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Effects of Graphic Warning Labels (GWL) on the Factors Escalating Smoking Behaviour: An Empirical Study on Pakistani Adult Consumers

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ABSTRACT

Cigarette smoking remains a substantial public health concern, contributing to millions of This study investigates the influence of Graphic Warning Labels (GWLs) on smoking behavior among adult smokers in Pakistan. The study is addressing the moderating role of GWL effectiveness in the relationships between perceived smoking environment, perceived stress, and smoking addiction. As the method, a quantitative, cross-sectional survey was employed, collecting data from 501 adult smokers aged 18–40 years in Rawalpindi, Pakistan, through convenience sampling. Structural Equation Modelling (SEM) using AMOS was employed to analyze direct and moderating effects. Findings revealed that all three independent variables significantly predict smoking behavior: perceived smoking environment (β = 0.102, p = 0.033), smoking addiction (β = 0.107, p = 0.018), and perceived stress (β = 0.218, p < 0.001). However, moderation analysis indicated that GWL effectiveness did not significantly moderate the relationship between any of the predictors and smoking behavior. Interaction effects were not significant in perceived smoking environment (β = 0.057, p = 0.197), perceived stress (β = -0.037, p = 0.405), and smoking addiction (β = 0.064, p = 0.166). These findings indicate that although there is evidence that increases awareness, the level of implementation of GWLs in Pakistan is not sufficient to change smoking behaviour where there are high levels of addiction, stress, and social exposure. A more comprehensive tobacco control program with plain packaging, public education, and cessation assistance is suggested to provide a deterrent effect to GWLs.

1. INTRODUCTION

Cigarette Smoking has emerged as the most threatening health hazard in recent times due to ever ever-increasing mortality rate due to tobacco consumption. Several alternate tobacco control strategies have been proposed by the World Health Organization to deal with this prevailing menace of tobacco consumption, causing more than fifteen types of cancers besides chronic cardiac and pulmonary diseases. MPOWER measures suggested by the FCTC provide practical solutions to overcome these overwhelming tobacco utilization issues. Enhanced tobacco taxation, besides bans on smoking in public places, comprises a few empirical tobacco control measures proposed by the WHO.

Graphic health warning labels on cigarette packages have proven to be cost-free and A highly effective tobacco control legislative measure, introduced by the WHO in 1985, has been Implemented by sixty-five countries so far. Due to its more effective risk communication than text-only warnings, it started spreading globally in the early 2000s, particularly in low and middle-income countries. The member signatory countries of FCTC (more than 180 so far) are required to mandate health warning labels on individual cigarette packages, under Article 11 of FCTC [1]. Initially starting from 30% of cigarette package space, the WHO FCTC necessitates signatory countries to cover 85% of the package surface with outsized, comprehensible graphic health warning labels, displaying harmful effects of cigarette smoking [2], [3]. Graphic health warnings are required to be cautiously designed, containing comprehensive information about the health risks associated with cigarette smoking. Effectual risk communication strategy demonstrating fear appeals in graphic warning labels on cigarette packaging will certainly prove to be supportive of smoking cessation [4].

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European Union Tobacco Products Legislation has mandated the placement of graphic warning labels, demonstrating emotions of disgust, sadness, and fear, on cigarette packages in all European Union member countries by May 2016. One Hundred Twenty-Seven countries (almost 74% of the global population), especially low-income countries, have banned all sorts of direct or indirect tobacco advertisements so far [5]. Attractive cigarette packaging must be intentionally distorted by the execution of the Plain Packaging Law, initially productively introduced in Australia in December 2012, intended to standardize the shape, labelling and size of cigarette packages. The Plain Packaging Law requires the printing of tobacco manufacturing company names as well as brand names on cigarette packages in small-sized and uniform font, besides monotonous brown colored (in Australia) packages [6]. The United Kingdom and Ireland followed suit in 2015.

Pakistan is the 26th country that legislated the placement of graphic health warning labels in 2010, covering forty percent of space of both the front and back side of cigarette packs [2, [7] that are proven to be effective tobacco control measures. The enactment of plain packaging legislation complemented with enlarged graphic warning labels up to 85% of package space, is still awaited in Pakistan to comprehensively address the prevalence of cigarette smoking behaviour [8], [9].

Normally, cigarette smokers initiate this addictive habit before eighteen years of age. Lifelong smoking habit is generally adopted in adulthood due to addictiveness to nicotine [3], [10]. Smoking preventive efforts might be successful in restricting adults at the smoking initiation or experimentation stage, but still, the smoking prevalence is spreading abruptly among young adolescents. Conclusively, despite the implementation of several effective tobacco control legislative measures comprising graphic health warning labels on cigarette packs, enhanced taxation on cigarettes, restrictions on tobacco advertisements, banning smoking at public places and most significantly the societal norms stigmatizing smokers, the dilemma persists [11]. This means that some more strong stimulus like plain packaging is required to enhance the effectiveness of risk communication through graphic warning labels. [7], [11]. Benefits due to taxation from the tobacco industry of Pakistan must be ignored to attain long-term health benefits for the betterment of current and future generations of Pakistan. Healthy youth will certainly play their due role in the economic and social development of Pakistan, provided some crucial precautionary health preservation measures have been undertaken recently.

Perceived smoking environment, perceived stress, as well as smoking addiction are the primary predictors/facilitators of smoking initiation/behavior. The evaluation of the impact of these predictors on smoking behavior, with the moderation of graphic warning Labels' effectiveness is the purpose of this study. In the context of Pakistan, cigarette smoking behavior, being the leading risk factor for over one hundred thousand annual deaths due to tobacco-related chronic ailments, necessitates the implementation of WHO-recommended effective tobacco intervention measures comprising enlarged GWL on plain cigarette packaging.

This research study will explore the moderating effect of graphic warning labels (GWL) effectiveness on the significant predictors/facilitators of smoking behavior, including perceived stress, perceived smoking environment and smoking addiction [12], consequently recommending effective tobacco control measures for Pakistani Adults.

Perceived Smoking Environment and Smoking Behavior

Parental and peer influences are the profound socialization forces directly affecting the adolescent development phenomenon. During adolescence, the youth develop friendship bonds and subsequently get engaged in cigarette smoking behavior as perceived by peer networks. This is the critical time for smoking initiation and consequent smoking addiction [8]. Normative expectations, i.e., the beliefs that others expect one to conform to a given norm, family or family members' smoking, friends' smoking, peers' smoking, cigarette availability, as well as co-workers' smoking, constitute perceived smoking environment factors or predictors of cigarette smoking initiation. Therefore, the following hypothesis is proposed:

H1: *Perceived Smoking Environment positively affects Smoking Behavior*

Smoking Addiction and Smoking Behavior

Multi-faceted nicotine dependence or smoking addiction comprises a strong 'urge to smoke' due to nicotine extraction from the body, where an increased level of smoking causes the enhanced nicotine level in the body, rigid patterns of cigarette consumption, and decreased tolerance of smoking, i.e., the satisfaction level attained from nicotine intake is derived from the arousal of the need to smoke more. Smoking addiction helps smokers develop rigid patterns of cigarette smoking, even being fully acquainted with the

harmful possible risks associated with smoking behavior, thus indulging in optimistic beliefs of remaining unharmed by these health risks of smoking [12]. Or due to smokers' brand loyalty for specific cigarette brands [13]. Therefore, the following hypothesis is proposed.

