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ARTICLE

Development of a Questionnaire on Subject Interest among Primary School Students

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ABSTRACT

The development of interest can improve the efficiency and quality of students' learning activities. Previous research mainly explored professional interest, but less on subject interest. This study designed and validated a subject interest questionnaire for primary school students to assess their potential to predict academic performance and offer reference for educational assessment and counseling. A sample of 545 students from two primary schools in Beijing was selected. The questionnaire consisted of 138 questions involving eight major courses, such as Chinese, mathematics and English. Through analysis, questions with good discrimination and social desirability were screened out, and nine questions of each sub-scale were finally retained. According to the result, the reliability and validity of the questionnaire reached an acceptable level. Further analysis of exploratory and confirmatory factors revealed that the subject interest can be summarized into two dimensions: "humanities-related factor" and "mathematics-related factor" . The two dimensions are consistent with the "human and material dimensions" proposed by ACT. As a preliminary exploration, this study lays a foundation for further research on the relationship between subject interest and basic interest and provides a practical evaluation tool for primary education.

Keywords: Subject Interest; Questionnaire Design; Primary School Students

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1. Introduction

Interest is defined as an individual's inclination towards acquiring knowledge about certain things or participating in specific activities. The development of interest can improve the efficiency and quality of students' learning activities[1]. The results of interest-driven learning differ from those of effort-based learning in essence. As posited by Fryer et al.[2], there is a proportional relationship between interest and learning outcomes. Thus, subject interest serves as a crucial predictor of academic achievement in the realms of educational evaluation and counseling[3]. Subject interest both affects students' learning motivation as well as participation and correlates with students' understanding and application ability concerning subject content[4].

Questionnaire is a pivotal means to explore and understand interest[5]. In China, interest research focuses on professional interest. Bai Ligang, Ling Wenquan and Fang Liluo[6] revised Holland's SDS scale by factor analysis. Their study involved 1535 college students from 23 departments across ten universities in Beijing. Long Lirong, Peng Pingen and Zheng Bo revised Holland's 1985 version of SDS and verified its applicability among 853 junior and senior high school students in Wuhan[7]. Dai Yiyun, Li Jian, Jaco and Gao Yiran examined the structure of contemporary college students' career interest[8]. To measure college students' career interest, they developed a set of scale tools with nine dimensions: research, artistic, display, social, risk-taking, enterprise, conventional, realistic and ecological. The reliability and validity of these scale tools were verified. Zhang Yu localized the "Personal Spherical Career Interest Scale Brief Version" (PGI - S), the most recent career interest assessment tool[9]. This led to the formation of a version (PGI - SC) tailored to Chinese high school students.

The abovementioned study primarily centers on professional interest while subject interest is less involved. However, as pupils' professional interest is still in its infancy[10], they know little about vocational activities, so it is ill-advised to compile the professional interest scale. Instead, it is essential to assess pupils' subject interest by enumerating learning activities. In this regard, several researchers have designed some subject interest tests[11]. For example, Zeng Fanmei designed the questionnaire involving Chinese and mathematics for specific grades of primary schools[12]. Nevertheless, the existing research fails to satisfy academia's needs.

Furthermore, from the perspective of result interpretation, the existing research merely focuses on the classification of students' interest, but overlooks the strength of interest and the relationship between interest and mental health. According to the "whole-person education model" by Zheng Richang, interest correlates with both strength and elegance[13]. Interest is central to teaching and learning[14]. Interest can stimulate individuals' enthusiasm, promote study as well as work, and enhance life quality whether their interest is wide-ranging or single-minded. If an individual has no interest in all things and activities, they struggle to acquire fun and meaning in everything. Consequently, they will become pessimistic as well as world-weary and even go to a dead end.

This study aims to develop a subject interest questionnaire covering the major course of primary school through interviews with primary school teachers and students to learn their needs. The interpretation of the questionnaire result involved not only the classification of students' interest, but also the analysis of its strength. Through these efforts, this study can satisfy the needs of teaching evaluation, academic guidance and interest research and provide reference for mental health counseling at primary school.

2. Materials and Methods

2.1. Research Concept

The operation is defined as an activity to "ascertain individuals' propensity towards acquiring knowledge about specific subjects or participating in learning activities". As regards that, researchers formulated 138 questions with each major course involving 16 to 19 questions. The course includes Chinese, mathematics, English, computer, nature, physical education, music and fine arts.

2.2. Application of Questionnaire

A sample of 545 students from two primary schools in Beijing was selected and then the subject interest scale was tested. For the detailed questionnaire, please refer to the **Appendix A**. The test was conducted collectively in class units. The experimenter distributed the questionnaire and read out instructions to subjects. If the subject had unclear

questions, they could raise their hands to inquire.

3. Results

3.1. Project Analysis

3.1.1. Discrimination

This study used the critical ratio or CR to calculate the discrimination degree. The calculation involved the significance test of the difference in the average score of each question between the group with the total score in the top 27% and the group in the bottom 27%. If the CR value reaches a significant level, then the question shows discrimination among subjects, which means it can identify the response degree of different subjects.

According to the result calculation of the first test, the CR value of all questions has reached a significant level, which means the question shows good discrimination.

3.1.2. Social Desirability

This study employed the selection rate of questions as a measure of social desirability. This study adopted five-point Likert scale. Specifically, if the combined proportion of responses for options 1 and 2, along with the combined proportion of responses for options 4 and 5, was less than 10%, the corresponding question would be deleted. Through calculation, the selection rates of 12 questions were found less than 10%, so these questions were removed, as shown in **table 1**.

Table 1. Social desirability indicators of deleted questions.

Title Number	Selection Rate (%)
DN01	4.3%
DN08	6.8%
DN13	6.8%
MS09	8.9%
MS10	7.2%
MS13	8.9%
MS16	7.2%
TY01	8.1%
ZR01	8.2%
ZR10	8.5%
ZR11	6.8%
ZR15	8.1%

Note: DN stands for computer, MS for fine arts, TY for P.E., and ZR for nature.

3.1.3. Question Screening

Questions were initially screened according to discrimination and social desirability. Then, in accordance with the corresponding factor loading and communality, some questions were deleted. Finally, each subscale retained nine questions.

3.2. Mean and Standard Deviation

Mean and standard deviation are shown in **Table 2**.

Table 2. Norm mean and standard deviation.

	Computer	Fine Arts	Mathematics	P.E.	Music	Chinese	English	Nature
Mean value	29.672	27.8273	28.8095	28.6926	26.3602	26.9579	24.81	29.706
Standard deviation	6.3961	7.604	6.8232	6.7041	8.3275	7.4906	9.4518	6.4401

3.3. Reliability

Retest reliability, split-half reliability and homogeneity reliability were used to indicate reliability. Among these indicators, the subject who re-tested the reliability was 48 sixth-grade pupils in Beijing after an interval of 30 days.

The index values of reliability are shown in **Table 3**.

As per the above table, the subject interest scale is credible as all reliability indicators are above 0.70.

Table 3. Reliability indicators of subject interest scale.

Items	Total Table	Com-puter	Fine arts	Mathe-matics	P.E.	Music	Chinese	English	Nature	Number of Samples
Fractional half-reliability (corrected)	0.896	0.869	0.903	0.912	0.759	0.919	0.882	0.967	0.855	545
Homogeneity reliability (alpha coefficient)	-	0.873	0.911	0.901	0.862	0.922	0.900	0.957	0.891	545
Re-test reliability	-	0.794	0.717	0.897	0.791	0.818	0.856	0.704	0.763	48

3.4. Criterion-Related Validity

This research used criterion-related validity as the validity criterion. There are two criteria: the first is the self-evaluation of students' interest in various subjects; and the second is students' test scores. The value of criteria is shown in **Table 4** and **Table 5**.

Table 4. Criterion correlation between each subscale and self-evaluation of students' interest.

	Computer Self-Evaluation	Fine Arts Self-Evaluation	Mathematics Self-Evaluation	P.E. Self-Evaluation	Music Self-Evaluation	Chinese Self-Evaluation	English Self-Evaluation	Nature Self-Evaluation
Computer subscale	**0.348****	0.292**	0.288**	0.256**	0.248**	0.163**	0.375**	0.375**
Fine Arts Subscale	0.153**	**0.649****	0.193**	0.204**	0.408**	0.233**	0.316**	0.286**
Mathematics subscale	0.165**	0.254**	**0.700****	0.302**	0.266**	0.297**	0.397**	0.466**
P. E. Subscale	0.273**	0.168**	0.311**	**0.517****	0.172**	0.212**	0.238**	0.335**
Music subscale	0.094*	0.338**	0.198**	0.171**	**0.641****	0.286**	0.359**	0.167**
Chinese subscale	0.143**	0.334**	0.351**	0.215**	0.377**	**0.514****	0.489**	0.343**
English subscale	0.104*	0.226**	0.327**	0.112*	0.330**	0.284**	**0.766****	0.270**
Nature subscale	0.221**	0.346**	0.385**	0.260**	0.249**	0.264**	0.316**	**0.593****

It can be seen from the table that the self-evaluation of interest has maximal relevance with the subject subscale.

Table 5. Criterion correlation between each subscale and academic performance.

	Computer Performance	Fine Arts Performance	Mathematics Performance	P.E. Performance	Music Performance	Chinese Performance	English Performance	Nature Performance
Computer subscale	**0.247****	0.115	0.191**	0.178**	0.139*	0.145**	0.200**	-0.005
Fine Arts Subscale	0.201**	**0.252****	0.103*	0.228**	0.211**	0.035	0.065	0.036
Mathematics subscale	0.086	0.103	**0.263****	0.251**	0.098	0.131*	0.147**	-0.026
P. E. Subscale	0.150*	0.019	0.029	**0.310****	0.066	0.001	0.019	-0.035
Music subscale	0.190**	0.181**	0.073	0.197**	**0.302****	0.049	0.116*	0.093
Chinese subscale	0.138*	0.154**	0.129**	0.272**	0.208**	**0.184****	0.154**	0.055
English subscale	0.203**	0.173**	0.321**	0.289**	0.211**	0.260**	**0.477****	-0.004
Nature subscale	0.072	0.085	0.165**	0.092	0.151**	0.152**	0.074	**0.220****

According to the table, the correlation between the score of subjects and the subscale is significant, with the level reaching 0.01.

3.5. Exploratory Factor Analysis

The sample of 237 students from two primary schools in Beijing was tested as subjects, and exploratory factor analysis was conducted based on the test data.

The scale analysis employed the principal components analysis method and varimax rotation in factor analysis. The KMO value was 0.864, and Bartlett's spherical test was significant, indicating that the data were suitable for factor analysis. Two components were extracted in screen plot test. The explainable variation was 59.582%. The results after screening are shown in **Table 6**.

In line with the above results, two extracted common factors are meaningful. F1 is "humanities-related factor" and F2 is "mathematics-related factor".

Table 6. Factor structure of the scale.

