

ORIGINAL ARTICLE

EFFECT OF EXPOSURE TO VIOLENT CONTENT OF VIDEO-GAMES ON EVOLUTION OF AGGRESSIVE AND SUICIDAL BEHAVIOURS

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Background: Exposure to violent video games leads to aggressive and suicidal behaviours. The objective of this study was to compare violence exposure, degree of aggression and suicidal ideation between non-video gamers (NVGs), non-violent video gamers (NVVGs), and violent video gamers (VVGs), and to correlate degree of violence exposure to intensity of aggression and suicidal ideation. **Methods:** Thirty-six subjects were included in each of NVGs, NVVGs and VVGs groups. Exposure to violence was evaluated through Video Game Questionnaire (VGQ), degree of aggression via Buss-Perry Aggression Questionnaire (BPAQ), and severity of suicidal ideation through Suicide Behaviours Questionnaire-Revised (SBQ-R). ANOVA, Post Hoc Tukey's test, and Pearson's correlation were used for data analysis. **Results:** Degree of violence exposure was significantly different between NVGs, NVVGs and VVGs ($p=0.000$), and so was intensity of physical-aggression, verbal-aggression, anger, hostility, and suicidal ideation ($p=0.000$ respectively). Degree of violence experienced by NVVGs and VVGs depicted a positive correlation with intensity of physical aggression [$(r=0.467, p=0.004)$ and ($r=0.546, p=0.001$) respectively], verbal aggression [$(r=0.401, p=0.015)$ and ($r=0.476, p=0.003$) respectively], anger [$(r=0.564, p=0.000)$ and ($r=0.485, p=0.003$) respectively], hostility [$(r=0.484, p=0.003)$ and ($r=0.440, p=0.007$) respectively] as well as suicidal ideation [$(r=0.827, p=0.000)$ and ($r=0.604, p=0.000$) respectively] while physical-aggression, verbal-aggression, anger and hostility scores showed an independent positive correlation with suicidal likelihood in both NVVGs and VVGs [$(r=0.451, p=0.006)$, ($r=0.484, p=0.003$), ($r=0.480, p=0.003$), ($r=0.384, p=0.021$), and ($r=0.441, p=0.007$), ($r=0.442, p=0.007$), ($r=0.458, p=0.005$), ($r=0.491, p=0.002$) respectively]. **Conclusion:** Exposure to violent video games creates aggression associated suicidal tendency.

Keywords: Neurophysiology, Aggression, Violence, Video games, Suicidal ideation, Medical students

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INTRODUCTION

With the evolution of society, opted and preferred modes of entertainment have also evolved. One of commonest modes of entertainment opted by masses of our modern society these days includes indulgence in to different genres of video games which could broadly be classified into violent and non-violent categories. Studies have indicated that up to 50% of a locality's individuals could be active video gamers out of which a considerable proportion can depict gaming addiction.¹

Adolescents and young adults both can experience a broad spectrum of emotional swings under effect of video games, commonest of which is impulsive spectrum of aggression which becomes intense with indulgence into violent genre of video games.² American Psychological Association defines this as an emotion marked by irrational antagonism towards a person that can express itself in form of an assault³ whose emergence could be explained on basis of various theories such as social learning theory, arousal theory, cognitive priming theory, catharsis theory, drive reduction theory and general affective aggression theory⁴.

Neurophysiological basis for emergence of aggression and impulsivity after exposure to

provocative/violent visual content⁵ could be established within circuits associated with amygdaloid-hypothalamic-periaqueductal pathways.⁶ It is believed that medial prefrontal cortex, which keeps the amygdaloid-hypothalamic system in an inhibited state under normal circumstances, is itself dishinhibited by exposure to virtual violent content of the videogames⁷ and this leads to development of impulsivity and aggression within VGs, specifically those who indulge into violent genres of video games⁸. It is thought that loss of neurochemical harmony between serotonin, dopamine, glutamate and GABA, within amygdaloid-hypothalamic-periaqueductal connections⁹ of those frequently exposed to violent digital content, is the prime event which induces aggression and suicidal ideation.¹⁰

Since our society has been displaying a steep rise of aggressive and non-tolerant behaviours and since prevalence of aggressive, impulsive and suicidal behaviours is on rise¹¹, this study was devised with the aim to identify a link between aggressive as well as suicidal behaviours and violent video gaming.

METHODOLOGY

Since males are more likely to be active VGs hence only males were selected for this cross-sectional (comparative

correlational) study from different medical institutes of town after getting approval from Nishtar Medical University, Multan (Letter No. 9645). Sample size of 36 for each group was calculated by inserting in the means of aggression scores¹² within the following formula:

$$n = \sigma^2 (Z_{1-\alpha/2} + Z_{1-\beta})^2 / (\mu_0 - \mu_1)^2$$

Since obesity itself can affect the psychopathiatric health, hence only non-obese male medical students (BMI of ≤ 24.9 and a WHR of ≤ 0.9) with history of regular video-gaming were enrolled. Video Game Questionnaire (Cronbach's alpha of 0.86)¹³ was administered to general pool of enrolled medical students that enabled us to randomly select 108 medical students out of it, with equal representation for non-video gamers (NVGs), non-violent video gamers (NVVGs, who preferred E-rated games) and violent video gamers (VVGs, who played A-rated games) categories. This scale categorizes VGs as per Entertainment Software Rating Board (ESRB) system and takes into account violence exposure score (VES).

