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TOKEN REINFORCEMENT, COGNITIVE BEHAVIOURAL THERAPY, DEGREE OF DISABILITY AND MANAGING AGGRESSIVE BEHAVIOUR AMONG PUPILS WITH INTELLECTUAL DISABILITY

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Abstract

Aggressive behaviour has a significant negative effect on learning and academic performance. This study investigated the significant main effect of token reinforcement, cognitive behavioural therapy, and degree of disability on managing aggressive behaviour among pupils with intellectual disability. The study participants were 60 pupils (N = 60, N = 27 boys; N = 33 girls; mean age = 11.7) with intellectual disability who were purposively selected from three (3) special schools in Ibadan Metropolis. The participants were divided into three treatment groups: token reinforcement, cognitive behavioural therapy, and control groups, with the degree of disability as the moderating factor. The token reinforcement and cognitive behavioural therapy groups met for thirty sessions over twelve weeks. Two treatment groups were assessed using the Overt Aggression Scale, while the three treatment groups were assessed post-intervention using the Overt Aggression Scale. Data for aggressive behaviour performance were collected after the participants were screened for mild intellectual disability. An analysis of covariance and estimated means was used to examine the data. The results revealed a statistically significant difference between the pre-test and post-test results of the three (3) treatment groups. The degree of disability on the aggressive behaviour of pupils with mild intellectual disability was significant. The interaction effect of treatment and degree of disability was significant on participants' aggressive behaviour. Based on this study's findings, the recommendation is that token reinforcement and cognitive behavioural therapy be adopted to manage aggressive behaviour among pupils with mild intellectual disability.

Keywords: Cognitive behaviour therapy, degree of disability, intellectual disability, token reinforcement

INTRODUCTION

Most pupils with intellectual disabilities (ID) cannot adapt to challenging circumstances because of their limited ability to cope with stressful situations. Aggression and other frustrating actions are some of the most common consequences of this constraint. Aggressive behaviour has detrimental effects on the environment of an individual and often on the aggressor (Jacob et al., 2021). Some of the negative impacts of aggressive behaviour on aggressors include self-injury, interference with social events, and violence (Jacob et al., 2021). Despite the frequent use of aggressive behaviour as a clinical diagnosis, there is no formal diagnostic status and no apparent connection to psychotic illness (Cooper, Smiley, Morrison et al., 2007). Such behaviour is typical, with a prevalence ranging from 16% to more than 50%, depending on the definition (McGrother et al., 2007; Smith et al., 1996; Qureshi & Alborz, 1992). The prevalence of aggressive behaviour among people with ID varies drastically between studies (Crocker et al., 2006; Tyrer et al., 2006).

This variation is due to methodological differences, differences in the definitions of aggressive behaviour, and differences in the populations studied. Aggressive behaviours, including risky behaviours, such as self-injury, sexual abuse, throwing tantrums and stealing, are commonly observed among pupils with ID, although prevalence rates differ significantly between studies (Emerson et al., 2001; Grey et al., 2010). Studies have revealed that aggressive behaviour among pupils with ID appears to persist over time in the general population (Einfeld et al., 2006). Although, different types of aggressive behaviour are frequently displayed at the same time among pupils with ID, such as physical, verbal, and auto-aggressive behaviour (Cooper, Smiley, Jackson, et al., 2009; Crocker et al., 2006; Nijman & Á Campo, 2002; Tenneij & Koot, 2008). It is challenging to provide the necessary support and safety for pupils with ID because they tend to exhibit aggressive behaviour due to the complexities

of performing research on this population, such as non-randomized designs and preliminary outcome evaluation. (Keenan & Dillenburger, 2011; Willner, 2005).

Studies have suggested that psychosocial interventions can minimize aggressive behaviour among pupils with ID (Harvey et al., 2009; Heyvaert et al., 2010; Willner, 2005) despite this challenge. Since the side effects of psychotropic drugs raise serious health issues and the absence of strong empirical evidence that aggressive behaviour is significantly minimized (Antonacci et al., 2008; Matson et al., 2009; Matson & Neal, 2009), it is vital to identify efficient psychosocial interventions for managing aggressive behaviour among pupils with ID in school settings. Therefore, this study seeks to determine the effect of token reinforcement and cognitive behavioural therapy (CBT) as an intervention in managing aggressive behaviour among pupils with ID.