Title	F1	F2
Music	0.842	
Fine arts	0.781	
Chinese	0.766	
English	0.762	
P.E.		0.857
Nature		0.774
Mathematics		0.737
Computer		0.711

3.6. Confirmatory Factor Analysis of Concept Validity

The sample of 308 students from two primary schools in Beijing was served as the subjects of the test, and confirmatory factor analysis (CFA) was conducted based on the test data.

CFA is a prevalent statistical technique within the realm of psychological and social - science research, frequently employed to elucidate the underlying structure of constructs such as personality traits and to compare different theoretical models. CFA can estimate the load parameter between observed variables and latent variables (such as dimensions of implicit structure) and correlation degree between latent variables. Additionally, it can determine the goodness of fit of observed data to theoretical conception by comparing the difference between sample covariance matrix (S) of observed variables and covariance matrix (E) derived from theoretical models.

In line with the **Table 7**, the X2/df value is less than 5, the GFI is 0.95, the AGFI is 0.90, and the CFI, IFI, and NNFI are all above 0.94, indicating that the model fits well.

Table 7. Main fitting indicators of confirmatory factor analysis.

	X 2	*df*	X 2/df	GFI	AGFI	CFI	IFI	NNFI	RMSEA
I scale	71.79	19	3.78	0.95	0.90	0.96	0.96	0.94	0.090

In line with the **Table 8**, the four subjects of Chinese, English, Fine Arts and Music show an obvious correlation with F1, indicating that these four subjects are more inclined to F1, the humanistic factor. Computer Science, Mathematics, Physical Education and Nature, on the other hand, show an obvious correlation with F2, which means these four subjects are more inclined to F2, the mathematical and physical factor.

In line with the **Table 9**, There is a high positive correlation between the humanistic factor and the mathematical and physical factor, with $\phi = 0.87$.

Table 8. Complete Standard Resolution of λ Values.

	F1	F2
Chinese	0.88	
English	0.79	
Fine arts	0.74	
Music	0.74	
Computer		0.73
Mathematics		0.75
P.E.		0.59
Nature		0.78

Table 9. Complete standard solutions for ϕ values.

	F1	F2
Humanities-related factor	1.00	
Mathematics-related factor	0.87	1.00

4. Discussion

The results of exploratory and confirmatory factor analysis supported the existence of "humanities-related factor" and "mathematics-related factor". These two factors which are aggregated from subject interest are also consistent with the "human-material dimension" proposed by ACT[15]. The first factor tends to deal with things while the second one tends to deal with people.

The validity analysis of this study also explored the relationship between subject interest and academic performance which showed a significant positive correlation according to the results. The results are consistent with previous findings that interest is an important predictor of academic achievement. The finding highlights the importance of interest cultivation in education and the role of interest in promoting learning motivation and academic performance.

5. Conclusion

The subject interest scale by this study demonstrated reliability indexes above 0.70 along with satisfactory criterion-related and conception validity. Therefore, this scale can be deemed reliable and effective. This study filled the gap of domestic research on primary school students' subject interest.

Author Contributions

Xuzhe Zhang: Responsible for literature review and thesis writing. Shixiang Liu: Responsible for overall design and thesis writing.

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Institutional Review Board Statement

Informed consent was obtained from all subjects involved in the study.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Not available.

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Conflicts of Interest

There is no conflict of interest.

Appendix A

Formal Test Questionnaire (Partial Questions)

Primary School Student Survey Questionnaire

Dear classmates, nice to meet you

Thank you very much for participating in the test of the "Tenth Five-Year Plan" project of the Ministry of Education. In order to help primary school students understand themselves better, we have compiled the following questionnaire. Everyone has different views and feelings about the questions, so there is no right or wrong answer. You just need to answer according to your own real views. The results of the answers will only be used for research, and we will strictly keep the confidentiality in accordance with the "Statistical Law of the People's Republic of China". Please pay attention to the following:

1, Answer every question.

2, Choose only one answer for each question.

3, If you have any questions, please raise your hand and ask.

Please fill in your basic information:

Name		Student Number	
Gender		Birth Date	Year () Month
Grade		School Name	
Recent Exam Scores	Chinese () points	Math () points	English () points
	Music () points	Fine Arts () points	P.E. () points
	Nature () points	Computer () points	

Instructions for Answering:

The main purpose of this part of the questionnaire is to help you understand your own interest and provide you with suggestions for improvement. Each question includes a sentence and four numbers behind it, where:

1 represents "Dislike" ;

2 represents "Tend to Dislike" ;

3 represents "Tend to Like" ;

4 representations "Like" .

Please read each sentence carefully and circle the correcting number "O" according to your real situation.

Please follow your first feeling and do not think too much, so as not to affect the accuracy of the test.

Note: This unit mainly examines your interest. When answering, do not consider which you have engaged in or which you are good at it. Just judge directly according to your interest without deep thinking.

Example:

Question Number	Sentence	Dislike	Tend to Dislike	Tend to Like	Like
1	**Solving math problems**	**1**	**2**	**③**	**4**

First, please determine which you "like" or "dislike" solving math problems. If you "like" it, choose 4; if you "dislike" it, choose 1; if you really can't determine which you like it or not, think carefully and then choose an answer between "Tend to Like" and "Tend to Dislike" .

A student chose 3 in this question, indicating that he/she "tends to like" solving math problems.

Well if you understand the requirements, let's start!

Question Number	Sentence	Dislike	Tend to Dislike	Tend to Like	Like
1	Talking with the computer teacher	1	2	3	4
2	Drawing	1	2	3	4
3	Attending math class	1	2	3	4
4	Being the PE monitor	1	2	3	4
5	Participating in Chinese competitions	1	2	3	4
6	Doing music homework	1	2	3	4
7	Listening to English	1	2	3	4
8	Observing the growth process of plants	1	2	3	4

Thank you for your cooperation!

Wish you a happy life and progress in your studies!

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ARTICLE

Research on Emotional Expression of Students in Different School Stages Based on Speech Emotion Recognition

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ABSTRACT

From children to teenagers and then to adults, individuals' emotional expression ability has undergone significant changes. From the compulsory education stage to the general senior middle school stage, students' cognitive and emotional needs will change greatly. Students of different school stages show significant differences in their vocal emotional expression, which not only affects their social skills but also has important guiding significance for educational practice. Therefore, this study focuses on the vocal emotional expression of students at different school stages. This study explores the differences in vocal emotional expression among students at different school stages (primary school, junior high school, and senior high school), with a focus on the expression characteristics of different emotional types and the situation of inconsistent internal and external emotions. The research results show that in terms of emotional types, students at different school stages have a relatively high accuracy rate in expressing sadness, while the accuracy rate for expressing anger is the lowest, and the accuracy rate for expressing anger is significantly lower than that for other emotions. In terms of school stages, the overall accuracy of emotional expression among students improves with the increase of school stages, but the differences between school stages are not significant. In the task of expressing inconsistent internal and external emotions, the study found that senior high school students have significantly better emotional conversion ability than primary and junior high school students, indicating that as the school stage increases, students' adaptability in complex emotional expression tasks gradually improves.

Keywords: Voice Emotional Expression; Grade Differences; Types of Emotions

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1. Introduction

Emotional expression ability is an important component of an individual's comprehensive quality. During the growth process from childhood to adolescence and adulthood, the ability of emotional expression through voice undergoes significant changes. Voice is not only a tool for information exchange but also an important medium for emotional communication. At different age stages, individuals show differences in the use of these voice features, which not only reflect the development trajectory of emotional expression ability but also influence an individual's social interaction, learning experience and mental health. From the stage of compulsory education to ordinary senior high school, students' age range is from 5 to 20 years old, and their cognitive levels, emotional needs and expression methods are constantly changing. Some studies have found that in junior high school, girls' emotional regulation ability and emotional expression ability are lower than boys' ability, but in high school, when they successfully pass puberty, their ability is basically the same[1]. For the individual's own development, in the childhood stage, the individual's emotional expression ability is mainly affected by the family atmosphere: such as parents' upbringing, attachment relationship, family expression, marriage relationship[2]. For teenagers, the rapid physiological development and gradually reach maturity, but the speed of psychological development is relatively slow, and the psychological level is also in the transitional stage from childish to mature development. Psychological development is prone to contradictions, especially in emotional aspects. Their emotional fluctuations and reaction intensity are large, so adolescent students The adjustment ability is weak, and the emotional expression ability is uneven. In adolescence, school is the place where people spend the most time apart from family. Zhu Xiaoman believes that teachers with a high level of emotion and interpersonal relationships can teach knowledge to students more effectively. Teachers express their emotions in the right way and at the right time, and talk about students' learning, friendship and school life. Emotional responses will affect students' emotional experience and emotional expression[3]. In the investigation of emotional expression in the college stage, some studies found that there was no significant difference in the emotional expression of college students in different grades[4], but junior college students showed stronger emotional expression ability than undergraduates[5]. The research of Gross and others found that compared with young subjects, older subjects reported less negative emotional experiences, more emotional control, and less expression of their emotions. Whether it is self-reporting on daily emotional expression or laboratory demonstration, there is evidence that emotional expression behavior declines with age[6]. At the same time, it also shows that the possibility of emotional expression declines with age[7]. It can be seen that the research on age or section still needs to be further verified. Therefore, studying the characteristics of emotional expression of students at different educational stages and exploring their commonalities and differences is of great significance to educational practice.

2. Problem Statement

Emotional expression is a process in which individuals manifest and transmit their internal emotional states to others through facial expressions, voice intonation, body language or language description[8,9]. This process is an important part of emotional communication, which not only contributes to the self-regulation of individual emotions, but also can deepen others' understanding of their emotional states[10]. Emotional expression has both universality and individual differences. Among them, the expression of basic emotions (such as happiness, sadness, anger, etc.) shows consistency in many usage scenarios, while the expression of complex emotions is often affected by culture, social norms and situations[11].

Emotional expression can be classified from multiple perspectives such as the mode of expression, the nature of emotions and the source of information. According to the way of expression, emotional expression can be divided into verbal emotional expression and non-verbal emotional expression. Emotional expression through language conveys emotions directly through written or oral language, such as praise or complaints towards others. This way of expression relies on semantic information and non-semantic information[12], directly reflecting the emotional state of the speaker. According to the information source, emotional expression can be divided into semantic emotional expression, intonation and prosodic emotional expression, and non-verbal physiological emotional expression. Semantic emotional expression conveys emotions through the language content it-

self, for example, directly saying "I'm very happy" to express pleasant emotions[12]. Emotional expression conveys emotional information through acoustic features such as speech rate, intonation, volume and pauses[13]. For example, when saying "I'm fine" in an angry tone, the intonation of the voice can reveal emotions more than the semantics. Non-verbal physiological emotional expression conveys emotions through sighing, crying, laughter, etc. This form of expression is directly related to physiological behaviors and is a cross-cultural and universal way of emotional expression[14]. The perception of emotional cues in semantic information varies among different age groups. Mccluskey and Albas' research found that children aged 3 to 12 tend to confuse the rhythms of happiness and anger, while participants aged 13 to 43 do not confuse these two emotions. Participants over 45 continue to confuse the sounds of happiness and anger[15]. Young children rely more on semantic information. Children around the age of 13 start to pay attention to both semantic and non-semantic information simultaneously, while adults mainly rely on non-semantic information for emotional judgment. Current research focuses more on an individual's inner experience and willingness to express emotions. In previous studies, most researchers have adopted the interview method in qualitative research and the questionnaire survey method in quantitative research to study emotions, while there are relatively few research and measurement tools for emotional expression in speech data. Based on this, this study proposes the following two research questions:

1. What are the similarities and differences in the accuracy of expressing basic emotions among students of different educational stages and different emotional categories?
2. When the inner emotional experiences of students at different educational stages are inconsistent with their external emotional expression needs, what similarities and differences exist in their emotional expressions?

