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Critical Factors Affecting Street Littering Behavior of Youth

Zainab Maharoof[1*], M. S. Dimuthu Kumari[2], Sachi Dilami Ilangasekara[3]

[1] Department of Public Administration, University of Sri Jayewardenepura, Sri Lanka

[2] Department of Public Administration, University of Sri Jayewardenepura, Sri Lanka

[3]Department of Social Statistics, University of Sri Jayewardenepura, Sri Lanka

*Corresponding Author Email: zainabmaharoof@gmail.com

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Abstract

Street littering has known to be a global phenomenon over the years. The intensity of littering varies across societies and age groups. This study on street littering is centered around youth. The objectives cover two aspects: exploring factors affecting street littering behavior in Sri Lanka and suggesting policy implications. The study adopted quantitative methods based on deductive reasoning approach. Data was collected as survey research using the simple random sampling technique. 315 youth were selected out of the total youth population in Colombo, Sri Lanka in 2022. Analysis of data was performed using Statistical Package for Social Sciences (SPSS). Analytical tools such as Pearson correlation, analysis of variance (ANOVA), independent sample t-test, and chi-square test were used. The study found to have a strong association between street littering behavior and two critical factors; visibility of litter and group behavior which corresponded with social psychological theories namely theory of deindividuation and theory of social comparison. A significant association with age and education was also indicated against street littering behavior while a weak relationship was noticed between environmental factors. The study suggests policymakers to focus on urgent and long-term sustainable solutions. Short term recommendations include positive and negative reinforcement strategies. The long-term sustainable solutions are proposed to make self-transformations within youth via attitudinal changes. Among the social science researchers in Sri Lanka, 'Street littering behavior' is considered an under-researched area. Hence this study provides both academic and empirical implications. Future research can be extended both locally and globally by comparing different demographic variables and changing the research study contexts within the same theme.

Keywords: *Critical factors; Street littering; Youth*

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Introduction

Littering has become a critical social issue in many countries even amidst their strong intervention towards waste management efforts. In the Sri Lankan context as well, littering is seen as a prolonged and neglected issue. A report published by Japan International Cooperation Agency (2016) revealed that the waste generation amount in Sri Lanka has increased from around 6,400 tons per day since 1999 to 10,786 tons per day since 2009. The report also states waste collected in the Western Province occupies 52% of the total waste of Sri Lanka while the waste collection rate is 51%, the highest among all other provinces. This situation is greatly aggravated by the practice of street littering in metropolitan areas in the Western Province. In addition, Infrastructure, and resources for waste collection lack in most parts of the country. Subsequently, uncontrolled scattering and dumping of garbage are widespread. Among other places, the roadways have become the most littered area across the country, thus, the current study mainly focuses on 'street littering'.

In addition, there is a lack of rules and regulations presently in Sri Lanka that strictly prohibits street littering. As per Regulation No 1627/19 (2009), by the Ministry of Environment and Natural Resources of the National Environmental Act, No. 47 of 1980, it is a punishable offense to dump municipal solid waste alongside any national highway or at any place other than places designated for such purpose. It is evident that institutions such as the Municipal Councils, including the Colombo municipal council, are governed by regulations on garbage collection and cleaning. However, there is a lack of enforcement in rules and regulations upon the public in specific.

Many past studies in Sri Lanka are based on waste disposal, waste management, and the garbage crisis. As there are many forms of street pollution where litter is recognized as one of them, it creates a vital issue for solid waste managers (Al-Khatib et al., 2009). Although street littering represents one form of waste, studies relating to this remain under-researched in the Sri Lankan context. Thus, a gap was identified and a scientific study on littering can be considered the need of the hour, which would significantly contribute to the existing body of knowledge. Moreover, the word 'littering' refers precisely to the human behavior of disposing of waste improperly (Schultz et al., 2013). Since human beings cause litter, it is crucial to examine why people litter and how to overcome the problem effectively. Therefore, this study tries to identify the causes as to why people litter in the context of Sri Lanka and suggest solutions to the issue. Hence, the purpose of this study is twofold; to identify factors affecting street littering behavior and to suggest policy implications for this prolonged issue.

