Intervention Design and Development

Abstract

The rising cases of child obesity amongst other food-related complications evokes the need for an intervention design and development in Birmingham UK. The education authority in Birmingham, UK calls for an inculcation of healthy eating habits in schools for children aged between 6-7 years, by ensuring that they eat five portions of fruit and vegetables daily. An intervention design will be developed using the Bartholomew's Intervention Mapping framework (Bartholomew et al., 2011). This study will therefore seek to test the hypothesis that 'Night' affects attitudes to eat unhealthily and also the intentions to eat unhealthily. This study will hence analyse the results that were derived upon surveying a total of 100 students in Birmingham aged between 6-7 years. Further, the study looks at the Theory of Planned Behaviour (TPB), and hence seeks to analyse the average correlations for TPB variables for Dietary Behaviours and hence comments on which variables have the strongest relationships with intentions.

Table of Contents

1. Intervention design & development

In a bid to understand and address the high prevalence of child obesity, it is of high importance that eating behaviours and the existing school meal programs should first be analysed and clearly understood. This is because globally, there are rising cases of child obesity; this is attributed to the eating behaviours that children adopt at an early age in addition to the school meal programmes that expose children to high-calorie foods (Waters et al., 2011). According to the Health Survey for England (Mindell et al., 2012) conducted in 2012, the prevalence of child obesity in UK has risen since the year 1995, when the percentage of obese boys was 11% and that of girls was 12%. The survey also revealed that by 2005, child obesity had peaked at the percentage of 18-19%, girls and boys alike. By 2011, the percentage had dropped to 17% for boys and 16% for girls; the percentage further dropped in 2012 to 14% for the children, both genders alike (Craig, 2014). This reduction resulted from the increased knowledge and awareness, amongst the residents of UK, of the risks that accrue from unhealthy eating habits; parents are hence more cautious of the food that their children consume (Wang et al., 2012). According to Millimet, Tchernis and Husain (2010) one benefit that accrues to the adoption of nutritional quality of school food is the fact that the adoption and implementation is in line with the Government policies to improve the health, well-being and education of children hence mitigating the risks of chronic diseases (Bradshaw, 2011). The adoption of implementation of nutritious food programs in schools could help to lower the occurrence of diet-related health problems (Mindell et al., 2012). These include diabetes, cancer, obesity and coronary heart disease. These diseases, on an estimate, cost the UK Government £4billion on a yearly basis (Scarborough et al., 2011).

The education authority in Birmingham, UK wishes to inculcate healthy eating habits in schools for children aged between 6-7 years, by ensuring that they eat five portions of fruit and vegetables daily. To ensure that this is made a reality, it was first necessary to test the efficacy of such an intervention in a controlled study. The intervention will employ Bartholomew's Intervention Map (Bartholomew et al., 2011). The intervention map encompasses six steps that will be useful in the design and development of this intervention. These steps are as outlined below:

1. Step one: Conducting the assessment of needs- this would encompass the assessment of the needs of the chosen population. This would involve the definition of the target

groups, their behaviour profiles, as well as their health. Further, this step will involve the identification of the crucial environmental and individual factors that influence the behaviours of the subjects. According to Birmingham Food Council (2015), there is limited access to nutritious food by many Birmingham citizens and as a matter of fact, some wards in Birmingham are regarded as "food deserts".

2. Step two: The clear and distinct elaboration of the performance as well as the change objectives, on the basis of the scientific assessment of the health issues and factors contributing to the health factors (McKenzie et al., 2010).
3. Step three: The choice of the intervention methods based on the existing theories and how they can be used to alter health-related issues.
4. Step four: the fabrication of program constituents, design and production.
5. Step five: The expectation of adoption of the program, its implementation and how it can be effectively sustained.
6. Step six: The expectation of the evaluation of process and effect (Bartholomew et al., 2011).

To design and develop the intervention using the Intervention Mapping steps requires a needs analysis conducted in Birmingham UK. Also, the intervention design will require the employment of effective literature to elucidate the existing measures taken and what needs to be done in order to reduce on the effects of unhealthy eating habits (Bartholomew et al., 2011). A steering group will be necessary; a total of 100 students in Birmingham aged between 6-7 years will be the subjects of the intervention study and they will therefore be grouped into six focus groups. Interviews will be conducted in the focus groups, with the presence of the children's parents. The variables that will be measured are the weight, height and physical activity of the participants. This is useful in determining whether the children's eating habits influence their physical appearance and health, and how the influence comes about (McKenzie et al., 2010).

