

The Scale for the Loneliness of College Students in Taiwan

I-Chieh Chen¹

¹ Department of Education, National Chengchi University, Taipei, Taiwan

Correspondence: I-Chieh Chen, Department of Education (Education Psychology and Counseling), National Chengchi University, No. 64, Sec. 2, ZhiNan Rd, Wenshan District, Taipei City 11605, Taiwan. Tel: 886-291-061-4268. E-mail: denyeverythingx@yahoo.com.tw

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Abstract

Because loneliness is an issue of general psychological interest in Taiwanese higher education and because the suitability of loneliness scales may vary across cultures, the aim of this study is to develop a loneliness scale specifically for Taiwanese college students. Based on two groups of Taiwanese college students ($N=121$ and $N=165$), each used for initial and secondary preliminary testing, as well as another group of Taiwanese college students ($N=140$) used for examining the scale's reliability and validity, the "Scale for the Loneliness of College Students in Taiwan" was developed. The scale may be of pragmatic value with regard to its contributions in Taiwanese higher education toward evaluating the loneliness levels of college students prior to implementing strategies against such loneliness. The scale may also have added value as a suitable evaluation instrument for loneliness-related research that focuses on Taiwanese college students.

Keywords: the scale for the loneliness of college students, loneliness, college student, Taiwan

1. Introduction

Loneliness has always been a focus of considerable discussion. The feeling of loneliness primarily originates in an unsatisfied demand for a close relationship, which generates an unpleasant sentiment (Sullivan, 1953). The remarkable development of communications technology in modern society intensifies the desire to communicate, which has substantial physiological and psychological effects (Bradburn, 1969; Peplau & Perlman, 1982; Jones, Hansson, & Cutrona, 1984; Lasgaard, Goossens, Bramsen, Trillingsgaard, & Elklit, 2005; Wei, Russell, & Zakalik, 2005; Hawkey & Cacioppo, 2010).

Scholars have diverse views on the connotations of loneliness. However, most agree that the feeling originates in relationships. Russell (1978) proposed a single-dimension view that the core perception of loneliness does not change with different relationships. In contrast, Weiss (1987) argued that differing demands among sources of social interactions result in distinct forms of loneliness, which is the multi-dimensional view. Weiss (1987) divided relationships into social integration (social loneliness) and dependence (emotional loneliness). Social loneliness results from the individual's lack of social networking, whereas emotional loneliness is caused by the individual's lack of a partner capable of providing emotional and security connections.

Loneliness is a common mental experience. When an individual faces changes but is unable to garner support, a feeling of reclusiveness is likely to ensue. For many, the college experience is an important transitional stage in life. Entering college means that the individual has changed from teenager to adult and will be confronted with numerous transformations in life, study and relationships. To take an example of such a stage from Taiwanese society, the student's life before college is characterized by fixed and intensive courses and schedules and the extended company of classmates and teachers who study together long-term. However, once in college, an individual's past relationships and achievements cannot simply be transferred into the new campus life. Instead, the student must arrange classes and community activities, seek suitable teachers and classmates to live or work with and independently structure his or her spare time. Such significant changes require individuals to learn to be mature and to adapt to various challenges. During this adaption process, the generation of loneliness is a substantial problem on college campuses (Cutrona, 1982; Wei, Russell, & Zakalik, 2005).

In light of the above, it is particularly necessary for contemporary Taiwanese higher education to realize the extent to which their college students experience loneliness and to develop strategies to address it. Nevertheless,

limited research has been performed to address this issue in Taiwan—hence the contributions this study expects to make. In other words, this study aims to develop a loneliness scale specifically for Taiwanese college students.

In support, Medora, Woodward and Larson (1987) have argued that the culture in which an individual grows up is an important factor influencing loneliness (cited in Rokach & Neto, 2002). That is, in addition to responding to the effects of social connections, the generation of loneliness is likely to vary from country to country. Thus, compiling a scale for loneliness specifically applicable to college students is important. In other words, rather than applying loneliness-related scales developed outside Taiwan to the evaluation of Taiwanese college students' loneliness, this study bases itself on the premise that a specifically developed scale may offer a pragmatic contribution by providing an instrument capable of adequately reflecting the level of loneliness in Taiwanese college students as a reliable reference for each college; this study may also offer an academic contribution by providing a suitable scale for related research that particularly focuses on Taiwanese college students as a research population.