Litter is any domestic or commercial waste, or any refuse, debris, or rubbish disposed of improperly Ojedokun (2015). Supporting this definition of Ojedokun, various other scholars have defined litter as items discarded by an individual, but it can include any item in an unacceptable location, regardless of the origin (Schultz et al., 2013). As a result of this improper disposal, litter becomes an issue. Street littering aggravates the problem even further as apart from waste disposed from households and industries, waste along streets contributes to additional cost and labor. They are causing a financial

burden in all instances of collecting, treating, and disposing of the litter generated. Litter can be found in both abandoned and public areas like roadways, storm drains, recreational areas such as parks, beaches, and other open areas, etc. Therefore, littering has been one of the main causes of diminishing the value and use of public places.

Specifying on street littering, Al-Khatib et al., (2009) recognize litter as a form of street pollution. Even practices such as leaving litter beside an overflowing dust bin, deliberately throwing litter from vehicles, and abandoning litter by the roadside qualify as littering. Street littering negatively influences various dimensions of the ecosystem. A threat posed to the wildlife and aquatic fauna is dangerous as they end up consuming polythene in their search for food. The mess people throw out create health impacts on human beings, resulting in the spread of deadly viruses such as the dengue epidemic. Clog drains, as litter items unnecessarily disrupt the smooth flow of wastewater, resulting in floods even during light showers. A report published by Keep America Beautiful Inc. (2009) notes that improper litter disposal poses a threat to human, animal, plant life, and people's economic prosperity. For instance, there may be a downfall in local tourism as litter affects the serenity of the country. Hence, it is evident that the consequences of littering are costly to human beings, animal species, the environment, and economy. This is further evident through the United Nations "Sustainable Development Goals" which covers 17 areas in their 2030 sustainable development agenda promoting a holistic view of social, economic, and environmental sustainability worldwide (Immler and Sakkers, 2021).

All above discussion concludes that street littering has been a timely and important area of discussion. Hence this study carries both empirical and academic worth. The findings and recommendations of this study would be useful for the policy making bodies in understanding the littering habits and behaviors of people. The dissemination of findings will create social awareness as well. In addition, scholars who have similar research interests would gain more insights to the Sri Lankan context in understanding the cultural variations of this issue.

This study is central to the youth. Literature suggests that youth comparatively litter more. According to Schultz et al. (2013), the highest littering rate occurred for younger individuals aged 18 to 29 years, for whom the littering rate was 26%. For adults 30 years and older, the littering rate remained steady at approximately 15%. Children and adolescents (younger than 18 years) had a littering rate of 13%. Furthermore, studies show that younger people, especially those between 17 and 19, tend to litter more than older people (Beck, 2007), cited by Khawaja and Shah, (2013). Hence, this study particularly focused on youth to identify other significant characteristics that affect their street littering behavior.

Previous studies denote many other influences towards littering behavior. For instance, Gender (Al-Khatib et al., 2009; Campbell, 2007; Freije et al., 2019; Schultz et al., 2013), income (Al-Khatib et al., 2009; Nkwocha and Okeoma, 2009), educational level (Al-Khatib et al., 2009; Campbell, 2007; Nkwocha and Okeoma, 2009) and age (Freije et al., 2019; Nkwocha and Okeoma, 2009; Schultz et al., 2013) as factors affecting littering behavior. Some other studies indicate that littering behavior is measured based on

factors such as trash bin facilities, awareness campaigns, and public littering behavior (Asmui et al., 2017). According to a study carried out in Mexico, it was revealed that laziness of people, lack of vigilance by municipal authorities, no litter bins on streets, and imitation (Muñoz-Cadena et al., 2012) were the main reasons behind littering.

Usually, people litter intentionally or unintentionally. It is difficult to explain the littering behavior of people without a deep understanding on this area. Hence, this study examined two social psychological theories (theory of deindividuation and theory of social comparison) to explain the littering behavior and associated factors of individuals.

According to Zimbardo's theory of deindividuation, situations that engender a feeling of anonymity may lead to the abdication of personal responsibility. Past studies have suggested that individuals are more likely to litter anonymously than when their name can be identified with their behavior. Deindividuation is a complex, hypothesized process in which a series of antecedent social conditions lead to changes in perception of self and others, thereby a lowered threshold of typically restrained behavior (Robinson, 1975). Another research finding reveals that broadly littering behavior stems from a lack of personal ownership (National Visible Litter Survey and Litter Cost Research Study, 2009). Thus, people litter when they do not take personal responsibility for their actions or increase obedience to group norms leading to losing self-awareness. As a result, one's behavior deviates from its original form as individual consciousness is replaced by a group conscious personality.