2. Tests of difference

This section seeks to test the hypothesis that 'Night' affects attitudes to eat unhealthily and also the intentions to eat unhealthily. This section will hence analyse the results that were derived upon surveying 100 schoolchildren in Birmingham, UK. The data that was obtained was appropriate in key topics including the attitudes and the intentions to eat unhealthily. The

analysis will assist in relating the data obtained to the objectives of the study. This section highlights "night" as the independent variable and the dependent variables are the attitudes to eat unhealthily and the intentions to eat unhealthily. Correlation and regression analyses are used to elucidate the extant relationships between the independent and dependent variables.

2.1 Analysis of the Attitudes

The research study involved interviewing 100 schoolchildren, of which 80 responded truthfully and without fear. The researcher was able to establish that the 80 schoolchildren had certain attitudes to eat unhealthily and these attitudes were influenced by "night". 70 of these children asserted that their attitudes to eat unhealthily were affected by night time majorly because they were relatively able to access snack foods while at home than at school (Kalavana et al., 2010). 10 schoolchildren however denied that "night" influenced their attitudes to eat unhealthily. This can be summarised in the figure below.

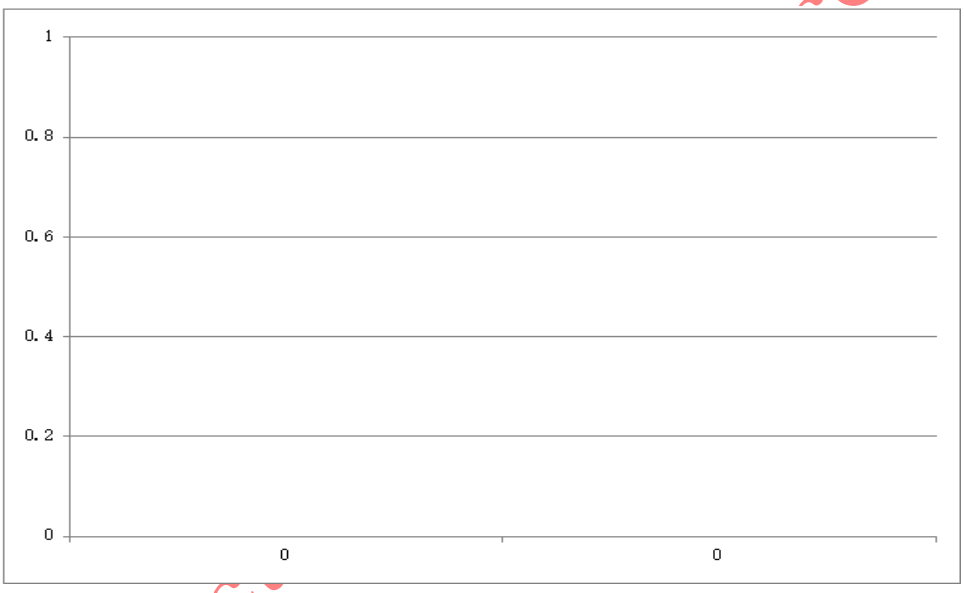

Figure 2.1: The relationship between "night" and the attitudes to eat unhealthily

The researcher sought to establish which night, amongst the three nights, affected the respondents' attitudes to eat unhealthily more. Of 70 schoolchildren who had affirmed that night affects their attitudes to eat unhealthily, 40 children affirmed that Saturday night highly affected their attitudes while 20 children indicated that it was Friday night that affected their attitudes more. 10 schoolchildren indicated that Thursday night highly influenced their attitudes to eat unhealthily. Hence, the study established different nights had different levels of influence to the children's attitudes to eat unhealthily.

Correlations

		Night	Attitude
Night	Pearson Correlation	1	-.106
	Sig. (2-tailed)		.355
	N	80	78
Attitude	Pearson Correlation	-.106	1
	Sig. (2-tailed)	.355	
	N	78	78

Figure 2.3: Correlation between Night and Attitude

The figure above shows how the variables night and attitude correlate. According to Cohen et al. (2013), correlation is the means used in research to quantify and elucidate the direction and strength of the relationship existing between two particular variables. In this case, as seen in Figure 2.3 above, there exists a negative correlation between the two variables. Lorenzo-Seva et al. (2010) posit that when a negative correlation exists between two variables, it implies that whilst the value of one variable increases, the value of the other variable decreases.

2.2 Analysis of the Intentions

The school children's intentions to eat unhealthily were also affected by the "night". The three selected nights for the study, Thursday, Friday and Saturday, were used to determine the effect that they have on the intentions of the children to consume unhealthy snack foods. The researcher therefore used the responses of the 80 schoolchildren to compute a report as represented in the figure below.

