

Research Paper

Online Attentional Bias Modification Training for Adolescents With Internet Gaming Disorder

Yasaman Nasiri^{1*} , Mohammad Noori¹ *1. Department of Clinical Psychology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.***Citation** Nasiri, Y., & Noori, M. (2022). Online Attentional Bias Modification Training for Adolescents With Internet Gaming Disorder. *Journal of Practice in Clinical Psychology*, 10(2), 79-90. <https://doi.org/10.32598/jpcp.10.2.739.3> <https://doi.org/10.32598/jpcp.10.2.739.3>**Article info:****Received:** 11 Apr 2021**Accepted:** 26 Feb 2022**Available Online:** 01 Apr 2022**Keywords:**Attentional bias modification,
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intervention, Adolescents**ABSTRACT**

Objective: Previous research has shown that attentional bias toward game-related stimuli is a significant factor in the etiology, maintenance, and severity of internet gaming disorder (IGD). Therefore, interventions targeting attentional bias toward game-related stimuli can potentially ameliorate this disorder. The present research aims to examine the effectiveness of online Attentional Bias Modification (ABM) training in reducing game-related attentional bias and the severity of IGD in adolescents.

Methods: In this quasi-experimental study, 33 adolescents with a DSM-5 diagnosis of IGD were sampled and randomly assigned to an experimental group (n=17) and a control group (n=16). The experimental group received online ABM, while no intervention was delivered to the control group. Attentional bias and IGD severity in these two groups were measured at pretest and posttest phases and then at 2 months follow-up via a modified Stroop test and internet gaming disorder-20 (IGD-20) questionnaire. Two-way repeated measures analysis of variance and Fisher's Least Significant Difference (LSD) were implemented to analyze the data using SPSS software, version 26.

Results: Game-related attentional bias and the severity of IGD were significantly decreased in the participants of the experimental group ($P<0.05$). The reductions were also maintained at the 2-month follow-up, whereas such reductions were not evident in the control group at any stage ($P>0.05$).

Conclusion: Given our findings, it can be concluded that online ABM can be an auxiliary or standalone treatment for adolescents with IGD; further research is necessary to understand its mechanisms of effect.

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Highlights

- Attentional Bias Modification (ABM) effectively decreases attentional bias toward game-related stimuli.
- Reduction of game-related attentional bias leads to Internet Gaming Disorder amelioration.
- The efficacy of the online implementation of ABM is confirmed.

Plain Language Summary

Individuals who suffer from certain psychological disorders usually have cognitive deficiencies that cause them to be more attentive to the information associated with their disorders. For example, people suffering from anxiety tend to pay more attention to threats, and people with addictive behaviors are inclined to vigilantly attend to the objects of their addictions. Similarly, individuals with IGD process game-related information with more priority. This phenomenon, known as attentional bias, is an influential factor in various mental disorders; therefore, its modification can have therapeutic effects. Methods of modifying attentional bias are called Attentional Bias Modification (ABM). In this study, the objective is to investigate the effects of ABM on IGD in adolescents suffering from this disorder. An online implementation of this intervention is delivered to 17 adolescents diagnosed with IGD. Then, their game-related attentional bias, along with the severity of their disorder, are compared with 16 other adolescents who received no intervention. The results show a significant decrease in game-related attentional bias after receiving online ABM; subsequently, this leads to a decrease in the severity of IGD. These findings suggest that ABM can be an auxiliary or standalone treatment for IGD, and the efficacy of its online implementation makes it an especially suitable intervention at a time when people are advised to stay at home and practice social distancing.