Festinger's theory of social comparison argues that people conform partly out of a desire to be correct, and what is correct is determined mainly through social comparison (Robinson, 1975). He believes that scientists and laymen prefer objective tests when objective standards are available. However, in the absence of unambiguous standards, people will seek to evaluate the correctness of their opinions, attitudes, and behaviors by comparing them with others. The theory of social comparison proposes that individuals turn to others in ambiguous situations to evaluate what is "correct " behavior. Once individuals in a group begin comparing themselves with others, there are intense pressures toward uniformity. This process is called consensual validation. In this situation, there is no individual to model or imitate. If people seek consensual validation for their behavior from situational cues, it can be hypothesized that littering will be more likely in a dirty area than in a clean area (Robinson, 1975). Accordingly, when people see waste scattered all over, they assume it is an ideal place to dispose, given that it is not so. As a result, people come to similar conclusions individually over an observed event amounting to littering in an already littered area.

Research Methods

The study was conducted under the positivist paradigm and used the quantitative method under the deductive reasoning approach. Both primary and secondary data sources were utilized. This research incorporated a survey research design where the primary tool used in data collection was a structured questionnaire. Questionnaires were chosen as they are a reliable and a quick method to collect information from multiple

respondents in an efficient and timely manner. The questionnaire was posted as an online survey to the sample, using google forms via popular social media networks. The first section of the questionnaire covered the demographic characteristics of the respondents, and the latter comprised questions relating to dependent and independent variables. A 5-point Likert scale was used to measure the level of agreement between the independent variables and the dependent variable.

Thus, the study initially attempts at deriving relationships using the variables identified from literature. Hence, the dependent variable was taken as the 'littering behavior of youth' and factors subject to discussion in this paper were selected as visibility of litter, group behavior, and environmental factors. In addition, demographic factors such as gender, family income, age, and education were analyzed as secondary factors to this study. The way how each factor affects street littering behavior was examined using a sample of youth aged between 15-29 years based on the Sri Lankan context. The research is then extended to determining sustainable solutions to overcome the issue. This study was carried out in Colombo, Sri Lanka.



Figure 1. Geographic Location of the Study Area - Colombo District in Sri Lanka
Source: Colombo District Map (2022)

Colombo, the heart of the Western province, was selected as the target population to this study. Figure 1 depicts a graphical representation of this geographical area. Statistics indicate Western province as the largest waste generating region in Sri Lanka. Colombo is also the most densely populated district with 3,300 persons per square kilometre. The youth population in the Colombo district stands at 556,554 for the year 2012. While the youth were mainly considered, as much prior literature suggests, they litter more than older people (Freije et al., 2019; Nkwocha and Okeoma, 2009; Shultz et al., 2013). This study used a simple random sampling technique. Simple random sampling is a subset of individuals (a sample) chosen from a more extensive set (a population) where each individual is chosen randomly and entirely by chance, such that each individual has the same probability of being chosen (Igwenagu, 2016). Furthermore, the researchers ensured that the samples were not explicitly identified as litter generators or non-litter generators to avoid bias. The sample size used was 315 youth residing in the Colombo district. It was deemed to be adequate as per Slovin's formula (refer appendix

A) under a margin of error of 7%. Moreover, the unit of analysis is the primary entity that is being analysed in a study. It is the 'what' or 'who' that is being studied (Igwenagu, 2016). Hence a youth between the age group of 15-29 years who actively participated in the survey was denoted as the primary unit of analysis.

Figure 2. depicts the analytical framework expected to be accomplished through the research. Accordingly, it can be hypothesized that visibility of litter, group behavior, environmental factors, and demographic factors (gender, age, education, family income) have a relationship with street littering behavior.