3. Literature Review

3.1. The Structure and Measurement of Emotional Expression

Emotional expression is the process by which an individual conveys their internal emotional state to others through facial expressions, tone of voice, body language or verbal description[9]. Looking at the various viewpoints proposed by researchers on the structure of emotional expression, it is evident that the research on emotional expression has evolved from a single dimension to multiple dimensions, and from simplicity to complexity. Kring[16] et al. studied the expressiveness of emotions from the perspective of observable external features of emotions and designed the Emotional Expression Scale; Friedman et al. examined emotional expression and individual differences in non-verbal communication from the perspective of non-verbal expression. However, these studies all explained emotional expression from a single dimension. Some other studies adopted a multi-dimensional structure to explain emotional expression. King and Emouns developed a three-dimensional model: positive emotional expression, negative emotional expression, and intimacy expression; Gross & Jolm established a five-factor structure of general emotional expressivity by examining six self-report emotional expressivity questionnaires. According to different structural dimensions of emotional expression, researchers have developed different measurement tools, such as the Emotional Expression Questionnaire (EEQ); the Emotional Expressivity Scale (EES); and the Berkeley Expressivity Questionnaire (BEQ). These self-report scales are all used to measure non-verbal emotional expression rather than emotional expression through speech, and they focus more on an individual's inner experience and emotional expression willingness. There are relatively few studies and measurement tools on emotional expression in voice data.

3.2. Voice Emotional Expression

Voice emotion expression refers to extracting the parameters of emotional features from the sound material based on the acoustic cues contained in the voice and determining the emotion type through specific methods, thereby obtaining the emotional information conveyed in the voice. The expression of voice emotion usually relies on semantic information and non-semantic information. Semantic information refers to the actual meaning at the content level of the voice, while non-semantic information further includes emotional prosody and non-verbal vocalizations[17]. Emotional prosody conveys emotions through speech rate, intonation, volume and pauses, and serves as a crucial clue for listeners to judge emotions. Prosodic information plays a significant role

in emotional communication, not only reinforcing the conveyance of semantic information, but also often dominating emotional judgment when there is a conflict between semantic and prosodic information. Non-verbal vocalizations are also important ways of emotional expression, which are unrelated to semantics and prosody and directly convey emotions through physiological sounds, such as sighing, laughing, crying and screaming.

3.3. Voice Emotion Recognition Technology

The development of speech emotion recognition technology has gone through a long period of evolution. Research on speech emotion recognition mainly focuses on emotion description models, construction of emotion databases, extraction of acoustic features, and improvement of classification algorithms. The selection and optimization of speech recognition research algorithms is a key research point in this field. After extracting acoustic features, machine learning methods or deep learning algorithms are needed to perform emotion recognition. Common traditional speech emotion recognition algorithms include Hidden Markov Model, Gaussian Mixture Model, and Support Vector Machine, etc. Compared with traditional machine learning algorithms, deep learning algorithms have stronger feature extraction and classification capabilities in the field of speech emotion recognition. Common deep learning methods include Convolutional Neural Network (CNN) and Recurrent Neural Network (RNN), etc. CNN can automatically extract local features from the spectrogram of speech, while RNN is better at capturing the temporal characteristics of speech signals and is particularly suitable for processing dynamic information where emotions change over time. Compared with traditional classifiers, deep learning methods do not rely on manually extracted features and can directly extract more discriminative features from raw data through end-to-end learning, achieving significant performance improvements in various speech emotion recognition tasks.

3.4. The Educational Value of Emotional Expression

Emotional communication is regarded as an important part of education. Tang Zeng, a Chinese scholar, proposed in "Qian Shu · Jiang Xue" that "teachers should be close to their students, as closeness makes it easier to understand them; students should also be close to their teachers, as closeness makes it easier for them to be influenced." This indicates that if students can actively express their emotions, such as interest, confusion or approval, they will be more likely to receive the attention and understanding of their teachers, thereby enhancing the effectiveness of education. Vygotsky's theory also emphasizes the importance of interaction between teachers and students for learning. Students' emotional expression enables teachers to better judge the timing and intensity of teaching intervention. Modern scholars such as Denham[18] have found that students who express their emotions positively are more likely to receive support, which has a positive impact on their academic performance and social skills; Meyer and Turner[19] found that positive emotional expression can promote classroom interaction, while negative emotional expression can inhibit participation; Saarni[20] pointed out that students' emotional expression can enhance emotional resonance in peer interaction and plays a key role in cooperative learning. Zhu Xiaoman[21] pointed out that students of different age groups have inconsistent emotional tendencies when expressing emotions, so different educational approaches are needed in emotional education. Therefore, it is very necessary to study the similarities and differences in emotional expression among students of different school stages.

4. Methods

This research comprehensively adopts literature research method, statistical analysis method, quantitative research method and comparative research method to ensure the scientificity and rigor of the research. Through the investigation of domestic and foreign journals, papers, books and other relevant literature, this study systematically composes the research background and development trend of speech emotional expression, deeply analyzes the research status of students 'emotional expression, and summarizes the current research results and existing problems of speech emotion recognition in the application of students 'emotional expression. After collecting a large number of students' emotional expression data, SPSS and other statistical analysis software were used to sort out, visualize and analyze the data. By horizontally comparing the emotional expression patterns of

students in different sections, the differences in emotional categories, emotional intensity and emotional transformation ability were analyzed. Finally, combining the results of manual evaluation and machine evaluation, the similarities and differences of different evaluation methods were discussed, so as to provide multi-dimensional reference for future research on emotional education.

5. Experimental Design

5.1. Experimental Objective

This study focuses on the emotional expression abilities of students at different educational stages and designs two experiments, respectively focusing on the classification of emotions and the impact of internal and external emotional experience conflicts on expression. Experiment one examines the accuracy of students in expressing basic emotions such as happiness, sadness, anger, and neutrality. Experiment two investigates emotional expression when there is a conflict in emotional needs, by inducing emotions and requiring the expression of opposite emotions, to study the performance of different educational stages in emotional regulation abilities. The main objective of this study is to explore the influence of educational stages on emotional expression, analyze possible cognitive and emotional development factors, and combine manual assessment with machine assessment to ensure the scientific and rigorous nature of the analysis.

5.2. Preliminary Preparations

5.2.1. Experimental Subjects

In this experiment, 30 students (15 boys and 15 girls) were randomly selected from each educational stage, totaling 90 students. The age range of the students in the primary school stage was between 10 and 11 years old, that of the junior high school stage was between 13 and 14 years old, and that of the senior high school stage was between 16 and 17 years old. All the students had the ability to communicate normally in daily life.

5.2.2. Experimental Materials

The participants need to express the four emotions of happiness, sadness, neutrality and anger through speech. The material selection for this task has the following steps:

First, design the emotional rhythm target sentence. The design criteria for emotional target sentences are as follows:

1. The semantic content of the sentence is neutral, without any semantic tendency, and can express different emotions with a high degree of emotional freedom. For example, “He knows about this matter” can express both happy rhythms and sad, angry rhythms, etc. The length of each emotional target sentence is seven syllables. Controlling the sentence length can ensure that the subjects will not be affected by the sentence length.
2. The selected emotional target sentences should be suitable for students aged 7 to 18 and close to life. In the relevant research conducted by scholar Ge Zhilin [22], emotional target sentences have been evaluated and screened. Finally, 10 target sentences that can express different emotions were selected and divided into four emotional prosodic categories: happiness, sadness, neutrality, and anger, totaling 40.

Secondly, design conversation scripts for the emotional target sentences to enable the subjects to better feel the emotional clues contained in the materials and help them express their emotions. Design conversation scripts of four different emotions - happiness, sadness, neutrality and anger - for each emotional target sentence.

After setting the conversation script, select voice actors with excellent professional skills and rich dubbing experience to record the conversation script in a quiet recording studio, and randomly select 30 college students to evaluate the recording materials. The average accuracy rate and average intensity of all sentences are shown in **Table 1**. Based on the assessment results, finally 10 target sentences capable of expressing different emotions were selected, divided into four emotional rhymes: happiness, sadness, neutrality and anger, as the target sentences for students’ emotional expression in this study.

Table 1. Mean correctness and mean intensity of emotional rhyming sentences.

Emotional Rhythm	Happiness	Sadness	Anger	Neutrality
average correct rate	96.3%	91.2%	87.8%	95.6%

It can be seen from **Table 1** that the average accuracy rate of each emotional rhythm is very high, all exceeding 85%. The selected emotional target sentences are shown in **Table 2** as follows.

Table 2. Emotional target sentences.

	Emotional Target Sentence
1	He knows about it.
2	We'll be leaving soon.
3	There's my name here.
4	My dad's coming home tomorrow.
5	Everyone's out.
6	He's always like this.
7	Mom's already off work.
8	It's almost noon.
9	There's only two people in the store.
10	The bell rang.

6. Research Results and Discussion

6.1. Analysis of the Differences in the Accuracy of Emotional Expression Classification among Students of Different School Stages

6.1.1. Manual assessment

1) Descriptive statistics

In the classification statistics table shown in **Table 3**, from the perspective of the average and median values of emotional expression scores, among the three different school stages, the accuracy of expressing sadness is the highest, followed by happiness and neutrality, and then anger. In the classification statistics by school stage, the expression accuracy rates of primary school, junior high school, and senior high school are not significantly different, basically ranging from 0.60 to 0.63.

2) Two-way analysis of variance

As shown in the two-way ANOVA in **Table 4**, there is no significant difference in the score rate among different school grades, but there is a significant difference in the score rate under different emotional conditions. The significance of the interaction between school grade and emotional type is 0.008, indicating that students of different grades perform differently in accuracy under different emotional types. To further analyze the specific differences in the score rate caused by emotions, the Tukey HSD test in post hoc tests was used to analyze the data. The results are shown in **Table 5** (The "*" in the table indicates a significant difference).

Post-event verification found that the recognition accuracy rate of anger among students was significantly lower than that of the other three emotions, with a considerable gap. However, there was no significant difference in the score rates among the neutral, happy and sad groups.

Table 3. Classification and statistics of school stages and emotional types.

