

Effectiveness of a Nurse-Led Dialectical Behavior Therapy on Emotional Adjustment, Psychological Well-Being, and Salivary pH among Destitute Adolescents: A Pilot Quasi-Experimental Study

Roselin J¹, Dr. S. Maragatham², Dr. D. Charmini Jeba Priya³, Dr. G. Grace Jebakani Sweety^{4*}

¹ Ph.D. Research Scholar, Department of Child Health Nursing, Saveetha College of Nursing, Saveetha Institute of Medical and Technical Sciences, Chennai, India.

ORCID: 0009-0007-9590-1176

Email: j.roselin@yahoo.in

² Professor, Department of Medical Surgical Nursing, Saveetha College of Nursing, Saveetha Institute of Medical and Technical Sciences, Chennai, India.

³ Professor, Department of Maternal and Child Health Nursing, Texcity College of Nursing, Podanur, Coimbatore, India.

⁴ Professor, Department of Community Health Nursing, Ganga College of Nursing, Coimbatore, India.

Corresponding Author

Roselin J

Email: j.roselin@yahoo.in

Abstract

Background: Destitute adolescents living in institutional care are vulnerable to emotional difficulties, poor psychological well-being, and stress-related physiological changes due to adverse childhood experiences, disrupted family relationships, and limited social support. Dialectical Behavior Therapy (DBT) may enhance emotional regulation and adaptive coping; however, evidence among institutionalized destitute adolescents is limited.

Aim: To evaluate the effectiveness of a nurse-led DBT programme on emotional adjustment, psychological well-being, and salivary pH among destitute adolescents residing in selected destitute homes in Coimbatore, Tamil Nadu.

Methods: A pilot quasi-experimental pre-test–post-test control group design was adopted. Twenty-one destitute adolescents were recruited through purposive sampling, with 13 in the experimental group and 8 in the control group, from NGO-operated destitute homes. The experimental group received a structured nurse-led DBT programme, while the control group received routine institutional care. Emotional adjustment was assessed using the Emotional Adjustment Questionnaire for Adolescents, psychological well-being using Ryff's 42-item Psychological Well-Being Scale, and salivary pH using pH indicator strips. Internal consistency was good for the EAQA (Cronbach's $\alpha = 0.786$) and moderate for the Psychological Well-Being Scale ($\alpha = 0.507$). Descriptive and inferential statistics were used, with significance set at $p < 0.05$.

Results: Psychological well-being significantly improved in the experimental group from 161.77 ± 9.92 to 177.92 ± 9.58 ($p < 0.001$), whereas no significant change occurred in the control group ($p = 0.464$). Significant improvements were observed in environmental mastery ($p = 0.013$), positive relations ($p = 0.021$), and purpose in life ($p = 0.018$). Emotional adjustment did not significantly improve. Neutral salivary pH increased from 53.8% to 92.3% in the experimental group; however, the between-group difference was not significant ($p = 0.640$).

Conclusion: The pilot findings indicate that nurse-led DBT is feasible and may enhance psychological well-being among institutionalized destitute adolescents. A larger adequately powered randomized controlled trial is warranted...

Keywords: Dialectical Behavior Therapy, Destitute Adolescents, Emotional Adjustment, Psychological Well-Being, Salivary pH, Nurse-Led Intervention, Pilot Study...

INTRODUCTION

Dialectical Behavior Therapy (DBT) is a highly structured cognitive-behavioral treatment designed to improve emotional regulation and psychological well-being. While traditionally delivered by psychologists, nurse-led DBT interventions are emerging as a scalable solution to address severe mental health disparities in vulnerable

populations. Destitute adolescents face profound chronic stressors, including homelessness, neglect, and trauma, which severely compromise their psychological health and induce physiological stress. Emerging research indicates that psychological stress alters autonomic nervous system activity, directly impacting physiological biomarkers such as salivary pH. This pilot quasi-experimental study evaluates the effectiveness of a nurse-led DBT program on emotional adjustment, psychological well-being, and salivary pH levels among destitute adolescents.^(1,2)

We developed and put into practice virtual and blended forms of dialectical behavior therapy for adolescents in order to help them with co-occurring mental illnesses and related issues (such as emotion dysregulation).⁽³⁾ Increased mood dysregulation, impulsivity, and participation in high-risk behaviors like substance abuse, aggression, and unprotected sexual activity are characteristics of adolescence. An evidence-based intervention called Dialectical Behavioral Therapy for Adolescents (DBT-A) focuses on impulsivity and emotion control in teenagers and has been shown to be successful in reducing high-risk behaviors.⁽⁴⁾ Throughout a person's lifetime, emotional dysregulation plays a significant role in the emergence and persistence of numerous incapacitating mental illnesses.⁽⁵⁾

The social and emotional wellbeing of young people is an area of increased focus for policy and practice.⁽⁶⁾ Dialectical Behavioral Therapy (DBT) skills have emerged as promising tools for addressing emotional dysregulation in adolescents.⁽⁷⁾ Both emotional dysregulation and self-harm peak in adolescence.⁽⁸⁾ Dialectical Behavioral Therapy for Adolescents (DBT-A) is an evidence-based intervention that targets emotion regulation and impulsivity among adolescents, proven effective at decreasing high-risk behaviors.⁽⁹⁾ In the Indian context, DBT-A has been investigated among specific clinical adolescent populations, such as adolescents with dissociative disorder; however, the application of DBT specifically among destitute adolescents living in institutional child-care settings remains insufficiently documented. Thus, the present study extends the application of DBT to a vulnerable and understudied adolescent population experiencing social and psychosocial disadvantage.

A further novel feature of the study is the nurse-led delivery of DBT skills training. Rather than relying exclusively on psychologists or psychotherapists, the intervention was delivered by a trained nurse using a structured DBT-based programme. This approach is particularly relevant to institutional settings where access to specialist mental-health professionals may be limited. Evidence from inpatient adolescent settings also demonstrates that nursing and other frontline staff can receive DBT-related training and participate in skills coaching and implementation, supporting the feasibility of integrating DBT principles within multidisciplinary and nursing-supported care.⁽¹⁰⁾ A distinctive feature of the present study is the delivery of a structured DBT-based programme by a trained nurse specifically for destitute adolescents residing in institutional care."