H2: Smoking Addiction positively affects Smoking Behaviour.

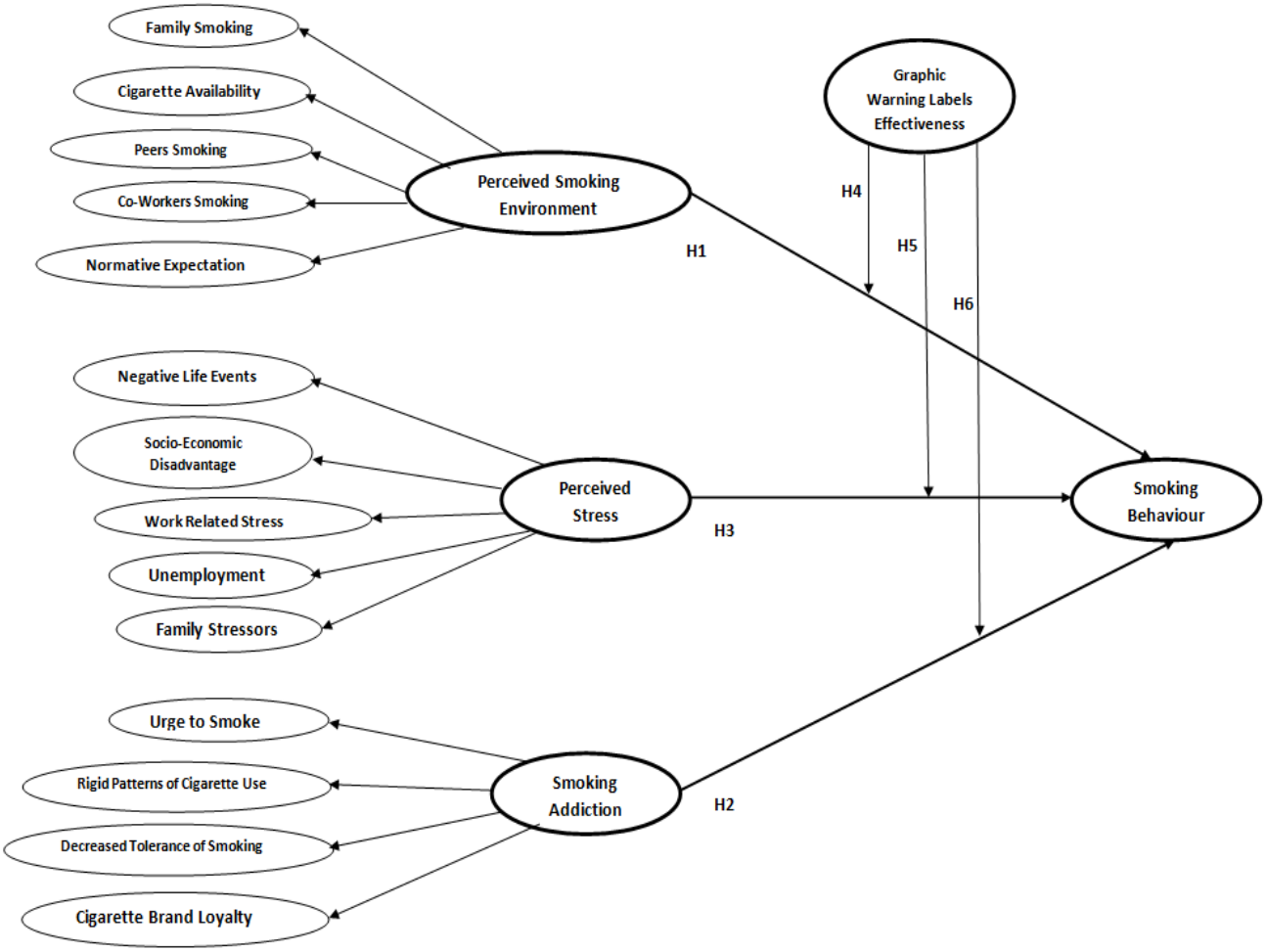

Figure 1. Research Model

Perceived Stress and Smoking Behaviour

During stressful time intervals, the self-medicating function of relieving physical distress originates and encourages different coping behaviours comprising smoking, alcohol drinking, overeating and several unhealthy activities which assist with the regulation of the human mood as well as converting the pressurized situations into pleasurable and relaxing circumstances. Most young adults experience depression before eighteen years of age, which encourages them to indulge in smoking behavior as a relaxant for their stressful situation [14]. Therefore, the following hypothesis could be proposed.

H3: Perceived Stress positively affects Smoking Behavior.

Moderation of Graphic Warning Labels Effectiveness in association between Perceived Smoking Environment and Smoking Behaviour

Parental smoking behavior is related to young adults' smoking patterns, i.e. occasional vs. daily. The smoking environment at the workplace represents a major cause of smoking initiation among adolescents. Interpersonal communication highlighting the associated health concerns is depicted by graphical health warning labels imparting a definite dispiriting impact on smoking behavior [15]. Therefore, the following hypothesis is proposed.

H4: Graphic Warning Labels Effectiveness moderates the association between Perceived Smoking Environment and Smoking Behavior

Moderation of Graphic Warning Labels Effectiveness in association between Perceived Stress and Smoking Behavior

Current smokers perceive greater levels of stress than non-smokers, as well as smokers who have quit smoking. Greater perceived stress is directly related to enhanced nicotine dependence and reduced quitting self-efficacy. Perceived stress has been determined as the main obstruction to smoking cessation [16]. Keeping in view the dire consequences of smoking among adolescents, graphic warning labels serve as an effective intervention to prevent stressful smoking behavior. Therefore, the following hypothesis is proposed.

H5: Graphic Warning Labels Effectiveness moderates the association between Perceived Stress and Smoking Behavior.

Moderation of Graphic Warning Labels Effectiveness in association between Smoking Addiction and Smoking Behavior

Young adults constitute the potential target market segment for the tobacco industry, as smoking addiction in young adulthood paves the way to lifelong smoking behaviour in this crucial physical and psychological developmental period of life. The graphical health warning labels serve as a viable prevention function of restraining youth from the addictive consumption of tobacco variants [9]. Therefore, the following hypothesis is proposed.

H6: *Graphic Warning Labels Effectiveness moderates the association between Smoking Addiction and Smoking Behavior.*

2. MATERIALS AND METHODS

This research study was conducted in Rawalpindi city of Punjab province of Pakistan.
The selection of Rawalpindi city of Punjab province of Pakistan is justified in a way that we are selecting the psychographic sample (based on consumer personality, traits, values, attitudes, interests and lifestyles) instead of a demographic sample. In another research study [11], participants above 18 years of age are adult smokers. Similarly, [17] also investigated the smoking behavior of adults by using participants under the age bracket of 18 to 40 years. Moreover, adult participants were above 18 years as well as above 15 years of age [11].

