


INVESTIGATING THE BINGE-WATCHING BEHAVIOR ON INSOMNIA AND OBESITY AMONG GENERATION Z

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ABSTRACT

Background and Aims: The study identified the risks of increased screen time on generation z considering two parameters i.e., insomnia and obesity and the moderating role of self-control.

Methodology: A cross-sectional study was conducted by convenient sampling technique. The survey only included people who were born between 1997 and 2002. The analysis of the effects of variables took into account only a few parameters. Discriminant validity and convergent validity was used to check reliability and validity while path coefficient analyzed the hypothesis.

Results: Binge-watching has positive significant impact on insomnia and obesity

($p < 0.05$), and the self-control strongly effect the relationship of binge-watching, obesity and insomnia as a moderator ($p < 0.05$).

Conclusion: Binge-watching caused insomnia and obesity while self-control in direct relation to obesity and insomnia controlled the prevalence rate. The moderating role of self-control showed that insufficiency of self-control during binge-watching led to obesity and insomnia. The outcome indicated that Generation Z needs to be encouraged to practice self-control through public health initiatives, social media, seminars, workshops, etc. At the same time, people need to be made aware of how binge-watching affects their health.

Keywords: *Insomnia, obesity, self-control, screen time, technology, mortality, exercise.*

Introduction

In this era of science and technology, the 21st century is more advanced with a lot of benefits as well as cons everything in excess is harmful and bad for humans. It should be in moderation, whether it is a beneficial or useful thing or activity. In this age, the use of technology has enormously increased that resulted in binge-watching, obesity or binge eating, and insomnia in recent years. Binge-watching is watching the series or TV shows in just one session. Binge watching has now developed into an addictive habit with the rising concerns of mental and physical health as a result¹. Obesity and binge-eating disorder are major risk factors of mobility and mortality² Spending hours on watching multiple series and seasons on the online steaming services, much of the attention has been paid to binge-watching and its psychological outcomes. It has risen the duration of covid-19. It might also the rising factor of stress and loneliness³ the skeptical health outcome of excess screen time (ST), such as abnormal body changes like increase in weight, behavioral problems, and sleep disturbances are outrageous. Physical activities among kids and teenagers is profoundly setting driven and shared and doesn't go about as a useful inverse

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to leisure screen time⁴. The binge-watching behavior has tremendous effect on people's health. As most of the people gained weight because of no physical activity and continuously using social medial all day long. This also affects the sleep at night and people tend to develop insomnia. The sympathetic nervous system, higher heart rates, aberrant hormone secretion, heightened hormone secretion, elevated whole-body and brain metabolic activation, and raised hormone secretion are all observed in patients with primary insomnia during sleep. Both daytime and night-time measurements of this ongoing activity are available⁵. The outcome of binge watching is disease, like obesity, chronic illness, and weight gain, and in many health domains, this has potentially negative consequences. There are many factors that can lead to obesity, but one of the major contributing factors to the present obesity issue is eating while watching television, which increases the consumption of high-density and high-calorie meals. It has also affected the sleep pattern in many individuals. According to the one research, binge watching is also a threat to the sleep quality and cognitive functions. Higher excessive television watching also lead to poorer sleep. The new study reveals that binge watching is widespread among young adults and is the first to link it to reduced sleep efficiency, increased exhaustion, and increased insomnia. Screen use has been linked to poor sleep quality in studies on sleep⁶. Due to the epidemic, binge watching has become more prevalent and has a negative effect on body weight. People with obesity and high stress levels experienced the biggest increase in binge watching frequency⁷. A study examined the students' self-control, professional efficacy (a measure of academic accomplishment), and binge-watching behavior. Two distinct multiple regression analyses were run on the data collected, conceiving binge-watching through two different mediating variables. The study's findings showed that self-control explains binge-watching and professional efficacy, binge-watching does not explain professional efficacy, and binge-watching does not explain the relationship between self-control and professional efficacy⁸. Furthermore Lades L. K. conducted a study that explored whether the valence of binge-watching experiences, as judged by the event reconstruction approach, can be explained by self-control. The research investigated the relationship between weaker trait self-control and binge-negative watching's and positive affect levels. The study investigated whether situational features of self-control moderate these correlations (plans, goal interference, or automaticity). According to regression analyses, participants with higher trait self-control experience less fatigue, boredom, guilt, and melancholy during binge-watching than do those with lower trait self-control. Binge-watching interferes with higher order goals less for highly self-controlled participants, which helps to explain these correlations⁹. Studies related to relative risk of having depression and lack of sleep among young adults due to screen time is scarce. Hence the current study will try to provide a means to identify the relative risk of increased screen time on adolescent population. Putting under the microscope; eating habits, lack of sleep or depreciation of sleep quality, lack of physical activity and onset of depression symptoms among young adults. This study will also attempt to look at the social association with these parameters. Providing an in depth looks whether taking care of oneself is for society's benefit.

