10.18686/neet.v2i4.4374

Evaluation of the Effectiveness of Psychological Flexibility Trainingon Enhancing Career Adaptability in High School Students

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Abstract: **Objective:** To assess the effectiveness of a psychological flexibility training course based on the Acceptance Commitment Therapy (ACT) DNA-V model in enhancing psychological flexibility and career adaptability among high school students, and to offer a reference for psychological health services.

Methods: Collaborating with a high school in Chengdu, 110 second-year students were randomly assigned into three groups: a DNA-V face-to-face group (33 students), a DNA-V online group (40 students), and a control group receiving standard psychological education (37 students). The intervention consisted of a six-session course, with assessments using the Avoidance and Fusion Questionnaire for Youth and the Career Adaptability Scale conducted before, one week after, and two months after the sessions.

Results: Data analyzed via linear mixed models showed that the face-to-face group experienced significant improvements in psychological flexibility and career adaptability at one week and two months post-intervention ($P<0.01$), with no significant changes noted between these two times. The online group saw no significant changes, and the control group's gains reverted to baseline after two months.

Conclusion: The face-to-face DNA-V course effectively enhanced psychological flexibility and career adaptability for at least two months, underscoring its potential for integration into student mental health programs.

Keywords: Mental Health; Adaptation, Psychological; Models, Statistical; Interventional Studies; Students

Recent reforms in the college entrance examination policy have enhanced secondary school students' autonomy, emphasizing the importance of self-awareness and the ability to make informed career decisions. This shift underlines the need for heightened career adaptability, an individual's readiness to cope with career tasks and adapt to changes during unforeseen career challenges[1]. Enhanced career adaptability is crucial for avoiding negative psychological outcomes such as escapism, self-abandonment, anxiety, and depression, and is essential for developing proactive decision-making and confidence[2][3][4].

Adolescents with high career adaptability are better at making proactive decisions and plans, eager to explore, and more confident[5]. Career adaptability predicts academic performance and life satisfaction among secondary school students, marking it a key element of career readiness and an important indicator of psychological health[6][7][8][9].

Currently, there are few empirical studies directly testing the effectiveness of interventions aimed at improving career adaptability[10]. Acceptance and Commitment Therapy (ACT) offers a new perspective through its adolescent psychological flexibility model (Discover, Noticer, Adviser-Value, DNA-V)[11], which provides a practical framework. The core goal of ACT is not to eliminate psychological symptoms but to enhance an individual's psychological flexibility. Psychological flexibility refers to the ability of an individual to fully engage with the present external environment while consciously noticing and accepting their internal mental state, clarifying their core values, and acting under the guidance of these values[12]. Studies have shown that enhancing psychological flexibility can help individuals change their approach to problems, boost self-esteem, and restore social functions, serving as a cornerstone for maintaining mental health[13][14][15][16].

Psychological flexibility and career adaptability both emphasize the interaction between the individual and the environment, with psychological flexibility focusing on the psychological process and career adaptability focusing on the outcome. This study aims to evaluate whether the DNA-V course can enhance career adaptability and compare the effects of the DNA-V face-to-face psychological course, the DNA-V online psychological course, and regular positive psychology school courses on the psychological flexibility and career adaptability of secondary school students, providing a reference plan for serving the mental health needs of secondary school

students.

1. Subjects and Methods

1.1 Subjects

In September 2022, a cooperation agreement was established with a high school in Chengdu, Sichuan Province, to implement the DNA-V program in six second-year psychology classes. The classes were randomly assigned into three groups: DNA-V face-to-face (offline group), DNA-V online (online group), and a regular psychological course (control group), with two classes per group. Before participation, students and their legal guardians signed informed consent forms. Eligibility required adherence to all sessions and assessments, no other psychological interventions during the study, no psychiatric medication, and no suicide risk. The study included 110 students aged 15 to 17 years, divided as follows: 33 in the offline group, 40 in the online group, and 37 in the control group.

1.2 Research Tools

1.2.1 Adolescent Psychological Flexibility Model - DNA-V

The DNA-V model, shaped like a compass, is designed to guide adolescent growth, with the 'V' at the center representing ACT's core principle of a "value-aligned, vital, and meaningful life." It incorporates six psychological techniques: acceptance, cognitive defusion, being present, observing self, clarifying values, and committed action, aimed at developing adolescents into Discoverers, Noticers, and Advisers, each fostering personal values and direction. In 2019, Anne et al.[17] performed a preliminary validation of the DNA-V model's applicability with a short-term online intervention among adolescents.

