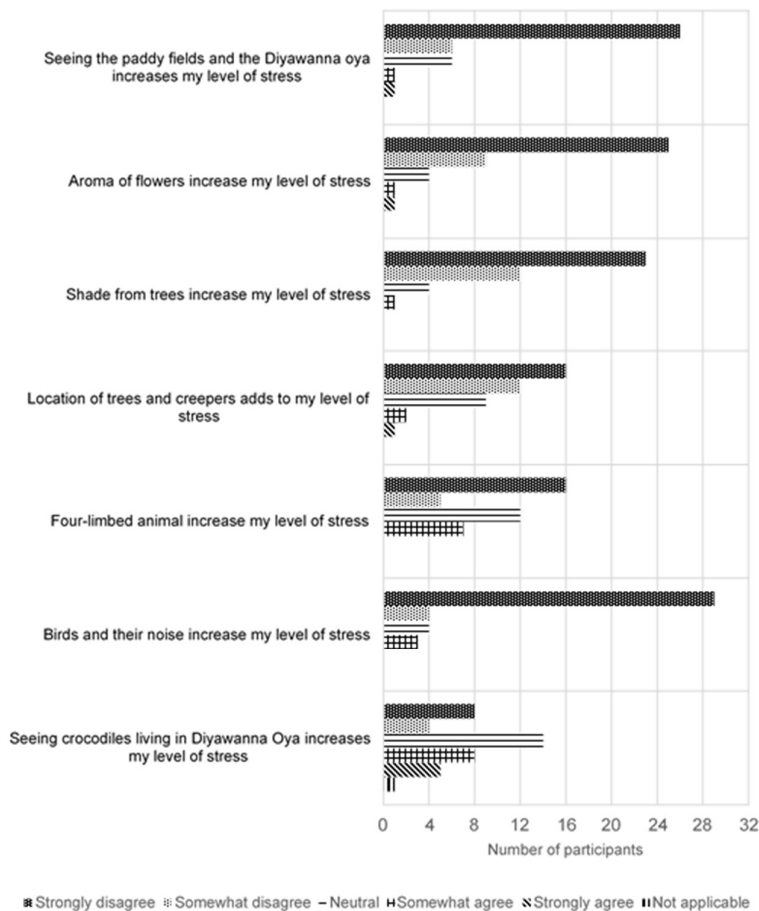


Chart 3: The flora, fauna and wetlands that are in the surrounding area affect the joggers' level of stress

An interesting finding emerged through an interview of a jogger who enjoyed seeing crocodiles. During the interview, jogger revealed that seeing crocodiles reduces stress. This suggests that personal choices play a role in identifying such conditions.

We further observed several protection steps taken for the safety of the joggers of the tracks. There was a notice board saying “beware of the crocodiles” and stretch the wire mesh (See, Fig. 6) along the Diyawanna lake for the safety of the joggers. These developments might have affected the opinion of the joggers as they felt safe from any potential threats of crocodiles.



Figure 6: Notice board and wire mesh (left); Crocodiles at Diyawanna Lake (right)
Source: Autor (left); Google Images (right)

The bird noise, seeing the paddy fields (See, Fig. 7) and aroma of the flowers had strong support (72.5%, 65% and 62.5 respectively) as factors that reduce the stress level of joggers (See, Chart 3). Here we derived this as the strong disagreement to our survey question, e.g., ‘birds and their noise increase my level of stress’. This is a strong indication that joggers are willing to stay close to Nature, i.e., Lush vegetation and the eye-catching greenery landscapes encourage the joggers to jog in the comfort conditions.



Figure 7: 360-degree panoramic view of the Kimbulawela jogging track facing paddy fields
Source: Author

In addition to the survey, during the interviews, participants revealed that bird sounds encouraged the morning and evening activities as they consider them as some music. Further, confirming survey results, seeing four-limbed animals such as dogs received mixed opinions. However, none of these tracks is pet-allowed, and all the dogs are found around food stalls but none in the jogging tracks. Moreover, interview participants found trees in the parking area as useful as they protect their vehicle from sunlight (See, Fig. 8). Also, the trees in the jogging track found useful for obvious reasons such as shades.



Figure 8: Trees in the car parking (left) and on the track (right)
Source: Autor

(c) Situational Surrounding

In the third sub-category, surrounding situational factors evaluated against the stress of joggers. These jogging tracks are close to junctions which has heavy traffic during peak times (See, Fig. 9). Hourly traffic flow shows 7 a.m. to 8.30 a.m. and 4 p.m. to 6.00 p.m. as the busiest traffic times in this area. Therefore, we considered three parameters as traffic noise, vehicle smoke and dust particles in the air. The results suggest that all three elements increase the stress of joggers in general. There was a strong agreement (65%) for vehicle smoke as the leading cause of stress. This was followed by 50% and 45% strong agreements for noise and dust particles, respectively as stress creators for joggers.