2. Need for the study: This study may...

Empowering frontline healthcare providers:

This study has the potential to strengthen the role of nurses in delivering structured psychological interventions to vulnerable adolescents. Nurse-led and task-sharing approaches have been identified as potentially useful strategies for expanding access to mental-health care, particularly in settings where specialist mental-health professionals are limited. Evidence from a systematic review indicates that appropriately trained and supervised nurses can contribute to the delivery of mental-health interventions. Therefore, evaluating a nurse-led DBT programme may provide a feasible and potentially sustainable approach for institutional settings with limited access to specialist services.^(11,12)

Providing holistic assessment:

The study incorporates both psychological outcomes and a physiological parameter, thereby attempting to obtain a broader assessment of the adolescents' response to the intervention. Psychological measures can capture subjective experiences such as emotional adjustment and psychological well-being, while physiological measures may provide complementary information about bodily responses. Salivary measures have been investigated as non-invasive indicators associated with psychosocial stress in children and adolescents; however, the physiological interpretation of salivary pH should be made cautiously because pH can be influenced by several factors.⁽¹³⁾ Thus, the inclusion of salivary pH in the present study provides an exploratory physiological dimension alongside psychological assessment.

Supporting targeted intervention:

Adolescents experiencing emotional and behavioural difficulties may benefit from interventions that specifically address emotion regulation, distress tolerance, mindfulness, and interpersonal skills. Evidence from systematic reviews indicates that DBT has been adapted for adolescents across several treatment settings and has shown promise for improving mental-health outcomes and reducing emotional and behavioural difficulties.^(14,15) A pilot quasi-experimental study can therefore provide preliminary evidence regarding the feasibility, acceptability, and potential effectiveness of a structured nurse-led DBT programme among destitute adolescents in institutional care. The findings can subsequently guide refinement of the intervention and the design of larger, adequately powered controlled studies.

3.Objectives

To assess and compare the pretest and posttest emotional adjustment within and between the experimental and control group among destitute adolescents.

To assess and compare the pretest and posttest psychological well-being within and between the experimental and control group among destitute adolescents.

To assess and compare the pretest and posttest physiological parameter within and between the experimental and control group among destitute adolescents.

To determine the association between selected socio-demographic variables and posttest emotional adjustment, psychological wellbeing and physiological parameter among destitute adolescents in the experimental and control groups.

4. Research Methodology**4.1 Research approach**

In this study quantitative approach was adopted.

4.2 Research design.

Quasi Experimental Pretest, Posttest Control Group Design was followed in the present study.

4.3 Target population: Adolescents belong to the age group of 13-18 years

4.4 Sample size: 21

4.5 Sampling Technique: Non probability purposive sampling technique

4.6 Research setting: Selected destitute homes in Coimbatore, Tamil Nadu, India.

4.7 Criteria for selection of sample**Inclusion criteria**

Age range 13- below 18 years

Willingness to participate

Ability to understand, read, write and speak the language Tamil

Who were present at the time of data collection

Exclusion criteria

Who were absent at the time of data collection

Who were with severe mental illness

Who were on ongoing psychiatric treatment

Who were having physical illness affecting participation.

4.8 Description of the tool

The instrument consists of 4 sections:

Section -A: A Proforma for demographic variables of adolescents.

Section -B: Emotional Adjustment Scale

Section- C: The Psychological Wellbeing Scale

Section D: Salivary pH Test

4.9: Data collection Procedure

After obtaining IEC and administrative permission of the selected destitute homes & informed consent, assent from the Guardians and students, Subjects were identified according to the inclusion and exclusion criteria by using non probability purposive sampling technique. The purpose of the study was explained using the subject information sheet. The homes were randomly allocated into two groups, Group 1 Experimental and group 2 control, based on lottery method.

On Day 1, pre-test assessment of Demographic data, Emotional Adjustment, Psychological Well-Being, and Salivary pH was conducted for both the experimental and control groups before administering Dialectical Behavior Therapy. Initial Salivary pH was assessed by using Litmus paper and reading was recorded table.

The experimental group received Dialectical behavior therapy for 30-40 minutes alternate day from day 2 onwards for a period of 10 weeks, and the control group received no intervention respectively.

Immediately after completion of the DBT intervention, post-test assessment was conducted for both experimental and control groups by using the same tools and Salivary pH was assessed. The collected data were then coded, analyzed, and interpreted to evaluate the effectiveness of the DBT intervention. The data was organized in Excel Worksheet for tabulation & statistical analysis.

5.Data analysis and Discussion

Categorical variables were summarized using frequencies and percentages. Differences in the distribution of categorical variables between the experimental and control groups were assessed using Pearson's chi-square test when the expected cell frequencies were adequate. Fisher's exact test was used when expected cell frequencies were small or when the assumptions of the chi-square test were not met. A two-sided p-value <0.05 was considered statistically significant.