Conceptual Framework

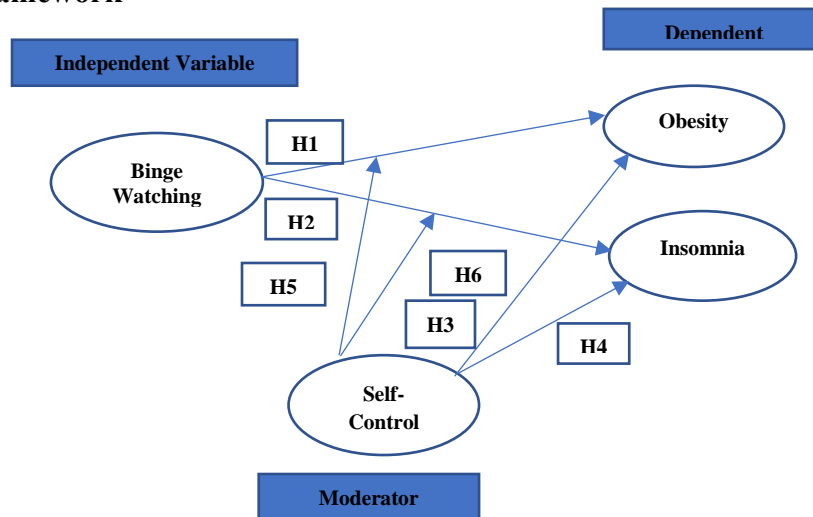


Figure 1: shows the conceptual framework of binge watching, obesity, insomnia and self-control.

H₁: There is a significant impact of binge watching on obesity.

H₂: There is a significant impact of binge watching on insomnia.

H₃: There is a significant impact of self-control on obesity.

H₄: There is a significant impact of self-control on insomnia.

H₅: There is a significant impact of self-control as a moderator between binge-watching and obesity.

H₆: There is a significant impact of self-control as a moderator between binge watching and insomnia.

Methodology

Target Population

The target population included the students who fell under the age group of 20-25 years and reported to be binge-watchers and/or was exposed to the screen excessively complaining for having insomnia or increased BMI. The University Students have been included as a respondent in this study.

Study design

Cross sectional study was conducted for the research.

Duration of study

The study was conducted during the period of 6 months after the approval of synopsis.

Sampling Technique

Participants of the study were recruited by convenient sampling method.

Inclusion criteria

- Individuals who fell under Generation Z specially the individuals born in 1997-2002 or between 20-25 years of age.
- Individuals who were binge-watchers and/or were exposed to screen excessively.
- Individuals who had insomnia or disturbed sleeping patterns.
- For Bing-watching, a small number of questions from the BWESQ and sleeping disorder severity index (ISI) for insomnia were used, as required.