During our field visits, we observed that less soundproofing barriers in heavy traffic areas are an issue in these tracks. Further, we identified the smoke and dust particles may create some discomforts such as coughing, sneezing or runny nose, which affects the level of stress of joggers.



Figure 9: Traffic flow in the Pitakotte - Thalawathugoda road
Red: Heavy traffic flow, Yellow: Normal traffic flow
Source: author

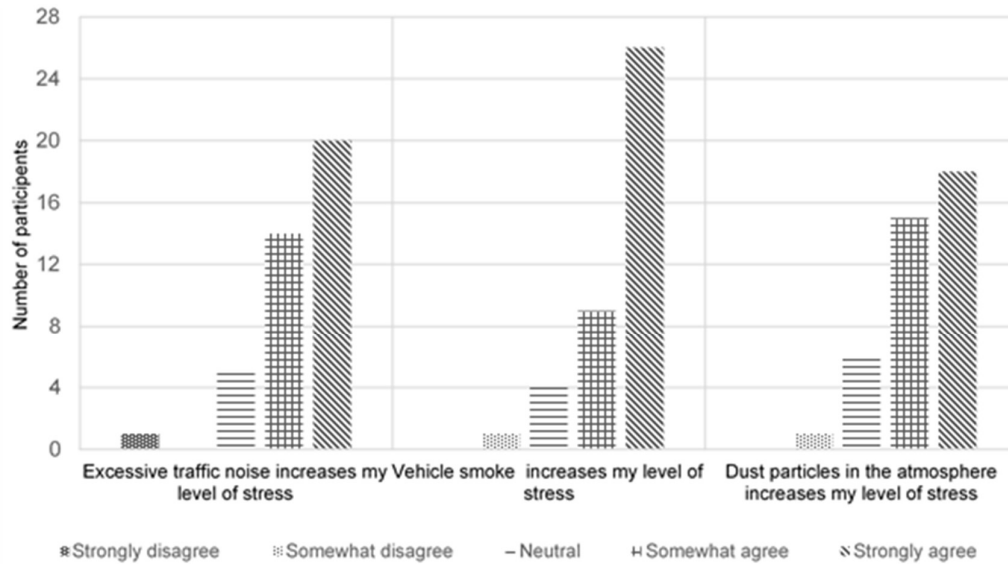


Chart 4: The flora, fauna and wetlands that are in the surrounding area can affect the joggers' level of stress

Answering RQ2: Main Track Conditions that affect the Level of Stress of Joggers

In this sub-section, we discuss the track conditions (anthropogenic) that affect the level of stress of joggers. This sub-section focuses on two main surrounding categories, namely, (a) jogging track construction elements and (b) facilities of the premises.

(a) Construction Elements

In this category, we examined four factors and their effect on the stress of the joggers. The factors we considered are level differences in the steps, drainage of water, the lighting and material used in the tracks.

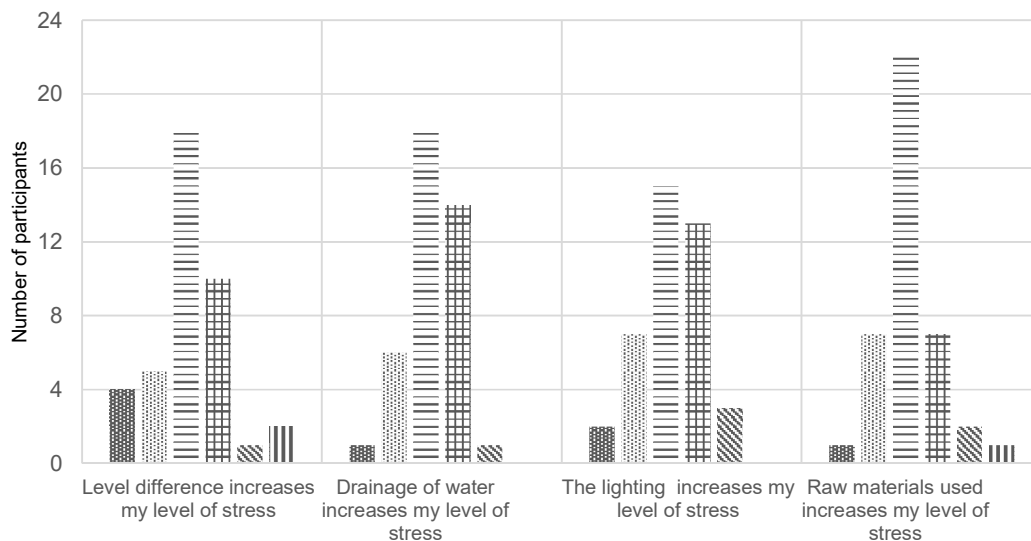


Chart 5: Level differences in the steps, drainage of water, the lighting and raw material used in the tracks affect the joggers' level of stress