The results are presented under the following sections

Section A: Description of baseline variables

Section B: Comparison of Emotional Adjustment across the experimental and control group

Section C: Comparison of PWB across the experimental and control group

Section D: Comparison of EAQA between the groups

Section E: Comparison of PWB within the experimental and control groups

Section F: Comparison of study variables between the groups

Section A: Description of baseline variables**Table 1: Descriptive statistics of study variables across the experimental and control groups (N=21)**

Parameter	Experimental		Control	
	Pre-test (n=13)	Post test (n=13)	Pre-test (n=8)	Post test (n=8)
Age				
13-15	4 (30.8%)	4 (30.8%)	6 (75.0%)	6 (75.0%)
16-18	9 (69.2%)	9 (69.2%)	2 (25.0%)	2 (25.0%)
Gender				
Male	2 (15.4%)	2 (15.4%)	6 (75.0%)	6 (75.0%)
Female	11 (84.6%)	11 (84.6%)	2 (25.0%)	2 (25.0%)
Parent status				
Both alive	1 (7.7%)	1 (7.7%)	-	-
One alive	1 (7.7%)	1 (7.7%)	3 (37.5%)	3 (37.5%)
None alive	11 (84.6%)	11 (84.6%)	5 (62.5%)	5 (62.5%)
Stay home				
0-6m	2 (15.4%)	2 (15.4%)	1 (12.5%)	1 (12.5%)
6m-1y	-	-	1 (12.5%)	1 (12.5%)
1-2y	-	-	2 (25.0%)	2 (25.0%)
2-3y	11 (84.6%)	11 (84.6%)	4 (50.0%)	4 (50.0%)
Birth place				
Urban	9 (69.2%)	9 (69.2%)	-	-
Rural	4 (30.8%)	4 (30.8%)	8 (100.0%)	8 (100.0%)
Sibling				
No	7 (53.8%)	7 (53.8%)	0 (0.0%)	0 (0.0%)
Yes	6 (46.2%)	6 (46.2%)	8 (100.0%)	8 (100.0%)
Relative visit				
No	10 (76.9%)	10 (76.9%)	6 (75.0%)	6 (75.0%)
Yes	3 (23.1%)	3 (23.1%)	2 (25.0%)	2 (25.0%)
Visit Frequency				
Occasional	3 (23.1%)	3 (23.1%)	2 (25.0%)	2 (25.0%)
None	10 (76.9%)	10 (76.9%)	6 (75.0%)	6 (75.0%)
Type of Institution				
NGO	13 (100.0%)	13 (100.0%)	8 (100.0%)	8 (100.0%)
Reason for Admission				
Orphan	11 (84.6%)	11 (84.6%)	1 (12.5%)	1 (12.5%)
Poverty	1 (7.7%)	1 (7.7%)	1 (12.5%)	1 (12.5%)
Abandoned	-	-	6 (75.0%)	6 (75.0%)
Neglect	1 (7.7%)	1 (7.7%)	-	-
Education status				

Regular	13 (100.0%)	13 (100.0%)	8 (100.0%)	8 (100.0%)
Salivary PH				
Acidic saliva	5 (38.5%)	1 (7.7%)	3 (37.5%)	2 (25.0%)
Netural	7 (53.8%)	12 (92.3%)	5 (62.5%)	6 (75.0%)
Mild alkaline saliva	1 (7.7%)	0 (0.0%)	-	-

A total of 13 adolescents in the experimental group completed both the pre-test and post-test assessments. The majority of participants were aged 16–18 years (69.2%) and were female (84.6%). Most participants had both parents deceased (84.6%), had been residing in the institution for 2–3 years (84.6%), and were from urban areas (69.2%). More than half of the participants had no siblings (53.8%), and 76.9% reported that they did not receive visits from relatives. Consequently, 76.9% reported no visits from relatives. All participants were residing in an NGO-run institution, were receiving regular education, and the primary reason for institutional admission was orphanhood (84.6%), followed by poverty (7.7%) and neglect (7.7%). As expected, these sociodemographic characteristics remained unchanged between the pre-test and post-test assessments. With respect to salivary pH, 53.8% of participants had neutral saliva, 38.5% had acidic saliva, and 7.7% had mildly alkaline saliva at the pre-test. Following the intervention, the proportion of participants with neutral salivary pH increased to 92.3%, while those with acidic saliva decreased to 7.7%. No participants exhibited mildly alkaline saliva at the post-test. A total of 8 adolescents in the control group completed both the pre-test and post-test assessments. The majority of participants were aged 13–15 years (75.0%) and were male (75.0%). Most participants had both parents deceased (62.5%), while 37.5% had one parent alive. Half of the participants (50.0%) had been residing in the institution for 2–3 years, and all participants were from rural areas (100.0%) and had siblings (100.0%). Most participants (75.0%) reported that they did not receive visits from relatives, and consequently 75.0% reported no visits from relatives. All participants were residing in an NGO-run institution, were receiving regular education, and the predominant reason for institutional admission was abandonment (75.0%), followed by orphanhood (12.5%) and poverty (12.5%). These sociodemographic characteristics remained unchanged between the pre-test and post-test assessments. Regarding salivary pH, 62.5% of participants had neutral saliva and 37.5% had acidic saliva at the pre-test. At the post-test, the proportion of participants with neutral salivary pH increased to 75.0%, while the proportion with acidic saliva decreased to 25.0%, indicating a slight improvement in salivary pH distribution over the study period.

Section B: Comparison of Emotional Adjustment across the experimental and control group

Table 2: Comparison of Emotional Adjustment across the experimental and control group

Emotional Adjustment for Adolescents	Experimental		P value	Control		P value
	Pre-test (n=13)	Post test (n=13)		Pre-test (n=8)	Post test (n=8)	
Average Adjustment	1 (7.7%)	0 (0.0%)	0.308	2 (25.0%)	0 (0.0%)	0.467
Highly Adequate Adjustment	12 (92.3%)	13 (100.0%)		6 (75.0%)	8 (100.0%)	

At the pre-test, 12 participants (92.3%) demonstrated highly adequate emotional adjustment, while 1 participant (7.7%) had average emotional adjustment. Following the intervention, all participants (100.0%) exhibited highly adequate emotional adjustment, with no participants remaining in the average adjustment category. Although an improvement in emotional adjustment was observed after the intervention, the difference between the pre-test and post-test was not statistically significant ($p = 0.308$). At the pre-test, 6 participants (75.0%) demonstrated highly adequate emotional adjustment, while 2 participants (25.0%) had average emotional adjustment. At the post-test, all participants (100.0%) exhibited highly adequate emotional adjustment, with no participants remaining in the average adjustment category. Although the proportion of adolescents with highly adequate emotional adjustment increased from 75.0% to 100.0%, the difference between the pre-test and post-test was not statistically significant ($p = 0.467$).