To assess degree of aggression harboured by NVGs, NVVGs and VVGs, Buss-Perry Aggression Questionnaire¹⁴ was administered and to detect probability of suicidal ideation within NVGs, NVVGs and VVGs, Suicide Behaviours Questionnaire-Revised (SBQ-R)¹⁵ was employed.

Collected data was gathered on a specifically evolved field proforma, and entered and analyzed using SPSS-26 and was evaluated for normality distribution. ANOVA with Post-hoc Tukey's test was applied to judge existence of differences among violence exposure, degree of aggression as well as intensity of suicidal ideation while Pearson's correlation was applied to correlate quantitative variables with each other in groups.

RESULTS

Because most of study variables followed normal distribution, hence data pertaining to basic demographics of all three study groups, placed in Table-1, as well as other quantitative variables has been represented as Mean \pm SD.

The inferential statistics of our data depicted that degree of violence exposure was minimal for NVGs and maximal for VVGs and so was the intensity of aggressiveness as well as the frequency and/or intensity of suicidal ideation. The degree of violence exposure within NVVGs, though significantly higher than NVGs, was significantly lower to that experienced by VVGs and so was true for the degree of aggressiveness as well as intensity of suicidal ideation. (Table-2).

Intensity of violence exposure, encountered through a specific genre of videogames, showed a significant positive correlation with degree of aggressiveness in NVGs, NVVGs as well as in VVGs which in turn had an independent positive correlation with severity of suicidal tendency in all the study groups.

Degree of violence experienced through a particular category of videogames showed an independent positive correlation with the intensity of suicidal behaviour also. (Table-3, 4).

Table-1: Basic demographics pertaining to NVGs, NVVGs, VVGs

Demographics [Median (IQR)]	NVGs	NVVGs	VVGs
Age (Years)	20.000 \pm 1.242	20.722 \pm 1.578	20.277 \pm 1.058
Weight (Kgs)	61.491 \pm 6.724	62.138 \pm 5.862	63.125 \pm 6.801
Height Square (m ²)	2.952 \pm 0.285	2.911 \pm 0.201	2.965 \pm 0.264
Body Mass Index (Kg/m ²)	20.377 \pm 1.939	21.027 \pm 1.470	21.147 \pm 1.439
Waist Circumference (Cm)	78.402 \pm 4.462	78.750 \pm 5.881	81.236 \pm 5.614
Hip Circumference (Cm)	92.847 \pm 4.872	92.819 \pm 6.064	94.902 \pm 5.467
Waist Hip Ratio	0.843 \pm 0.028	0.845 \pm 0.026	0.851 \pm 0.027

Table-2: Comparison of VES, BPPAS, BPVAS, BPAS and SBQ-R amongst study groups (n=36)

Variable	Mean \pm SD (n=36)		p
Violence Exposure Score (VES)	NVGs	NVVGs	0.004
	0.000 \pm 0.000	13.277 \pm 4.172	
	NVGs	VVGs	0.000
	0.000 \pm 0.000	94.694 \pm 29.388	
Buss-Perry Physical Aggression Score (BPPAS)	NVVGs	VVGs	0.000
	13.277 \pm 4.172	94.694 \pm 29.388	
	NVGs	NVVGs	0.034
	0.2489 \pm 0.078	0.321 \pm 0.128	
Buss-Perry Verbal Aggression Score (BPVAS)	NVGs	VVGs	0.000
	0.2489 \pm 0.078	0.410 \pm 0.146	
	NVVGs	VVGs	0.006
	0.321 \pm 0.128	0.410 \pm 0.146	
Buss-Perry Anger Score (BPAS)	NVGs	NVVGs	0.007
	0.235 \pm 0.070	0.313 \pm 0.096	
	NVGs	VVGs	0.000
	0.235 \pm 0.070	0.398 \pm 0.142	
Buss-Perry Hostility Score (BPHS)	NVVGs	VVGs	0.003
	0.313 \pm 0.096	0.398 \pm 0.142	
	NVGs	NVVGs	0.003
	0.233 \pm 0.094	0.336 \pm 0.161	
Suicide Behaviours Questionnaire Revised (SBQ-R)	NVGs	VVGs	0.000
	0.233 \pm 0.094	0.428 \pm 0.129	
	NVVGs	VVGs	0.011
	0.336 \pm 0.161	0.428 \pm 0.129	
Suicide Behaviours Questionnaire Revised (SBQ-R)	NVGs	NVVGs	0.026
	0.261 \pm 0.112	0.357 \pm 0.188	
	NVGs	VVGs	0.000
	0.261 \pm 0.112	0.466 \pm 0.154	
Suicide Behaviours Questionnaire Revised (SBQ-R)	NVVGs	VVGs	0.009
	0.357 \pm 0.188	0.466 \pm 0.154	
	NVGs	NVVGs	0.015
	5.750 \pm 3.643	8.527 \pm 4.074	
Suicide Behaviours Questionnaire Revised (SBQ-R)	NVGs	VVGs	0.000
	5.750 \pm 3.643	11.111 \pm 4.676	
	NVVGs	VVGs	0.026
	8.527 \pm 4.074	11.111 \pm 4.676	