1.2.2 Self-Developed General Demographic Information Survey

A tailored demographic questionnaire collected data on participants' age, gender, grade, single-child status, parents' educational levels, previous psychological interventions, mood disorder history, and medication use.

1.2.3 Avoidance and Fusion Questionnaire for Youth (AFQ-Y8)[18]

This scale measures experiential avoidance and cognitive fusion, reflecting psychological flexibility. The Chinese version features 8 items rated from 1 ("completely disagree") to 5 ("completely agree"), and it is noted for its reliability and practicality. Its Cronbach's alpha and test-retest reliability indicate solid validity, with alpha coefficients in this study consistently above 0.84.

1.2.4 Career Adapt-Ability Scale (CAAS)[19]

The CAAS comprises 24 items distributed across four factors—career concern, career control, career curiosity, and career confidence. These factors address critical questions about an individual's future career path, including their capability to establish, manage, explore, and confidently pursue their career goals. Scoring on a Likert scale from 1 ("strongly disagree") to 5 ("strongly agree"), the scale has proven to be highly reliable, with Cronbach's alpha for its subscales and the overall scale exceeding 0.80 in this study, indicating high levels of career adaptability.

1.3 Method

1.3.1 Intervention Plan

Following the "Guidelines for Mental Health Education in Primary and Secondary Schools" issued by the Ministry of Education of China[20], the DNA-V intervention program was localized into a six-week psychological curriculum for secondary school students, tailored to the psychological and physical development characteristics of Chinese adolescents. Following the Delphi method's procedure of "soliciting expert opinions - summarization - statistical analysis - feedback - iteration - consensus[21]" the course was optimized as follows: (1) Contact was made with the founders to obtain the original scheme for localization; (2) The original scheme was translated by psychology postgraduate students, supervised by two clinical psychologists trained in the DNA-V model by its founders in Spain and Ireland, who provided guidance and drafted the course script; (3) A pilot study was conducted within a research group consisting of high school students, parents, and high school psychology teachers, and statistical analysis was performed on the feedback; (4) An eight-round course discussion was conducted, cyclically soliciting opinions from the research group and the school to optimize the course plan; (5) The localized course was enhanced to align with China's secondary school educational standards, focusing on the core competencies development of students, adjusting the objectives and key difficulties of the learning units, revising the advancement relationship and expressions of unit course objectives, and redesigning activities and some secondary indicators under the intervention strategy; (6) The DNA-V online psychological course was developed into a computer-based educational game based on the content of the face-to-face course, designed by postgraduate students specializing in psychology and computer science. Details of the content of the three psychological courses are shown in Table 1.

Table 1: Content of the Training Course on Psychological Flexibility

Group	Lesson 1	Lesson 2	Lesson 3	Lesson 4	Lesson 5	Lesson 6
Control	The Road to Growth: Introduction, Video Clips, Discussion, Summary	Emotions Start with Love: Introduction, Video Clips, Discussion, Summary	Discover Strengths Towards Goals: Introduction, Video Clips, Discussion, Summary	Positive Psychological Qualities: Introduction, Video Clips, Discussion, Summary	Being Your Own Hero on the Road to Growth: Introduction, Video Clips, Discussion, Summary	Deciphering Life: Introduction, Video Clips, Discussion, Summary
Offline	Understanding DNA-V: Team Building, Introduction to DNA-V, "Life Game", Summary & Feedback	The Adviser: Introduction to Adviser, "Survivor Game", My Adviser, Summary & Feedback	The Observer: Recognizing Observers, Normalization, A-N-D, Allowance, Summary & Feedback	The Explorer: Recognizing Explorers, Discovering Strengths, How Explorers Act, Summary & Feedback	Values: Understanding Values, Finding My Values, Self-Portrait of Life, Summary & Feedback	A Healthy Flexible Self-Perspective: Review, Flexible Self-Perspective, Mastering DNA-V, Course Summary
Online	Introduction to DNA-V: Prologue, Agreements, First Acquaintance, Life Game, Crazy Writing, Summary	The Adviser: Memories of the Past, Survivor Game, Observing the Mind, File Folder Game, Summary	The Observer: Memories of the Past, Emotion Figures, A-N-D Game, Mind Reading, Summary	The Explorer: Memories of the Past, Explorer Learning, Strength Cards, Action Guide, Summary	Values: Memories of the Past, What are Values, Clarification Game, Life Simulation, Summary	The Secret to Happiness: Memories of the Past, Labels, Rediscovering DNA-V, Six Secrets to Happiness, Summary