Exclusion criteria

- Individuals from Generation Z born after 2002 or individuals who were less than 20 years or more than 25 years.
- Incomplete questionnaire

Data collection procedure

Data was collected through a self-designed questionnaire via Google forms. The questionnaire was made on 5-point Likert scale. Scales ranged from strongly agree, agree, neutral, disagree and strongly disagree. The first part of the questionnaire contained demographic details followed with the BMI calculation and descriptive analysis questions and in the last part of the questionnaire major details of the study were taken by the individuals highlighting the possible consequences of excessive binge-watching which led to insomnia and obesity.

BMI Calculation

BMI, previously called the Quete let index, is an action for demonstrating healthful status in grown-ups. It characterized as an individual's weight in kilograms divided by the square of the individual's height in meters (kg/m²). The researchers followed the WHO's defined standard criteria to measure obesity by BMI for the adults above 20 years and as per the criteria the people having BMI below 18.5 fell under the category of underweight, while the people who had BMI 18.5-24.9 were considered to have normal weight. Moreover, people whose BMI lied (25.0-29.9) were said to be pre-obese while the individuals who had 30.0-34.9 BMI fell under the obesity class I. Similarly, people having BMI (35.0-39.9) fell under obesity class II and people having BMI above 40 belonged to obesity class III¹⁰.

Data analysis procedure

Data analysis tool was SmartPLS. Discriminant validity and convergent validity was used to check reliability and validity. Path coefficient test was used to analyze the data.

Results

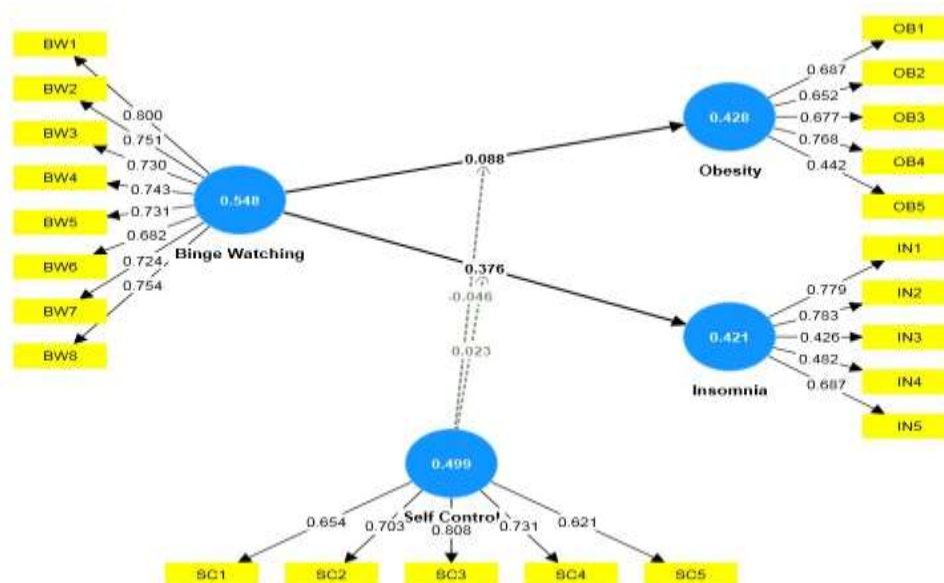


Figure 2: shows the outer loading of the model with all observed variables (items).

Figure 3 was the initial path model of the study which clearly illustrated the impact of binge watching on two dependent variables i.e., obesity and insomnia in the presence of a moderator i.e., self-control. The relationship and impact among the variables were analyzed using smart pls which computed standard results assessment criteria¹¹. Every construct or latent variables was analyzed

using observed/manifest variables or items. 8 items were used for the exogenous latent variable i.e., binge watching to analyze the impact on endogenous latent variables, while for remaining three latent variables i.e., insomnia, obesity and self-control, five items were used for each variable respectively.