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applicable

According to results, the most number of participants acted neutral to all four factors (See, Chart 5). However, in comparison, it is revealed that lighting conditions (40% of participants) and drainage of the water (37.5% of participants) comparatively, contribute more to increase the stress of the joggers followed by the step levels of the tracks (37.5% of participants). Joggers were less concerned about the material (red-yellow podzolic and humus mixed soil) that has been used in these tracks (See, Chart 5).

The author collected important observations during the field visits, which are aligning with these outcomes. With regard to the lighting conditions, Diyawanna lake track has a better coverage as it has seven lamp posts to every 100 meters whereas only five lamp posts were found at Kimbulawela track. All the lamp posts operate through solar power and two luminaires fixed to each lamp post to get better lighting. The bottom part of the lamp post mounted to the ground used concrete in two shapes. Kimbulawela jogging track has a cylinder shape (See, Fig. 11), while Diyawanna Oya has a cube shape (See, Fig. 10).



Figure 10: Landscape lighting, location, mounting method and the used materials for the lamp post in Diyawanna oya Jogging track

Source: author



Figure 11: Landscape lighting, position, mounting method and the used materials for the lamp post in Kimbulawela Jogging track
Source: author

The drainage of the water is designed well in both tracks as they have appreciable level drainage design and used raw materials on tracks' surface absorb the runoff water and exceed runoff water quickly discharge to the Diyawanna lake and Kimbulawela canal (See, Fig. 12). Further, exceed runoff water collects through the sloping drainage system and discharge to the Diyawanna lake and canal by using the underpass drainage system from these jogging tracks. This is helped by the higher level of the landscape on the bays of these tracks (the Japanese friendship road and new hospital road).



Figure 12: Drainage systems and the used raw materials for the jogging tracks
Source: author

With regards to step levels of the tracks, Diyawanna jogging track has only one step to up as a level difference (See, Fig. 13) while the rest of the track is at the same level. In contrast, in the Kimbulawela jogging track, some places had a few steps as the track crosses an access road towards a highly residential area from two places. Joggers were found crossing a road as inconvenient as it brings steps on both sides (See, Fig. 14) of the crossings as well as busy roads often interrupt the rhythm. This creates stress of the joggers. Further, steps at Kimbulawela jogging track has less align with the correct anthropometrics. Some of the heights of the steps were more than one foot (See, Fig. 15), and the angle of the slope is not in an acceptable range.



Figure 13: Entering point to the Diyawanna Jogging track
Source: author



Figure 14: Kimbulawela jogging track fragmented by the access road
Source: author



Figure 15: Steps and ramps constructed across the jogging track
Source: author

(b) Facilities of the Premises

In this category, we examined four factors, namely, and their effect on the stress of the joggers. The factors we considered are mobile food outlets, the seating arrangements, the parking lot and outdoor gymnasium (See, Chart 6).

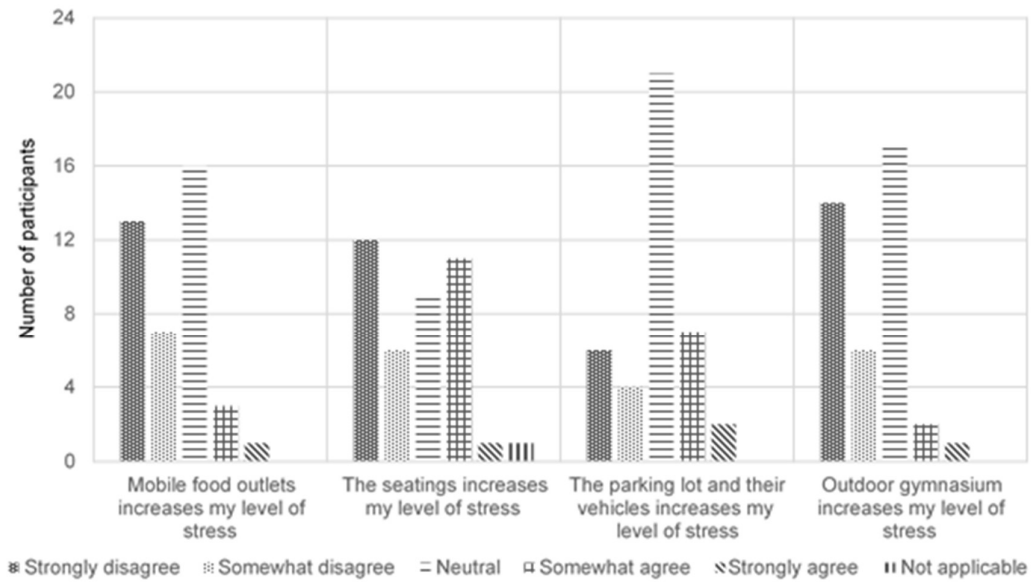


Chart 6: The mobile food outlets, the seating arrangements, the parking lot and outdoor gymnasium affect the joggers’ level of stress