Segments	Type Of Emotion	Average	Standard Deviation
primary school	happiness	0.753	0.314
	sadness	0.793	0.270
	anger	0.340	0.320
	neutrality	0.607	0.260
	figure	0.623	0.340
junior high school	happiness	0.707	0.233
	sadness	0.780	0.219
	anger	0.373	0.340
	neutrality	0.547	0.246
	figure	0.602	0.304
senior high school	happiness	0.573	0.374
	sadness	0.687	0.245
	anger	0.433	0.320
	neutrality	0.747	0.278
	figure	0.610	0.327
figure	happiness	0.678	0.318
	sadness	0.753	0.247
	anger	0.382	0.325
	neutrality	0.633	0.271
	figure	0.612	0.323

Table 4. Two-way analysis of variance.

Emotional Rhythm	Mean Square	F	Significance
school grade	0.014	0.172	0.842
emotional type	2.327	27.96	0.000
*school grade*emotional type*	0.244	2.93	0.008

Table 5. Tukey HSD.

Emotion	Mean Difference	Standard Deviation	F
happiness-sadness	−0.076	0.043	0.296
happiness-anger	0.296 *	0.043	0.000
happiness-neutrality	0.044	0.043	0.730
sadness-anger	0.371 *	0.043	0.000
sadness-neutrality	0.120 *	0.043	0.028
anger-neutrality	−0.251 *	0.043	0.000

The accuracy of students expressing basic emotions at different educational stages is shown in **Figure 1**.

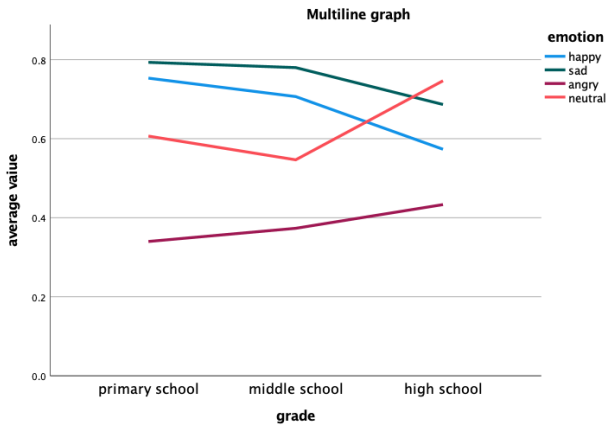

Figure 1. Average score statistics chart.

It can be intuitively seen from **Figure 1** that at the primary school stage, students' emotional expression tends to be explicit. The average scores of "happiness" and "sadness" are relatively high, especially the score of sadness is close to the highest level, indicating that students at this stage are emotionally sensitive and easy to express. In contrast, the scores of "anger" and "neutrality" were relatively low, especially the emotional expression of anger was the weakest. This reflects that the emotions of students in the primary school stage are mainly expressed positively and directly.

When entering junior high school, students' emotional expression gradually becomes more reserved. The scores of "happiness" and "sadness" both decline, while the score of "anger" begins to rise, and the score of "neutral" emotion drops to the lowest.

By the high school stage, emotional expression changes further. The scores of "neutral" and "angry" increase significantly, especially the score of "neutral" emotion jumps to the highest level, while the scores of "happy" and "sad" continue to decline.

Overall, as the academic stage progresses, the characteristics of students' emotional expression gradually shift from being overt to being introverted. The emotion of "happiness" weakens, while the emotions of "neutrality" and "anger" increase. The emotion of "sadness" is generally stable but slightly decreases. This trend reflects the psychological changes and the gradual improvement of adaptability of students during their growth process.

6.1.2. Machine Assessment

As shown in the **Table 6**, in terms of educational stages, the average accuracy rate of machine assessment results for each stage is within the range of 0.45 to 0.55, which is about 0.10 lower than that of human assessment, and there is little difference among the stages. This result indicates that the differences in emotional expression among students of different stages are not significant, which is consistent with the results of human assessment. Specifically, in terms of emotional types, primary school students have the highest accuracy rate in expressing the emotion of "happiness", and the accuracy rate of expressing this emotion in junior high school and senior high school stages drops significantly. Among the three stages, the accuracy rate of expressing the emotion of "anger" is significantly lower than that of other emotions, while the recognition rates of "neutral" and "sadness" emotions are relatively high in all three stages, with no significant

differences. The different emotional expression situations of students in different stages shown by machine assessment are roughly consistent with those of human assessment, further confirming the experimental results.

Table 6. Machine assessment.

Segments	*Average Accuracy Rate*	*Emotional Types*	*Accuracy*
primary school	0.516	happiness	0.879
		sadness	0.518
		anger	0.167
		neutrality	0.500
junior high school	0.535	happiness	0.633
		sadness	0.445
		anger	0.270
		neutrality	0.792
senior high school	0.487	happiness	0.656
		sadness	0.435
		anger	0.167
		neutrality	0.688

6.2. Analysis of the Differences in Emotional Transitions Induced by Emotions among Students of Different School Stages

6.2.1. Manual Assessment

1) Descriptive statistics

According to the descriptive statistical results (**Table 7**), as the educational stage increases, students' performance in the accuracy of emotional expression gradually improves. Specifically, the average accuracy rates for primary school, junior high school, and senior high school are 0.380, 0.547, and 0.700 respectively. The accuracy rate of senior high school students is significantly higher than that of primary and junior high school students. Meanwhile, the standard deviations among different educational stages are relatively small, but the standard deviation of senior high school students is lower, indicating a stronger consistency. In contrast, the standard deviations of primary and junior high school students are higher, suggesting that the accuracy rates of emotional expression in these two stages fluctuate more. Overall, there are differences in the accuracy of emotional expression among different educational stages, and students' performance gradually improves as the educational stage increases.

Table 7. Manual assessment.

Segments	**Average**	**Standard Deviation**
primary school	0.380	0.312
junior high school	0.547	0.319
senior high school	0.700	0.215
figure	0.542	0.312

2) One-way analysis of variance

The results of the analysis of variance indicate that there are significant differences in the performance among the groups at different educational stages. Meanwhile, the data within each group show relatively small fluctuations and are relatively consistent.To further clarify which specific educational stages have significant differences, a multiple comparison analysis method in post hoc tests was adopted for the study. The research results are shown in **Tables 8** and **9** (The "*" in the table indicates a significant difference).

The post-experiment test results show that there are significant differences in the emotional expression scores among students of different school stages, and the score rate of high school students is higher than that of junior high school students, while the score rate of junior high school students is higher than that of primary school students. This indicates that the ability of emotional transformation under emotional induction gradually improves with the increase of school stage, especially with a significant improvement from primary school to high school.

Table 8. ANOVA.

		Sum of Squares	Mean Square	F
Segments	**inter group**	1.537	0.768	9.386
	within-group	7.123	0.082	
	figure	8.660		

Table 9. Multiple comparisons

Segments	Average Difference	Standard Error	Significance
primary school-junior high school	−0.167	0.074	0.068
junior high school-senior high school	−0.155	0.074	0.101
primary school-senior high school	−0.320 *	0.074	0.000

6.2.2. Machine Assessment

The accuracy rate of machine assessment of school stages are shown in **Table 10**.

Table 10. Accuracy rate of machine assessment of school stages.

Segments	Average Accuracy
primary school	0.366
junior high school	0.540
senior high school	0.660

6.3. A Comparative Analysis of Similar Studies at Home and Abroad

This study explores the accuracy of students' emotional expression at different educational stages and its comprehensive relationship with educational stages and types of emotions. By comparing with similar studies at home and abroad, it is found that the results of this study have many similarities with the conclusions in the relevant literature, but there are also certain differences. The following is an analysis of these similarities and differences and an exploration of the possible reasons.

6.3.1. Similarities and Differences in the Accuracy of Emotional Expression and Analysis of the Reasons

This study finds that the type of emotion has a significant impact on the accuracy of emotional expression. Especially, the expression accuracy of anger emotion is relatively low, and the score is significantly lower than that of other emotions. For comparisons at the educational stage level, although the accuracy of emotional expression among students at different stages does not vary significantly, the accuracy of emotional expression among high school students is slightly higher than that of junior high school and primary school students, especially in the expression of angry emotions. Domestic studies generally find that students are relatively weak in expressing anger. Chen Le [23] and Tan Haining et al. [24] pointed out that in terms of the accuracy of emotional expression, anger, as a rather complex emotion, has a relatively low expression ability among students. This is consistent with the research conclusion of this thesis. Regarding the comparison of the accuracy of expressing anger emotions, there are certain differences in the research results at home and abroad. In foreign research, especially in Western countries, the cultural atmosphere for emotional expression is relatively open, and the manifestation of anger is less suppressed.

The main reasons for the differences in research results at home and abroad lie in the differences in cultural background, educational intervention and social norms. In China, anger is often regarded as a negative emotion that needs to be suppressed, especially in the family and school environment. Students are encouraged to control their anger, so they may be more reserved in emotional expression, which leads to a lower accuracy in the expression of anger. In foreign countries, especially in Western nations, the emotion of anger is more easily accepted and expressed. Emotional education courses such as Social and Emotional Learning (SEL) focus on cultivating students' ability to appropriately express emotions like anger from an early age. The educational environment encourages students to freely express their emotions in appropriate situations, which makes the expression of anger more direct and accurate. Therefore, the differences in cultural expectations and educational systems are the main reasons for the differences in the accuracy of expressing anger emotions.

6.3.2. Similarities and Differences in Emotional Transformation Induced by Emotion and Analysis

As the educational stage progresses, students' ability to transform emotions significantly improves. Especially high school students show a stronger ability to transform emotions compared to the primary school stage. Foreign studies such as Teodorescu et al. [25] have also verified this point, suggesting that as age and cognitive ability increase, students' emotional regulation and transformation abilities significantly enhance.

The reasons for this similarity and difference are mainly related to students' cognitive development, emotional regulation ability and cultural background. According to Piaget's theory of cognitive development, as students progress through different educational stages, their cognitive abilities gradually mature, enabling them to understand and express emotions more complexly. Especially in terms of emotional regulation, older students can better adjust and transform their emotions. Gross's emotional regulation model also indicates that students' emotional regulation ability significantly increases with age, especially when facing emotional conflicts, they can better regulate their emotional responses. In addition, cultural background and educational intervention also play an important role. In China, as the educational stage progresses, emotional education gradually increases, especially in the high school stage, where the training of emotional regulation and transformation is given greater attention. In contrast, the emotional expression of lower grade students is more direct, which is closely related to the tolerance and guidance methods of social culture towards children's emotional expression.

7. Conclusion

Firstly, regarding the differences in the accuracy of expressing basic emotions among students at different educational stages, the research found that the type of emotion has a significant impact on the accuracy rate of expression. Among the four basic emotions, sadness has the highest accuracy rate of expression, while happiness and neutrality have relatively high accuracy rates, and anger has the lowest accuracy rate, with its score significantly lower than that of other emotions. In terms of comparisons at the educational stage level, although the differences in the accuracy of emotional expression among students at different stages are not significant, the accuracy of emotional expression among high school students is slightly higher than that of junior high school and primary school students, especially in the expression of anger, where the differences are most obvious. Additionally, the results of machine assessment and manual assessment are relatively consistent, further verifying these findings.