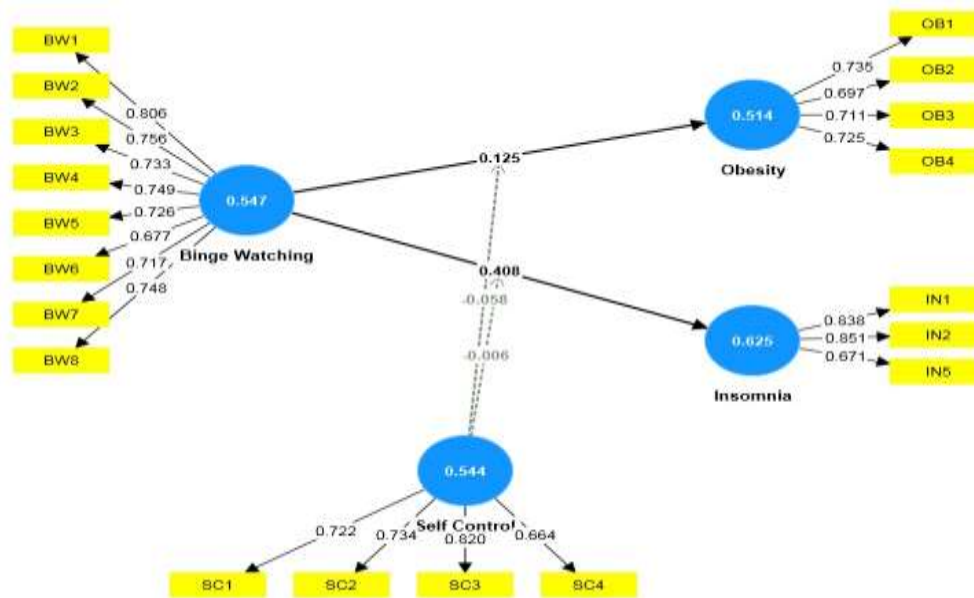


Figure 3: shows the outer loading of the model with some deleted observed variables (items).

As the data was analyzed it was noted that the extracted AVE was not fulfilling the defined criteria so in order to balance it, we had deleted four in total items from insomnia, obesity and self-control. Items 3 and 4 were deleted from insomnia; item 5 was deleted from obesity and self-control respectively. Figure 2 was the finalized path model of the study.

Construct reliability and validity

Internal consistency is measured by using cronbach’s alpha which means how closely all the items are related to one another¹². The threshold defined for the good internal consistency among the items was 0.71-0.91¹³. The AVE compares the amount of variation recorded by a construct to the amount attributable to measurement error. Values over 0.7 are regarded as extremely good, while a level of 0.5 is deemed acceptable. While composite reliability in comparison to Cronbach's Alpha, provides a less skewed assessment of reliability having a defined threshold of 0.7 and above, however the values of Cronbach’s alpha and composite reliability is between 0.50 to 0.70 could be considered if the AVE is > 0.50^{14,15,16}.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Binge Watching	0.882	0.890	0.906	0.547
Insomnia	0.693	0.706	0.832	0.625
Obesity	0.690	0.691	0.809	0.514
Self-Control	0.720	0.727	0.826	0.544

Table 1: shows that the composite reliability of binge watching, insomnia, obesity and self-control.

Table 1 showed that AVE for binge watching was found to be 0.547, for insomnia it was 0.625, similarly for obesity it was 0.514 and for self-control it was found to be 0.544. The table further interpreted the Cronbach’s alpha values which was found to be good for binge-watching (0.882) and self-control (0.720) as the values were greater than 0.7 but for insomnia (0.693) and obesity (0.690) the values were found to be below the defined threshold but the values between 0.50 to 0.70 could be considered if the AVE is >0.50^{15,16}, so considering the values of AVE for all the

variables, the composite reliability and Cronbach's alpha of insomnia and obesity would be accepted.