1. Introduction

Playing internet games is regarded as one of the most favorite activities for children, adolescents, and young adults, and as long as it is done in a reasonable and controlled amount, it is considered to be an innocuous or even beneficial activity (Wilms, Petersen, & Vangkilde, 2013). Nearly 1.7 billion individuals worldwide play online games routinely (Jeromin, Rief, & Barke, 2016). This behavior goes out of control for 0.2% to 8.7% of this population (Gentile, 2009), which leads to Internet Gaming Disorder (IGD). This disorder is defined as a regular and persistent preoccupation with playing internet games, causing clinical levels of mental distress and functional impairment (Argyriou, Davison, & Lee, 2017). The disorder has temporarily been introduced in the third section of DSM-5 with diagnostic criteria similar to those of gambling and substance use disorder (Jeromin, Nyenhuis, & Barke, 2016). Meanwhile, it requires more study before being recognized as a definite psychological disorder (Pontes & Griffiths, 2015). Also, in the 11th edition of the International Classification of Diseases (ICD-11), published in 2018 by the World Health Organization, gaming disorder is added to the list of mental disorders (Kim et al., 2019).

Earlier studies have shown numerous adverse physical and psychological outcomes arising from IGD. For instance, this disorder causes increased obesity, sleep abnormalities, decreased occupational function or job loss, decreased educational achievements, interpersonal issues, loneliness, heightened stress, lowered well-being, neglecting other entertainments and relationships, depression, and anxiety (Kuss et al., 2014; Jeromin et al., 2016; Kuss & Griffiths, 2012; Lam, 2014; Sublette & Mullan, 2012). In DSM-5, the main characteristics of IGD are continuous and repetitive playing of internet games and significant distress and dysfunction due to concerns about these games (Association, 2013).

Aside from the diagnostic criteria of IGD, its symptomatology, comorbidity, genetic origins, prognosis, underlying cognitive processes, and neurobiological mechanisms are comparable to gambling and substance use disorders (Yau & Potenza, 2015; Zhang et al., 2016). One of the cognitive processes prominent in the literature regarding the causation and sustenance of addiction symptoms is the selective allocation of attention in processing information. According to previous theories, the attention of individuals with addictive behaviors is focused more on the stimuli associated with their objects of addiction, which is called attentional bias (Metcalf & Pammer, 2011). Extensive empirical evidence supports

this assumption that people with addictive behaviors, including younger adults and adolescents diagnosed with IGD, process addiction-related stimuli with attentional bias (Azarmehr & Ahmadi, 2020; Chia & Zhang, 2020; van Holst et al., 2012).

One of the common methods of evaluating attentional bias is the modified Stroop test (Metcalf & Pammer, 2011). In this test, addiction-related and neutral words, which are leveled in terms of semantic processing characteristics (e.g., number of letters or usage frequency in the language), are presented to people with and without addictions. Similar to the classic Stroop test (Stroop, 1935), these words are displayed in four different colors, and participants should correctly point out every word's color as fast as possible while ignoring their meanings. Usually, people with addictive disorders indicate the colors of the addiction-related words with more delay compared to normal participants. This delay is because their attention is initially focused on the meaning of the words; therefore, the bias in attention delays the recognition of the colors of the words (Metcalf & Pammer, 2011). Research shows the modified Stroop test as a valid instrument for measuring attentional bias in addictive disorders (Cox, Fadardi, & Pothos, 2006). Studies using the modified Stroop test and similar instruments have shown that game-related attentional bias is evident in both adolescents and adults suffering from IGD (Decker & Gay, 2011; Dong & Potenza, 2014; Kim et al., 2018; van Holst et al., 2012; Zhou, Yuan, & Yao, 2012).

Researchers have altered the methods used to assess attentional bias to develop training through which attentional bias can be manipulated (Mathews & MacLeod, 2002). For example, the aforementioned modified Stroop test can be adjusted in a way that addiction-related stimuli and neutral ones are presented in pairs (an addiction-related one next to a neutral one, placed randomly), while the participants are asked to only point out the colors of neutral stimuli. This measure acts as training, and through repetition, participants learn not to focus their attention on addiction-related stimuli; therefore, their attentional bias would be reduced. Studies have demonstrated that such attentional bias modification (ABM) methods are effective in a variety of mental health problems, including depression, anxiety, gambling, and substance use disorder (Browning, Holmes, & Harmer, 2010; Heitmann, et al., 2018; MacLeod & Clarke, 2015; Wittekind et al., 2019).