Regarding the impact of inconsistency between internal and external emotions on emotional expression, this study found that high-grade students can better adjust and express emotions that meet external requirements when facing the inconsistency between internal and external emotions. Particularly in the high school stage, students' emotional conversion ability has significantly improved, while low-grade students perform relatively poorly in this aspect. This finding indicates the differences in emotional regulation ability among different educational stages and the improvement of the ability to adapt emotional expression to emotional experience as the educational stage increases.

Overall, this study reveals the multi-dimensional influence of educational stage and emotion type on students' emotional expression. The advancement of educational stage not only affects the accuracy of emotional expression but also plays an important role in emotional regulation and conversion ability.

This study mainly focused on the accuracy of students' emotional expression and the impact of inconsistency between internal and external emotions on emotional expression, but did not involve external factors influencing students' emotional expression, such as social and cultural background, educational methods, and individual personality traits. These factors may play a significant role in the process of emotional expression. Future research can combine methods from multiple disciplines such as psychology and education to further explore the underlying mechanisms influencing students' emotional expression.

Author Contributions

Q.Y. implemented the whole experiments, data analysis and wrote the paper. Y.C. was responsible for revising the paper, organizing its format, and submitting it. W.W. pro-

vided direct guidance on the topic selection, whole research process of the paper. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

First, voice data from students of different school years (elementary, middle and high school) were collected through a WeChat applet, and the voice content was the students' emotional expression in a set context. Second, adult volunteers with normal emotion recognition ability were invited to categorize the emotional tendencies (happy, sad, angry, neutral) of the students' speech data through questionnaires and rate the intensity and accuracy of the emotions. In order to verify the reliability of adult volunteers' judgments, the study introduces a deep learning-based speech emotion classifier, which is pre-trained using the CASIA Chinese emotion dataset before classifying the students' speech data to assist in verifying the adults' judgment results. Finally, combining the subjective assessment of adults and the classification results of the machine, the accuracy of emotion expression of students from different school years was compared through statistical analysis to explore the differences and commonalities in the emotion expression of students from different school years.

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Conflicts of Interest

There is no conflict of interest.

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ARTICLE

The Influence of the Framework and Emotion Related to Animal Protection among Teenagers in China

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ABSTRACT

This study is based on Regulatory Fit Theory, Cognitive Dissonance Theory, and the Elaboration Likelihood Model (ELM) to explore factors affecting teenagers' awareness and behavior regarding wild animal protection. Experiment 1 aimed to examine whether emotional and rational advertising appeal frames differentially influence wild animal protection among teenagers. Participants were 66 junior middle school students from Beijing, China. The Questionnaire Regarding Wild Animal Protection Awareness and the Questionnaire Regarding Wild Animal Protection Behavior were used. Results showed that rational and emotional advertising appeals did not significantly influence teenagers' wild animal protection awareness or behavior. Experiment 2 explored the effect of attribute framing and emotion on wild animal protection awareness and behavior among 43 junior middle school students using the same questionnaires. The results were as follows: (1) Framing and emotion interactively influenced wild animal protection awareness and behavior; (2) Under the negative frame, negative emotions had a stronger effect than positive emotions; and (3) Under positive emotions, the positive frame had a stronger effect than the negative frame. These findings suggest that framing and emotion can influence teenagers' wild animal protection awareness and behavior.

Keywords: Framework; Emotion; Wild Animal Protection; Teenager

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1. Introduction

Since early 2020, many cases of pneumonia of unknown cause have been reported throughout the world, referred to as "novel coronavirus pneumonia (NCIP)"[1]. One study has shown that the new virus found in patients belongs to the coronavirus family, which includes coronaviruses found in humans, bats and other wildlife[2]. The virus may infect people when they hurt wildlife, and the harm inflicted by humans on wild animals will eventually be returned to humans. We should promote the prohibition of hunting and use of wild animals. The Elaboration Likelihood Model (ELM) proposed by Petty and Cacioppo points out that the way of persuasion will affect the behaviour of an individual[3]. The Elaboration Likelihood Model contains two routes, central route and peripheral route. The central route is an individual's careful examination of evidence and other relevant clues through a detailed cognitive process, and in this route, the individual thinks carefully about the information. The peripheral route means that information changes in a convenient and fast way; in this route, individuals will be persuaded by simple fringe information (e.g., the source of the information)[4]. Some studies have shown that the framework of the message can affect the route when people think[5]. The framework affects people, having two different reactions to two different ways of expressing[6].

1.1. The Framework

The framework originates from the problem of an Asian disease studied by Kahneman and Tversky[6]. In their study, participants were required to select between a confirmed consequence that led to the certain survival of one third of 600 hypothetical patients (200 people) and a risky probabilistic consequence, a one-third probability that all 600 people would survive and a two-thirds probability that no one would survive. The study found that frameworks can influence people's decisions, and different types of frameworks have different effects on decision-making. Regulatory Focus theory helps to better understand frameworks; different decision-making results are caused by the difference between different expected goals[7]. The framework was divided into three categories: risky framework, attribute framework and goal framework, and this study applies the attribute framework. The attribute framework will influence individuals' encoding and assessment of the object or its characteristics[8].

1.2. The Attribute Framework

The attribute framing refers to the tendency of message recipients to evaluate objects framed positively more favorably than they do objects framed negatively, although one description is implied as the complement of the other, and they are logically equivalent[9]. In general, messages framed positively are more persuasive than those framed negatively, probably because they generate more positive associations[10]. For example, people tend to choose foods described as containing 80% lean hamburger instead of those containing 20% fat hamburger[11]. Attribute frameworks affect humans in many ways. For example, those exposed to a positive framework rated the human papillomavirus (HPV) vaccine as more effective than those exposed to a negative framework and the control group[12]. In addition, people with low thinking conversion ability are more susceptible to attribute framework than those with high thinking conversion ability[13,14]. A study has shown that the attribute framework plays an important role in information transmission in the field of news broadcasting[15].

1.3. Advertising Appeal Framework

The attribute framework is adopted in media communication in the form of the advertisement appeal. As early as 1986, Berkman and Gilson studied the application of the advertising appeal framework[16]. They defined advertising appeal as an attempt at creativity that inspires consumers' motives for purchase and affects consumers' attitudes toward a specific product or service. Subsequently, Schiffman and Kanuk (2007) continued to study the framework effect. From their viewpoint, advertising appeal was suppliers' application of psychological motivating power to arouse consumers' desire and action for buying while sending broadcasting signals to change receivers' concepts of the product[17]. Kotler divided advertising appeal into rational and emotional appeal[18]. In order to meet the varying demands of their target consumers, advertisers commonly use rational appeal and emotional appeal in their advertising in an attempt to influence consumer behavior[19], and print advertisements are dominated by emotional appeal[20]. Rational appeal focuses on the rational thinking process of consumers, in which the

functional demands of products or brands and their measurable interests play a crucial role. Therefore, rational appeal is defined as the degree of paying attention to a rational purchase[21]. Emotional appeal is aimed at consumers' psychological, social or symbolic needs, so as to stimulate their emotions, give play to their emotional mechanism, and finally encourage consumers to buy products[22].

1.4. Emotion

It is found that decision-making behavior is influenced not only by the information framework, but also by emotion. When people are emotionally aroused, they are more likely to believe that animals need to be protected[23]. Immediate emotions (such as anger, fear, anxiety, etc.) arising from current events have a direct impact on decision-making[24,25]. The interaction between emotion and framework also influences decision-making. Under the negative framework, negative emotions happen more strongly than positive emotions in the donation behavior[26]. According to the Regulatory Fit Theory proposed by Higgins[27], when the strategy selected by individuals in pursuit of goals is consistent with the current regulation, individuals tend to choose the strategy pattern with high matching rate with the current regulation. After that, some scholars used this concept to explain emotion and information frameworks, and found that when the emotion of an individual is promoted with the situation in which the individual is located, the role of adjustment and matching can be felt. The higher the adjustment and matching, the better the individual feels regarding the matched situation and the worse they feel regarding the mismatched situation[28]. Cognitive Dissonance Theory can also explain the influence of information matching on individual decision-making; it links actions and attitudes. According to the Cognitive Dissonance Theory, people tend to maintain internal consistency and stability. It holds that dissonance is experienced whenever one cognition that a person holds follows from the opposite of at least one other cognition that the person holds[29], that is, people tend to maintain the coordination between their own attitudes and behaviors. Cognitive dissonance adversely affects the structure of an individual's inner world. Therefore, people will use various methods to reduce the disharmony between cognition, attitude and behavior. And then, strive to achieve a balanced, stable, unified and harmonious state[30]. Emotions can also affect people's willingness to protect wildlife. Human fear of wildlife leads to hostility toward wildlife[31], so it reduces their willingness to protect wildlife. For example, snakes were killed massively in many countries because of people's fear[32]. Pet owners' affectionate attitude also keeps a positive attitude toward wildlife protection[33].

1.5. Wild Animal Protection

Wild animals, also known as wildlife, are non-domestic animals that grow and breed in the wild[34]. China includes more than 2,100 species of terrestrial vertebrates, accounting for more than 10% of the world's terrestrial vertebrates, and is one of the countries with the largest wildlife diversity in the world[35]. However, as the population increases and the range of human activities expands, their habitat is threatened, and many have become extinct or are threatened with extinction[36]. Previous studies have found that emotions affect awareness of wildlife; therefore, public attitudes and priorities toward wildlife management are key to successful conservation[37]. Most people now think that the biblical rule of animals means that everyone has a responsibility to protect animals[38]. It shows that people's awareness of wild animal protection has improved. Previous research on wild animal protection awareness is extensive, for example, in studies of wild animal protection awareness in primary school students, university students and city dwellers[39–42]. The results show that the factors affecting the awareness of wild animal protection include religious belief, education level and media coverage of animals. The change in awareness affects the change in behavior. People have begun to change their wild animal protection behavior, for example, the government has established law enforcement monitoring in wildlife habitats and improved the law on wildlife protection[43,44], researchers have reduced the number of animals used in experiments[45], middle school students watch animal programs to improve the awareness of animal protection, etc.

Wild animal protection awareness and behavior have been affected in a propagandist way[46]. The content of propagandist information and the emotion aroused by propagandist information play a role in the effect of publicity. The purpose of this study was to explore the relationship between framework and emotion regarding wild animal protection awareness and behavior, so as to improve teenagers' wild animal protection awareness and behavior.

2. Experiment 1

The first experiment studied the influence of a rational and emotional advertising appeal framework on the awareness and behavior of teenagers regarding wild animal protection, under the following hypothesis:

Hypothesis 0. *There was no significant difference in the scores of wild animal protection consciousness and behavior between the emotional appeal group and the rational appeal group.*

Hypothesis 1. *The scores of the emotional appeal group for wild animal protection awareness and behavior will be significantly higher than those of the rational appeal group.*

2.1. 1A Formal Experiment

2.1.1. Participants

The participants were 87 junior middle school students from Beijing in China, and 66 were valid participants: 35 male and 31 female, aged 12 to 14; 36 were randomly assigned to the emotional advertising appeal framework group and 30 were assigned to the rational advertisement appeal framework group.