Discriminant validity

Heterotrait-monotrait ratio (HTMT) - Matrix

Discriminant validity focuses on determining the actual lack of relationships between notions that theoretically should not be related to one another. The correlation between the constructs is estimated via HTMT. HTMT scores below 1 indicate that a true correlation between the two constructs existed and similarly if it is greater than 1 than it will indicate an absence or lack of discriminant validity among the variables^{14, 17}.

	Binge Watching	Insomnia	Obesity	Self-Control
Binge Watching				
Insomnia	0.735			
Obesity	0.494	0.545		
Self-Control	0.660	0.796	0.804	
Self-Control x Binge Watching	0.067	0.045	0.119	0.058

Table 2: shows that the HTMT values close to 1 indicates a lack of discriminant validity

Table 2 indicated the HTMT obtained after analyzing results of the study and it showed that true correlation existed among the variables as all the acquired values of HTMT was less than 1.

Fornell-Larcker criterion

The primary value of AVE should be higher than its correlation with other factors, according to the Fornell-Larcker criterion, which is posited for each variable. Accordingly, the variance shared by the indicator block and each variable is higher than the variance divided by the other variables. The main value of AVE occurs inside diagonal cells and the correlation is displayed below it in the output of Smart PLS in the Fornell-Larcker criterion table. As a result, there is a discriminant validity if, in absolute terms, the top number (which is the prime value of the AVE) in any factor column is higher than the number (correlation) below¹⁸.

	BW	IN	OB	SC
Binge Watching	0.740			
Insomnia	0.592	0.791		
Obesity	0.402	0.374	0.717	
Self-Control	0.530	0.562	0.584	0.737

Table 3: shows that the Fornell Larcker Criterion (the square root of AVE shown on the diagonal), Binge Watching (BW); Insomnia (IN); Obesity (OB); Self-Control (SC).

Table 3: represented that each component has higher major AVE values than the ones below. The result demonstrated that Fornell Larcker's standards have been met for the study.

Cross loadings

For the intended parameters as well as other elements that are not meant to be readily quantified, cross loading or crosslinking is a good loading indication. Although it can still range from 0.50 to 0.70, the loading factor determinant is >0.70 . While 0.30 or 0.40 should be the determining criteria for cross loading. As an alternative to AVE, cross loading is also declared though the AVE value satisfies the requirements; it is still admissible even though the cross-loading value is not eligible^{15,18,19}.

	Binge Watching	Insomnia	Obesity	Self-Control	Self-Control x Binge Watching
BW1	0.806	0.570	0.318	0.384	0.013
BW2	0.756	0.514	0.384	0.430	-0.008
BW3	0.733	0.392	0.234	0.348	-0.013
BW4	0.749	0.415	0.282	0.406	-0.056
BW5	0.726	0.376	0.323	0.433	-0.134
BW6	0.677	0.337	0.266	0.335	-0.073
BW7	0.717	0.428	0.285	0.389	-0.038
BW8	0.748	0.406	0.257	0.410	-0.036
IN1	0.567	0.838	0.209	0.386	-0.015
IN2	0.513	0.851	0.296	0.438	-0.063
IN5	0.303	0.671	0.398	0.524	-0.011
OB1	0.308	0.262	0.735	0.404	-0.018
OB2	0.206	0.216	0.697	0.324	0.023
OB3	0.360	0.282	0.711	0.466	-0.130
OB4	0.250	0.299	0.725	0.452	-0.114
SC1	0.438	0.425	0.537	0.722	0.032
SC2	0.348	0.399	0.435	0.734	-0.028
SC3	0.415	0.519	0.351	0.820	-0.063
SC4	0.351	0.291	0.381	0.664	-0.023
Self-Control x Binge Watching	-0.053	-0.038	-0.095	-0.025	1.000

Table 4: shows the Cross Loading where Binge Watching (BW); Insomnia (IN); Obesity (OB); Self-Control (SC).

Multiple collinearity

Multiple collinearity (Inner VIF). The independent variables are put through a multicollinearity test to see if they are redundant with one another. When VIF is less than 5.00, collinearity is alleged to exist¹⁵.