Token economies have been implemented to decrease disruptive behaviours and increase appropriate behaviours. In a token economy, punitive steps such as seclusion, restriction, and increased surveillance are often used to handle imminent aggression. The use of seclusion and restrictions, such as restraints, are often misused, resulting in pupils becoming more aggressive due to forced coercion (Poulsen & Engberg, 2001). Sandra and Friedrich (2009) described a token economy within an educational setting as a system for motivating learners by giving tokens for task completion or exhibiting the desired behaviour. It encourages learners to increase desirable behaviour and decrease undesirable behaviour. According to Hackenberg (2009), the token economy method was first used during the 19th century but, in recent times, manipulated, modified, and practised within various disciplines. A study conducted in a psychiatric hospital using token economy and positive reinforcement to minimize aggressive behaviour while facilitating adaptive behaviour showed significant group differences after two weeks (Park & Lee, 2012).

According to Elliott et al. (2000), a token economy is a form of classroom management in which students receive tokens for desirable behaviour. Various authors assert that the primary goal of the token economy is to increase and maintain appropriate behaviour while decreasing undesirable behaviour (Carr et al., 2005). Wille (2002) investigated the use of multicomponent intervention, which included token reinforcement to mitigate behavioural disorders in the classroom, and found that token reinforcement was one of the most effective ways to improve classroom behaviours. Similarly, positive findings were reported when adopting tokens to increase the attendance of a child with autism during discreet trial instructions (Tarbox et al., 2010). A different approach used tokens to reinforce reciprocal social interactions in interactions between a child and three adults (McDonald & Hemmes, 2003).

Similar to other studies reported here, the same result was achieved. The flexibility of the token system as a teaching approach is also underscored by an innovative and exciting study published by Kahng et al. (2003). They used the earnings of tokens predicated on consuming bites of food as a criterion for terminating meals. This procedure effectively increased the food intake of a 4-year-old girl with a pervasive developmental disorder in food consumption. Furthermore, the variety of foods she would consume increased since tokens were based on the quantity and number of foods consumed. Reinke and Herman (2002) recently identified the importance of adolescents' psychosocial adjustment that, among other factors, the school environment is academically successful, peers in the classroom are perceived as friends or colleagues, and positive interactions occur with teachers.

Another strategy is CBT, a time-restricted, present-focused technique that educates clients by leveraging their cognitive and behavioural proficiencies to adaptively pursue their interpersonal and intrapersonal

lives (Mennin et al., 2006). DiGiuseppe and Tafrate (2007) stated that behavioural approaches, including classical and operant conditioning, can manage anger. In addition to treatments, Paivio and Carriere (2007) also developed emotion-focused therapy for individual anger interventions. Therefore, CBT combined with mindfulness methods may effectively manage dysfunctional behaviour (Cayoun, 2004). According to a study by Chen et al. (2006), patients in an experimental group experienced more significant cognitive improvements (self-esteem increase) than those in the comparison group due to CBT. CBT is an effective intervention for self-esteem and self-efficacy-related problems evaluated with low scores (Dryden, 2003; Lim et al., 2005).

Howells and Day (2003) posited the efficacy of anger management techniques implemented in CBT. The finding shows that CBT enhances effective self-control methods for anger management (Singh et al., 2008). Hutchinson et al. (2016) found CBT interventions to reduce dysfunctional expression of anger, while Bekirogullari and Korusan (2019) proposed CBT as an efficient method to deal with various psychiatric issues. CBT is an efficient treatment method for solving problems associated with self-esteem and self-efficacy (Neacşu, 2013) and is considered an efficient treatment method for anxiety disorders (Bekirogullari & Korusan, 2019).