As the association between IGD and attentional bias has been observed in previous research, investigating the effects of ABM interventions on IGD could be the

next step in understanding the mechanism and treatment of this disorder. So far, only one study has been conducted for this purpose. Although its results indicate significant effects of ABM on IGD, their research had several limitations (Rabinovitz & Nagar, 2015); namely, only adult males were recruited as participants, only one session of ABM was carried out, and the permanency of the intervention effects was not examined through follow-up assessments. Moreover, similar to most studies that examine attentional bias in people with IGD, the research was also conducted in an experimental setting, thus decreasing the generalizability of the results. Online studies benefit from higher external validity and can be accessible to a wider variety of participants as they contribute to the study from home (Denissen, Neumann, & Van Zalk, 2010).

Considering the need for more research about IGD as a newly introduced disorder in the field of psychopathology, this study aims to evaluate the outcomes of internet-delivered ABM training on game-related attentional bias and IGD severity in adolescents suffering from this mental health problem. In light of the research background, this study hypothesizes that delivering online ABM to adolescents with IGD would decrease their game-related attentional bias and ameliorate their disorder.

2. Participants and Methods

Study participants

In this quasi-experimental study, the target population was all the adolescents in the city of Tehran, Iran, according to the following inclusion criteria:

- a) being diagnosed with IGD according to DSM-5;
- b) being in the age range of 12 to 17;
- c) having the informed consent to contribute to the study.

Meanwhile, the exclusion criteria were defined as follows:

- a) suffering from serious medical conditions that necessitated prompt treatment;
- b) comparability of other DSM-5 disorders;
- c) engaging in any type of psychotherapy;
- d) leaving the study before the completion of the participation.

The convenience method of sampling was used by visiting multiple schools in different locations in Tehran and asking their staff to inform their students about the website of the study. There, they could familiarize themselves with the research and participate in it. Social media platforms and online forums related to gaming were also used to recruit participants. A total of 1217 adolescents filled the Internet Gaming Disorder-20 (IGD-20) questionnaire, from which 67 participants scored 72 or higher. They were called via telephone to be interviewed for the diagnosis of psychological disorders. The required sample size was calculated using power analysis with the G*Power software while considering the participants' dropout. Thirty-eight participants diagnosed with IGD, without comorbidities, and under no psychotherapy were recruited and randomly assigned (using a computer random number generator) to experimental and control groups. Five participants terminated their participation before the completion of the study; therefore, their data were excluded from the analysis. Ultimately, the data gathered from 33 adolescents (9 females, 16 controls) were used for the analysis.

Study measures

Modified Stroop Test

Game-related attentional bias was evaluated using the modified Stroop test. For the current study, the development of this test was based on the theoretical guidelines and methodological recommendations of Cox et al. (2006). Accordingly, the two series of game-related words and neutral words were selected in equal amounts, and none of them were representative of a color. Also, the words were leveled in terms of the number of letters. However, because no reference is available for the usage frequency of Persian words, the authors had to consider this criterion based on their judgments. Brown et al. (2014) have demonstrated that the English version of this test has good test-retest reliability (with the correlation coefficient ranging from 0.65 to 0.74) and internal consistency (with the split-half correlation ranging from 0.83 to 0.89). Khodadadi et al., (2014) and Rasti and Taghavi (2006) evaluated and verified the psychometric properties of the IGD's Persian version, with its Cronbach α ranging from 0.83 to 0.94, and its test-retest correlation coefficient ranging from 0.80 to 0.91.