	Binge Watching	Insomnia	Obesity	Self-Control	Self-Control x Binge Watching
Binge Watching		1.394	1.394		
Insomnia					
Obesity					
Self-Control		1.391	1.391		
Self-Control x Binge Watching		1.003	1.003		

Table 5: shows the shows the correlations between the latent exogenous variables

All VIF test results, according to Table 5, are less than 5.00. Each variable has therefore satisfied the relevant VIF requirements.

Collinearity statistics (VIF)	
	VIF
BW1	2.206
BW2	1.795
BW3	1.915
BW4	2.028
BW5	1.852
BW6	1.660
BW7	1.832
BW8	1.977
IN1	1.680
IN2	1.726
IN5	1.157
OB1	1.421
OB2	1.447
OB3	1.189
OB4	1.291
SC1	1.270
SC2	1.356
SC3	1.718
SC4	1.385
Self Control x Binge Watching	1.000

Table 6: shows the correlations between the latent exogenous variables. According to Table 6, every variable displayed perfect VIF values of less than 5.00.

R square

The R Square value can be defined as the value of contribution between the variables. The thresholds of the R square values could be characterized in a way that if the R square value of a particular value is greater than 0.67 (>0.67), it is said to be strong. However, if the R square value lies at more than 0.33 (>0.33), it is said to be moderate. Whereas if the value of a selected variable comes more than 0.19 (>0.19), it is referred as weak¹⁵.

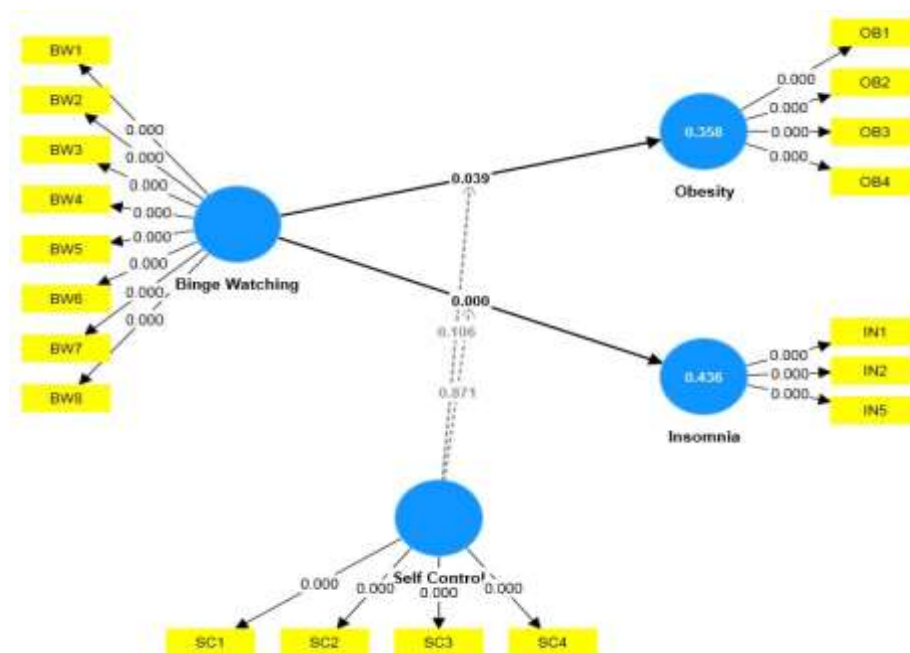


Figure 4: shows the Path model for testing the relationship between the independent and dependent variables

According to the characterization of the values mentioned above it had been interpreted the R square value of obesity was 0.358 and insomnia was 0.436. Both the values were a moderate value as per the defined criteria.