2. 1. Participants

By using these justifications, the population of adult smokers aged between 18 to 40 years in Rawalpindi city is considered for this research study. In Rawalpindi city, there are approximately 2.03 million (2,025,666) adults comprising 22.2% (449,700) male smokers, 2.1% (42,540) female smokers and overall, 12.4 % (251,183) smokers belonging to the age group of 18-40 years. The population frame considered for this research study comprises adult (male and female) consumers of cigarettes in Rawalpindi city of Pakistan. These adults are regular consumers or usual customers of cigarettes from different retail outlets, commercial areas or (POS) points of sale of cigarettes [17]. The total population selected for this research investigation is 251,183 (two hundred fifty-one thousand approximately) smokers in Rawalpindi city, ranging between the age bracket of 18 to 40 years.

2. 2. Sample Selection

In this cross-sectional research study, "Convenience Sampling" is used for the selection of a sample from the population. Adult cigarette consumers are accessible at points of sale (POS) of cigarettes as well as at cash & carry stores or shopping malls in various commercial areas of Rawalpindi city. By using the convenience sampling technique, it is easy to draw the required sample convenient for the researcher in the collection of data from respondents. In total, 2.03 million people belong to the adult age bracket (18-40 years) in Rawalpindi city. There is a total of 12.4 percent of cigarette smokers belonging to this age group, approximating 251,183 (almost two hundred fifty-one thousand), including 22.2% males and 2.1% females. They used convenience sampling in their research study. [1], [17] also used convenience sampling in their research study.

2. 3. Data Collection

Six hundred questionnaires were distributed to the adult cigarette smokers of Rawalpindi city and it ensured 501 completed questionnaires were collected back, thus illustrating the *Response Rate* as 83.5%, which was calculated as '501/600*100=83.5'. The questionnaire for this research study is self-administrated, but at the time of data collection, the researcher was available for any kind of query.

3. RESULTS

3. 1. Reliability

Initially, the pilot study was conducted to check out the reliability of items in our questionnaire. Data was obtained from 128 respondents of Rawalpindi city using a convenience sampling technique. After treating the missing values of the entire data of 501 respondents, a reliability analysis was run, and outcomes revealed that all variables in our research study and respective questions are

exceptionally reliable, possessing reliability greater than the threshold value of 0.6 Cronbach's Alpha. The reliability of perceived smoking environment (PSE) is 0.831, perceived stress (PS) is 0.903, smoking addiction (SA) is 0.837, graphic warning labels effectiveness (GWLE) is 0.662 and smoking behaviour (SB) is 0.708.

Table 1. Reliability statistics for study variables (Cronbach's Alpha)

Variables	No of items	Alpha
PSE	14	0.831
PS	16	0.903
SA	11	0.837
GWLE	5	0.662
SB	5	0.708

Table 2. Tests of normality using kolmogorov–smirnov and shapiro–wilk tests

Tests of Normality				
	Kolmogorov-Smirnova		Shapiro-Wilk	
Variables	Statistics	Sig.	Statistics	Sig.
PS	0.087	.000	.964	.000
SA	0.094	.000	.981	.000
GWLE	0.136	.000	.959	.000
SB	0.142	.000	.967	.000

The above table shows the normality statistics of the data using a nonparametric test. Kolmogorov-Smirnova test, abbreviated as the K-S test of normality, demonstrates that the distribution of data is not normal because the significance P-value is below 0.10 for every variable. In this data analysis, data normality is also determined by observing the values of skewness and kurtosis, which must lie between -3 to 3 for normal distribution of data. The following table elucidates that the values for all variables lie between the threshold values of Skewness and Kurtosis.

Table 3. Skewness and kurtosis values for assessing data normality

Variable	Skewness	Kurtosis
PSE	-.103	1.163
PS	.137	2.279
SA	.112	1.979
GWLE	.570	2.021
SB	-.314	0.236

As illustrated above, the research data is normally distributed and now parametric tests of multiple regression and moderation are used for this study. Correlation is a precondition of running regression, so initially, we found the correlation among variables.

Table 4. Correlation analysis

Variables	Mean	Std. Deviation	PSE	PS	SA	GWLE	SB
PSE	2.946	0.375	1				
PS	2.982	0.372	.405**	1			
SA	3.016	0.390	.225**	.0253**	1		
GWLE	2.894	0.557	.0247**	.0289**	.0287**	1	
SB	2.824	0.591	.0224**	.0291**	.0226**	.0167**	1

** Correlation is significant at the 0.01(99%) level

The above table depicts the mean values of PSE as 2.946, PS as 2.982, SA as 3.016, GWLE as 2.894 and SB as 2.824. Standard deviations of variables are also illustrated as 0.375 for PSE, 0.372 for PS, 0.390 for SA, 0.557 for GWLE and 0.591 for SB. Perceived stress and perceived smoking environment are 40% positively and moderately correlated, besides confirming a 99% significant association between them. Smoking addiction and perceived stress are 25% positively and weakly correlated, besides confirming a 99% significant association between them. Graphic warning labels' effectiveness and smoking addiction are 29% positively and weakly correlated, besides confirming a 99% significant association between them. Smoking behavior and graphic warning labels are 17% positively and weakly correlated, besides confirming a 99% significant association between them. All the variables are correlated, having values less than 0.8, thus negating any multicollinearity issue in our hypothesised model.

The value of R-Square is 0.105, which illustrates that almost 10% of the change in smoking behavior as a dependent variable has been caused by three independent variables, including perceived smoking environment, perceived stress and smoking addiction.

Table 5. Regression coefficients for predictors of smoking behaviour

	Unstandardized Coefficients		Standardized Coefficients		
Variables	B	Std. Error	Beta	t	Sig.
(Constant)	.813	.281		2.892	.004
PSE	.160	.075	.102	2.139	.033
PS	.343	.076	.218	4.503	.000
SA	.169	.071	.107	2.368	.018

The above table relates to the coefficient output of the regression analysis. Beta values demonstrate the power or strength of association between dependent variables and independent variables. The beta value (standardized coefficients) of PSE is 0.102, which demonstrates that one unit change in PSE brings a 10% change in smoking behavior, alternatively, the association between PSE and SB is 10% strong. Moreover, the t value for PSE is 2.139 which shows a positive effect or impact of PSE on SB. PSE P-value is 0.033, which is significant and less than 0.05 as well as depicts the significance of the association between PSE and SB with 95% confidence. Eventually, it is inferred that hypothesis H1 is accepted, i.e., perceived smoking environment positively affects smoking behaviour. The beta value of smoking addiction (SA) is 0.107, which illustrates that a 10 percent change in smoking behaviour is caused by one unit change in smoking addiction; alternatively, the association between SA and SB is 10% strong, which is almost equivalent to the strength of the relationship between PSE and SB. The t value for this relationship is 2.368, which denotes the positive impact of SA on SB. SA P-value is 0.018, which is significant and less than 0.05. Consequently, hypothesis H2 is accepted, and it is concluded that smoking addiction positively affects smoking behaviour. The beta value of perceived stress or PS is 0.218 which demonstrates that one unit change in perceived stress generates almost 22% percent change in smoking behaviour; alternatively, the association between SA and SB is 22% strong enough, which is greater than both individual associations of PSE and SA with SB. t value for this relationship is 4.503 which depicts the positive impact of PS on SB. PS P-value is 0.000, which is significant and less than 0.05 or all levels. Conclusively, hypothesis H3 is accepted stating that perceived stress positively affects smoking behaviour

3.2 Perceived Smoking Environment

The perceived smoking environment is the first independent variable. In this research study, two hypotheses were made to determine the association of perceived smoking environment with moderating variables as well as with dependent variables. *H1: Perceived smoking environment positively affects smoking behavior*.