Correlations

		Night	Intention
Night	Pearson Correlation	1	-.139
	Sig. (2-tailed)		.217
	N	80	80
Intention	Pearson Correlation	-.139	1
	Sig. (2-tailed)	.217	
	N	80	80

Figure 2.4: Correlation between night and intention

The above figure elucidates the existing relationship between night and the children's intentions to eat unhealthily. This figure shows that the correlation between night and the children's intentions to eat unhealthily is -0.139. This therefore depicts a relationship that shows how children's intentions change as the week draws to an end. The schoolchildren's intentions are lower during weekdays and they rise as the weekend approaches (Kalavana et al., 2010).

The figures used below are the existing variances for attitudes to eat unhealthily as established in the three nights, Thursday, Friday and Saturday respectively

Figure 2.5: Variance for attitudes in Night 1

	N	Minimum	Maximum	Variance
Night	13	1.00	1.00	.000
Attitude	13	6.00	33.00	48.103
Valid N (listwise)	13			

Figure 2.6: Variance for attitudes in Night 2

	N	Minimum	Maximum	Variance
Night	19	2.00	2.00	.000
Attitude	17	5.00	35.00	39.529
Valid N (listwise)	17			

Figure 2.7: Variance for attitudes in Night 3

	N	Minimum	Maximum	Variance
Night	45	3.00	3.00	.000
Attitude	45	5.00	26.00	32.543
Valid N (listwise)	45			

From the figures above, it is deduced that in the first night of the study, the variance of the attitudes to eat unhealthily is 48.103. In the second night, the variance is 39.529 and on night three, the variance for the attitudes is 32.543. These results depict that children have higher attitudes to eat unhealthily on Thursday than on Friday. On Friday night however, the attitudes to eat unhealthily is higher than on Saturday. This shows that as the weekend is

approaching, the children's attitudes to eat unhealthily steadily decline and by Saturday night, the attitudes are at the lowest probably as a result of other factors that they are subjected to, for example, parental influence. The reason that can be attributed to this steady decline is probably because the environmental factors such as the control by parents, and the socioeconomic factors at home that particularly affects them during weekends. The results for the intentions to eat unhealthily are represented by the figures below.

Figure 2.8: Variance for intentions in Night 1

	N	Minimum	Maximum	Variance
Night	13	1.00	1.00	.000
Intention	13	3.00	18.00	23.308
Valid N (listwise)	13			

Figure 2.9: Variance for intentions in Night 2

	N	Minimum	Maximum	Variance
Night	19	2.00	2.00	.000
Intention	19	3.00	18.00	23.164
Valid N (listwise)	19			

Figure 3: Variance for intentions in Night 1

	N	Minimum	Maximum	Variance
Night	45	3.00	3.00	.000
Intention	45	3.00	21.00	17.836
Valid N (listwise)	45			

From the figures above, it is evident that the children's intentions to eat unhealthily vary from night to night. Figure 2.8 shows that the variance for intentions to eat unhealthily on Thursday night is on the highest record compared with the intentions to eat unhealthily on Friday and Saturday (Domingo, 2012). Figures 2.9 and 3 above show the decrease in variances for intentions on Friday and Saturday respectively. Therefore, it can be deduced that just like the attitudes to eat unhealthily vary decreasingly from Thursday to Saturday; the children's intentions vary as well. This can therefore assert the fact that the schoolchildren have higher intentions to eat unhealthily as the weekend approaches, but the intentions decline steadily hitting a record low on Saturday (Domingo, 2012).

2.3 Impact of Location on intentions to eat unhealthily.

There exists a negative correlation between location and attitudes to eat unhealthily.

Figure 3.4: Correlation between Location and Intention

		Location	Attitude
Location	Pearson Correlation	1	-.260(*)
	Sig. (2-tailed)		.022
	N	80	78
Attitude	Pearson Correlation	-.260(*)	1
	Sig. (2-tailed)	.022	
	N	78	78

*Correlation is significant at the 0.05 level (2-tailed).

Figure3.5: Correlation between Location and Intention

		Location	Intention
Location	Pearson Correlation	1	-.239(*)
	Sig. (2-tailed)		.033
	N	80	80
Intention	Pearson Correlation	-.239(*)	1
	Sig. (2-tailed)	.033	
	N	80	80

* Correlation is significant at the 0.05 level (2-tailed).

Having established the correlation, it can be deduced that the significant level is 0.05 as the Sig. levels are 0.022 and 0.033 for attitude and intention respectively. The variances are represented in Figures 3.6 and 3.7 below.