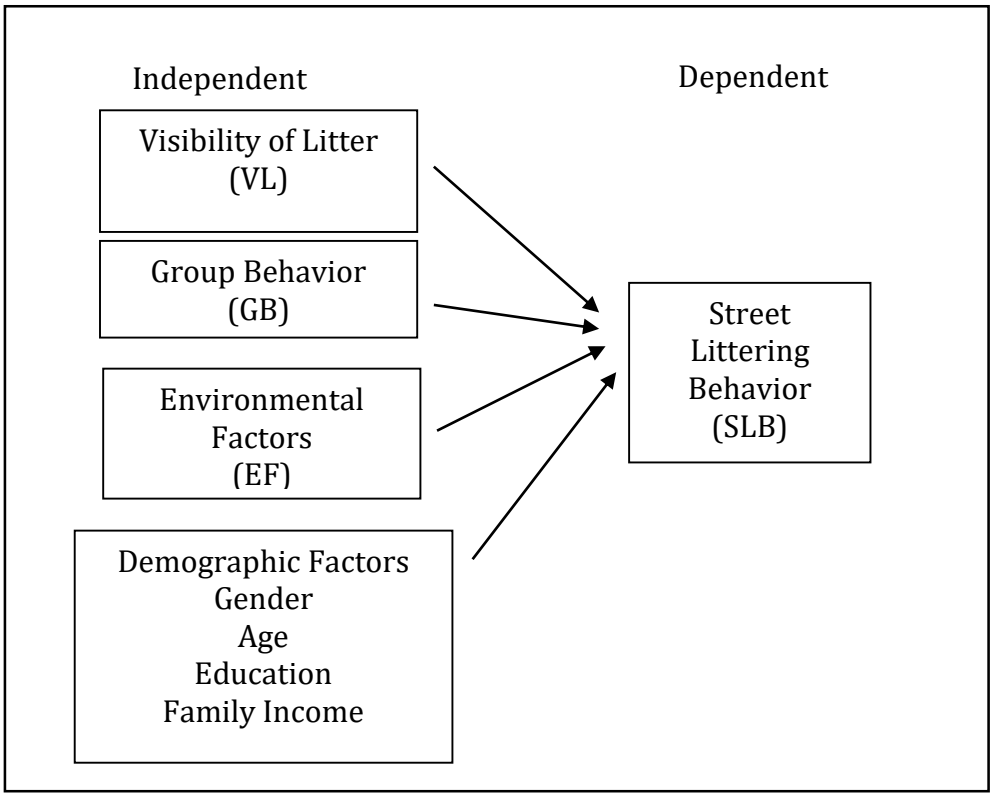


Figure 2. Analytical Framework
Source: Processed by Authors (2022)

Separate analytical techniques were used to analyse the variables. Visibility of litter, group behavior and environmental factors were subjected to a correlation analysis. While demographic factors used t-test and analysis of variance (ANOVA).

Table 1 elaborates on the operationalization of both dependent and independent variables. Analysis of data was performed using Statistical Package for Social Sciences (SPSS) computer program version 25. Frequencies for categorical variables were computed in order to summarize the demographic characteristics of the sample.

The results were graphically presented using pie charts. Moreover, the study incorporated statistical tools that follow the parametric analysis. The sample size used in this study was adequately large enough (>30) to follow the parametric test. Such that the decision to use parametric or non-parametric analysis becomes indifferent (Chin and Lee, 2008).

Table 1. Conceptualization Table
Source: Processed by Authors (2022)

Variables	Working definition	Items/Indicators	Question No.
Visibility of Litter (VL)	Litter readily seen throughout an area which grabs human vision towards the litter items (National Visible Litter Survey and Litter Cost Research Study, 2009).	• Presence of litter • Influence by other's actions • Reduced level of consciousness	Q- 01 Q- 02 Q- 03
Group Behavior (GB)	The influence on thinking and behavior from the broader social context, including social norms (established or accepted ways of behaving), cultural conventions, and shared understandings (Lyndhurst, 2013).	• Shared understandings • Anonymity • Lack of guilt • Social norms	Q- 04 Q- 05 Q- 06 Q- 07
Environmental Factors (EF)	Improved infrastructure and accessibility (Al-Mosa and Abdullah S., 2017).	• Availability of litter bins • Convenience of a litter bin • Government fines • A ban on street littering • Signboards on littering • Anti-litter messages through pictures and slogans	Q- 08 Q- 09 Q- 10 Q- 11 Q- 12 Q- 13
Street Littering Behavior (SLB)	The process by which waste ends up in the wrong place. (Lyndhurst, 2013). Litter on the roadside can arise as a result of people deliberately dropping or throwing it from their vehicles. (Litter Strategy for England, 2017).	• Littering as a pedestrian • Littering as a traveler • Littering as a consumer of a product	Q- 14 Q- 15 Q- 16

Prior to proceeding to any other advanced analysis, the validation of measurement properties was made. The reliability of a scale indicates how free it is from random error. Reliability in this study was assessed based on internal consistency, which refers to the degree to which the items that make up the scale are all measuring the same underlying

attribute. The most used statistic is Cronbach's coefficient alpha. Ideally, the Cronbach alpha coefficient of a scale should be above 0.7 (Pallant, 2005).