Total effects

The p value reflects the degree of data compatibility with the null hypothesis. Some recommend abandoning p value, others lowering the significance threshold to 0.005. A 0.005 threshold could increase sample sizes and costs as well as depress spontaneous research. Authors should provide actual p values, not just “ $p < 0.05$ ” or “ $p \geq 0.05$ ”²⁰.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Binge Watching -> Insomnia	0.411	0.417	0.069	5.980	0.000
Binge Watching -> Obesity	0.123	0.124	0.059	2.061	0.039
Self-Control -> Insomnia	0.343	0.340	0.068	5.010	0.000
Self-Control -> Obesity	0.517	0.523	0.055	9.434	0.000
Self-Control x Binge Watching -> Insomnia	-0.006	-0.004	0.036	0.163	0.871
Self-Control x Binge Watching -> Obesity	-0.058	-0.056	0.036	1.615	0.106

*Table 7: Hypothesis testing between the variables, original sample implies the original data; sample mean implies the 500 bootstrapped samples. * $p < .05$*

A significant positive relationship was found between binge-watching and insomnia as the p-value was 0.00. Similarly, a substantial positive relationship was found between binge-watching and obesity as the p-value was less than 0.050 which is 0.039. Another noteworthy positive relationship was found between self-control and insomnia as the p-value was 0.00. Moving further, a consequentially positive relationship was also found between self-control and obesity as the p-value was 0.00. Furthermore, when a moderator (Self-Control) was introduced to binge-watching an inconsequential relationship was found between self-control and binge-watching against obesity as the p-value was greater than 0.05 which is 0.871. Similarly, an insignificant positive relationship was found between self-control and binge-watching against obesity as the p-value was 0.106.

Discussion

The study used a cross-sectional research design in conjunction with an online survey approach to examine how binge-watching affects obesity and insomnia in the presence of a moderator, namely self-control among generation Z. The study was conducted by analyzing the impact of an independent variable on two dependent variables with an effect of the moderator. Hence, two direct and two moderating hypotheses were proposed for the study. Results of the direct hypotheses indicated a positive significant relationship of independent variable with the dependent variables and similarly the relationship of the moderator with the dependent variables was found to have a significant positive effect, congruent with the cited investigations by Fan & Jin and Fossum et al., people with less self-control showed obesity and insomnia more^{21,22}. However, the moderating hypotheses showed that there was no self-control in the respondents of the study, so they reported to had weight and sleeping issues. Obesity was calculated manually by collecting the age and heights of the respondents and considering the WHO defined criteria. It was found that 41.97% of the total population of the study lied in the pre-obese category, while 22.54% of the people belonged to the obesity class-I. 3% of the total population of the study was the individuals from obesity class-II and 0.8% were the people from obesity class-III category. It was found that