Figure 3.6: Descriptive Statistics

	N	Minimum	Maximum	Variance
Location	45	1.00	2.00	.249
Attitude	45	5.00	26.00	32.543
Valid N (listwise)	45			

Figure 3.7: Descriptive Statistics

	N	Minimum	Maximum	Variance
Location	45	1.00	2.00	.249
Intention	45	3.00	21.00	17.836

Valid N (listwise)	45			

From the figures above, it is evident that there is a higher variance in attitude than in intention to eat unhealthy. This can be attributed to the parental influence and control that the children are subjected to at home. Parents play a big role in establishing control on the foods that the children eat and with time, the children's attitudes towards some foods change.

2.4 The impact of gender on intentions controlling for attitudes

Figure3.8: Correlations

		Gender	Intention	Attitude
Gender	Pearson Correlation	1	.318(**)	.117
	Sig. (2-tailed)		.004	.311
	N	79	79	77
Intention	Pearson Correlation	.318(**)	1	.389(**)
	Sig. (2-tailed)	.004		.000
	N	79	80	78
Attitude	Pearson Correlation	.117	.389(**)	1
	Sig. (2-tailed)	.311	.000	
	N	77	78	78

** Correlation is significant at the 0.01 level (2-tailed).

From the figure above, it is evident that gender has positive correlation with both intentions and attitudes to eat unhealthily. This can be seen by the positive coefficients 0.318 and 0.117 for intentions and attitudes respectively. This shows that gender plays a significant role in determining the eating habits of the children; their attitudes and their intentions to eat unhealthily (Domingo, 2012). Figures 3.9 and 4 below are the variances of the intentions and attitudes to eat healthy, the factor being gender. From the figures below, it is clear that male children (as in Figure 3.9) have high attitudes and intentions to eat unhealthy as opposed to the female children (see Figure 4.0). This can be attributed to the fact that at a tender age, young girls adopt the lifestyles of many female models such as their parents and other key female celebrities (Kalavana et al., 2010). Therefore, the girls would want to watch their eating habits so as to maintain their body weight as opposed to boys who would prefer to eat most snack foods for fun.

Figure 3.9 Descriptive Statistics

	N	Minimum	Maximum	Variance

Gender	59	1.00	1.00	.000
Intention	60	3.00	18.00	15.656
Attitude	59	5.00	33.00	37.137
Valid N (listwise)	58			

Figure 4: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Gender	20	2.00	2.00	2.0000	.00000
Intention	20	3.00	21.00	9.4500	5.60521
Attitude	19	6.00	35.00	19.6316	6.28234
Valid N (listwise)	19				

3. Test of Association

This section, by using the Theory of Planned Behaviour (TPB), seeks to analyse the average correlations for TPB variables for Dietary Behaviours and hence comments on which variables have the strongest relationships with intentions (Ajzen, 2011). In addition, the section conducts the correlations between each predictor variable and intentions then states the direction, significance and size of these relationships. Also, the section conducts and reports the correlations between predictor variables and offers comments on the independence of these variables from other predictors. Ultimately, this section performs a linear regression to predict snack intentions.

3.1 Theory of Planned Behaviour for Dietary Behaviours

The study has sought to analyse the application of TPB, a theory proposed by Icek Ajzen, to the two important variables- dietary behaviours- particularly the perceived control as well as self-efficacy (Ajzen, 2011). These variables form the behavioural control constituents in the theory. To establish the influence of the aforementioned variables on the behaviour and intentions to eat five portions of vegetables and fruits a day, about 80 subjects who are schoolchildren were interviewed. These subjects revealed that the variables actually influenced their behaviours and intentions; 45 of these subjects posited that they adopt and use the 5 A Day program that encompasses the consumption of five portions of vegetables and fruits in a day. The other 35 subjects claimed that they regularly consume high-calorie

snack foods. The study also analysed the individual variables that is, the self-efficacy and perceived control. The determinants of these variables- their beliefs- were established. The TPB variables proved to be effective predictors of the schoolchildren's intentions to eat unhealthily (Ajzen, 2011). However, the variables were relatively ineffective in the prediction of behaviour. These are tabulated in the figure below.

Figure 4.1: Correlations Between Self-efficacy, PBC and Intention

		Self-efficacy	Perceived Behavioural Control	Intention
Self-efficacy	Pearson Correlation	1	.369(**)	.174
	Sig. (2-tailed)		.001	.123
	N	80	80	80
Perceived Behavioural Control	Pearson Correlation	.369(**)	1	.234(*)
	Sig. (2-tailed)	.001		.037
	N	80	80	80
Intention	Pearson Correlation	.174	.234(*)	1
	Sig. (2-tailed)	.123	.037	
	N	80	80	80

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

From Figure 4.1 above, there exists a positive correlation between the two variables and the snack intentions. This therefore implies that self-efficacy and perceived behavioural control have great effects on the children's intentions to consume unhealthily. Analysing the correlation coefficients for self-efficacy and perceived behavioural control (0.174 and 0.234), it is evident that perceived behavioural control has a greater relationship with the intentions (Sharma et al., 2010). The existing relationship is a positive one hence it implies that the children's snack intentions are more influenced behavioural control by parents, friends or teachers. Self-efficacy also has a positive relationship with snack intentions, but the relationship is weaker. It is therefore inevitable to deduce that schoolchildren would have snack intentions that are more influenced by external factors than self-made decisions.