1.3.2 Research Process

The intervention for the offline group, online group, and control group lasted six weeks, with a 40-minute session each week, totaling six sessions. The offline group and control group sessions were conducted in the psychology classroom, with two main teachers alternating the lectures; the class was randomly divided into four groups, each led by a mentor guiding the discussion segment. The online group sessions were held in the computer classroom, with technical guidance provided by the teacher who lectured the DNA-V face-to-face course. At least one school teacher was present in the classroom as an observer to make observational records without participating in the activity sessions. Assessments were conducted three times: before the intervention (T1), within one week after the intervention (T2), and two months after the intervention (T3), with questionnaires distributed simultaneously; the main teacher emphasized instructions and maintained discipline, with students completing the questionnaires on computers in the computer classroom.

1.4 Quality Control

Using action research methodology[22], the intervention was continually monitored, with an emphasis on dynamically evaluating the technical components of each unit and their alignment with the educational model and process. The effectiveness of the interventions, theoretical explanations, and teaching techniques were collaboratively assessed by teachers and mentors after each class, with adjustments made as needed. Semi-structured interviews with teachers and student feedback sessions provided insights into the intervention's impact and helped refine the approach throughout the program. Supervisory sessions were conducted for the main teachers and mentors to enhance the application of the DNA-V model.

1.5 Statistical Methods

The study used a 3x3 factorial mixed design (three groups: offline, online, control x three tests: pre-test, post-test, follow-up test) to analyze data. Linear mixed models (LMM) controlled for time-based correlations within participants, transforming the collected data for in-depth analysis. Using R language and specific statistical packages (lmerTest and emmeans), the study evaluated simple effects and trends over the testing periods. Significance tests were adjusted for multiple comparisons, setting the significance level at $\alpha = 0.05$.

2. Results

2.1 Impact of Different Course Interventions on Psychological Flexibility

Linear Mixed Models (LMM) were used to assess the impact of the interventions on psychological flexibility, with results detailed in Tables 2 and 3. The analysis showed that while the group effect was not statistically significant ($\chi^2 = 0.01$, $P > 0.05$), the time effect was significant ($\chi^2 = 19.16$, $P < 0.01$), and there was a significant interaction between group and time ($\chi^2 = 12.21$, $P < 0.05$). The variables accounted for 7.2% of the variance initially, increasing to 10.8% after accounting for gender, age, only child status, and parental education, though these demographic variables did not significantly impact the results (P values > 0.10).

Controlled analyses indicated that the offline group experienced significant improvements in psychological flexibility one week and two

months post-intervention (t-values of 4.22 and 3.11, respectively, P < 0.01), with no significant changes between these two time points (t = -1.11, P > 0.05). The online group did not show significant changes in flexibility post-intervention (P values > 0.40). The control group improved one week after the intervention (t = 4.64, P < 0.01) but reverted to initial levels two months later (P = 0.63). Refer to Tables 2 and 3 for detailed results.

Table 2: Influence of Different Course Intervention Conditions on Psychological Flexibility and Career Adaptability without Control Variables [$\bar{x}$ ($\bar{x}$ 95%CI)]

Measurement Time	Psychological Flexibility			Career Adaptability		
	Offline Group (n = 33)	Online Group (n = 40)	Control Group (n = 37)	Offline Group (n = 33)	Online Group (n = 40)	Control Group (n = 37)
T1	3.22 (2.95~3.50)	3.24 (2.99~3.49)	3.23 (2.97~3.49)	3.52 (3.32~3.73)	3.60 (3.42~3.79)	3.57 (3.37~3.76)
T2	3.78 (3.51~4.06)	3.38 (3.13~3.62)	3.81 (3.55~4.07)	3.80 (3.59~4.00)	3.77 (3.59~3.96)	3.78 (3.59~3.97)
T3	3.64 (3.36~3.91)	3.33 (3.08~3.58)	3.34 (3.09~3.60)	3.90 (3.70~4.10)	3.78 (3.60~3.97)	3.69 (3.50~3.88)
-	0.56 **	0.14	0.58 **	0.28 **	0.17	0.21*
$\bar{x}_{T1}$-$\bar{x}_{T3}$	0.41 **	0.09	0.11	0.38 **	0.18	0.12
$\bar{x}_{T2}$-$\bar{x}_{T3}$	- 0.15	- 0.05	-0.47 **	0.10	0.01	- 0.09