2.1.2. Measures

Questionnaire regarding wild animal protection awareness. The questionnaire was referenced to the "2007 Chinese Version of Environmental Concern Scale", adapted version, after changing, respectively, items 5, 6, 7, 8, 9, and 10 in the topic "natural" to "wild animals". Five subscales formed the questionnaire using a Likert scale, with a reliability of 0.727. The revised questionnaire is highly correlated with the original questionnaire, with a Cronbach alpha coefficient of 0.938, see **Appendix A**.

Questionnaire regarding wild animal protection behavior. The three questions in a self-written questionnaire on wild animal protection behavior were: "To what extent do you support this activity?" "What is your intention to participate in the activity?" "What is your intention to participate in such activities in the future?". The rating method was a seven-point scale with a Cronbach alpha coefficient of 0.762.

2.1.3. Design

In this experiment, two levels of a single factor were adopted as an experimental design. The independent variable was the advertising appeal framework, respectively, the emotional advertising appeal framework group and the rational advertising appeal framework group. The dependent variables were teenagers' wild animal protection awareness and behavior.

2.1.4. Materials

Materials were adapted from real news about beluga whales. The rational version presented factual information; the emotional version used a first-person narrative. Both versions described negative living conditions of captive belugas.

Rational Appeal Example: The beluga is a relatively small toothed whale…The complete versions are available in the **Appendix B**.

Emotional Appeal Example: My name is Lisa, and I'm a beluga whale…The complete versions are available in the **Appendix B**.

Another 63 junior middle school students, 27 males and 36 females aged between 13 and 15 years, were selected to conduct an experiment between participants at two levels of a single factor, to judge the emotional valence caused by two versions of advertisement appeal materials. The single sample *t*-test was used for the data, and the score was compared with the theoretical mean. The results showed that the materials of emotional version raised significant negative emotions ($t(30) = -2.93$, $p = 0.006$, $M = 3.35$, $SD = 1.23$), but the material of rational version was not obvious ($t(31) = -0.21$, $p = 0.83$, $M = 3.94$, $SD = 1.67$).

2.1.5. Procedure

After reading the material, the subjects performed the operational inspection immediately (**Figure 1**). Subjects need to finish three choice questions related to the material information. In doing so, check the involvement of subjects. Only the subjects who finished all three questions correctly will have their data used.

2.1.6. Results

Using the advertising appeal framework as the independent variable, wild animal protection awareness and behavior as the dependent variable in the independent samples *t*-test, the results showed that the different advertising appeal framework has no significant influence on wild animal protection awareness and behavior among teenagers; see **Table 1**.

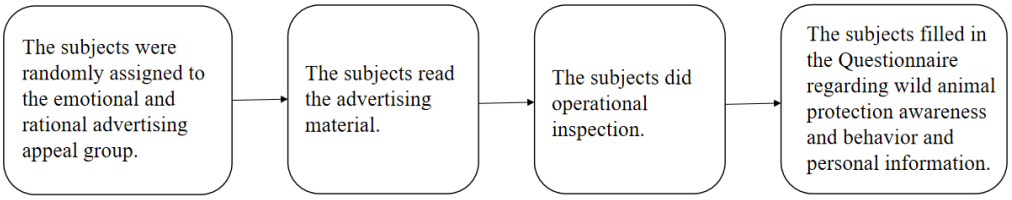

Figure 1. Flow Diagram for Experiment 1.

Table 1. Independent Sample *t*-Test of Advertising Appeal Framework on Wild Animal Protection Awareness and Behavior.

	Emotional ***M* ± *SD***	**Rational** ***M* ± *SD***	***t***	***df***	***p***	***Cohen's d***
Awareness	41.44 ± 4.43	40.97 ± 4.98	0.408	64	0.685	–
Behavior	19.94 ± 2.18	19.37 ± 3.00	0.879	64	0.383	–

2.1.7. Discussion

The results show that there is no significant influence in wild animal protection awareness and behavior between the two advertising appeal frameworks, which differ from the experimental expectations and previous studies of the advertising appeal framework[43–49]. The reasons may be that, firstly, owing to COVID-19 (coronavirus disease 2019), teenagers have a high awareness of wildlife protection and relevant behaviors. The scores of awareness (41.44 and 40.97) and behavior (19.94 and 19.37) were very high, which are nearly the full score (the awareness is 50, the behavior is 21), already reaching ceiling effect. Secondly, the way of words to show may be less attractive to the subject, so the feeling of the materials is not deep. Thirdly, although the emotional valence between the two versions of materials has no significant difference. The emotional intensity of the material may also affect the awareness and behavior on wild animal protection. Therefore, the author conducted additional experiment to determine whether there was a significant difference in emotional intensity between the two materials.

2.2. 1B Additional Experiment

Since there was no significant difference in the influence of rational and emotional advertising appeal framework on the awareness and behavior of wild animal protection among teenagers, the author judged that the emotional intensity evoked by experimental materials might have an impact on the subjects, so the additional experiment was conducted to detect the difference in the emotional intensity of the subjects evoked by the two materials.

2.2.1. Participants

The participants comprised 63 junior middle school students (17 males and 46 females) between 13 and 15 years of age.

2.2.2. Measures

The subjects judged the emotional intensity of the material. The question "The emotional degree of material" was shown to the subjects, with 1 being strongly disagree and 7 being strongly agree.

2.2.3. Design

In this experiment, two levels of a single factor were adopted as an experimental design. The advertising appeal is the independent variable and emotional intensity is the dependent variable.

2.2.4. Results

The independent sample *t*-test was used in this study. The results showed that there was no significant difference in the emotional intensity induced between two materials (M_{rational} = 3.99, SD_{rational} = 1.66; $M_{\text{emotional}}$ = 3.35, $SD_{\text{emotional}}$ = 1.23, t = 1.58, p = 0.02).

2.2.5. Discussion

Combined with the additional experimental results, the analysis shows that the framework of the rational and emotional appeals had no significant impact on the awareness and behavior regarding wild animal protection among teenagers. The reason may be that there is no significant difference in emotional value and intensity between the rational and emotional advertising appeal frames, while the rational

advertising appeal frame also led to negative emotions. If the author is manipulating emotional valence, perhaps the awareness and behavior on animal protection would be different. Therefore, study 2 was designed to explore further the influence of different emotional valence on the awareness and behavior related to wild animal protection among teenagers.

3. Experiment 2

The second study explored the interaction between the information presented by the attribute frame and the emotional valence triggered by the picture. In order to explore the effect of the matching degree of the information seen and the emotional valence perceived by the subjects on their wild animal protection awareness and behavior, under the following hypotheses.

Hypothesis 0. *There was no significant difference in the influence of different emotional valence and attribute framework on teenagers' wild animal protection awareness and behavior. Whether positive or negative emotions, the two frameworks have no influence on teenagers' wild animal protection awareness and behavior.*

Hypothesis 1. *Both emotional valence and attribute framework can stimulate teenagers' wild animal protection awareness and behavior. Under the negative framework, negative emotions happen more strongly than positive emotions; and (3) Under positive emotions, positive framework happens more strongly than negative framework.*

3.1. 2A Preliminary Experiments: Experimental Material Determination

3.1.1. The Picture Material

1) Participants

The participants were 43 valid junior middle school students, 16 males and 27 females, aged 13 to 15.

2) Measures

The students rated each picture on a seven-point scale: 1 = triggers positive or negative mood of lowest intensity, 7 = triggers highest positive or negative emotional intensity.

Materials

Twenty positive and twenty negative pictures were selected on various websites, then adjusted to shape the appearance of the same size using a picture editor and inserted into the questionnaire.

3) Procedure

Every subject judges the degree and valence of emotion in all pictures. And then the author ordered all the pictures based on the score.

4) Results

The nine pictures with the highest levels of positive emotions were chosen for the positive material ($ps < 0.001$). The nine pictures with the highest levels of negative emotions were chosen for the negative material ($ps < 0.001$). See **Figure 2**, **Figure 3** and **Appendix C Figures A1** and **A2**.

Figure 2. An Example of Positive Pictures.

Figure 3. An Example of Negative Pictures.

3.1.2. The Text Material

1) Participants

The other participants were 64 junior middle school students, 26 males and 38 females, aged 14 to 16.

2) Measures

The subjects judged the attribute framework of the material. The question "The emotional valence and intensity of material" was shown to the subjects, with 1 being strongly disagree and 7 being strongly agree.

3) Materials

The material adapted the real wildlife situation of a wild animal protection website into versions with positively and negatively framed information. Positive framing materials described the survival rate of wildlife, and negative framing materials described the extinction rate of wildlife. The materials for the positive framework and the negative framework are given in **Appendix D**.

4) Results

The single sample *t*-test was used for the data, and the test value was 4 (theoretical mean). The results showed that the positive framework material induced significant positive emotions ($t(32) = 2.68$, $p = 0.011$, $M = 4.61$, $SD = 1.30$), and the negative framework material induced significant negative emotions ($t(30) = –3.86$, $p = 0.001$, $M = 3.13$, $SD = 1.26$). There were significant differences in emotional valence between the two framework materials ($t(62) = 4.62$, $p < 0.001$).

3.2. 2B Formal Experiments

3.2.1. Participants

The 157 valid students were selected from a senior high school in Beijing, China, 82 males and 75 females, aged 14 to 16. They were randomly divided into four groups.

3.2.2. Measures

The wild animal protection awareness and behavior questionnaire used in this study is the same as that in Experiment 1.

3.2.3. Design

2 (emotional valence: positive vs. negative) × 2 (framework: positive vs. negative) experimental design was adopted. The independent variables were emotional valence and framework, and the emotional valence was positive and negative, respectively. The dependent variables were wild animal protection awareness and behavior.

3.2.4. Materials

All pictures and information framework used in this experiment were selected from Experiment 2A.

3.2.5. Procedure

After viewing pictures and reading material, the subjects performed the operational inspection immediately (**Figure 4**). Subjects need to finish three choice questions related to the material information. In doing so, check the involvement of subjects. Only the subjects who finished all three questions correctly will have their data used.

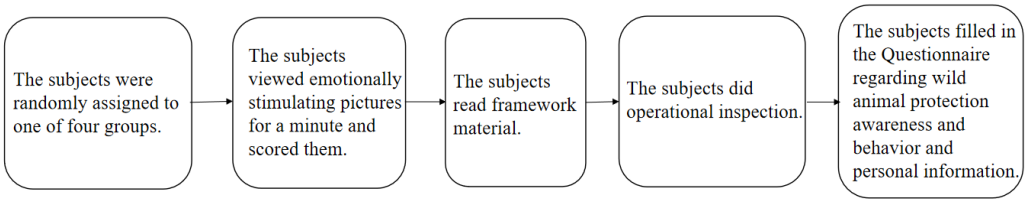

Figure 4. Flow Diagram for Experiment 2.