Hypothesis: There is a significant difference in the level of emotional adjustment between pre-test and post-test among destitute adolescents in the experimental and control groups.

The hypothesis is not supported. There was no statistically significant difference in the level of emotional adjustment between pre-test and post-test in either the experimental group ($p = 0.308$) or the control group ($p = 0.467$).

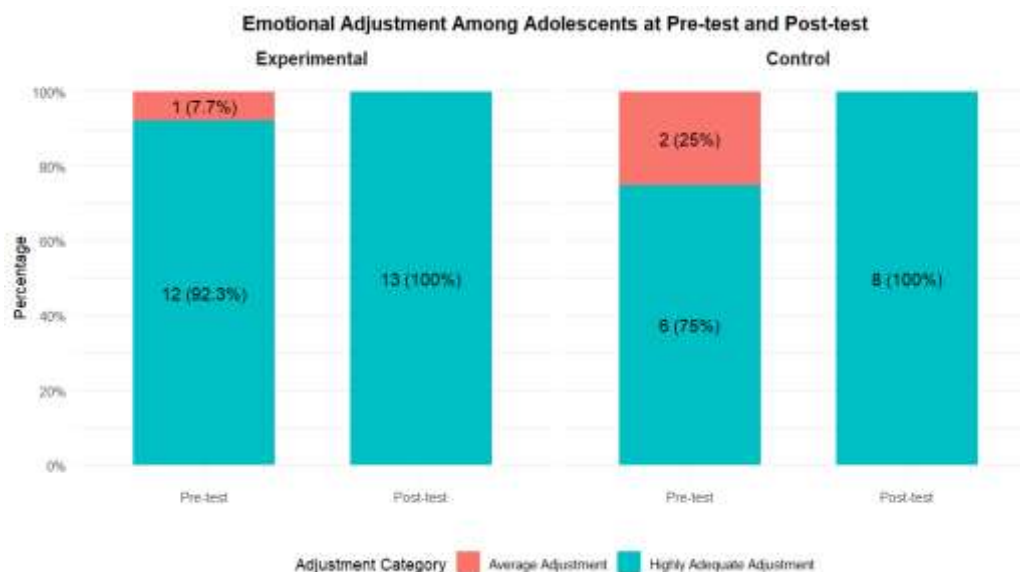


Figure 1: Comparison of Emotional adjustment among adolescents at Pre-test and Post-test across the group

Section C: Comparison of PWB across the experimental and control group

Table 3: Comparison of PWB across the experimental and control group

Ryff's Psychological Well-Being Scales (PWB)	Experimental		P value	Control		P value
	Pre-test (n=13)	Post test (n=13)		Pre-test (n=8)	Post test (n=8)	
Moderate Psychological Well-Being	13 (100.0%)	13 (100.0%)	-	8 (100.0%)	8 (100.0%)	-

At both the pre-test and post-test, all participants (100.0%) in the experimental group were classified as having moderate psychological well-being according to Ryff's Psychological Well-Being Scale. No change in the distribution of psychological well-being categories was observed following the intervention; therefore, no statistical test was performed, and a *p*-value was not applicable. At both the pre-test and post-test, all participants (100.0%) in the control group were classified as having moderate psychological well-being according to Ryff's Psychological Well-Being Scale. No change in the distribution of psychological well-being categories was observed between the two assessments. Therefore, no statistical comparison was performed, and the *p*-value was not applicable.

Section D: Comparison of EAQA between the groups

Table 4: Comparison of EAQA between the groups

Emotional Adjustment Questionnaire for Adolescents	Group	Assessment	Mean $\pm$ SD	P value
	Experimental	Pre (n=13)	130.31 $\pm$ 8.88	0.665
		Post (n=13)	131.69 $\pm$ 7.1	
	Control	Pre (n=8)	123.38 $\pm$ 8.19	0.637
		Post (n=8)	129.25 $\pm$ 5.63	

In the experimental group, the mean emotional adjustment score increased slightly from 130.31 $\pm$ 8.88 at the pre-test to 131.69 $\pm$ 7.10 at the post-test. However, this increase was not statistically significant (*p* = 0.665). Similarly, in the control group, the mean emotional adjustment score increased from 123.38 $\pm$ 8.19 at the pre-test to 129.25 $\pm$ 5.63 at the post-test. Despite the observed improvement, the difference between the pre-test and post-test scores was not statistically significant (*p* = 0.637).

Hypothesis: There is a significant difference in the mean emotional adjustment scores between pre-test and post-test among destitute adolescents in the experimental and control groups. The hypothesis was not supported, as the

difference in mean emotional adjustment scores was not statistically significant in either the experimental group ($p = 0.665$) or the control group ($p = 0.637$).

Section E: Comparison of PWB within the experimental and control groups

Table 5: Comparison of PWB within the experimental and control groups

Ryff's Psychological Well-Being Scales (PWB)	Experimental (Mean $\pm$ SD)			Control (Mean $\pm$ SD)		
	Pre (n=13)	Post (n=13)	P value	Pre (n=8)	Post (n=8)	P value
Ryff's Psychological Well-Being Scales (PWB)	161.77 $\pm$ 9.92	177.92 $\pm$ 9.58	<0.001**	171.75 $\pm$ 18.28	172.25 $\pm$ 17	0.464
Six subscales Ryff's Psychological Well-Being Scales (PWB)						
Autonomy	29.92 $\pm$ 6.56	31.69 $\pm$ 3.75	0.407	30.13 $\pm$ 8.08	27.88 $\pm$ 6.6	0.341
Environmental mastery	29.15 $\pm$ 4.76	34.15 $\pm$ 4.79	0.013*	27.88 $\pm$ 5	28 $\pm$ 6.09	0.932
Personal Growth	27.31 $\pm$ 2.59	28.92 $\pm$ 3.4	0.186	29.75 $\pm$ 5.55	29.88 $\pm$ 2.9	0.546
Positive Relations	30.77 $\pm$ 2.28	36.92 $\pm$ 8.21	0.021*	26.75 $\pm$ 3.92	31 $\pm$ 3.78	0.541
Purpose in life	25.31 $\pm$ 5.56	30.23 $\pm$ 4.13	0.018*	30.88 $\pm$ 5.94	33 $\pm$ 5.24	0.01*
Self-acceptance	32.15 $\pm$ 3.91	32.77 $\pm$ 3.54	0.678	31.88 $\pm$ 5.82	31.13 $\pm$ 5.94	0.465