Tenneij and Koot (2008) studied aggression in longer-term inpatient treatment centres for individuals with mild developmental disabilities and severe challenging behaviours with a high rate of aggression. During the 20-week observation period, 639 incidents were documented. Seventy-one per cent of these incidents were outwardly directed, predominantly toward staff. Recent studies have specifically examined aggression instead of challenging behaviour (Deb et al., 2001; Tyrer et al., 2006) and support Emerson's (2001) earlier findings that individuals with a severe developmental disability are more likely to display aggression, especially self-injurious behaviour. Some authors have shown

gender differences in the prevalence of aggressive behaviour in more recent studies. However, Tenneij and Koot (2008); Crocker et al. (2006) did not find significant differences. Although aggression may begin in childhood, rates tend to peak in late adolescence and early adulthood, with increased rates in persons aged between 20 and 35 years old (Murphy et al., 2005; Crocker et al., 2007).

Studies have reported the correlation of aggressive behaviour with types of disability. Research shows that Epilepsy has a relationship with aggression irrespective of developmental disability (Marcangelo & Ovsiew, 2007). Therefore, it has been suggested that Epilepsy is a potential causative factor in this population. Espie et al. (2003) found that behavioural problems, such as irritability, agitation, lethargy, social withdrawal, stereotypic behaviour, hyperactivity, non-compliance, and inappropriate speech, were lower than population norms in a sample of 186 individuals with developmental disabilities and Epilepsy. Deficiencies in language skills are a risk factor for aggression in nondisabled populations (Burke et al., 1989; Cohen et al., 2003). In the population of individuals with developmental disabilities, language skills are often deficient or absent. Therefore, aggression toward oneself and others might take the place of more appropriate means of communication in these individuals. Bihm et al. (1998) studied aggression in 170 persons with severe and profound developmental disabilities and failed to support the hypothesis that lower levels of communication relate to higher levels of aggression. Deb et al. (2001) showed that higher rates of self-injurious behaviour were associated with more severe developmental disabilities and poor communication abilities.

McClintock et al. (2003) summarised studies from the past 30 years and noted that the severity of developmental disabilities, poor communication, and autism were risk markers for aggression. However, the interpretation of their results was difficult given the overlapping

nature of these variables. Crocker et al. (2007) examined sensory and motor impairment (which they called *physical handicap*) as an individual character in a sample of 296 individuals with developmental disabilities. A high proportion of violent (all forms of aggression) and self-mutilation (self-injurious behaviour) subgroups had physical handicap.

METHODOLOGY

Material and methods

The study was based on a quasi-experimental research design of the pre-test control group using a 3 × 2 factorial matrix. Three (3) levels of treatment (token reinforcement, CBT and control) were considered. The design is as follows:

Experimental Group 1: (E1) O_1 X_1 O_4

Experimental Group 1: (E1) O_2 X_1 O_5

Control Group 2: (E2) O_3 O_6

Where:

O_1, O_2 and O_3 represent the experimental and control group pre-test scores, respectively.

O_4, O_5 and O_6 represent the post-test scores of the experimental and control groups, respectively.

X_1 represents the treatment for the experimental group (token reinforcement)

X_1 represents the treatment for the experimental group (CBT)

Participants

There were 60 participants in the study, of whom forty-five per cent (27) were boys, and fifty-five per cent (33) were girls. Their IQs ranged from 42 to 68 on the Slosson Intelligent Test for adults and children. Slosson developed the scale using the 1960 revision of the Stanford Binet (SB) Intelligence Test (Jacob, U. S. & Pillay, 2021). Validity coefficients were determined independently for each age group. The correlation

coefficient ranged from 0.90 to 0.98. Thus, just as SB correlates with itself, SIT does as well. This indicates that the SIT is statistically valid and reliable. SIT-R3 now has adaptable score sheets for scanning electronic readers, and embossed materials are available for the blind and visually impaired (Jacob et al., 2021).