3.2.6. Results

The effects of emotional valence and framework on animal protection awareness and behavior have been shown in **Table 2**. There were main effects and interaction effects of emotional valence and framework on awareness and behavior of wild animal protection among teenagers. For teenagers' wild animal protection awareness and behavior, under the negative framework, negative emotions happen more strongly than positive emotions ($p_{\text{awareness}} < 0.001$; $p_{\text{behavior}} < 0.005$). Under positive emotions, positive framework happens more strongly than negative framework ($p < 0.001$). See **Figures 5** and **6**.

3.2.7. Discussion

The influence of negative emotion under negative framework. The results showed that, under the negative framework, negative emotions happen more strongly than positive emotions of awareness and behavior on wild animal protection. On the one hand, the positive or negative frameworks operate as positive or negative primes and activate either positive or negative associations, leading to biased evaluations [50,51]. When the participants were in a negative framework, the pessimistic estimation of the living environment of the protected animals led to an increase in protection awareness and behaviors. It is found that individuals faced a negative emotional

message framework are more likely to be persuaded by a bad state, which indicates that the good matching of individual emotional valence and the emotional framework of the message has a strong persuasion effect[52]. On the other hand, according to the ELM, some scholars believe that, under negative emotions, decision-makers will fine-process existing cognitive resources in order to get rid of the current negative emotions, so they are more susceptible to the influence of an information framework[53,54]. Therefore, under the influence of negative framework information, individuals are more likely to break away from the negative emotion and then raise awareness and behavior of wild animal protection.

Table 2. The Influence of Framework and Emotional Valence on Teenagers' Wild Animal Protection Awareness and Behavior.

	Positive Framework (N = 91)		**Negative Framework (N = 66)**		**Emotion**		**Frame**		**Emotion × Frame**	
	Positive Emotion (N = 44)	**Negative Emotion (N = 47)**	**Positive Emotion (N = 31)**	**Negative Emotion (N = 35)**						
	M* ± *SD	***M* ± *SD***	***M* ± *SD***	***M* ± *SD***	***F***	η^2	***F***	η^2	***F***	η^2
Awareness	40.56 ± 3.76	40.85 ± 4.94	20.45 ± 8.05	42.76 ± 1.90	217.50*	0.58	141.12*	0.47	206.49*	0.56
Behavior	17.42 ± 2.31	18.15 ± 3.68	9.23 ± 2.97	17.33 ± 1.49	105.62*	0.40	109.73*	0.41	73.47*	0.31

Note: * $p < 0.05$.

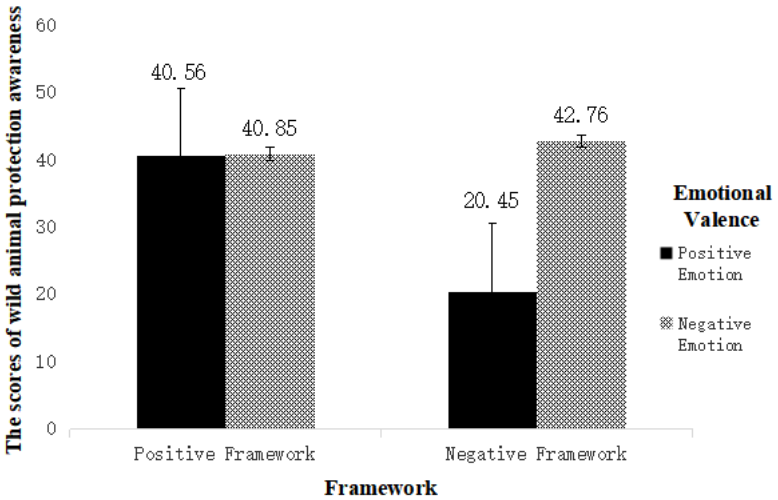

Figure 5. Analysis of the Interaction Between Framework and Emotional Valence on Influencing Wild Animal Protection Awareness.

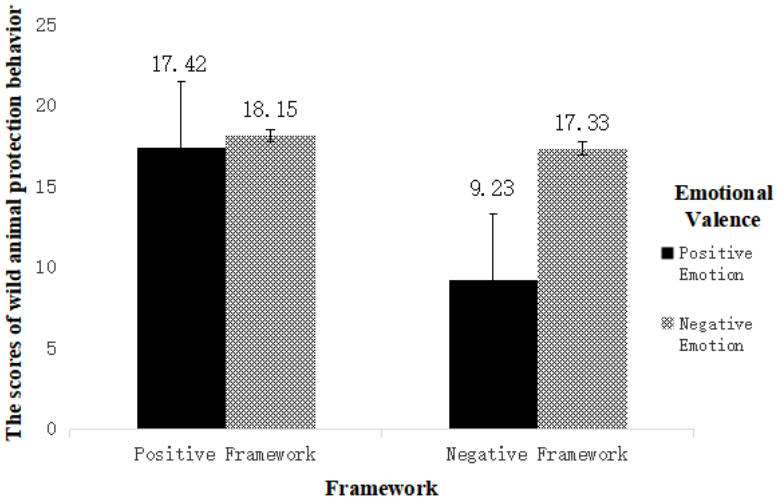

Figure 6. Analysis of the Interaction Between Framework and Emotional Valence on Influencing Wild Animal Protection Behavior.

On the contrary, under the positive framework, emotions did not affect the teenagers' wild animal protection awareness and behaviors. The reasons may be, firstly, that one study has shown that a positive framework produces more persuasion for happy and angry participants [55]. In this experiment, positive pictures triggered strong emotions of happiness and negative pictures triggered strong emotions of anger, both of which had a strong persuasive effect on individuals under a positive framework. Secondly, the view of ELM shows that, when faced with positive information, decision-makers engage in less autonomous and sophisticated analysis [56,57]. Therefore, in a positive framework, the participants did not think carefully about what they were facing and rarely made changes, so they were affected by the framework impossibly. Thirdly, participants under the influence of the positive framework experienced more optimistic emotions, which led to their optimistic estimation of the current living environment of wild animals, so they did not change their behavior greatly. Finally, studies of the framework indicate that individuals are risk-averse for a decision framework with gains but risk-seeking for a decision framework with losses [58]. When the information presented to individuals is positive, which is equivalent to a gain framework, they are more willing to practice risk aversion; that is, they have little desire to take part in wild animal protection activities. When the information presented to the participants is negative, which is equivalent to a loss framework, they are more willing to take risks; that is, they are willing to take part in activities to protect animals.

The influence of positive framework under positive emotion. The results of this study also show that, under positive emotions, positive framework happens more strongly than negative framework of awareness and behavior on wild animal protection. For one thing, under positive emotions, people feel comfortable because they do not need to activate more cognitive resources. A previous study has shown that individuals are more optimistic when they are in a good mood and more pessimistic when they are in a bad mood [59]. For another, according to Regulatory Fit Theory, individuals are more likely to be persuaded to take action when their emotions match the frame information. At the same time, when individuals are in positive emotions, they are not prone to cognitive dissonance in the face of a positive information frame. Therefore, individuals in a positive framework tend to show more wild animal protection.

In contrast, under negative emotions, frameworks did not affect the teenagers' wild animal protection awareness and behaviors. This differs from previous results in which there was a significant interactive effect between negative emotion and framework [60]. In the first place, one study found that when an individual is in a negative emotional state, the negative information framework will stimulate more donating behavior and a better psychological experience [61,62]. In the second place, according to ELM, individuals with high involvement are not easily persuaded by any framework [63]. Individuals who are in the midst of an epidemic receive a lot of information related to wild animal protection and are more involved in the issue. Thus, subjects who were induced to experience negative emotions were not affected by the framework information.

Avoiding Cognitive Dissonance. The results showed that the combination of a negative framework and positive emotion made the teenagers have the least awareness and behavior related to wild animal protection. The reason may be that the participants developed cognitive dissonance [19]. After reading about the extinction of wild animals, the participants were unable to associate it with scenes of wild animals living happily, leading to cognitive dissonance. Moreover, owing to information mismatch, individuals will consume more cognitive resources and are more susceptible to the influence of the information framework [13,14]: negative framing reduced the persuasive power of the participants. Therefore, they cared less about wild animal protection and were not willing to participate in wild animal protection activities.

4. General Discussion

4.1. Suggestions

The results showed that both "the negative emotion under the negative framework" and "the positive framework under the positive emotion" could significantly influence the wild animal protection awareness and behavior among teenagers. Therefore, designing publicity for wildlife protection, the propaganda department, environmental groups and social scientists should pay attention to the degree of matching of teenagers' emotions with the situation, so as to carry out the publicity work according to the situation. For

example, in the context of the current epidemic situation, people's attitude towards the living environment of wild animals is in a negative state. When promoting wild animal protection, negative information such as the number of endangered species of wild animals and their poor living environment can be added to promote the protection of wildlife.

4.2. Limitations and Future Directions

The limitations of this study are as follows. Firstly, different emotions have different effects on the framework and awareness of wild animal protection. Studies have shown that the emotions of disgust and fear significantly and negatively influence human willingness to protect animals[58]. The ranking of emotional experience has some value in enhancing persuasion; for example, hope is a key mediator between gain-framed messages and desired climate change policy attitudes and advocacy[59]. Research shows that fear increases risk-averse choices, while anger reduces risk-averse choices[60]. Therefore, subsequent experiments should explore which specific emotions have a more significant impact on the information framework for wild animal protection. Secondly, compared with neutral emotion initiation, a positive emotion will produce related potential changes[61], and when people make decisions, they will use different brain networks[62]. Therefore, future studies can explore what kind of specific emotion can make subjects produce more protective behaviors. Thirdly, in this study, text and pictures were used to induce emotions in the subjects. In subsequent experiments, audio, video and other more attractive methods could be adopted to induce emotions, which might have more obvious effects. Finally, the research materials in this paper are mainly related to wild animals, and the protection of domestic animals should also receive our attention. Research has shown that people who commit intimate partner violence are more likely to abuse their companion animals[62]. There are also popular poems about animals that have been widely cited by lawmakers advocating animal welfare laws, such as Martin's 1822 Act, which protects livestock[63]. Therefore, in the following research on wild animal protection, the similarities and differences between domestic and wildlife protection measures can be further discussed.

5. Conclusions

The unity of framework and emotion has the most significant influence on the consciousness and behavior of wild animal protection. It is mainly reflected in the following aspects that under positive emotion, the positive frame has a significantly higher influence on wild animal protection awareness and behavior than the negative frame; In the negative frame, the negative emotion has a significantly higher impact on the awareness and behavior of wild animal protection than the positive emotion. This shows that when publicizing wild animal protection, we can pay attention to the unity of content and emotion to achieve better publicity effects.

Author Contributions

Conceptualization, W.Z., J.Y. and P.Z.; methodology, W.Z.; formal analysis, W.Z.; investigation, W.Z.; data curation, W.Z.; writing—original draft preparation, W.Z.; writing—review and editing, W.Z., J.Y. and P.Z. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

All data in this article is available.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Appendix A. Animal Protection Awareness Questionnaire (Partial Questions)

Each question in this questionnaire has five alternative answers (strongly disagree, disagree, unsure, agree, strongly agree). Please circle your choice.