The above statement represents hypothesis 1 for this research study which shows that there is a positive relationship between the perceived smoking environment with smoking behaviour. [17]Nichols et al., (2006) investigated and found a positive association of perceived smoking environment with the smoking behaviour of adolescents in their research study with a sample size of 858 respondents in New York City, U.S. [18] came across the direct positive relationship of the perceived smoking environment with smoking behaviour in their research article with sample size 713 in Minnesota, USA, as well. *H4: Graphic Warning Labels effectiveness moderates the association between perceived smoking environment and smoking behavior*.

The above statement represents the moderating effect of graphic warning labels on the association of perceived smoking environment and smoking behaviour. Previous literature describes that a perceived smoking environment enhances the smoking behaviour of cigarette smokers, and alternatively, graphic warning labels decrease the impact or influence of a perceived smoking environment on smoking behaviour. [15] analysed the positive association of the introduction of graphic warning labels on cigarette packages with the reduced impact of the perceived smoking environment on the smoking behaviour of adult smokers in Hong Kong in their research study. [15] also confirmed the discouraging impact of graphic warning labels on the association of perceived smoking environment and smoking behaviour in Australia, with a sample size of 1000 respondents in their research study.

The R-square value for model 1 is 0.066 which demonstrates that the perceived smoking environment causes a 6.6% change in smoking behaviour as the independent variable. Model 2 in the above output shows the R-Square value which is 0.069 which shows that a 6.9% change in smoking behavior is caused due to perceived smoking environment in the presence of graphic warning labels as moderator. Above table shows that Model 2 R-Square change, which is calculated as difference of R square of model 2 and model 1, has value of 0.003; it demonstrates that graphic warning labels have 0.3% impact or effect on the individual association of perceived smoking environment and smoking behaviour. F change value is 0.197 that depicts insignificance of our model with the inclusion of moderating variable GWLE.

Table 6. Moderation analysis: interaction of perceived smoking environment and gwl effectiveness on smoking behaviour

Variables	Unstandardized Coefficients	Standardized Coefficients		
	B	Beta	t	Sig.
(Constant)	-.022		-.494	.622
Z-score: PSE	.208	.207	4.580	.000
Z-score: GWLE	.114	.114	2.538	.011
Interaction_ PSE_GWLE	.051	.057	1.292	.197

Moderation regression is run on all three independent variables because all of they have significant P-values, which depict that the three independent variables have a significant effect on smoking behaviour, which is why, moderation effect of GWLE on all three individual associations of independent variables with the dependent variable will be analyzed separately. Beta value of the Interaction term, Interaction_PSE_GWLE, is 0.057, which elucidates 5% strong relationship between PSE and GWLE; the t value is 1.292, which demonstrates that GWLE has a positive impact on the association between PSE and SB. P value is 0.197, which is insignificant and greater than all three significance levels, i.e., 1%, 5% & 10% correspondingly representing 99%, 95% and 90% confidence intervals. R-square change is 0.003, which shows that due to the presence of the moderating variable of graphic warning labels effectiveness, 0.3% change is caused by GWLE on the association between PSE and SB. Conclusively, the H4 hypothesis is rejected, stating that graphic warning labels moderates the association between perceived smoking environment and smoking behaviour. As the interaction term is insignificant, the moderator GWLE does not have an impact. This It is evident from the results that GWLE is not playing the role of moderator between PSE and SB.

3.3 Perceived Stress

Perceived Stress is the third independent variable in our study, which has two hypotheses to determine the relation of Perceived Stress with the moderating variable, as well as with the dependent variable. *H3: Perceived Stress positively affects smoking behaviour.* The above statement represents hypothesis 3 for this research study, which shows that there is a positive relationship of Perceived Stress with Smoking Behaviour. It confirmed the affirmative association of perceived stress with smoking behaviour in their research study, conducted in the U.S. [11] revealed the direct positive association of smoking behaviour with perceived stress in their research study conducted in USA as well.

H5: Graphic Warning Labels effectiveness moderates the association between perceived stress and smoking behaviour. The above statement represents the moderating effect of graphic

warning labels on the relationship of Perceived Stress and Smoking Behaviour. Previous literature shows that Perceived Stress enhances the smoking behaviour of the consumer, and on the contrary, graphic warning labels decrease the impact of Perceived Stress on Smoking Behaviour. [19] observed in their research study conducted in Auckland, New Zealand, that while mulling over the ominous cost of smoking behaviour by youngsters, graphic warning labels serve as an effective intervention to abstain from stressful smoking behaviour. They scrutinised the condensing impact of graphic warning labels on the strength of the relationship between perceived stress and smoking behaviour of young adults in their research study conducted in the USA.

Table 7. Moderation analysis: interaction of perceived stress and GWL effectiveness on smoking behaviour

Model	R	R Square	Adjusted R Square	R Square Change	Sig. F Change
	.292	.085	.081	.085	.000
2	.294	.086	.081	.001	.405
Variables	Unstandardized Coefficients		Standardized Coefficients		
	B		Beta	t	Sig.
(Constant)	-.012			-.279	.780
Z-score: PS	.268		.271	5.923	.000
Z-score: GWLE	.062		.060	1.306	.192
Interaction_ PS_GWLE	.028		.037	-.834	.405

The above table is the model summary output of the moderation analysis for PS. In this table, R-squared value depicts the descriptive or expressive power of the regression model. Rsquare value for model 1 is 0.085 which demonstrates that perceived stress causes 8.5% change in smoking behaviour as independent variable. Model 2 in above output shows RSquare value which is 0.086 which shows that 8.6% change in smoking behavior is caused due to perceived stress in the presence of graphic warning labels as moderator. Above table shows that Model 2 R-Square change has value of 0.001; it demonstrates that graphic warning labels have 0.1% impact or effect on the individual association of perceived stress and smoking behaviour. F change value is 0.405, which depicts insignificance of our model with the inclusion of moderating variable GWLE.

Beta value of Interaction term, Interaction_PS_GWLE, is -0.037 which elucidates no relationship between PSE and GWLE; t value is -0.834, which demonstrates that GWLE has no impact on the association between PS and SB. The P-value is 0.405 which is insignificant and greater than all significance levels. R-square change is 0.001 which shows that due to the presence of a moderating variable of graphic warning labels effectiveness, 0.1% change is caused by GWLE on the association between PSE and SB. Conclusively, the H5 hypothesis is rejected stating that graphic warning labels effectiveness moderates the association between perceived stress and smoking behaviour. As the interaction term is insignificant, so the moderator GWLE does not have an impact. This is evident by the results that GWLE is not playing the role of moderator between PS and SB.