Out of the four factors we considered, mobile food outlets have a minimum impact on the level of stress of joggers as 50% of participants strongly disagree with the opinion that food outlets increase their stress. To the contrary, interview participants revealed that foods smell, advertising methods and also street food lovers hanging around food stalls affect joggers’ level of stress. With regard to the seating’s facilities, joggers noted that seating space capacity is not sufficient for the joggers and it creates discomfort to joggers. During the site visits, the author identified that the Kimbulawela track does not have any seating areas at all. Further, the seating area at the Diyawanna track has less capacity as one seat can accommodate only two joggers.

Limitation

This study inherits the limitations of the case study approach, such as less generalizability. This study only examined two jogging tracks in Colombo. Therefore, the identified factors might not be the conclusive list that affect the level of stress of joggers in Sri Lanka. Further, some of the identified factors are arguably can be considered as general knowledge. However, this study scientifically approach such knowledge and verify them. We only had 40 responses and ten interviews to inform our results, while more face-to-face interviews could have brought more validity to this study. We faced several situation incidents such as COVID-19 restrictions during this study, which affected the study. We used data triangulation techniques with interviews and expert opinions to verify our results from the survey as a strategy to decrease the threat of data manipulations. The author of this research observed and studied the case study areas, and some of the observations mentioned in this research are to the best of author’s knowledge. In order to minimize the author bias, we discussed these observations with experts (landscape architects) at the Urban Development Authority to verify them as correct.

Summary and Recommendations

This research identifies surrounding and track condition factors that affect the level of stress of joggers in Sri Lanka. The results are derived through a survey and other data sources such as face-face interviews with joggers and expert opinions. Our results identify six main factors that affect the level of the stress of joggers, namely, increased temperature, seeing amphibians in the surrounding, excessive traffic noise, vehicle smoke, dust particles in the atmosphere and level differences of the jogging track. After a careful analysis of these factors and other field visit observations, the author proposes a set of recommendation for maintaining, restructuring and developing of jogging tracks in Sri Lanka.

We divide these recommendations into two categories as short-term and long-term recommendations based on the easiness to implement the recommendation. To note, these are suggestions, which are not ordered as we understand the prioritization of such suggestions need more in-depth study about the other parameters such as cost and benefit.

Short Term Recommendations

- Spray the water vapours to the jogging track to reduce the heat waves from the jogging tracks.
- Build a sound-absorbing wall near the highly noisy areas such as near the junctions.
- Add dust proofing nets where necessary.
- Rebuilt the step to reduce the height of the existing steps in Kimbulawela jogging tracks aligning with the anthropometrics designs.
- Increase the slope and width of the ramps for easy access.
- Display the signboards on the access roads which crosses the tracks to reduce vehicle speed.
- Construct alternative spaces for mobile food stalls and vehicles.

Long Term Recommendations

- Propose more spreading canopy, medium height trees such as “Karanda trees” for the shady in the parking space.
- Plant medium-height trees in the bays of the jogging tracks to reduce the surrounding temperature.
- Add cellular pavers for the parking space to reduce the urban heat island effect.
- Add sound-absorbing plants and shrubs along the roads next to the tracks.
- Plant air purifying plants for the jogging tracks and the parking area.
- Develop natural green curtain wall near to the junction area to reduce the sound, smoke and dust in the atmosphere.
- Develop broad leaves canopy trees either sides of the jogging track to reduce the dust in the atmosphere.
- Design the track where possible in a way that they avoid any access roads
- Construct a speed limit table to reduce the vehicle speed while both table and jogging track have the same ground level.

Conclusion and Future Work

The objective of this study was to identify the surrounding conditions of jogging tracks that affect the level of stress of the joggers. This research Also Investigated the jogging track conditions that affect the level of stress of joggers. We identify six of these main factors, followed by several other factors. To minimize the impact of the identified factors, we presented a set of recommendations which can be considered during maintaining, designing or developing jogging tracks in Sri Lanka. The future work of this research includes (a) verification study of this research using different jogging tracks, (b) conduct an in-depth analysis of the factors to identify recommendations further and finally, (c) prioritize the set of recommendation considering other parameters such as cost and benefits.

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