Although reliability is vital for a study, it is not sufficient unless combined with validity. In other words, for a test to be reliable, it also needs to be valid (Wilson, 2010) cited by Taherdoost, (2016). Accordingly, the validity of a scale refers to the degree to which it measures what it is supposed to measure (Pallant, 2005). Content and construct validities (convergent and discriminant validity) were tested in this study. The constructs were developed based on scholarly definitions to ensure content validity. Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were used to ensure convergent validity. These tests examine whether the researcher has adequate items for each construct. According to Hair et. al., (2011), researchers need to examine the average variance extracted (AVE) for convergent validity. An AVE value of 0.50 or higher than that indicates a sufficient degree of convergent validity, meaning that the latent variable explains more than half of its indicator's variance. For discriminant validity, the AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct (Fornell–Larcker criterion).

Furthermore, Pearson Correlation was used to explore the strength of the relationship between the independent variables (visibility of litter, group behavior, and environmental factors) against street littering behavior of youth. A Pearson correlation matrix indicates the direction, strength, and significance of the bivariate relationships among all the variables that were measured at an interval or ratio level (Sekaran and Bougie, 2016). According to Pallant, (2005) correlation coefficient (r) values vary from -1 to +1. The sign indicates whether there is a positive or negative correlation. A negative correlation means the variables are inversely related, and a positive correlation denotes that the variables are positively related. The value zero refers to no correlation, while 1 means a perfect correlation (the value of one variable can be determined exactly by knowing the value of the other variable). The strength of the correlation can be expressed using the below guide presented in Table 2.

Table 2. Strength of the Correlation
Source: Akoglu (2018)

$0.00 < r_s \leq \pm 0.19$	Negligible
$\pm 0.20 < r_s \leq \pm 0.29$	Weak
$\pm 0.30 < r_s \leq \pm 0.39$	Moderate
$\pm 0.40 < r_s \leq \pm 0.69$	Strong
$\pm 0.70 < r_s < \pm 1.00$	Very Strong

An independent sample t-test was used for the demographic variable, gender, to compare the scores among variables and test their influence independently on street littering behavior. Accordingly, it tells the researcher whether there is a statistically significant difference in the mean scores of the dependent variable between the two groups (Sekaran and Bougie, 2016).

Analysis of Variance (ANOVA) was applied to the independent variables: age, education level, and income level. ANOVA assesses the relative size of variance among group means (between-group variance) compared to the average variance within groups (within-group variance) (Kim, 2014). This study used one-way ANOVA where the title 'one-way' indicates there is only one independent variable, and 'between groups' means having different subjects or cases in each group. Before comparing the sample means, the underlying populations should have a common variance (Gastwirth et. al., 2009). Accordingly, homogeneity of variance was tested using Levene's test. A significance value of more than 0.05 indicates that variances between two groups are equal (Pallant, 2005). However, when homogeneity of variance is violated, the Welch test is preferred. According to James Algina et al., (1994), when the data are sampled from skewed distributions and the variances are different for the sampled populations, Welch's test controls the Type I error rate. A chi-square test is used to check the independence between two categorical variables. Hence, this test was used to determine the general association between the variables: age, education, and income level against street littering behavior.

Results and Discussion

Demographic Analysis

315 youth from the Colombo District took part in this survey: 172 females and 143 males. As a proportion, it amounts to 55% of females and 45% of males. Most of the respondents, 46% belonged to the higher income category of a monthly income of above Rs.100 000. The middle-income holders of Rs. 10 000 – 50 000 and Rs. 50 000 – 100 000 proportioned to 23% and 28% respectively. Only 3% formed the lower monthly income bracket of less than Rs. 10 000.