Figure 4.2: Correlations

		Regret	Past Behaviour	Intention
Regret	Pearson Correlation	1	.428(**)	-.613(**)
	Sig. (2-tailed)		.000	.000

	N	80	80	80
Past Behaviour	Pearson Correlation	.428(**)	1	-.529(**)
	Sig. (2-tailed)	.000		.000
	N	80	80	80
Intention	Pearson Correlation	-.613(**)	-.529(**)	1
	Sig. (2-tailed)	.000	.000	
	N	80	80	80

** Correlation is significant at the 0.01 level (2-tailed).

The figure above illustrates the correlation between the predictor variables, past behaviour and anticipated regret, and the snack intentions of the school children. As postulated in the figure, there exists a negative correlation between these variables and the intentions; -0.613 and -0.519 for anticipated regret and past snacking behaviour respectively. This implies that anticipated regret has a higher negative correlation with snacking intentions than past snacking behaviour. The reason for this could be the fear that the children have in regards to the repercussions of taking high-calorie snacks. Hence, the results reveal that the anticipated regret has a stronger relationship with snack intentions as it makes the schoolchildren to significantly reduce the consumption of the snacks. On the other hand, the past snacking behaviour has a negative relationship with the snack intention, however weaker. This shows that past snacking behaviour could influence the children's intention hence leading to the reduction of consumption of the high-calorie foods. This is probably due to various repercussions that occurred in the previous week after the consumption of such unhealthy foods. These relationships are significant because it enables the children to reduce unhealthy eating habits and therefore enhancing the adoption of healthy eating programs such as 5 portions of fruit and vegetables in a day.

Figure 4.3: Correlations

		Regret	Past Behaviour
Regret	Pearson Correlation	1	.428(**)
	Sig. (2-tailed)		.000
	N	80	80
Past Behaviour	Pearson Correlation	.428(**)	1
	Sig. (2-tailed)	.000	
	N	80	80

** Correlation is significant at the 0.01 level (2-tailed).

From the figure above, it is evident that the predictor variables, anticipated regret and past snacking behaviour have a positive relationship with the size of 0.428. This shows that anticipated regret is more likely to be influenced by the past snacking behaviour. Hence, there would be a greater anticipated regret after the subject indulgences in unhealthy snacking behaviour (Sharma et al., 2010).

Figure 4.4: Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.432	.820		7.847	.000
	Self-efficacy	-.036	.090	-.037	-.397	.693
	Perceived Behavioural Control	.094	.113	.078	.832	.408
	Past Behaviour	-.408	.130	-.310	-3.146	.002
	Regret	-.408	.080	-.476	-5.094	.000

a Dependent Variable: Intention

From the table above, it can be deduced that self-efficacy, past snacking behaviour and anticipated regret are the best predictors of the intentions to consume snack foods. This is these variables are measurable as self-efficacy best states how the schoolchild would intend to consume snack foods while the past snacking behaviour outlines what happened in the previous week and how it affected the schoolchild's snack intentions (Bradshaw, 2011). Also, anticipated regret gives the researcher the idea of how much the schoolchildren are willing to risk taking snacks even though they anticipate regrets.

Whilst analysing the Theory of Planned Behaviour, it is worth noting that some factors are normally neglected. These include affect and emotions. This particular concern has its basis on the fact that there is an ordinary misperception that TPB postulates a coherent participant that is not subject to emotions even as the theory's constructs are analysed. However, it is a notable fact that the consumer decisions posited by the samples are dependent on their emotions (Craig, 2014). Affect and emotions in TPB are evident in two notable way namely; they can act as factors that influence the behaviours and control beliefs. Hence, it is a known fact that the general moods of the participants in the theory play a significant role in the evaluation and strength of the beliefs and behaviours. In comparison to the people who

possess negative moods, the people who possess positive moods are more inclined to analyse the events like the consequences of taking a particular inclination towards certain behaviours more favourably. Additionally, affective states can also assist to choose the normative, behavioural and control beliefs that are easily accessible in the memory (Domingo, 2012).

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