majority of the respondents were binge-watchers and were exposed to some screening medium. 61.5% of the respondents were exposed to some mediums from more than 4 years while 31% of the population was using the screens for more than 12 hours per week. As stated by Abrams unlimited access to digital entertainment such as Netflix, YouTube, Facebook, Insta and Snap chat has given rise to “binge-watching”²³. Candidates also stated that they often check TV series application (i.e., Netflix, Urduflix, Amazon Prime etc.) in order to get acknowledged about any release of their interested series. As a result of their binge watching and lack of exercise and self-control majority of people have developed behavior problems as well, they complained for obesity too. In the light of obtained data for the study it had been noted that the respondents spend very much of their time watching TV series though they tried to control their selves from watching TV series, but failed to resist which resulted in the failure to accomplish the tasks timely just to satisfy the craving of watching TV series. Furthermore, it was examined that most of the respondents consider binge-watching a cause of joy and enthusiasm. Hence, the findings suggested that the respondents always need to watch more episodes to satisfy the urge, and greediness to watch more and more lead to binge watching in generation Z. Obesity had been linked to television viewing, probably because it leads to more sedentary behavior and/or increased eating. The rising trend of binge watching may influence body weight and the energy balance²⁴. Considering the screen consumption and BMI statistics, it had been analyzed that most of the respondents craved snacks while watching something. However, an uncontrollable eating behavior was also reported by the respondents. Furthermore, some people agreed that they had developed unhealthy diet consumption habit due to binge watching. It had also been noticed from the results that respondents reported to have disturbed sleeping patterns or faced insomnia as they reported to woke up on a slightest movement in their surrounding and most of them prefer to watch something before sleeping. Excessive sedentary behavior can contribute to a sedentary lifestyle and might raise the risk of weight gain and obesity. Examples include spending extended periods of time sitting and watching television. Weight gain can also result from binge-watching while overeating or engaging in unhealthy snacks²⁶. Late-night binge watching might interfere with sleep cycles and make it more difficult to get to sleep or stay asleep. The body's natural sleep-wake cycle may also be hampered by exposure to bright screens and stimulating content just before bed²⁷. One of the investigations by Exelmans and Van den Bulck claimed that binge watching is harmful to the sleep quality and cognitive functions⁶. However, the direct impact of the moderator on both the dependent variables was found to be significant positive as the respondents reported to manage the obesity and insomnia by self-control. Another important part of the investigation was the moderating role of self-control between binge-watching and obesity and similarly between binge-watching and insomnia. The results clearly showed the absence of self-control among the respondents as binge-watching had led to obesity and caused insomnia in the Generation Z. Liu et al., discovered that self-control in adolescents both attenuated the direct relationship between mindfulness and poor sleep quality as well as the indirect relationship through rumination²⁵.

Conclusion

The results clearly summarized the direct and positive significant effect of IV (binge-watching) on both the DVs (obesity and insomnia) which means that as much as the individual binge-watch, the more they have chances of getting insomnia and/or obesity as majority of the respondents reported to had disturbed sleeping behaviors, cravings and weight issues. However, the direct effect of self-control on obesity and insomnia showed a positive significant relation; hence a reduction in the cases or chances of obesity and insomnia was concluded. On the other hand, the results of the moderating hypotheses summarized that self-control lacked among the respondents as sleeping and weight issues was reported by the outcome. Hence, it had been concluded that the presence and absence of self-control during binge-watching plays an important role in creating or controlling the obesity and insomnia. Higher self-control may help one get over disturbed sleeping patterns and obesity issues, while lower self-control creates such issues among the individuals.

Limitations

The study was limited to the 5 age groups of generation z, i.e., who were born in between 1997 to 2002. Few factors were considered to analyze the impact of IV on DVs. To better understand the results more factors and maximum age groups of generation z should be considered as this will help to identify the effective interventions and strategies to mitigate these negative effects.

Recommendations

Generation Z must be educated on the negative effects of binge-watching, particularly on sleep and weight gain. This can be done through public health campaigns, social media, seminars, workshops etc. People should be encouraged the development of healthy habits such as regular exercise, healthy eating, and good sleep. This will help mitigate the negative effects of binge-watching on insomnia and obesity. The role of self-control strategies must be promoted such as mindfulness, meditation, and cognitive-behavioral therapy. These strategies will help individuals regulate their binge-watching behavior and reduce the negative impact on their health. The parents should be encouraged the use of parental controls and monitoring tools for streaming services. This will help them limit their children's exposure to binge-watching and promote healthy viewing habits. Overall, it is important to raise awareness about the negative effects of binge-watching, and to promote healthy viewing habits and self-control strategies to minimize the consequences.

AUTHORS' CONTRIBUTION:

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Aniq Saeed

Acquisition, Analysis or Interpretation of Data: Aniq Saeed

Manuscript Writing & Approval: Aniq Saeed

All authors acknowledge their accountability for all facets of the research, ensuring that any concerns regarding the accuracy or integrity of the work are duly investigated and resolved.

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INFORMED CONSENT: The participants involved in this study were fully informed about the nature and purpose of the research, as well as the procedures involved.

CONFLICT OF INTEREST: The authors declare that there is no conflict of interest.

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