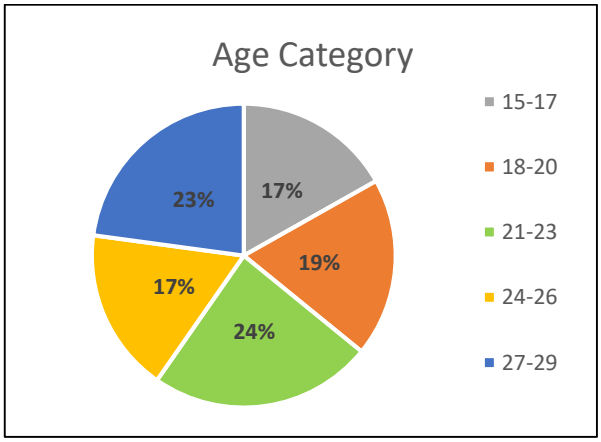


Figure 3. Age Composition
Source: Processed by Authors (2022)

According to Figure 3 The respondents varied between the age groups of 15 – 29 years. Most of the youth (24%) are 21 – 23 years old, and 23% of the youth belong to the age group 27 -29, while 19% belonged to the 18 – 20 age range. An equal proportion of

respondents making up 17% each, belonged to the age groups of 15 – 17 and 24 – 26 years.

The educational background of respondents was as follows. Most of the respondents amounting to 49%, hold a bachelor's degree as their highest education. 25% and 14% of youth have respectively advanced level (A/Ls) and obtained school education until Ordinary level (O/Ls). The educational qualifications such as Masters' degree, professional qualifications, and Higher National Diploma proportions to 12% of youth in the postgraduate and other higher education category.

Validation of Measurement Properties

As per Table 3 validation of measurement properties, all the reliability coefficient values are higher than 0.7 concluding all variables as reliable. Each KMO value of respective variables is greater than 0.6 indicating that there is an adequate sampling. Since all P-values are lesser than 0.05 level of significance under the Bartlett's Chi square test, convergent validity is present with items in each variable that are suitable for structure detection and further analysis. The AVE fulfills a sufficient degree of convergent validity with AVE values equal or greater than 0.5 to have a high level of variance explained by the set of items in each variable, as presented in Table 3.

Table 3. Validation of Measurement Properties
Source: Processed by Authors (2022)

Variable		No of Items	Cronbach's Alpha	KMO	Bartlett's P-value	AVE
Type	**Name**					
Dependent Variable	SLB	3	.881	.724	0.000	1.706
Independent	VL	3	.848	.686	0.000	1.529
Variable	GB	4	.780	.643	0.000	1.911
	EF	6	.712	.671	0.000	1.726

Table 4. Squared Correlations Between Latent Constructs
Source: Processed by Authors (2022)

Construct	AVE	Construct			
		VL	GB	EF	SLB
VL	1.529	**1.529**			
GB	1.911	0.438	**1.911**		
EF	1.726	0.041	0.123	**1.726**	
SLB	1.706	0.342	0.421	0.082	**1.706**

Discriminant validity was also assured as Table 4. Accordingly, the bold values in the matrix are the AVE values and the off-diagonal values represent the squared correlations between the latent constructs.

Correlation Analysis

The association between the independent variables against the dependent variable was analyzed using Pearson Correlation.

Since the probability value (2-tailed) is 0.000 and is less than the 1% level of significance, it shows a statistically significant linear relationship of each independent variable with the dependent variable, street littering behavior. According to Table 5, both visibility of litter (r= 0.585) and group behavior (r= 0.649) indicate a statistically significant strong positive association with street littering behavior of the youth. This finding is supported by several studies stating that littering behavior is more prevalent in an already littered area (Campbell, 2007; Freije et al., 2019; Robinson, 1975; Shultz et al., 2013). Furthermore, this finding also supports Festinger's consensual validation under the theory of social comparison. The finding on group behavior is in line with Zimbardo's theory of deindividuation, where people increase their obedience to group norms leading to losing one's self-awareness. It is also evident by Campbell, (2007) that people litter, arguing that everyone else is doing it. As a result, group behavior is seen to have a strong positive association with street littering behavior. Similarly, Lyndhurst (2013) notes that the presence of peers seems to drive littering behavior among the young.