Internet Gaming Disorder-20 (IGD-20)

The severity of IGD symptoms in participants was assessed using IGD-20, developed by Pontes, et al., (2014). This questionnaire includes 20 items divided into 6 sub-

scales, named salience (SA), Mood Modification (MM), tolerance (TO), withdrawal (WI), conflict (CO), and relapse (RE). A 5-point Likert scale is used for scoring the questionnaire's items, and the total score is from 20 to 100. The structural validity of the questionnaire was confirmed via confirmatory factor analysis. Additionally, the correlations of its scores with weekly hours of gameplay and the diagnostic criteria of IGD confirmed its criterion validity. Also, the Cronbach α of 0.88 demonstrated good internal consistency (Pontes et al., 2014). Studies recruiting non-adult samples have shown that this instrument can be implemented for adolescents (Fuster, et al., 2016; Shu et al., 2019). In their study of the psychometric properties of the Persian version of IGD-20, Vahidi, et al., (2019) demonstrated good criterion and structural validity, test-retest reliability ($r=0.95$), and internal consistency (Cronbach $\alpha=0.91$).

Attentional Bias Modification (ABM)

ABM was first developed and successfully implemented in 2002 to reduce threat-related attentional bias (MacLeod, et al., 2002). Since then, ABM has extensively been used for reducing attentional bias in various mental health problems (Browning et al., 2010; Heitmann et al., 2018; Wittekind et al., 2019). In the present study, the design of the ABM was adapted from a training developed by Ziaee, Fadardi, Cox, and Yazdi (2016) for modifying drug-related attentional bias, using the structure of a modified Stroop test. Four sets of stimuli (game-related words and pictures, and neutral words and pictures) were presented to the participants, and their task was to correctly point out each stimulus' background color or border color as fast as possible.

A sample of 69 unbiased individuals was asked to rate the potential stimuli for the training (64 words and 64 pictures; half were related to gaming, e.g., joysticks, consoles, popular games, and their characters, and half were neutral, e.g., doors, windows and other parts of buildings) from 0 to 100 based on their relevance to gaming. A total of 16 lexical and 16 pictorial stimuli that received the highest and lowest ratings were selected for the game-related and neutral stimuli sets, respectively. In the first half of the training, each stimulus was separately and randomly shown to the participants, and they were asked to indicate the color of the backgrounds or the borders of the stimuli without considering their contents. In the second half of the training, the stimuli were displayed in pairs (a game-related stimulus along with a neutral stimulus, with random placements), and the participant's task was directing their attention away from the game-related stimulus and indicating the neu-

Table 1. Details of each session of attentional bias modification training

Sessions	Stimuli			Criteria of Passing	
	Type	Appearance	Color Location	Response Time (s)	Number of Errors
1	Picture	Single	Background	<1	<4
2	Word	Single	Background	<1	<4
3	Picture	Single	Border	<1	<3
4	Word	Single	Border	<1	<3
5	Picture	Paired	Background	<1	<3
6	Word	Paired	Background	<1	<3
7	Picture	Paired	Border	<1	<2
8	Word	Paired	Border	<1	<2

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tral stimulus' background or border color. Each session was designed to be more intricate compared to the prior. The successful completion of each session depended on the total number of each participant's errors and the response time for all of the stimuli in that session. The details of each training session are presented in [Table 1](#).

Study procedure

The experimental group received ABM, while the control group received no interventions. Before the intervention, all participants completed the modified Stroop test (IGD-20 was filled during sampling). Eight sessions of online ABM were conducted every two days, and reassessments with modified Stroop test and IGD-20 were carried out once after the last session of intervention (or after 16 days for the participants who did not receive any intervention) and once again after 2 months.

The study was conducted according to all ethical standards. The research protocol was developed in compliance with the ethical guidelines defined in the Declaration of Helsinki in 1975 (as revised in 2000). All participants and their mothers were informed about the subject, purpose, and procedure of the research prior to their formal declaration of consent to participate. Also, it was clarified to all participants that their information remains anonymous, and they have the option to discontinue their participation at any time. In the end, the participants and their mothers were thanked for contributing to the study, and a simplified explanation of the results and their meanings were delivered to them.