3.4 Smoking Addiction

Smoking addiction is the second independent variable in our research study, which has two hypotheses to determine the relationship between smoking addiction the moderating variable as well as the dependent variable. H2: Smoking addiction positively affects smoking behaviour. The above statement represents hypothesis 2 for this research study which shows that there is a positive relationship between smoking addiction with smoking behaviour. [10] confirmed the affirmative association between smoking addiction and the smoking behaviour of adults in their research study conducted in Columbia, USA. [10] stressed on the direct positive association of smoking addiction and smoking behaviour in their research study conducted in the USA. [11] Conducted research in Iowa, USA, and emphasised the positive relationship between smoking addiction and smoking behaviour as well. H6: Graphic warning labels effectiveness moderates the association between smoking addiction and smoking behaviour. The above statement represents the moderating effect of graphic warning labels effectiveness on the relationship of smoking addiction and smoking behaviour. Previous literature shows that smoking addiction enhances the smoking behaviour of the consumer and on the other side graphic warning labels decrease the

impact of smoking addiction on smoking behaviour [9] divulged the discouraging impact of graphic warning labels effectiveness on the association of smoking addiction and smoking behavior in their research study conducted in the U.S. Similarly, [15] conducted a research study in Australia, Mexico, and Canada through online punter panels and verified the dispiriting effect of graphic warning labels on the association of smoking addiction and smoking behaviour.

R-square value for model 1 is 0.060 which demonstrates that smoking addiction causes 6% change in smoking behaviour as independent variable. Model 2 in above output shows R-Square value which is 0.064 which shows that 6.4 % change in smoking behavior is caused due to smoking addiction in the presence of graphic warning labels as moderator. Above table shows that Model 2 R-Square change has value of 0.004; it demonstrates that graphic warning labels have 0.4% impact or effect on the individual association of smoking addiction and smoking behaviour. F change value is 0.166 that depicts insignificance of our model with the inclusion of moderating variable GWLE.

Table 8. Moderation analysis: interaction of smoking addiction and GWL effectiveness on smoking behaviour

Variables	Unstandardized Coefficients	Standardized Coefficients		
	B	Beta	t	Sig.
(Constant)	-.022		-.498	.618
Zscore: SA	.180	.181	3.892	.000
Zscore: GWLE	.094	.094	2.021	.044
Interaction_ SA_GWLE	.041	.064	1.389	.166
Hypotheses		Results	Reason	
H1: Perceived smoking Environment positively affects Smoking Behaviour.		Accepted	Significant	
H2:Smoking Addiction positively affects Smoking Behaviour.		Accepted	Significant	
H3:Perceived Stress positively affects Smoking Behaviour.		Accepted	Significant	
H4:Graphic Warning Labels Effectiveness moderates the associates between Perceived Smoking Environment and Smoking Behaviour.		Rejected	Insignificant	
H5:Graphic Warning Labels Effectiveness moderates the association between Perceived Stress and Smoking Behaviour.		Rejected	Insignificant	
H6:Graphic Warning Labels Effectiveness moderates the association between Smoking Addiction and Smoking Behaviour.		Rejected	Insignificant	

The beta value of the Interaction term, Interaction_SA_GWLE, is 0.064 which elucidates 6.4% strong relationship between SA and GWLE; the t value is 1.389, which demonstrates that GWLE has a positive impact on the association between PSE and SB. The P-value is 0.166 which is insignificant and greater than all significance levels. The R-square change is 0.004 which shows that due to the presence of a moderating variable of graphic warning labels effectiveness, 0.4% change is caused by GWLE on the association between SA and SB. Conclusively, the H6 hypothesis is rejected stating that graphic warning labels effectiveness moderates the association between smoking addiction and smoking behaviour. As the interaction term is insignificant, so the moderator GWLE does not have an impact. This is evident by the results that GWLE is not playing the role of moderator between SA and SB.

3.5 Responses to the Research Questions

RQ1: *What is the role of graphic warning labels effectiveness in discouraging smoking behaviour of young adults?* Graphic warning labels employ risk communication technique by precisely and accurately demonstrating fear appeals on the cigarette packages in a flamboyant coloured picture recalling the relentlessness of smoking-related diseases as well as discouraging young non-smokers and smokers from detrimental physical harms associated World Health Organisation [3], [14].

Health concerns constitute most pervasive stimulus for smoking cessation Berg et al., [15]. Health warning labels depicting lung cancer,

instead of addiction, are more inclined to discourage consumption of tobacco among young males, thus enhancing their capability to comprehend the injurious consequences of cigarette smoking [15]. wrappings of every tobacco merchandise have advanced swiftly from miniature and feeble text based warnings forty years before to prologue of strapping graphic health warning labels, earliest took up by Canada during 2001 [7]. In 2014, apex twelve countries with respect to magnitude of GWLs as proportion of cigarette package space comprise Thailand with 85 percent, Australia with 83 percent, Uruguay with 80 percent, Canada, Nepal and Brunei with 75 percent, whereas, Mexico, Mauritius, Togo, Turkmenistan, turkey and Venezuela with 65 percent [7]. Article 11, being a substantial provision of WHO FCTC, necessitates member countries to put into practice tobacco intervention of placing GWL on the discernible space of cigarette packages at minimum 30% and rather 50% within the duration of three years [7]. Despite substantial accomplishment from decades of anti smoking messages, increasing taxes on tobacco variants, limitations on purchase and consumption of cigarettes, and societal values that disgrace and stigmatize smokers, the problem still persists.

The enlarged graphic warning labels, more than least requirement of WHO of 50% cigarette package space, will definitely discourage smoking behaviour, as their size will make them more observable, leading to thoughts about smoking cessation, and ultimately prevent smoking among non-users or initiators, reduce smoking and avoid relapse among cigarette smokers. Smoking intention among vulnerable young adults is greatly reduced by the removal of tobacco branding from cigarette packaging and replacing it with unattractive graphic warning labels.

The plain packaging of cigarettes, besides dual-sided graphical health warnings, presents a cost-free, worth-applicable and appealing public health strategy in discouraging consumer smoking intentions (Gallopel-Morvan et al., 2013; Oswal, Raute, Pednekar, & Gupta, 2011) complemented with a supplementary element of text warnings in the indigenous language of the country for general unproblematic comprehension.

Graphic health warning labels have been verified to be effective in reducing pessimistic responses to cigarette smoking behaviour, subsequently mounting intent to refrain from smoking as well as transforming contemplations about smoking perils. In non-daily cigarette smokers, better ocular concentration is attributed to graphic health warning labels merged with plain cigarette packaging as against packaged cigarette brands. As suggested by the theory of memory and attention, the observation interval is positively linked with commemoration; nevertheless, consideration of balance of cigarette packs might divert the attention of observers from the health warning label. Recollection is amplified for GWL adverts as compared to text-only health warning labels (Berg et al., 2011) owing to the association of augmented observation of GWL with comprehensive remembrance of associated smoking threats [10].

RQ2: What are consumer perceptions of the graphic warning labels effectiveness on the branded cigarette packages available in Pakistan? Apprehension phenomenon of warning labels constitute thinking, reading about and behaviour of smokers depending on size, position, design as well as content of these graphical warnings. Health warnings effectiveness is evaluated in three facets including health warning salience: close observation and apprehension of warnings, cognitive reactions to warnings: evaluative thinking of associated harms and smoking cessation, and behavioural reactions to warnings: prevention and foregoing of cigarettes. In order to enhance effectiveness, graphical warnings should capture attention, influence knowledge and affect compliance of decisions [19]. GWL advance cigarette smokers' reminiscence of wellbeing hazards associated with warnings by capturing and retaining attention.