Table 5. Correlation between Independent Variables and the Dependent Variable
Source: Processed by Authors (2022)

Pearson Correlation & P-value	**SLB**
VL	0.585**
P-value	0.000
GB	0.649**
P-value	0.000
EF	- 0.287**
P-value	0.000

However, there is a statistically significant weak negative association between environmental factors and street littering behavior. One aspect of environmental factors includes the placement of litter bins. Although previous studies denote increasing the number of litter bins is expected to help, it has been reported in the literature suggesting that this may not be a total solution (Al-Khatib et al., 2009). Similarly, fines and penalties were found to be less appealing in a study conducted in Bahrain (Freije et al., 2019). The above findings support this study because its strength is weak even though there is a significant correlation.

Independent Sample T- test

The probability value (P=0.224) is not less than or equal to 0.05. Hence, the null hypothesis is not rejected at 5% level of significance. Therefore, it can be concluded that there is no statistically significant difference between the population average (mean) of male and female youth street littering behavior.

Table 6. T-test Group Statistics
Source: Processed by Authors (2022)

	Gender	N	Mean	Std. Deviation	Std. Error Mean
SLB Total	Male	143	6.08	3.142	.263
	Female	172	5.64	3.193	.243

This is similar to the finding of Nkwocha and Okeoma (2009) that stated there was no evidence littering habits differed by gender. Contradictory studies however denote that male litter more than females (Al-Khatib et al., 2009; Freije et al., 2019; Shultz et al., 2013).

One-way Analysis of Variance (ANOVA)

The mean SLB (M= 6.75) is highest for the 15-17 age group while the mean rank SLB (M = 5.44) is lowest for the 24-26 age group. The significance value of the Levene's test (0.138) is greater than 0.05. Thus the null hypothesis is not rejected at 5% significance level. Accordingly, the assumption of homogeneity of variance is not violated for the variable age. Based on the one-way ANOVA results presented in table 7 it does not indicate a statistically significant difference in the SLB scores for the five age categories [F(4,310)= 1.436, P=0.222] at 5% level of significance, thus the null hypothesis is not rejected.

Table 7. One-way Analysis of Variance (ANOVA) –Age
Source: Processed by Authors (2022)

SLB Total					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	57.484	4	14.371	F1.436	.222
Within Groups	3103.259	310	10.011		
Total	3160.743	314			

Supporting this finding Cialdini, Reno, and Kallgren (1990), cited by Freije et al., (2019) identified no significant difference with gender or age group against street littering behavior. Nevertheless, some other studies show a contradictory view. For instance, de Kort et al., (2008) identified that young people (below 20 years) were more likely to litter than people of older age. Similarly, Schultz et al. (2013) found younger people (18-29 years) to litter more than older ones. A chi-square test however shows that there is an association between age and street littering behavior. Where the P-value is 0.05 and the null hypothesis is rejected at 5% level of significance.

The mean SLB (M= 7.26) is highest for ordinary level education while the mean rank SLB (M = 5.33) is lowest for other levels of education such as Masters' degree, Diploma, etc. The mean SLB (M= 6.76) is highest for the Rs.10 000-50 000 income bracket while the mean rank SLB (M = 5.44) is lowest for less than Rs. 10 000 income group. The significance value of the Levene's test is not greater than 0.05 for both education (0.02)

and income level (0.015). Thus, the null hypothesis is rejected at 5% significance level violating the assumption of homogeneity of variance. Furthermore, based on the one-way ANOVA results it does not indicate a statistically significant difference in the SLB scores for the five educational levels (P=0.102) and the four income categories (P=0.132) at 5% level of significance. Thus, the null hypothesis is not rejected.

Literature suggests education level as a major determinant for street littering behavior. They note that individuals with lower education levels litter more frequently. (Freije et al., 2019; Nkwocha and Okeoma, 2009). However, this study shows a contradictory result. Nevertheless, a chi-square test shows there is an association between education level and street littering behavior. Where the P-value is 0.044 and the null hypothesis is rejected at 5% level of significance.

Moreover, although this study did not indicate a significant difference in street littering behavior across different income groups, past literature found family income to have a direct relationship with littering behavior Al-Khatib et al., (2009). In addition, Nkwocha and Okeoma, (2009) also identified income as a major determinant of littering behavior where people from lower-income levels had high rates of littering.

Recommendations

In line with the research findings and research objectives following recommendations are brought forward to mitigate the problem of street littering. Both short term and long-term recommendations are suggested towards policymakers.