Statistical analysis

Two-way repeated measures analysis of variance (ANOVA) was used in combination with Fisher's least significant difference to analyze the data gathered from the evaluations. A comparison of the two groups at baseline was carried out for the quantitative and the qualitative data using independent samples t-test and chi-squared test, respectively. These analyses were done using SPSS software v. 26.

3. Results

The analysis of the participants' demographic information (gender, age, and educational level) and the data regarding their weekly hours of gameplay and the age of first gameplay revealed no significant differences between the participants in the experimental and control groups (all P 's > 0.05). The details of these comparisons are provided in [Table 2](#).

To test the hypotheses of the research regarding the effectiveness of ABM on game-related attentional bias and IGD severity, the experimental and control groups' differences in their scores on the modified Stroop test and IGD-20 at three measurements were evaluated via 2-way repeated measures analysis of variance (with assumed sphericity). Group was defined as an inter-subject factor in the analysis, with time as an intra-subject factor and the scores in the modified Stroop test and IGD-20 questionnaire ([Table 3](#)) as dependent variables. As demonstrated in [Table 4](#), the analysis results confirmed the statistical significance of time, group, and time*group

Table 2. Participants' baseline demographic information and clinical characteristics

Variables	Groups		Statistics	P
	Experimental	Control		
Age (y)	14.38±1.76	14.79±1.05	t=0.80	0.42
Gender (male - female)	11 - 6	13 - 3	$\chi^2=1.13$	0.28
Education (middle school - high school)	7 - 10	8 - 8	$\chi^2=0.25$	0.65
First gameplay (age in years)	9.13±2.41	8.46±1.92	t=0.87	0.38
Weekly gameplay (h)	23.69±11.30	21.28±9.84	t=0.65	0.51

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effects on both dependent variables (all P 's<0.05), i.e., the experimental and control groups' scores in the modified Stroop test and IGD-20 have been significantly different at three stages of measurements.

After the significance of time, group, and time*group effects on attentional bias and IGD severity was confirmed. Pairwise comparisons using Fisher's LSD were conducted to detect the areas in which significant changes had occurred. The post hoc test results revealed that only the experimental group had experienced significant change, as their scores in the modified Stroop test had significantly been reduced from the pretest stage to the posttest assessment and from the pretest to 2 months follow-up evaluation (Table 5). The IGD-20 scores of the experimental group were also reduced from the pretest stage to the posttest assessment and from the pretest to 2 months follow-up evaluation (all P 's<0.05). Mean-

while, the control group's scores on the modified Stroop test and IGD-20 did not change significantly between measurements at multiple stages (all P 's>0.05).

4. Discussion

The present study was the first research initiative for evaluating the effects of ABM on game-related attentional bias and IGD severity in adolescents suffering from such disorder. In this study, online ABM was delivered to an experimental group, and its effects were examined via the comparison of attentional bias and IGD severity in the participants of the experimental and control groups.

The findings demonstrated that ABM was successful at reducing the game-related attentional bias of adolescents diagnosed with IGD, and this was evidenced

Table 3. Participants' Mean±SD scores in the studied variables

Variables	Measures	Mean±SD					
		Experimental			Control		
		Pretest	Posttest	Follow-up	Pretest	Posttest	Follow-up
Attention bias	Modified Stroop test	3257.63±539.11	1184.37±314.60	1375.19±296.86	3104.77±467.14	3354.31±570.35	3013.84±541.08
	IGD-20	80.68±16.22	56.82±14.81	55.36±14.17	79.21±17.31	78.69±16.63	78.31±16.74
Internet Gaming Disorder (IGD) severity	Salience	4.48±1.03	3.11±0.82	3.04±0.93	4.54±1.15	4.50±1.01	4.67±0.98
	Mood modification	4.01±0.93	3.39±0.95	3.07±0.90	3.88±0.98	4.09±1.06	3.76±0.89
	Tolerance	3.69±0.93	2.66±0.76	2.48±0.79	3.75±0.90	3.88±0.92	3.81±0.83
	Withdrawal	4.21±0.99	2.85±0.78	2.94±0.82	4.10±0.97	4.16±1.02	4.02±0.91
	Conflict	3.85±0.89	2.63±0.70	2.72±0.81	3.54±0.85	3.37±0.87	3.74±0.94
	Relapse	3.94±0.86	2.41±0.71	2.35±0.69	3.97±0.98	3.62±0.79	3.49±0.81