*Significant at the level of <0.05 ; **Significant at the level of <0.01

In the experimental group, the mean psychological well-being score increased significantly from 161.77 ± 9.92 at the pre-test to 177.92 ± 9.58 at the post-test. This improvement was statistically significant ($p < 0.001$), indicating that the intervention was associated with a significant enhancement in psychological well-being. In contrast, the control group showed only a marginal increase in the mean psychological well-being score from 171.75 ± 18.28 at the pre-test to 172.25 ± 17.00 at the post-test. This difference was not statistically significant ($p = 0.464$). In the experimental group, significant improvements were observed in three of the six dimensions of psychological well-being following the intervention. The mean environmental mastery score increased significantly from 29.15 ± 4.76 at the pre-test to 34.15 ± 4.79 at the post-test ($p = 0.013$). Similarly, significant increases were observed in positive relations with others, with the mean score increasing from 30.77 ± 2.28 to 36.92 ± 8.21 ($p = 0.021$), and purpose in life, which improved from 25.31 ± 5.56 to 30.23 ± 4.13 ($p = 0.018$). Although the mean scores for autonomy, personal growth, and self-acceptance increased following the intervention, these changes were not statistically significant ($p > 0.05$). In the control group, significant improvement was observed only in the purpose in life subscale, with the mean score increasing from 30.88 ± 5.94 at the pre-test to 33.00 ± 5.24 at the post-test ($p = 0.010$). No statistically significant changes were found in autonomy, environmental mastery, personal growth, positive relations with others, or self-acceptance ($p > 0.05$).

Hypothesis: There is a significant difference in the mean psychological well-being scores between pre-test and post-test among destitute adolescents in the experimental and control groups. The hypothesis was supported, as a statistically significant improvement was observed in the experimental group ($p < 0.001$), while no statistically significant difference was observed in the control group ($p = 0.464$).

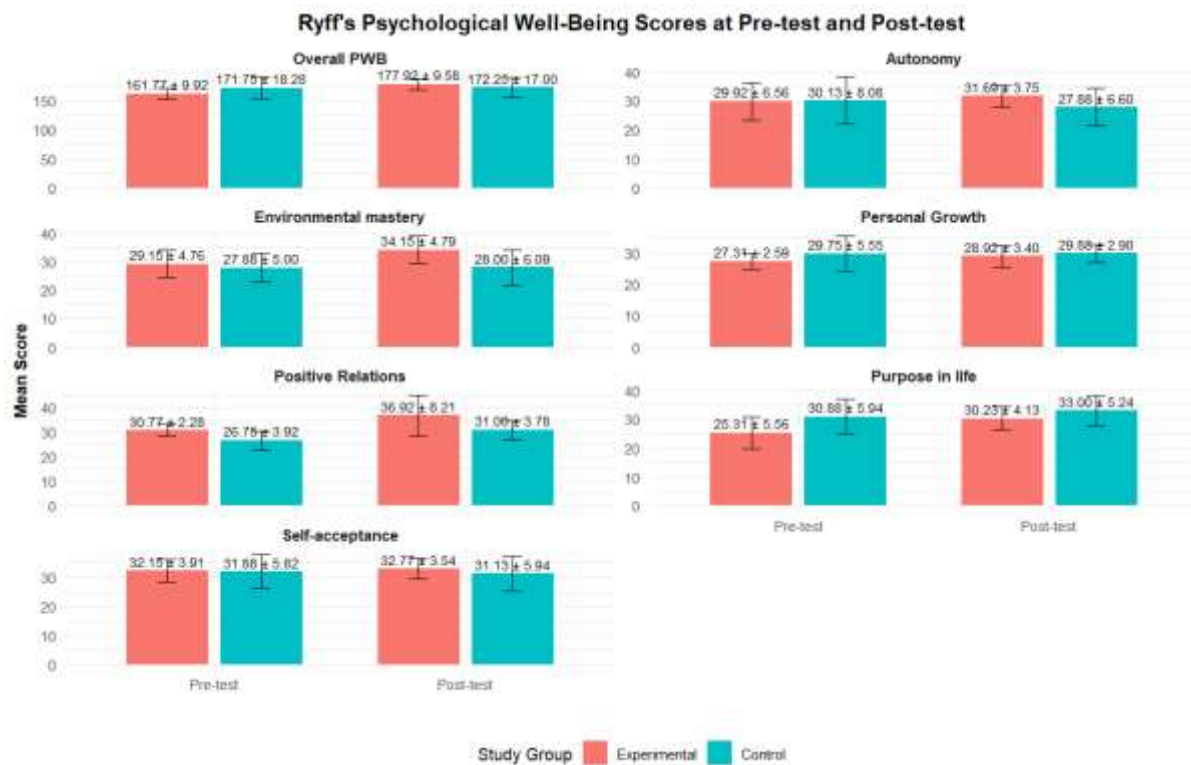


Figure 2: Comparison of PWB at Pre-test and Post-test across the group

Section F: Comparison of study variables between the groups

Table 6. Baseline distribution of sociodemographic and study-related characteristics by study group