All participants had a history of exhibiting various forms of aggressive behaviour, while seventy-two (72%) had engaged in four or more of such behaviours over the six months before the study ($M = 5.4$). The participants were selected using multi-stage sampling. Three special schools were selected to reflect the geographical coverage of Ibadan, Oyo State. The pupils with moderate/mild intellectual disability were selected using purposive sampling. We randomly assigned participants to one of three treatment groups, TR, CBT, or C, depending on their treatment type. In school TR, a total of 21 pupils with moderate/mild ID (male = 9; female = 12; mean age = 12.2) were selected; in school CBT, 17 pupils with moderate/mild ID (male = 8; female = 9; mean age = 10.6) were selected; and in school C, 22 pupils with moderate/mild ID (male = 10; female = 12; mean age = 12.4). Participants in school TR were exposed to token reinforcement, those in school CBT were exposed to Cognitive Behavioural Therapy, and participants in school C were exposed to a placebo method and served as the control group. The reason for not exposing children from the same school to all three treatments was to avoid contamination of the results.

Hypotheses

The following were formulated and tested.

Ho1: There is no significant main effect of treatment on the aggressive behaviour of pupils with ID.

Ho2: There is no significant main effect of the degree of ID on the aggressive behaviour of pupils with ID.

Ho3: There is no significant interaction effect of treatment and degree of ID on the aggressive behaviour of pupils with ID.

Description of instruments

Token reinforcement

The token reinforcement consists of a research assistant that implements the point system. The occurrence of identified target behaviours was recorded as the baseline. The school day was divided into six 30-minute intervals. For each interval, pupils with ID had the opportunity to earn four points. A point was earned for the absence of aggression in each of the four categories during each interval. The allocation of points was made verbally at the end of each 30-minute interval. No points were earned during the intervention for misbehaviour. Pupils could earn a total of 24 points on the Day of intervention. The research assistant and the pupils jointly created a token reinforcement menu, and the points were exchanged with the reinforcer at the end of each session.

Cognitive behavioural therapy (CBT)

The therapist used CBT to highlight the relationship between thoughts, emotions, and behaviour while employing the ABC model to show and evaluate participants' thoughts and how these thoughts led to problematic aggressive behaviour. The treatment consisted of twenty-four sessions per week for 45 minutes each for the treatment group for 12 weeks.

Overt Aggression Scale

In this study, the Overt Aggression Scale (Yudofsky et al., 1986) was used to assess participants' aggression, such as verbal assault, property damage, and physical assault. According to the Overt Aggression Scale, aggressive behaviour is measured, not tendencies to be violent. It is divided into two parts, with the first section consisting of four groups: a) verbal attack, b) willful destruction of property, c) physical aggression

against oneself, and d) physical aggression against other people. Within each category, aggressive behaviour was rated according to severity. The second section rated staff intervention during the aggressive incident. The total score of aggression was computed in the same manner as the scores of aggressive items (ranging from a minimum of one point to a maximum of sixteen points), plus the scores according to staff intervention (from a minimum of zero points to a maximum of ten points), with a total maximum score of 26 points. The Overt Aggression Scale is simple to complete and can be used to assess aggressive behaviour. The scale allows for documentation and quantification of verbal and physical overt aggressive behaviour. The intraclass correlation coefficients of reliability (ICC) showed good reliability (greater than .75) for most items (20).

Ethical approval

After identifying potential participants, their caregivers requested to sign a consent form for the study. The research team adapted written informed consent procedures to meet the developmental needs of the participants.

RESULTS

Hypotheses testing

Ho1: There is no significant main effect of treatment on the aggressive behaviours of pupils with ID

Table 1: Summary of the result showing the effects of treatment, gender and the degree of disability of pupils with ID

Tests of Between-Subjects Effects						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2070.297[a]	11	188.209	16.751	.000	.793
Intercept	8687.041	1	8687.041	773.179	.000	.942
Treatment	1564.859	2	782.429	69.639	.000	.744
Error	539.303	48	11.235			
Total	15752.000	60				
Corrected Total	2609.600	59				
a. R Squared = .793 (Adjusted R Squared = .746)						

The results presented in Table 1 show that there was a significant main effect of treatment on aggressive behaviour ($F_{(1, 59)}$ = 69.639, p < .005, η^2 = .744). It implies that the treatments contributed significantly to the variation in participants' scores on aggressive behaviour among pupils with ID in Ibadan. The Eta-value of .744 shows that the treatment contributed approximately 74% to the aggressive behaviour of the participants.