Table-3: Correlation of violence exposure to emergence of aggression within NVGs, NVVGs and VVGs

Variable	Violence Exposure					
	NVGs		NVVGs		VVGs	
	r	p	r	p	r	p
BPPAS	---	---	0.467	0.004	0.546	0.001
BPVAS	---	---	0.401	0.015	0.476	0.003
BPAS	---	---	0.564	0.000	0.485	0.003
BPHS	---	---	0.484	0.003	0.440	0.007

Table-4: Correlation of violence exposure and aggression with suicidal ideation in NVGs, NVVGs and VVGs

Variable	NVGs		NVVGs		VVGs	
	r	p	r	p	r	p
VES	---	---	0.827	0.000	0.604	0.000
BPPAS	0.439	0.007	0.451	0.006	0.441	0.007
BPVAS	0.648	0.000	0.484	0.003	0.442	0.007
BPAS	0.520	0.001	0.480	0.003	0.458	0.005
BPHS	0.475	0.003	0.384	0.021	0.491	0.002

DISCUSSION

Though the severity of violence exposure within NVVGs was significantly higher than NVGs, it was significantly lower than that of VVGs which depicted itself in the degree of aggressiveness of theirs also. Hence, NVGs who were not exposed to digital violence harboured lowest degree of aggression while VVGs who had maximal exposure to digital violent content depicted the highest amount of aggressive as well as suicidal behaviours. This finding of ours is echoed within the results of similar studies¹⁶ and could be explained on the neuro-physiological proposition which suggests that exposure to the violent content of videogames stimulates dorso-anterior cingulate cortex whose activation supersedes that of amygdala as well cingulate gyrus which in turn suppresses empathy and stimulates aggressiveness in individuals indulging into the violent content of videogames.¹⁷

The presence of suicidal behaviour within NVGs, who had minimal exposure to media violence and carried minimal degrees of aggression, was negligible while VVGs who had frequent exposure to violent genre of video games and harboured the maximal intensity of aggressive behaviours of all the study groups showed the strongest probability of suicidal thoughts. Similar findings have been reported by contemporary medical fraternity¹⁸ and its justification could be found within the scientific argument that virtual violence decreases the volume of left orbitofrontal cortex and not only disrupts dopaminergic as well as serotonergic neurophysiology associated with the control of docile and empathetic behaviours within whole of limbic circuitry but also leads to dysregulation of circuits aligned with medial prefrontal cortex, which combined together provide the base for evolution of aggressiveness and increase probability of impulsivity leading to suicidal ideation and suicidal attempts.¹⁹

Both within NVVGs and VVGs intensity of exposure to virtual violent content indicated a strong positive correlation with the emergence of aggression which once again is a finding that reverberates within the data being presented by studies conducted within similar domain²⁰ and could be explained on base of neuro-physiological findings which do suggest that indulgence into digital violence disrupts hypothalamo-pituitary-adrenal axis which in turn dysregulates cortisol as well

melatonin and Orexin A associated stress responses within the neurological circuits of the limbic system and increases both aggressive impulsivity and self-harm tendency through intricate neuro-endocrine modulations.²¹

Violence exposure and aggressiveness within NVVGs as well as VVGs showed independent positive correlations with the probability of suicidal likelihood both of which have been reported within projections of research works carried within the domain of videogaming^{22,23} where it is suggested that continuous exposure to media violence disrupts both GABAergic as well as glutamatergic neuro-biochemistry within key mood controlling areas²⁴ which leads to emotional volatility that could depict itself into flares of aggressive impulses and attempts to self-harm.²⁵

CONCLUSION

Exposure to violent content of videogames increases the risk of aggressive impulsivity and suicidal ideation.

OUTCOME & UTILIZATION

This study provides clinicians, educationists as well as parents with scientific data that highlights negative effects of digital violence exposure on psychopsychiatric stability of our youth. This thus can help in identification and curtailment of aggressive traits which may end up as an attempt for social or personal harm.

LIMITATIONS

The major limitation of this study is its dependency on a singular observation within a limited population, which raises a possibility that results might differ in longitudinal or cohort studies.

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HR: Acquisition, analysis and representation of data

MAL: Data analysis and final drafting

HH: Literature review, referencing

RZ: Literature review, referencing

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