Variables	Group		P value
	Experimental (n=13)	Control (n=8)	
Age			
13-15	4 (30.8%)	6 (75.0%)	0.005**
16-18	9 (69.2%)	2 (25.0%)	
Gender			
Male	2 (15.4%)	6 (75.0%)	<0.001**
Female	11 (84.6%)	2 (25.0%)	
Parent status			
Both alive	1 (7.7%)	-	0.039*
One alive	1 (7.7%)	3 (37.5%)	
None alive	11 (84.6%)	5 (62.5%)	
Stay home			
0-6m	2 (15.4%)	1 (12.5%)	0.009**
6m-1y	-	1 (12.5%)	
1-2y	-	2 (25.0%)	
2-3y	11 (84.6%)	4 (50.0%)	
Birth place			
Urban	9 (69.2%)	-	<0.001**
Rural	4 (30.8%)	8 (100.0%)	

Sibling			
No	7 (53.8%)	0 (0.0%)	<0.001**
Yes	6 (46.2%)	8 (100.0%)	
Relative visit			
No	10 (76.9%)	6 (75.0%)	0.887
Yes	3 (23.1%)	2 (25.0%)	
Visit Frequency			
Occasional	3 (23.1%)	2 (25.0%)	0.887
None	10 (76.9%)	6 (75.0%)	
Type of Institution			
NGO	13 (100.0%)	8 (100.0%)	-
Reason for Admission			
Orphan	11 (84.6%)	1 (12.5%)	<0.001**
Poverty	1 (7.7%)	1 (12.5%)	
Neglect	-	6 (75.0%)	
Abandoned	1 (7.7%)	-	
Education status			
Regular	13 (100.0%)	8 (100.0%)	-
Salivary PH			
Acidic saliva	5 (38.5%)	3 (37.5%)	0.64
Netural	7 (53.8%)	5 (62.5%)	
Mild alkaline saliva	1 (7.7%)	-	

*Significant at the level of 5%; **Significant at the level of 1%

Values are presented as n (%). Pearson's chi-square test was used for variables meeting the expected-frequency assumptions; Fisher's exact test was used for variables with sparse expected cell frequencies.

Table 6 presents the comparison of selected socio-demographic characteristics and baseline physiological parameters between the experimental and control groups. The baseline distributions were compared between the experimental and control groups using Pearson's chi-square or Fisher's exact test, as appropriate. The experimental group comprised a higher proportion of adolescents aged 16–18 years (69.2%), females (84.6%), participants with both parents deceased (84.6%), those who had resided in the institution for 2–3 years (84.6%), participants from urban areas (69.2%), and adolescents without siblings (53.8%). The predominant reason for institutional admission in the experimental group was orphanhood (84.6%). In contrast, the control group consisted predominantly of adolescents aged 13–15 years (75.0%), males (75.0%), participants from rural areas (100.0%), adolescents with siblings (100.0%), and those admitted primarily due to abandonment (75.0%). Significant differences were observed between the groups with respect to age ($p = 0.005$), gender ($p < 0.001$), parental status ($p = 0.039$), duration of stay in the institution ($p = 0.009$), birthplace ($p < 0.001$), sibling status ($p < 0.001$), and reason for institutional admission ($p < 0.001$). No statistically significant differences were observed between the experimental and control groups with respect to relative visits ($p = 0.887$), frequency of visits ($p = 0.887$), or salivary pH ($p = 0.640$). Additionally, all participants in both groups were residing in NGO-run institutions and were receiving regular education.

Hypothesis: There is a significant difference in selected socio-demographic and physiological characteristics between the experimental and control groups among destitute adolescents.

The hypothesis is partially supported. There was a statistically significant difference between the experimental and control groups with respect to age, gender, parent status, duration of stay in the home, place of birth, sibling status, and reason for admission. However, no statistically significant difference was observed with respect to relative visits, frequency of visits, or baseline salivary pH.

5.1 Comparison of Socio-Demographic Characteristics with Previous Research

The present pilot study included 21 destitute adolescents aged 13–18 years, of whom 13 were assigned to the experimental group and 8 to the control group. In the experimental group, the majority of adolescents were aged 16–18 years (69.2%), female (84.6%), had both parents deceased (84.6%), had stayed in the institution for 2–3 years (84.6%), and were from urban areas (69.2%). More than half had no siblings (53.8%), and 76.9% reported

no visits from relatives. In contrast, the control group consisted predominantly of adolescents aged 13–15 years (75.0%), males (75.0%), adolescents with both parents deceased (62.5%), those residing in the institution for 2–3 years (50.0%), rural adolescents (100%), and adolescents with siblings (100%). The predominant reason for admission was orphanhood in the experimental group (84.6%) and abandonment in the control group (75.0%). These findings are consistent with the broader literature indicating that adolescents living in vulnerable or institutional settings are exposed to multiple psychosocial stressors, including parental loss, poverty, neglect, abandonment and reduced family support. Sujithra's study of adolescents residing in residential homes similarly identified stress as an important psychological concern among adolescents living away from the family environment. The author emphasized the importance of interventions that help adolescents develop self-management and coping skills.

A SIMATS-affiliated study by Kalabharathi and Shiny Sheeba examined self-esteem among orphan children and highlighted the importance of family and peer relationships during adolescence. This is relevant to the present study because a large proportion of adolescents in the experimental group had lost both parents and many did not receive visits from relatives. Such circumstances may influence interpersonal relationships and psychological well-being.

The present study also found statistically significant baseline differences between the experimental and control groups in age ($p=0.005$), gender ($p<0.001$), parental status ($p=0.039$), duration of institutional stay ($p=0.009$), birthplace ($p<0.001$), sibling status ($p<0.001$), and reason for admission ($p<0.001$). However, relative visits, frequency of visits and baseline salivary pH did not differ significantly between groups.

These baseline differences should be considered when interpreting the intervention findings. The imbalance in age, gender, family circumstances and institutional background indicates that the two groups were not fully comparable at baseline. Therefore, the observed post-test improvement in psychological well-being should be interpreted as preliminary evidence rather than definitive proof of treatment efficacy.