Whilst the existing health warnings are observed by adolescents, they do not probably bring out feelings concerning the health hazards associated with tobacco consumption, predominantly among existing cigarette smokers. There is space for meliorism in health warning labels, essentially in the extent to which they retain the observer, so as to be peerlessly effectual in instructing present and prospective cigarette smokers regarding the wellbeing perils of tobacco consumption [10]. The existing warning labels on cigarette packs in Pakistan lack effective preventive impact on smoking behaviour in the absence of plain packaging. Plain packaging enhances salience and effect of graphic warning labels by explicitly depicting hazards associated with smoking behaviour. Following table depicts the perceptions of smokers and non-smokers in Pakistan:

Table 9. Perceptions of smokers and non-smokers about smoking-related health risks

Perceptions of Smokers & No -Smokers	Current Smokers (%)	Non- Smokers (%)	Overall (%)
Adults who believed smoking causes serious illness	87.8	85.5	85.5
Adults who believed breathing other people smoke cause illness in non-smokers	83.7	81.4	81.7

WHO counsels plain packaging constituting prohibition of using logos, brand imagery, colours or marketing information on cigarette packages along with product name and brand name demonstrated in principle font style and standard colour besides printing helpline number for smoking. According to Global Adult Tobacco Survey, conducted by the Pakistan Bureau of Statistics 2014, the following statistics demonstrate the effectiveness of graphic warning labels on cigarette packages as a counter advertising strategy in Pakistan:

As suggested by theories of attitude change, persons who are commencing to assimilate the healthiness consequences of their behaviour besides avoiding the suggested defensive deed comprising fright control may, nonetheless, be profoundly processing hazard communiqué [15], warning labels are uniformly enlightening amongst cigarette smokers possessing diverse echelons of educational accomplishment, this intercession should not aggravate smoking associated healthiness discrepancies, which are presently concerted amid groups having least educational achievement. Smoking inconsistencies might be more passably abridged if graphic warning labels are established to reverberate with the population fragments experiencing utmost rates of cigarette smoking. Imagery of individuals on GWL known as exemplars, i.e., individualized cases portraying a particular condition, behaviour or incidence, form awareness about peril as well as reverberate in a different way among diverse demographic sub-populations, as elucidated by exemplification theory. Exemplification and exemplars are required to be well thoughtout when opting for and appraising graphic warning labels and connected media drives [14]. Graphic warning labels (GWL) are obligatory to caution smokers, non-smokers and previous smokers across assorted populace concerning the hazards accredited to cigarette consumption [14].

The apparent graphic stage of the caveat enhances the depressing sensations of fright, guilt, and repugnancy. Trepidation and culpability interrelate with cigarette smoking status in order to reinforce the affirmative influence of the passions on recent smokers' thoughtfulness of smoking. Smoking status temperates the outcomes of fear and guilt by fortification of smokers' conviction that second-hand cigarette smoke is detrimental to kids. By inducing culpability and revulsion in amalgamation with aggrandising trepidation, graphic warning labels may turn out to be effective in anti-smoking drives concentrating adolescent smoking cessation[20]. Smokers acknowledge the images depicting significantly slighter gore as compared to GWL utilized in foreign countries. Incremented viewing time period enhances the probability of accurate recall. Regulation of the body of the advert including pertinent haleness instruction is an efficacious stratagem. The analytical outcomes indicate the necessity of enhancing the effectiveness of currently insignificant graphic warning labels in order to induce cessation thoughts in Pakistani adult smokers. RQ3: *How are perceived smoking environment, perceived stress, and smoking addiction escalating smoking behaviour in young adults in Pakistan?*The universal availability and legality of tobacco have increased the exposure rate of this inexpensive drug, consequently reducing the stigma of its usage. Persistent smoking behaviour is normally caused by to presence of highly addictive nicotine components in tobacco smoke [13] as human beings have more tendency to tobacco addiction than animals.

The mean age of initiation of cigarette smoking is 18 [14], whereas thirty-nine (39%) young adults smoked their initial cigarette earlier than sixteen years of age. Early addiction to smoking is generally a precursor to lifelong addictive smoking behaviour [11]. Primary reasons attributed to adolescent smoking behaviour constitute nicotine dependence [12], parental smoking, family members smoking as well as second-hand smoking (SHS) exposure at home.

In this research study, the perceived smoking environment is the first independent variable of the dependent variable smoking behaviour, with five determinants, namely family smoking [18], Cigarette Availability [17](Nichols et al., 2006), Peers' Smoking [21], Co-Workers Smoking and Normative Expectations. Smoking addiction is the

second independent variable of dependent variable smoking behaviour, with four determinants, namely the Urge To Smoke [11], Rigid Patterns Of Cigarette Use, Decreased Tolerance Of Smoking and Cigarette Brand Loyalty [13]. Perceived stress is the third independent variable [11] of the dependent variable smoking behaviour, with five determinants, namely Negative Life Events, Socio-Economic Disadvantage, Work Related Stress, Family Stressors and Unemployment. Perceived Stress impacts smoking expectancies for pessimistic reinforcement devoid stress stress-relieving attributes of nicotine, consequently inducing more problematic smoking attitudes comprising perceived hindrance in quitting and corroboration of smoking behaviour as a stress reliever [16].

Parental and peer influences are the profound socialization forces directly affecting the adolescent development phenomenon. During adolescence, youth develop friendship bonds and subsequently get engaged in cigarette smoking behaviour as perceived from peer network. This is the critical time of smoking initiation and consequent smoking addiction [8]. Normative expectations, i.e., the beliefs that others expect one to conform to a given norm (Bicchieri, 2009), family or family members' smoking, friends' smoking, peers' smoking, cigarette availability (Rachele et al. 2016) as well as co-workers' smoking constitute perceived smoking environment factors or predictors of cigarette smoking initiation [18].

During the stressful time intervals, the self-medicating function of relieving the physical distress originates and encourages different coping behaviours comprising smoking, alcohol drinking, overeating and several unhealthy activities which assist regulate human mood as well as convert the pressurised situations into pleasurable and relaxing circumstances. Multi-faceted nicotine dependence or smoking addiction comprises strong 'urge to smoke' due to nicotine extraction from the body where increased level of smoking causes enhanced nicotine level in the body, rigid patterns of cigarette consumption, and decreased tolerance of smoking, i.e., satisfaction level attained from nicotine intake is derived from the arousal of need to smoke more. Smoking addiction assists smoker develop rigid patterns of cigarette smoking even being fully acquainted with harmful possible risks associated with smoking behaviour, thus indulging in optimistic beliefs of remaining unharmed by these health risks of smoking [12] or due to smoker's brand loyalty for specific cigarette brands [13]. Analytically, our data depicts striking increment in smoking behaviour of Pakistani young adults due to presence of three predictors of smoking behaviour under consideration. Even though smoking has diminished worldwide predominantly in developed societies and countries, however generally the low-income countries incorporating Pakistan persist confronting ever-increasing albatross of tobacco pandemic with contemporary cigarette smoking pervasiveness of 15.2% amongst adults as well as 6.3% amid youth. It is anticipated that if existing tendency of smoking pervasiveness prolongs, then yearly tobacco associated casualties will exceed 8 million by 2030 as well as above two third of such deaths will transpire in low or middle income countries [21]. Tobacco consumption patterns in Pakistan are presented as follows:

Figure 2. Tabacco uses in Pakistan (GATS, 2014**)**

RQ4: What empirical initiatives should be undertaken in order dispirit cigarette smoking behaviour in Pakistan? In order to discourage the continually escalating smoking behaviour among Pakistani adult smokers, Tobacco Control Cell, Ministry of National Health Services Regulations and Coordination, Pakistan, is advised several empirical recommendations to counter this socio economic hindrance to development. Social and mass media ought to be brought into play in a strategically noteworthy manner, so as to enlighten, instruct, and persuade cigarette smoking cessation.