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Table 4. Results of 2-way repeated measures analysis of variance for the study's variables

Variables	Measures	Source	F	df	P Value	η^2
Attentional bias	Modified Stroop test	Group	89.53	1, 31	< 0.001	0.66
		Time	64.32	2, 62	< 0.001	0.59
		Group*Time	118.96	2, 62	< 0.001	0.78
Internet Gaming Disorder (IGD) severity	IGD-20	Group	7.61	1, 31	< 0.01	0.37
		Time	6.47	2, 62	0.01	0.29
		Group*Time	10.89	2, 62	< 0.001	0.54
	Salience	Group	7.96	1, 31	< 0.01	0.38
		Time	5.84	2, 62	< 0.01	0.24
		Group*Time	9.57	2, 62	< 0.001	0.46
	Mood modification	Group	7.44	1, 31	0.01	0.33
		Time	6.23	2, 62	< 0.01	0.27
		Group*Time	9.56	2, 62	< 0.001	0.46
	Tolerance	Group	8.11	1, 31	< 0.01	0.39
		Time	4.91	2, 62	0.01	0.17
		Group*Time	9.02	2, 62	< 0.001	0.42
	Withdrawal	Group	7.71	1, 31	< 0.01	0.36
		Time	5.53	2, 62	< 0.01	0.21
		Group*Time	9.29	2, 62	< 0.001	0.43
	Conflict	Group	7.88	1, 31	< 0.01	0.36
		Time	5.02	2, 62	< 0.01	0.19
		Group*Time	8.98	2, 62	< 0.001	0.41
	Relapse	Group	7.40	1, 31	0.1	0.32
		Time	5.67	2, 62	< 0.01	0.22
		Group*Time	8.91	2, 62	< 0.001	0.40

in the significant decrease of the modified Stroop test scores of the experimental group. This significant change was observed while comparing the pretest stage and the posttest assessment, and it was maintained at the 2-month follow-up, indicating the relative stability of the intervention effects. These results are consistent with the research background demonstrating the effective manipulation of attentional bias via ABM training (Arsanjani, et al., 2020; Heitmann et al., 2018; Wittekind et al., 2019) and its compatibility with internet-

based implementation (Denissen et al., 2010). Contrary to this study's findings, Wen et al. (2020) concluded that online ABM may not effectively reduce attentional bias in people with addictive behaviors. In explaining these contrary results, it could be said that the insignificant results of the study by Wen et al. (2020) could be the result of a large number of participants dropping out and the use of very few training sessions. In this study, the stimuli used for the development of the modified Stroop test and the ABM training were different; therefore, the

Table 5. Results of fisher's least significant difference as mean differences between different measurements

Variables	Measures	Groups	Comparisons		
			Pretest with posttest	Pretest with follow-up	Posttest with Follow-up
Attentional bias	Modified Stroop test	Experimental	2073.26*	1882.44*	-190.82
		Control	-249.54	90.93	340.14
IGD severity	IGD-20	Experimental	23.86*	25.32*	1.46
		Control	0.52	0.90	0.38
	Salience	Experimental	1.37*	1.44*	0.07
		Control	0.04	-0.13	-0.17
	Mood modification	Experimental	0.62	0.94*	0.32
		Control	-0.21	0.12	0.33
	Tolerance	Experimental	1.03*	1.21	0.18
		Control	-0.13	-0.06	0.07
	Withdrawal	Experimental	1.36*	1.27*	-0.09
		Control	-0.06	0.08	-0.14
	Conflict	Experimental	1.22*	1.13*	-0.09
		Control	0.17	-0.20	-0.37
	Relapse	Experimental	1.53*	1.59*	0.06
		Control	0.35	0.48	0.13

* Significant mean difference ($P < 0.05$).PRACTICE in
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effects of the intervention were generalized to new and untrained stimuli. In other words, the observed results were not due to response bias.