Note: ** P < 0.05, ** P < 0.01.*

Table 3: Effects of different course intervention conditions on psychological flexibility and career adaptability after controlling demographic variables[$\bar{x}$($\bar{x}$ 95%CI)]

Measurement Time	Psychological Flexibility			CAREER ADAPTABILITY		
	Offline Group (n = 33)	Online Group (n = 40)	Control Group (n = 37)	Offline Group (n = 33)	Online Group (n = 40)	Control Group (n = 37)
T1	3.21 (2.93~3.48)	3.20 (2.94~3.45)	3.20 (2.94~3.46)	3.55 (3.34~3.76)	3.62 (3.43~3.81)	3.58 (3.38~3.77)
T2	3.77 (3.49~4.05)	3.33 (3.08~3.59)	3.78 (3.52~4.04)	3.82 (3.61~4.04)	3.79 (3.60~3.98)	3.79 (3.59~3.99)
T3	3.62 (3.34~3.90)	3.29 (3.03~3.54)	3.32 (3.06~3.57)	3.93 (3.72~4.14)	3.80 (3.61~3.99)	3.70 (3.50~3.90)
$\bar{x}_{T1}$-$\bar{x}_{T2}$	0.56 **	0.14	0.58 **	0.28 **	0.17	0.21*
$\bar{x}_{T1}$-$\bar{x}_{T3}$	0.41 **	0.09	0.11	0.38 **	0.18	0.12
$\bar{x}_{T2}$-$\bar{x}_{T3}$	- 0.15	- 0.05	- 0.47 **	0.10	0.01	- 0.09

Note: ** P < 0.05, ** P < 0.01.*

2.2 Impact of Different Course Interventions on Career Adaptability

Analysis of the impact on career adaptability showed that without controlling for variables, the main effect of the group was not significant (χ^2 = 0.34, P > 0.05), while the effect of time was significant (χ^2 = 18.54, P < 0.01), but no significant interaction between group and time was observed (χ^2 = 5.06, P > 0.05), with an R2 value of 3.7%. When controlling for demographic factors, the time effect remained significant (χ^2 = 18.54, P < 0.01), but the group effect and interaction still showed no significance (χ^2 = 0.26 and 5.06 respectively, P values > 0.05), and the R2 value increased to 6.1%.

Further analysis revealed that the offline group exhibited significant improvements in career adaptability both one week and two months after the intervention (t-values of 3.05 and 4.16, respectively, P < 0.01), with no notable difference between these times (t = 1.11, P > 0.05). No significant changes were observed in the online group's adaptability at any time points (P values > 0.07). The control group improved one week post-intervention (t = 2.74, P < 0.05) but reverted to initial levels two months later (P values > 0.05). Refer to Tables 2 and 3 for detailed results.

3. Discussion

The results confirm the long-term effectiveness of the DNA-V face-to-face course, showing both validity and sustainability among

Chinese secondary school students[23]. The study supports the hypothesis of an interaction between psychological flexibility and career adaptability, suggesting that high psychological flexibility allows individuals to effectively respond to external uncertainties, which in turn enhances their career adaptability. Similarly, high career adaptability aids in clarifying value directions, amplifying the impacts of psychological flexibility.

The DNA-V face-to-face intervention outperformed standard positive psychology courses, likely due to its foundation in contextual behavioral science which integrates key aspects of positive psychology and circumvents its common pitfalls[24].

The study also assessed the potential of online interventions to teach psychological flexibility and career adaptability, but these did not yield significant improvements, possibly due to the course's emphasis on gaming rather than core content and a lack of personalized interactive guidance.

The study faced limitations, including the use of a non-blank control group and a sample from only one school, which may affect the generalizability of the findings. Future applications are planned across multiple schools to verify the consistency of the positive effects.

This research proposes that psychological flexibility and career adaptability form a dynamic cycle that helps individuals navigate internal and external uncertainties, effectively managing negative emotions and fostering proactive abilities. Future research should continue to refine and test the DNA-V model, focusing on enhancing its application through mixed online and offline formats, extended durations, and broader implementations to improve adolescent mental health comprehensively.

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