For instance, an advertisement campaign driven by mass media in Senegal augmented numeral of support seeking calls to nationwide cigarette smoking quitline by 600%, whilst a cessation supporting video in Thailand directed to a 40% boost in calls to the countrywide smoking quit-line as well as over 5m You Tube views within the duration of 10 days. Seventy five percent (75%) of retail price of cigarette is WHO standard for excise duty, while in Pakistan the excise duty is merely forty six percent (46%) of retail cigarette price, thus necessitating increment in excise taxation of cigarettes. Neither nationwide quitline is functioning nor quit support is proffered in the form of Nicotine Replacement Therapy (NRT) or some other smoking cessation facilities whether price sheltered or not. The cessation helpline or quitline is required to be established and printed on cigarette packages in Pakistan in an attempt for convincing cigarette smokers to quit smoking to all intents and purposes.

Health connoisseur, tobacco addicts, and governments may not presume that ecigarette usage would lend a hand to terminate the tobacco pandemic. Almost 50% of US adolescent e-cigarette consumers are twofold consumers. Tobacco intervention campaigners must connect and team up with contemporaries across economic, social, environmental and developmental disciplines to facilitate constructing a comprehensive case, designed for strapping tobacco control. Governments ought to legislate the elimination of all accoutrements of tobacco advertising on cigarette packages as well as other tobacco merchandise packaging, besides pursuing Australia's supremacy in launching plain or standardised cigarette packaging.

Few LMICs have the know-how and wherewithal as compared to the global tobacco manufacturing industry. For that reason, international support for tobacco intervention is essential, particularly at the preliminary phases of the epidemic. Countries currently at later phases of the tobacco pandemic should disseminate their tobacco intervention savoir faire, as well as novel funding mechanisms would assist the worldwide community in raising the finances requisite to extend the execution of measures embarked in the MPOWER regulations. In due course, recognising the worth of spending on tobacco control, every country has to optimise the allocation of funds required to deal with the tobacco plague. In spite of its immense return on investment, financial support for tobacco intervention measures stays behind the echelons that are insufficient as compared to existing requirements, and distant from the echelons of financial support aimed at concentrating on other wellbeing tribulations, causing far fewer casualties [7].

Pakistan is the 26th country who legislate the placement of graphic health warning labels in 2010, covering forty percent space of both the front and back side of cigarette packs. Effective tobacco control measures [8, 9]. The enactment of plain packaging legislation complimented with enlarged graphic warning label of package space, are still awaited in Pakistan in order to comprehensively address the prevalence of cigarette smoking behavior the insignificant value of effectiveness of GWL needs to be enhanced in the context of three predictors of smoking behaviour under consideration, in order to discourage smoking tendency among adult smokers in Pakistan. The graphic health warnings are required to be cautiously designed, containing comprehensive information pertaining to the health risks associated with cigarette smoking. An effective risk communication strategy demonstrating fear appeals in graphic warning labels on cigarette packaging will certainly prove to be supportive in smoking cessation behaviour.

The results of the study revealed that all three independent variables—perceived smoking environment, smoking addiction, and perceived stress—had a statistically significant positive effect on smoking behaviour among Pakistani adults. Specifically, perceived stress had the strongest influence ($\beta = 0.218$, $p < 0.001$), followed by smoking addiction ($\beta = 0.107$, $p = 0.018$) and perceived smoking environment ($\beta = 0.102$, $p = 0.033$). However, moderation analysis showed that the effectiveness of graphic warning labels (GWL) did not significantly moderate the relationship between any of these predictors and smoking behaviour. The interaction terms for GWL with perceived smoking environment, perceived stress, and smoking addiction were all statistically insignificant, indicating that GWLs, in their current form, do not weaken the influence of these factors. Overall, while the predictors explain a modest 10.5% of the variance in smoking behaviour, the GWLs failed to exert a meaningful moderating effect.

4. DISCUSSION

RQ1: What is the role of graphic warning labels (GWLs) in discouraging smoking behaviour among young adults?

Graphic health warning labels have been internationally recognized as a cost-effective and impactful tool to reduce smoking. However, this study found that GWLs did not significantly moderate the relationship between perceived

smoking environment, smoking addiction, or stress and smoking behaviour among Pakistani youth. This suggests that while labels raise awareness, they lack the psychological or emotional force needed to alter behaviour, especially among those already addicted or socially influenced. These findings are consistent with earlier research indicating that poorly designed or weakly enforced GWLs have limited behavioural impact [2, 3].

RQ2: What are consumer perceptions of the graphic warning labels' effectiveness on the branded cigarette packages available in Pakistan?

Although consumers are aware of GWLs, the current study indicates that they perceive them as relatively ineffective in influencing behaviour. This may be due to a lack of emotional resonance, repeated exposure leading to desensitisation, or poor design quality. In Pakistan, graphic warnings cover only 40% of the cigarette package, in contrast to the 85% recommended by WHO and implemented in countries like Australia [7, 15]. Moreover, the persistence of attractive branding on cigarette packs dilutes the visual impact of the warnings. Without plain packaging and more shockingly, locally relevant imagery, GWLs will continue to be viewed as a passive feature rather than a behavioural deterrent.

RQ3: How are perceived smoking environment (PSE), perceived stress (PS), and smoking addiction (SA) escalating smoking behaviour among young adults in Pakistan?

The study found that all three factors — PSE, PS, and SA — significantly predicted smoking behaviour, supporting global findings that social environments, stress, and addiction are critical determinants of tobacco use [10, 11]. Pakistani youth often encounter pro-smoking cues in their environment, from peers to public settings. Combined with unmanaged stress and nicotine dependency, this creates a high-risk context for smoking continuation. These results highlight the limitations of one-dimensional strategies like GWLs and underscore the need for comprehensive interventions targeting psychological and social triggers.

RQ4: What empirical initiatives should be undertaken to discourage cigarette smoking behaviour in Pakistan?

The current tobacco control framework in Pakistan lacks several essential components of an effective anti-smoking strategy. There is no national quit-line, limited access to smoking cessation aids like Nicotine Replacement Therapy (NRT), and weak implementation of policies like the Health Warning Rules (2009) and their amendments. While Pakistan has initiated GWLs covering 40% of packs, countries like Australia cover 83% and have moved to plain packaging, a best-practice approach Pakistan has yet to adopt.

According to WHO recommendations, Pakistan should:

Increase excise tax on cigarettes to at least 75% of the retail price (currently at 46%)

Launch sustained anti-tobacco media campaigns on radio and television

Include outcome evaluations to assess policy impact

Add Urdu warnings on the front of packs and English on the back

Modernize outdated laws like the 2002 Prohibition of Smoking Ordinance

Pakistan remains in the first phase of GWL implementation, while countries like Australia have already progressed to second-phase strategies. The lack of targeted research, strategic media planning, and behavioural interventions limits the efficacy of existing measures. Without broader reforms, including plain packaging and support systems for quitting, tobacco control efforts will remain insufficient to reduce smoking rates among youth.