The government may initiate several short-term strategies or strengthen the existing non-working strategies to eradicate the problem of street littering in Sri Lanka. Although environmental factors revealed a weak relationship against street littering, recommendations can be sought as a complementing mechanism to mitigate the problem. Henceforth, as a starting point, measures should be taken to facilitate the public towards proper disposal of waste. Trash bins are vital in reducing this indecent behavior of the people. It is suggested that trash bins be placed in areas of high public movement with methodical proximity between each bin. They should also be designed innovatively to capture the attention of the litter generators. Statements such as 'Use me', 'I am here at your convenience', 'Leave your trash here' etc. can be stated on trash bins.

Measures should also be taken with the help of the area local government to clear the trash bins on time to avoid overflowing bins. In order to empower the local governments, performance measures can be established based on clean streets. As findings indicate more and more visible litter induce street littering it is important that such institutions maintain a clean street.

General instructions such as 'Do not litter' does not create a significant impact on street littering behavior. Thus, government-sponsored advertisements, attractive posters, and banners should be displayed along the streets. A strong, broad-based, and cross-sectional campaign must simultaneously emerge within the society, taking the support of both government and private sector organizations, environmentalists, civil society activists, educational institutions, religious institutions, social influencers etc. The government requires publicizing this message to the wider community in the country in

all three languages. (i.e., English, Sinhala, and Tamil Languages). Social media can also be used as a strong tool in obtaining a wider reach.

As the last resort, the government may opt for fines or other forms of punishment such as getting the public to clean the streets. A spot fine between Rs. 500 - 5000 or a court-imposed fee of Rs. 5000 to 50 000 or imprisonment of a minimum three months and not less than one year was gazetted in 2008 for litter generators in the Western province. However, local authorities' incapacities hindered its effective enforcement. Thus, such existing rules and regulations should also be strengthened and strictly enforced. The police environmental protection division of Sri Lanka which was re-established during the latter part of 2019 can be utilized to monitor people's behavior and impose the appropriate penalties. All the above suggestions can be launched within a short period with minimum effort and cost.

Moreover, it is of vital importance to change the attitude of the people. Perceiving ourselves as genuine generators of change, ultimately reflect real agents acting from an individual level of education to a societal one (Muñoz Cadena 2012). Schools can become a pioneer in changing the attitudes of children by inculcating a sense of love towards the environment from a very young age. Practical exposure should be given along with awareness programs conducted at school level. Group behavior was a key factor that influenced street littering behavior. As such, education can have a multiplier effect as the message will be taken to their families as well.

Research findings show no difference in the littering behavior against demographic factors of youth based on gender, age, income, and education. Thus, youth who were the subject of this study should spend time individually reflecting upon their behavior and assessing the impact caused by them on the environment, irrespective of their demographic differences. As governments and educators take measures to propagate reduction in street littering, the youth should actively engage in the programs set out for them. It is also suggested that they make best use of the facilities that are provided. For instance, litter bins should be used appropriately where segregation of litter is required. Ultimately, from the viewpoint of youth, it is self-discipline, self-reflection, and self-transformation that will assist in irradicating the indecent behavior of street littering among youth.

Conclusion

Many studies carried out in Sri Lanka are based on waste disposal, waste management, and the garbage crisis. Although street littering represents one form of waste, studies specifically relating to this remain scarce in the Sri Lankan context. Thus, a scientific study on littering would significantly contribute to the existing body of knowledge. The study was carried out on a sample of 315 youth residing in the Colombo district, aimed at determining the critical factors that affect street littering behavior. The study mainly focused on finding answers to the questions (i) what factors affect the littering behavior among youth in the Colombo district? (ii) what solutions can be taken to resolve the problem of street littering? The critical factors that affect street littering

behavior in Sri Lanka among youth were identified as visibility of litter, group behavior, age, and educational level. Environmental factors indicated a weak relationship, while no distinction in gender or family income affected street littering behavior. Moreover, it is suggested that future research be carried out covering all districts in the country extending the findings of street littering behavior among youth in Sri Lanka as a whole. Cross comparison studies can also be conducted between urban and rural youth, youth and adult street littering behavior, or a gender-wise study on youth street littering behavior.

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APPENDICES

Appendix A – Sample Size

Eq. (A.1)

Slovin's formula

$$n = \frac{N}{1+Ne^2}$$

N = Population size

e = Margin of Error