Table 2: Adjusted marginal mean showing the direction of difference in token reinforcement and CBT among the groups

			95% Confidence Interval	
Treatment	Mean	Std. Error	Lower Bound	Upper Bound
Token reinforcement	23.886	1.021	21.832	25.939
CBT	13.632	1.068	11.485	15.779
Control	8.809	.769	7.262	10.356

Table 2 shows that participants in treatment group 1(token reinforcement) obtained a higher mean score of ($\bar{x}$ = 23.886), followed by treatment group 2 (CBT) with a mean score of ($\bar{x}$ = 13.632), while the lowest means score of ($\bar{x}$ = 8.809) was recorded for participants in the control group of (= 8.809). An indication that participants in treatment group 1 performed better than those in treatment group 2 and the control group. It then means that token reinforcement had a better effect on the aggressive behaviour of pupils with ID than both CBT and control.

Ho2: There is no significant main effect of degree of ID on aggressive behaviour of pupils with ID in Ibadan

The results presented in Table 1 show that there was no significant main effect of gender on aggressive behaviour among pupils with ID ($F_{(1,59)}$ = 42.722, p < .005, η^2 = .366). It implies that treatment contributed significantly to the variation in participants' scores on the aggressive behaviour of pupils with ID. The Eta-value of .366 shows that treatment

contributed approximately 37% to aggressive behaviour among the participants.

Table 3: Adjusted Marginal Mean showing the direction of difference in the degree of ID on aggressive behaviour among the groups

Degree of ID	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Mild	17.526	.536	13.449	18.603
Moderate	16.358	.973	14.402	15.315

Table 3 shows that participants with mild ID obtained a higher mean score ($\bar{x}$ =17.526) than participants with moderate ID with a mean score of ($\bar{x}$ =16.358). The implication is that mild ID contributed to better behaviour among pupils with ID than those with moderate degree of ID.

Ho3: There is no significant interaction effect of treatment and the degree of ID on aggressive behaviour of pupils with ID in Ibadan

The results presented in Table 1 show that there was a significant interaction effect of treatment and the degree of ID on the aggressive behaviour of pupils with ID ($F_{(1,59)}$ =21.715, p < .005, η^2 = .289). It implies that the interaction effect of treatment and the degree of ID contributed significantly to the variation in participants' scores on the aggressive behaviour of pupils with ID. The Eta-value of .289 shows that treatment contributed approximately 29% to the aggressive behaviour of the participants.

Table 4: Adjusted Marginal Mean showing the direction of difference in aggressive behaviour by interaction effect of treatment and the degree of ID among the treatment groups

Treatment	Degree of ID	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Token reinforcement	Mild	22.571	1.896	20.770	24.373
	Moderate	21.200	1.836	21.509	22.891
CBT	Mild	16.264	1.904	13.446	18.081
	Moderate	15.000	1.935	11.109	16.891
Control	Mild	8.743	.981	6.770	10.716
	Moderate	8.575	1.185	6.492	11.258

Table 4 shows that participants with mild ID in treatment group 1 (token reinforcement) obtained a higher mean score of ($\bar{x}$ =22.571) than the participants with moderate ID in this treatment group with a mean score of ($\bar{x}$ =21.200). Participants with a mild degree of ID performed better than those with a moderate degree of ID. Also, from the table, participants with a mild degree of ID in treatment group 2 (CBT) obtained a higher mean score of ($\bar{x}$ =16.264) than the participants with a moderate degree of disability with a mean score of ($\bar{x}$ =15.000), while the participants in the control group had the lowest mean scores of ($\bar{x}$ =8.743) and ($\bar{x}$ =8.575) respectively.

The result shows that token reinforcement was more effective in managing aggression, and the interaction effect with the degree of ID on aggressive behaviour was more significant, especially among those with a mild degree of ID.