Conclusion

Tobacco intervention health employed in health warnings smokers as well as non smokers cigarette packages [22]. convinced for tobacco cessation by the placement of packages, necessitates wide-ranging tobacco amalgamation of adequately financed smoking restrictions at public abolition of entire tobacco promotion significantly, the legislation enforcing plain or standardized cigarette packaging in Pakistan 166 WHO Target, The Tobacco Atlas, 2015 professionals must certify that the images induce a substantial negative intuitive reaction in besides detracting them from implied. Our conclusion that Pakistani young adults graphic warning labels intervention national programming mass media anti smoking campaigns, spaces, enhanced tobacco taxation as recommended by WHO, nal activity by Pakistan tobacco industry and most and messages cigarette magnetism of are not on cigarette inclusive of comprehensive.

Conflict of Interest

The authors declare no conflict of interest and no financial or other support influenced the research, authorship, or publication of this article

Ethics Committee

This study was conducted in accordance with ethical standards. The research strictly followed the guidelines by COMSATS University, Islamabad Ethical Committee, prioritising participants' rights

and well-being in design, procedures, and confidentiality measures.

Author Contributions

Study Design, FAB; Data Collection, FAB, ZT; Statistical Analysis, FAB, ZT; Data Interpretation, FAB, ZT; Manuscript Preparation, FAB; Literature Search, ZT, FAB. All authors have read and agreed to the published version of the manuscript.

REFERENCES

1. Hiilamo, H., & Glantz, S. A. (**2015**). Implementation of effective cigarette health warning labels among low and middle income countries: State capacity, path-dependency and tobacco industry activity. *Soc Sci Med*, 124, 241–245. [CrossRef] [PubMed]
2. World Health Organization. (**2015**). WHO report on the global tobacco epidemic, 2015: Raising taxes on tobacco. World Health Organization. [CrossRef]
3. Yaqub, F. (**2015**). Pakistan government faces legal challenge over images on tobacco packaging. *Lancet Respir Med*, 3(9), 673. [CrossRef] [PubMed]
4. Riley, D. (**2014**). Mental models in warnings message design: A review and two case studies. *Saf Sci*. 2014;61:11–20. [CrossRef]
5. Islami, F., Stoklosa, M., Drope, J., & Jemal, A. (**2015**). Global and regional patterns of tobacco smoking and tobacco control policies. *Eur Urol Focus*, 1(1), 3–16. [CrossRef] [PubMed]
6. Nagelhout, G. E., Osman, A., Yong, H. H., Huang, L. L, Borland, R., & Thrasher, J. F. (**2015**). Was the media campaign that supported Australia's new pictorial cigarette warning labels and plain packaging policy associated with more attention to and talking about warning labels? *Addict Behav*.;49:64–67. [CrossRef] [PubMed]
7. Eriksen, M., Mackay, J., Schluger, N., Islami, F., & Drope, J. (**2015**). *The Tobacco Atlas* (5th ed.). American Cancer Society. https://ncdalliance.org/sites/ default/ files/resource_files/TA5_2015_WEB.pdf
8. Lakon, C. M., Wang, C., Butts, C. T., Jose, R., Timberlake, D. S., & Hipp, J. R. (**2015**). A dynamic model of adolescent friendship networks, parental influences, and smoking. *J Youth Adolesc*, 44(9), 767–1786. [CrossRef] [PubMed]
9. Villanti, A. C., Johnson, A. L., Glasser, A. M., Rose, S. W., & Rath, J. M. (**2015**). Patterns of combustible tobacco use in U.S. young adults and potential response to graphic cigarette health warning labels. *Addict Behav*, 42, 119–125. [CrossRef] [PubMed]
10. Johnson, S. E., Holder-Hayes, E., Tessman, G. K., King, B. A., Alexander, T. N., & Zhao, X. (**2014**). Self-reported exposure to tobacco warning labels among U.S. middle and high school students. *Am J Prev Med,* 47(2 Suppl 1):S69–S75. [PubMed]
11. Pampel, F. C., Mollborn, S., & Lawrence, E. M. (**2015**). Life events, genetic susceptibility, and smoking among adolescents. *Soc Sci Res*, 54, 221–232. [CrossRef] [PubMed]
12. Hwang, J., & Yun, Z. S. (**2015**). Mechanism of psychological distress-driven smoking addiction behavior. *J Bus Res*, 68(10), 2189–2197. [CrossRef]
13. Dawes, J. (**2014**). Cigarette brand loyalty and purchase patterns: An examination using US consumer panel data. *J Bus Res*, 67(9), 1933–1943. [CrossRef]
14. Lorenzo-Blanco, E. I., Unger, J. B., Ritt-Olson, A., Soto, D., & Baezconde-Garbanati, L. (**2016**). A process-oriented analysis of parent acculturation, parent socio-cultural stress, family processes, and Latina/o youth smoking and depressive symptoms. *Int J Intercult Relat,* 52, 60–71. [CrossRef] [PubMed]
15. Thrasher, J. F., Abad-Vivero, E. N., Huang, L., O'Connor, R. J., Hammond, D., Bansal-Travers, M., Yong, H. H., Borland, R., Markovsky, B., & Hardin, J. (**2015**). Interpersonal communication about pictorial health warnings on cigarette packages: Policy-related influences and relationships with smoking cessation attempts. *Soc Sci Med*, 164, 141–149. [CrossRef] [PubMed]
16. Robles, Z., Garey, L., Hogan, J., Bakhshaie, J., Schmidt, N. B., & Zvolensky, M. J. (**2016**). Examining an underlying mechanism between perceived stress and smoking cessation-related outcomes. *Addict Behav*, 58:149–154. [CrossRef] [PubMed]
17. Kim, A. E., Loomis, B., Rhodes, B., Eggers, M. E., & Farrelly, M.C. (**2014**). Influence of point-of-sale tobacco displays and graphic health warning signs on adults: Evidence from a virtual store experimental study. *Am J Public Health*, 104(5), 888–895. [CrossRef] [PubMed]
18. Mannocci, A., Saulle, R., Semyonov, L., Meggiolaro, A., & La Torre, G. (**2015**). From directive to practice: Are pictorial warnings and plain packaging effective to reduce tobacco addiction? *Public Health*, 129(12), 1563–1570. [CrossRef] [PubMed]
19. Laughery, K. R., & Wogalter, M. S. (**2014**). A three-stage model summarizes product warning and environmental sign research. *Saf Sci*, 61, 3–10. [CrossRef]
20. Richard, S. C., Craig, J., & Robertson, T. P. (**2015**). Graphic health warnings on cigarette packages: The role of emotions in affecting adolescent smoking consideration and secondhand smoke beliefs. *J Chem Inf Model*, 53(9), 1689–1699. [CrossRef] [PubMed]
21. Shafique, K., Khan, N. A., Abbas, M., & Hassan, S. M. (**2014**). Prevalence and determinants of susceptibility to cigarette smoking among school students in Pakistan: Secondary analysis of Global Youth Tobacco Survey. *Subst Abuse Treat Prev Policy*., 9:10. [CrossRef] [PubMed]
22. White, V., Webster, B., & Wakefield, M. (**2008**). Do graphic health warning labels have an impact on adolescents' smoking-related beliefs and behaviours? *Addiction*, 103(9), 1562–1571. [CrossRef] [PubMed]