1) We are approaching the limit of the number of people the earth can support
2) Plants and animals have as much right as humans to exist.
3) Despite our special abilities humans are still subject to the laws of nature.

Appendix B

- Emotional Advertising Appeal Framework

1. Please read the following carefully and answer the questions.

My name is Lisa, and I'm a beluga whale, a relatively small toothed whale, and I have about 40,000 to 80,000 friends. When I was born, my skin was brown and gray, but as an adult, it turned bright white. When I grow up, I will grow to about five and a half meters, and we beluga whales are the only whales that can move their necks and their heads up and down and left and right. We live in the Arctic Ocean and adjacent waters, foraging in shallow coastal waters in the summer and near the ice edge in the winter.

We are known for our loud, clear yell and because we like to "sing" we are also known as "Canary in the Sea". We often "sing" and can be heard on the sea, from boats, or on the shore. In a small village near the North Pole of Russia, a team of certified specialists takes up their job every year, spending six months or so domesticating us in the wild for amusement in the aquarium.

The 12-year-old beluga whale in the picture is my friend Petrovich, who moved to the aquarium last fall for the rest of his life and soon became accustomed to being hand-fed. But of the hundreds of friends who move to the aquarium each year, not all beluga whales adapt to their new life, with about half fending off hunger or feeling stressed until they die. Friends who live in the aquarium usually have to train for performances. The bad water, the touch of visitors, and the chemicals in the aquarium can all cause our skin to become infected. Constant training and an unnatural environment can cause us to secrete too much stomach acid due to stress, resulting in a perforated stomach, making captive beluga whales live far less than a third as long as their friends in the wild.

Currently, to protect belugas, humans have created new marine reserves, reduced pelagic fishing, rescued endangered whales (such as those stranded), and protected their food and environment, leaving them a peaceful and harmonious place to live and breed. A marine conservation group is calling for a "no beluga show, no petting, no kissing, no beluga back to nature" campaign, which requires supporters to sign their names on a public account. 1. To what extent do you support the activity? 2. What is your intention to participate in the activity? 3. What is your intention to participate in such activities in the future?

1 = very unwillingly; 2 = unwillingly; 3 = Somewhat unwillingly; 4 = neither unwillingly nor willingly; 5 = somewhat willingly; 6 = willingly; 7 = very willingly

- Rational Advertising Appeal Framework

1. Please read the following carefully and answer the questions.

The beluga is a relatively small toothed whale with a brown–gray skin at birth and a bright white skin at adulthood. There are between 40,000 and 80,000 beluga whales in the world. The adult beluga whale is about 5.5 meters long. It is the only whale that can move its neck and head up and down. Belugas are confined to the Arctic Ocean and adjacent

waters, foraging in shallow coastal waters in the summer and near the edge of the ice in the winter.

Beluga whales are known for their loud, clear calls. Because they like to "sing", they are also known as the "canary in the sea". They often "sing" and can be heard even on the surface of the sea, from boats, or on shore. In a small village near the North Pole of Russia, a team of certified specialists takes up their jobs each year, usually spending about six months domesticating wild beluga whales for the amusement of humans in an aquarium.

A 12-year-old beluga whale named Petrovich was captured last fall. He soon became accustomed to captivity and artificial feeding, and will soon be sent to an aquarium in Moscow for the rest of his life. Not all of the hundreds of beluga whales captured each year in the wild are well adapted to life after capture, with about half dying from hunger strikes or stress. Belugas kept in captivity at the aquarium are often forced to train for performances. Poor water quality, visitors' stroking, and chemicals can all lead to skin infections. Owing to constant training and an unnatural environment, beluga whales can produce too much stomach acid due to stress, resulting in a perforated stomach, which means their life expectancy in the ocean is less than a third of that in the wild.

Currently, to protect belugas, humans have created new marine reserves, reduced pelagic fishing, rescued endangered whales (such as those stranded), and protected their food and environment, leaving them a peaceful and harmonious place to live and breed. A Marine conservation group is calling for a "no beluga show, no petting, no kissing, no beluga back to nature" campaign, which requires supporters to sign their names on a public account. 1. To what extent do you support the activity? 2. What is your intention to participate in the activity? 3. What is your intention to participate in such activities in the future?

1 = very unwillingly; 2 = unwillingly; 3 = somewhat unwillingly; 4 = neither unwillingly nor willingly; 5 = somewhat willingly; 6 = willingly; 7 = very willingly

Appendix C

Figure A1. *Cont.*

Figure A1. The Positive Pictures.

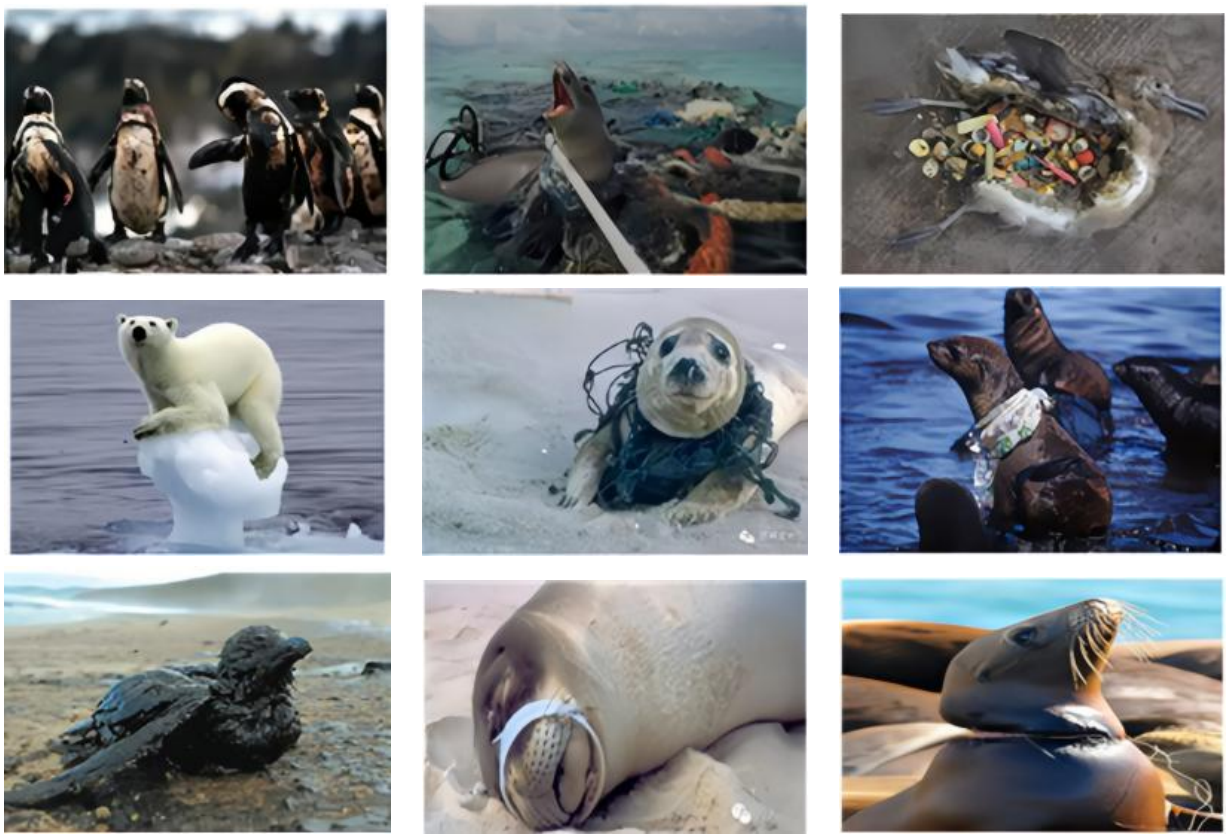

Figure A2. The Negative Pictures.

Appendix D

- Positive Framework

1. Please read the following carefully and answer the questions.

The earth where we live is very different from the environment in the past. Life has constantly transformed the earth's surface in the process of evolution. The diversity of the earth's environment is the result of continuous evolution after numerous disasters.

Some scientists believe that the reproduction of species has always been part of the process of life. Around the world, a large proportion of animal species are preserved, including 3/4 of mammals, 4/5 of reptiles, 3/4 of amphibians, 8/9 of birds and 2/3 of fish. The above information is only known to humankind today; we do not know how many unknown species are still alive.

At present, in order to protect wild animals, human beings have taken measures to strengthen the management of animal hunting and killing, prohibit excessive hunting and stealing, create a habitat for wild animals, solve the problem of food shortage, and rescue and breed wild animals. A wildlife protection group is calling for a campaign to "refuse

wildlife shows, refuse to keep wild animals in captivity, and let wild animals return to nature". People who support the campaign need to sign their names on a public account.

The following questions are required for students to answer, all of them are single choice, please circle your options, thank you for your cooperation!

1. There are ( ) kinds of mammal that are living.

A. 2/3 B. 2/4 C. 3/4 D. 3/5

2. There are ( ) species of reptiles that are living.

A. 1/2 B. 2/3 C. 3/4 D. 4/5

3. There are ( ) species of fish that are living.

A. 2/3 B. 1/4 C. 3/4 D. 3/5

4. To what extent do you support the campaign?

very unwillingly 1 2 3 4 5 6 7 very willingly

5. What is your intention to participate in the activity?

very unwillingly 1 2 3 4 5 6 7 very willingly

6. What is your intention to participate in such activities in the future?

very unwillingly 1 2 3 4 5 6 7 very willingly

- Negative Framework

1. Please read the following text carefully and answer the questions.

The earth where we live is very different from the environment in the past. Life has constantly transformed the earth's surface in the process of evolution. The diversity of the earth's environment is the result of continuous evolution after numerous disasters.

Some scientists believe that extinctions have always been part of the process. Animal species are disappearing at a rapid rate around the world, including 1/4 mammals, 1/5 reptiles, 1/4 amphibians, 1/9 birds and 1/5 fish species facing extinction. That's just what we know today, and we don't know how many unknown species are disappearing.

At present, in order to protect wild animals, human beings have taken measures to strengthen the management of animal hunting and killing, prohibit excessive hunting and stealing, create a habitat for wild animals, solve the problem of food shortage, and rescue and breed wild animals. A wildlife protection group is calling for a campaign to "refuse wildlife shows, refuse to keep wild animals in captivity, and let wild animals return to nature". People who support the campaign need to sign their names on a public account. The following questions are required for students to answer, all of them are single choice, please circle your options, thank you for your cooperation!

1. There are ( ) kinds of mammal that are endangered.

A.1/3 B.1/4 C.1/5 D.1/6

2. There are ( ) species of reptiles that are endangered.

A.1/3 B.1/4 C.1/5 D.1/6

3. There are ( ) species of fish that are endangered.

A.1/2 B1/3 C.2/3 D.1/4

4. To what extent do you support the campaign?

very unwillingly 1 2 3 4 5 6 7 very willingly

5. What is your intention to participate in the activity?

very unwillingly 1 2 3 4 5 6 7 very willingly

6.What is your intention to participate in such activities in the future?

very unwillingly 1 2 3 4 5 6 7 very willingly

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