DISCUSSION OF FINDINGS

Based on the first hypothesis, a significant main effect of treatment (token reinforcement and CBT) on reducing aggressive behaviour among pupils with mild ID. The findings are consistent with the assertion of Park and Lee (2012), who reported significant group differences after two weeks of using token economy and the concept of positive reinforcement to minimize aggressive behaviour while facilitating adaptive behaviour. Theirs align with those of Chen et al. (2006), who found that increased cognitive improvement (self-esteem increase) was observed among patients in the experimental group compared to the control group due to the use of CBT. It aligns with the observation of Reinke and Herman (2002) that an academically successful school environment, peer interaction in the classroom, and positive interactions with teachers are essential for adolescent's psychosocial adjustment. The findings further reveal that CBT is an effective intervention for self-esteem and self-efficacy related problems (Dryden, 2003; Lim et al., 2005).

The adjusted marginal means show that token reinforcement had a better effect on reducing aggressive behaviour among pupils with ID. This is supported by Carr et al. (2005), who opined that the primary goal of token reinforcement was to increase and maintain appropriate behaviour while decreasing undesirable behaviour. The result also aligns with the submission of Howells and Day (2003), who posited the efficacy of anger management techniques using CBT. Higher adjusted means were recorded among pupils treated with token reinforcement because the token was visible and easily compared with the tokens earned by their peers in the learning environment. Nevertheless, CBT offered the opportunity to learn effective self-control methods necessary for anger management and effectively reduce dysfunctional expressions of anger (Singh et al., 2008; Hutchinson et al., 2016). Token reinforcement produced higher outcomes in this study, which cannot be disputed.

The second hypothesis showed a significant main effect of degree of disability on aggressive behaviour among pupils with ID. In contrast, Espie et al. (2003) reported fewer behavioural problems in their sample of 186 people with developmental disabilities compared with population norms. Although, it aligns with the findings of Crocker et al. (2007) based on a study that investigated sensory and motor impairment. The researchers reported that a significant proportion of violent (all forms of aggression) and self-mutilation subgroups (self-injurious behaviour) had some kind of physical handicaps.

The result shows that the interaction effect of treatment and the degree of ID contributed significantly to the variation in participants' scores on aggressive behaviour of pupils with ID. This is consistent with Chen et al. (2006) report that increased cognitive improvements (self-esteem increase) were observed due to the effective intervention. This is also consistent with the opinions of Carr et al. (2005), who state that the primary goal of token reinforcement is to increase and maintain

appropriate behaviour and to decrease undesirable behaviour. Furthermore, the result is supported by Deb et al. (2001), who reported higher rates of self-injurious behaviour as associated with a more severe developmental disability and poor communication abilities.

CONCLUSION

The purpose of this study was to determine if token reinforcement and cognitive restructuring therapy were effective as behaviour modification strategies. The result shows that the intervention was quite effective in decreasing aggressive behaviour among pupils with ID. Token economy and cognitive restricting may have led to a reduction in participants' aggressive behaviour after using it according to its appropriateness and understanding of the participants. Findings show that behaviour modification therapy is an essential alternative to coercive measures in managing aggressive behaviour among pupils with ID. The results show a significant main effect of the degree of disability on aggressive behaviour among participants. It is, therefore, expected that the potential benefits of token reinforcement and cognitive restructuring of varying age, gender, and school type (public or private) would undergo investigation in controlled experimental studies to determine the effectiveness of token economy, cognitive restructuring, and degree of disability. The results can advance the development of outcome measures, strategies, and methods to implement the interventions in classroom settings.

Limitation and suggestion

The researchers did not find any study investigating the effect of independent variables (token reinforcement and cognitive restructuring therapy) on aggressive behaviour among pupils with mild ID. The study was only interested in the effect of two behavioural modification

strategies in reducing aggressive behaviour. Another limitation was the small sample size selected as participants for the study due to the unique characteristics of pupils with mild ID—making it difficult for their parents to show interest in enrolling them in school.

Conflict of interest

The authors confirm no conflict of interest for the data presented in this paper.

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Data Access Statements

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available**.**

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