5.2 Comparison of Emotional Adjustment Findings with Previous Research

In the present study, emotional adjustment improved slightly following the nurse-led DBT intervention. In the experimental group, the proportion of adolescents classified as having highly adequate emotional adjustment increased from 92.3% at pre-test to 100% at post-test. However, the difference was not statistically significant ($p=0.308$). Similarly, in the control group, highly adequate emotional adjustment increased from 75.0% to 100%, but the change was not statistically significant ($p=0.467$).

The mean emotional adjustment score in the experimental group increased from 130.31 ± 8.88 at pre-test to 131.69 ± 7.10 at post-test ($p=0.665$). The control group also showed an increase from 123.38 ± 8.19 to 129.25 ± 5.63 ($p=0.637$). Thus, although there was a favourable numerical change, statistical significance was not demonstrated. The finding is partly different from research demonstrating stronger effects of structured psychological interventions on adolescent emotional functioning. Nirmala et al. reported that a comprehensive intervention package produced significant improvement in psychological variables among adolescents, including assertiveness, stress, coping, peer relationships and self-esteem ($p<0.001$). The intervention was delivered in a larger sample of 152 adolescents, with 76 participants in each group.

The difference between that study and the present study may be explained by sample size, intervention content, baseline characteristics and outcome measurement. The present study was a small pilot involving only 13 adolescents in the experimental group. In addition, most participants already demonstrated highly adequate emotional adjustment at baseline, leaving limited scope for measurable improvement. This possible ceiling effect may explain why the numerical improvement did not reach statistical significance.

The present finding is also important when interpreted alongside adolescent DBT research. Evidence from adolescent DBT studies indicates that DBT can improve emotion regulation and psychosocial functioning, although the magnitude of improvement varies according to the population, baseline severity, intervention duration and outcome instrument. A study of adolescents receiving comprehensive DBT reported improvements in several domains of emotion regulation, including strategies, impulse control, goal-directed behaviour, awareness and clarity.

Similarly, adolescent participants in a DBT skills-training study reported positive experiences and perceived improvements in reflective functioning and emotional management. Therefore, the slight improvement observed in the present study is directionally consistent with previous DBT research, although the present pilot did not demonstrate statistical significance.

5.3 Comparison of Psychological Well-Being Findings with Previous Research

Psychological well-being was the outcome that demonstrated the clearest improvement in the present pilot study. The mean psychological well-being score in the experimental group increased significantly from 161.77 ± 9.92 at pre-test to 177.92 ± 9.58 at post-test ($p<0.001$). In contrast, the control group showed only a small increase from 171.75 ± 18.28 to 172.25 ± 17.00 , which was not statistically significant ($p=0.464$).

Although all participants in both groups remained within the "moderate psychological well-being" category at both assessments, the continuous score demonstrated a substantial improvement in the experimental group. This

finding illustrates why categorical classification alone may fail to detect clinically meaningful changes when participants remain within the same broad category.

The finding is supported by research demonstrating the usefulness of mindfulness- and skills-based psychological interventions in adolescents. Gopalsamy, Raman and Asirvatham, affiliated with SIMATS, investigated mindfulness meditation among 300 adolescent nursing students in Madurai. Their study found significant improvements in depression, anxiety, stress and self-esteem following mindfulness meditation. The intervention included psychological skills that overlap conceptually with DBT, particularly present-moment awareness and emotional regulation.

The present finding is also consistent with the recent systematic review and meta-analysis by Lakshmanan et al., involving researchers from Saveetha College of Nursing, which examined nurse-led interventions and psychological well-being. The study supports the broader role of nurse-led interventions in improving psychological well-being, although the population in that review consisted of older adults rather than adolescents. Therefore, it provides evidence for the effectiveness of nurse-led approaches but should not be considered a direct adolescent comparison.

The significant improvement in psychological well-being in the present study may be attributed to the multidimensional nature of DBT. The intervention incorporated mindfulness, distress tolerance, emotion regulation and interpersonal effectiveness. These skills may help adolescents understand their emotions, tolerate distress, establish healthier relationships and develop a greater sense of control over their lives.

5.4 Comparison of Psychological Well-Being Subscales

Analysis of the six dimensions of Ryff's Psychological Well-Being Scale demonstrated that three dimensions improved significantly in the experimental group. Environmental mastery increased from 29.15 ± 4.76 to 34.15 ± 4.79 ($p=0.013$), positive relations increased from 30.77 ± 2.28 to 36.92 ± 8.21 ($p=0.021$), and purpose in life increased from 25.31 ± 5.56 to 30.23 ± 4.13 ($p=0.018$). The changes in autonomy, personal growth and self-acceptance were not statistically significant.

The improvement in environmental mastery is particularly consistent with the DBT philosophy of developing practical coping strategies. DBT teaches adolescents to identify emotional triggers, tolerate distress and select adaptive responses rather than reacting impulsively. These skills may contribute to a greater perceived ability to manage daily situations.

The significant improvement in positive relations is also consistent with the interpersonal effectiveness component of DBT. Skills such as DEAR MAN, GIVE and FAST are specifically intended to improve communication, relationship effectiveness and self-respect. Evidence from adolescent DBT research similarly indicates improvements in social connectedness and relationship quality following DBT-based interventions. In an adolescent adaptation of radically open DBT, improvements were reported in social connection, attachment relationships and interpersonal functioning.

The significant improvement in purpose in life suggests that the intervention may have helped adolescents develop greater direction and meaning. However, purpose in life also improved significantly in the control group (30.88 ± 5.94 to 33.00 ± 5.24 ; $p=0.010$). This indicates that factors other than the DBT intervention may have contributed to improvement in this dimension, such as routine institutional activities, education, peer interaction, maturation or repeated exposure to the assessment.

The lack of significant improvement in autonomy, personal growth and self-acceptance may be related to the relatively short intervention period and the developmental characteristics of the participants. These dimensions may require longer-term changes in identity, self-concept, independence and life experiences. Therefore, future studies with larger samples and longer follow-up may be better able to determine whether DBT produces sustained improvements in these domains.