Another finding of the study was that, in addition to reducing game-related attentional bias, ABM was also successful at ameliorating IGD severity in adolescents suffering from this disorder. This was observed by the significant decrease in the experimental group's scores on the IGD-20 questionnaire at the posttest stage compared to the pretest. ABM effects on IGD severity were maintained at a 2-month follow-up, which confirmed the relative reliability of these effects. These results suggest that deficits in the cognitive process of selective attention are crucial in IGD's etiology, sustenance, and exacerbation. Meanwhile, the treatments that target such deficits may have therapeutic effects on this psychological disorder. Confirming the study's hypothesis, these findings add to the growing research suggesting that IGD is essentially similar to other addictive disorders like substance use disorder and gambling disorder (Yau

& Potenza, 2015; Zhang et al., 2016), and ABM can be suitable as an auxiliary or standalone treatment for this disorder (Rabinovitz & Nagar, 2015). Nevertheless, this was only one of the first attempts at studying the potential benefits of this novel treatment on adolescents with IGD. Examining its replicability and mechanisms of effect is necessary for future research.

Certain limitations should be noted while conducting this study. First, this research was an online study, and in addition to the ABM intervention, the process of clinical assessment of the participants was conducted online (except for the DSM-5 diagnostic interview via telephone) and indirectly. Therefore, only self-report measurement of the severity of IGD was possible, whereas evaluation through behavioral assessment and clinical examination might provide a more thorough evaluation. Accordingly, it is recommended to use additional assessment measures in future studies. Another limitation was the short-term follow-up of two months, which, although it confirms the relative reliability of the observed results,

does not guarantee long-term stability. Therefore, we suggest longer periods of follow-up in future studies. It is noteworthy to mention that the control group received no placebo interventions in this study; therefore, the effect of the time spent by the experimental group in front of the computer for doing the training was not controlled. We recommend that in future studies, placebo training similar to ABM be developed and delivered to the control group to evaluate the replicability of these results after controlling the effect of the aforementioned variable.

5. Conclusion

Notwithstanding the aforementioned limitations, it could be concluded that the present study provided initial evidence demonstrating that online ABM can effectively reduce the attentional bias of adolescents with IGD toward game-related stimuli and successfully ameliorate the severity of their disorder. The clinical and practical implication of this study is that ABM can be considered a potential auxiliary or standalone treatment for IGD. Considering that IGD is a newly introduced disorder in the field of psychopathology, and a deeper understanding of its etiology and treatment requires more research, it is recommended that interventions targeting attentional bias, like ABM, be the subject of more research and evaluation.

Ethical Considerations

Compliance with ethical guidelines

This study was conducted in compliance with all ethical standards. The study's protocol was designed according to all the ethical guidelines defined in the Declaration of Helsinki in the year 1975 (as revised in the year 2000). Moreover, all participants were informed that the data obtained from their participation in the study stays anonymous and confidential, and they have the option to terminate their participation at any point during the study.

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Authors' contributions

All authors equally contributed in preparing this article.

Conflict of interest

The authors declared no conflicts of interest.

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Research Paper

Tracking Sequences of Patient-Therapist Dialogues by Coding Responses During Integrative Psychotherapy

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ABSTRACT

Objective: The Assimilation of Problematic Experiences Scale (APES) to code the client's responses and the Process Focused Conversation Analysis (PFCA) to code the therapist's responses were applied to transcripts of a successful case of integrative psychotherapy of depression.

Methods: The method used for the present research was a case study. Dialogues (150 conversations between therapist-client on the basis of meaning) between a therapist and a client in one case with a good outcome were coded and analyzed by two different systems of APES and PFCA.

Results: The data revealed that combining the results of APES and PFCA is a suitable coding system for drawing a client's change equation. In a pyramid of therapeutic change, questions, skills, and techniques applied by the therapist are located in the base, center, and high level, respectively. Meanwhile, higher APES levels are located at the top of the pyramid. The efficient intervention has to be delineated on the spot and is appropriate for a situation in which the client is at one particular moment. Case improvement has demonstrated that at high levels of APES, level 4 is the critical one.

Conclusion: Setbacks and stagnations are common within psychotherapy and are generally affected by the main topic of the therapeutic conversation.

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Highlights

- The Process Focused Conversation Analysis (PFCA) for coding therapist responses is sufficient method for illumination of psychotherapy.
- The combination APES and The Assimilation of Problematic Experiences Scale (APES) results in a suitable coding system for drawing a change equation of the client.
- Case improvement is demonstrated at high levels of APES and APES Level 4 is the critical level.
- Using of the PFCA and appointment of the Series of triangles in therapeutic conversation are fundamental in determining effective therapist responses.

Plain Language Summary

Using the Process Focused Conversation Analysis (PFCA) along with The Assimilation of Problematic Experiences Scale (APES) is a successful framework for simply introducing events in the course of psychotherapy and hypothesis testing. Dialogues (150 conversations) between a therapist and client in one good outcome case were coded and analyzed by two different systems; APES and PFCA. Data revealed that combining APES and PFCA results in a suitable coding system for drawing a change equation of the client. In a pyramid of therapeutic change questions, skills and techniques, which have been applied by the therapist, are located in the base, center and superior level respectively and higher APES levels are located at the top of the pyramid. Efficient intervention has to be delineated on the spot and appropriate for the situation the client is in at one particular moment. Writing change equation and drawing change pyramid are two different styles to follow the therapist and client responses altogether after therapeutic sessions. The therapist can consider which question had more frequency and where it was within the psychotherapy process and is the same with respect to skills and techniques. Because writing the therapist and client responses in a change equation is done session by session therefore it is possible to compare fitness or unfitness in every one of therapist and client responses. Observation and inquiry of development, stagnation and setbacks of APES levels become simplified and the therapist focuses better on evaluating the quality of responses. The results showed that The combination APES and APES results in a suitable coding system for drawing a change equation of the client. Using of the PFCA and appointment of the Series of triangles in therapeutic conversation are fundamental in determining effective therapist responses.

1. Introduction

Psychotherapy is two-way communication between the therapist and the client; hence, every analysis must include responses from both sides. This is consistent with [Stiles \(1980\)](#) viewpoint that “to influence psychotherapeutic practice, the outcome research must address itself to the level at which therapeutic decisions are made—the moment-by-moment interchange between the client and the therapist.” However, current models investigate the responses of the therapist and the client differently and separately. There are at least five methods for analyzing the client’s behavior change stages based on different theoretical backgrounds. Assimilation of problematic experiences scale (APES) tracks problematic experiences across therapy sessions and describes a sequence of eight stages or levels of APES, from being dissociated or

unwanted to being understood and integrated ([Stiles, et al., 1992; Stiles et al., 1991; Stiles et al., 1990](#)). The innovative moments coding system (IMCS) was introduced by [Goncalves, Matos, and Santos \(2009\)](#). This system includes five stages from action to performing the change. The narrative processes coding system has three distinct modes of inquiry, namely external, internal, and reflexive narrative modes ([Angus, Levit and Hardtke, 1999](#)). [Ribeiro et al. \(2013\)](#) introduced the Therapeutic Collaboration Coding System (TCCS) which is based on [Vygotsky \(1978\)](#) concept of the Zone of Proximal Development (ZPD). ZPD includes both the therapist’s intervention and the client’s responses (in five subgroups for the client) and exchange or two peaking turns.

Another comprehensive model for understanding the change process has emerged from the work of Prochaska, DiClemente, and their associates ([Prochaska and DiClemente, 1982, 1984, 2005; Prochaska, DiClemente,](#)