5.5 Comparison of Salivary pH Findings with Previous Research

In the experimental group, the proportion of adolescents with neutral salivary pH increased from 53.8% at pre-test to 92.3% at post-test, while acidic saliva decreased from 38.5% to 7.7%. Mildly alkaline saliva decreased from 7.7% to 0%. In the control group, neutral saliva increased from 62.5% to 75.0%, while acidic saliva decreased from 37.5% to 25.0%.

The larger favourable change in the experimental group is compatible with the possibility that reduction in psychological arousal or stress may have influenced salivary characteristics. However, salivary pH is influenced by several factors, including food intake, salivary flow, oral health and timing of collection. Therefore, the change in salivary pH should be interpreted as a preliminary physiological observation rather than a specific biomarker of DBT-related stress reduction.

This interpretation is supported by SIMATS dental research. Swathy and Muralidharan, from Saveetha Dental College, studied salivary pH and dietary factors and reported that dietary patterns, particularly carbohydrate-rich food consumption, were associated with acidic salivary pH. Their findings demonstrate that salivary pH is influenced by factors other than psychological stress.

Similarly, Ravikumar, Ramani and Gayathri, affiliated with Saveetha Dental College, examined salivary pH among children with and without early childhood caries. They found no statistically significant difference in salivary pH between the groups, emphasizing that salivary pH can vary independently of a single health condition. Another SIMATS publication by Gokul G, Vishnupriya and Gayathri demonstrated significant changes in salivary pH before and after food intake among college students. This finding is particularly relevant to the present study because it emphasizes the importance of controlling the timing of food and fluid intake when salivary pH is used as an outcome measure.

Therefore, the improvement in salivary pH observed in the present study is encouraging, but future studies should standardize the time of collection, fasting/food intake, hydration, salivary stimulation and oral-health conditions and preferably include a more specific physiological stress biomarker such as salivary cortisol.

5.6 Comparison of Nurse-Led Intervention Findings with Previous Research

The present study provides preliminary support for the feasibility of a nurse-led psychological intervention for adolescents living in institutional care. The intervention was delivered through structured DBT components including mindfulness, emotion regulation, distress tolerance and interpersonal effectiveness.

This approach is consistent with evidence from SIMATS nursing research supporting the role of nurses in delivering structured interventions. Rajeswari, Tamilselvi and Helen Mary Perdita conducted a randomized controlled trial of a nurse-led intervention among 100 pre-teen girls. Their 12-week intervention resulted in significant improvement in BMI in the experimental group, demonstrating that structured nurse-led interventions can produce measurable changes in adolescent health outcomes.

Similarly, the SIMATS-affiliated study by Gopalsamy and colleagues demonstrated significant improvements in psychological variables following a structured mindfulness intervention among adolescents.

These studies support the feasibility of using nurses as providers of structured health-promoting interventions. The present study extends this concept into the area of adolescent mental health by applying DBT skills in an institutional setting.

5.7 Comparison of Baseline Group Differences with Previous Research

The present study demonstrated significant differences between the experimental and control groups in several socio-demographic characteristics. These differences indicate that the groups were not completely homogeneous before the intervention. In particular, the experimental group contained more older adolescents and females, whereas the control group contained more younger adolescents and males. Differences were also found in parental status, duration of institutional stay, birthplace, sibling status and reason for admission.

This differs from randomized controlled studies in which random allocation generally produces more comparable groups. For example, Rajeswari et al. reported that their experimental and control groups had similar socio-demographic characteristics at baseline before the nurse-led intervention.

The baseline imbalance in the present pilot study is therefore an important methodological consideration. It does not invalidate the pilot findings, but it limits the ability to attribute all post-test differences exclusively to the DBT intervention. For the main study, random allocation, stratification or matching based on important variables such as age and gender should be considered. Statistical adjustment using ANCOVA may also be appropriate when baseline differences exist, provided the assumptions of the analysis are satisfied.

5.8 Overall Comparison with Previous Research

Overall, the findings of the present pilot study are broadly consistent with previous research demonstrating that structured psychological and skills-based interventions can improve selected aspects of adolescent mental health. The strongest evidence in the present study was the significant improvement in total psychological well-being and three PWB dimensions—environmental mastery, positive relations and purpose in life. Emotional adjustment showed a favourable numerical trend but did not reach statistical significance. Salivary pH also showed a favourable descriptive change, although its interpretation as a stress-related outcome requires caution.

The findings are consistent with the SIMATS study by Gopalsamy et al., which demonstrated significant improvement in psychological parameters following mindfulness meditation among adolescents. They are also conceptually consistent with research on adolescent DBT demonstrating improvements in emotion regulation, coping, social connection and interpersonal functioning.

However, the present study differs from several larger intervention studies because of its very small pilot sample, non-randomized allocation and baseline differences between groups. Consequently, the results should be regarded as preliminary evidence supporting feasibility and possible effectiveness rather than definitive evidence of efficacy.

The present findings provide an important basis for proceeding to a larger main study with adequate statistical power, balanced groups, standardized salivary pH collection procedures, appropriate control of baseline confounders and longer-term follow-up.

Limitations of the Study

Small sample size, because it was a pilot study.

Purposive/non-probability sampling, which limits generalizability.

The study was conducted in selected destitute homes in Coimbatore, so findings may not represent all institutionalized adolescents.

Baseline differences between experimental and control groups in some demographic variables may have influenced the findings.

The intervention was conducted over a relatively short period (10 weeks), so long-term effects could not be assessed.

Salivary pH measurement using indicator strips provides limited precision compared with laboratory-based methods.

Because participants lived in institutional settings, environmental or social factors could not be completely controlled.

6. Conclusion

The nurse-led DBT programme significantly improved psychological well-being among destitute adolescents, particularly in environmental mastery, positive relationships, and purpose in life. Although improvements in emotional adjustment and salivary pH were observed, they were not statistically significant. These findings support the feasibility of nurse-led DBT and warrant further evaluation in larger.

Conflict of interest

NIL

Financial support

NIL.

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