The remainder of this study is organized as follows. A literature review is offered in the next section. The research methods and scale development procedure are then described. The final section provides discussions and conclusion.

2. Literature Review

2.1 Origin and Theories of Loneliness

Loneliness was initially studied by Sullivan (1953), who proposed that loneliness was an unpleasant and intense experience related to unsatisfied requirements for intimacy. Sullivan's research was all but neglected in his time. This neglect lasted until 1973, when Weiss, an American scholar who was an adherent of Bowlby's attachment theory, published an article entitled "Loneliness: the experience of emotional and social isolation". In the article, Weiss argued that loneliness is a subjective psychological feeling or experience that occurs when an individual feels the lack of a satisfactory relationship and a gap between his or her desire and the actual connection level. Russell (1978) established the University of California at Los Angeles (UCLA) Loneliness scale, which has been widely employed to this day, and performed a theoretical factor analysis for loneliness. His research and results attracted broad attention around the world.

Loneliness can be studied by three approaches: the cognitive process approach, the human needs approach and the behavioral approach. The cognitive process approach emphasizes an individual's mental awareness and assesses his or her social relationships. This approach proposes that the individual is vulnerable to loneliness if he or she perceives a gap between actual and anticipated relationships (Peplau, 1978; Peplau & Perlman, 1982; Dupont, 1994). The human needs approach considers that loneliness originates in unsatisfied basic demands during individual growth stages (Sullivan, 1953; Bowlby, 1969; Weiss, 1982; Vincenzi & Grabosky, 1987; Derlega & Margulis, 1982; Thomas, 1996). The behavioral approach stresses a lack of social enhancement as the primary cause of loneliness (Young, 1982). Nevertheless, most scholars share the view that loneliness is a subjective and unpleasant feeling that results from unsatisfied individual demands with respect to relationships and social connections (Perlman, 1981; Weiss, 1987; Rokach & Brock, 1997; Killeen, 1998).

2.2 Connotations of Loneliness

The connotations of loneliness can be examined by dividing them into the domains of cognition, emotion and behavior. The cognitive aspect refers to the interpretation of self and self-other relationships. Studies on children (Fordham & Stevenson-Hinde, 1999; Hymel et al., 1990; Kirova-Petrova, 2000; J. C. Dunn, Dunn, & Bayduza, 2007), adolescents (Diamant & Windh, 1981; Larson, 1999; McWhirter, Besett-Alesch, Horibata, & Gat, 2002; Prinstein & La Greca, 2004; Wei, Russell, & Zakalik, 2005) and adults (McWhirter, 1997; Nurmi et al., 1997; Olmstead et al., 1991; Hawkey & Cacioppo, 2010) have unanimously revealed that low self-esteem is a major cognitive feature manifested by lonely persons. Long-term studies have also indicated that low self-esteem is closely associated with loneliness. Using factor analysis, Rubenstein and Shaver (1982) similarly reported that one element among the loneliness connotations was self-depreciation, e.g., when an individual finds him- or herself unattractive, humbled, stupid, shameful or insecure. Therefore, lonely persons tend to view themselves in a negative, self-belittling way and consider themselves to be disappointing, worthless, unappealing and unlovable. In addition, they often judge themselves in a relatively pessimistic tone and are uneasy regarding accepting others. They are also concerned about the negative comments of others regarding themselves. Thus,

the lonely express an attitude of isolation, hostility and unwillingness to communicate with others, which substantially hinders their relationships.

The emotion aspect refers to the negative sentiment generated by loneliness, which primarily consists of feelings of despair, frustration, helplessness, vulnerability, fear, sadness, grief, frustration, depression, moodiness and anger (Rokach, 1990; Rokach & Brock, 1997; Rubenstein & Shaver, 1982; Wei, Russell, & Zakalik, 2005). As noted by psychodynamics theory, when the feeling of loneliness arrives, it may coalesce with the unpleasant sentiments that result from an unsatisfied demand for intimacy during the early stage of a person's life. Therefore, Rokach (1990) proposed that when feeling lonely, an individual might sense a lack of affiliation, a feeling of rejection or abandonment, a feeling of being alone or helpless, a feeling of being misunderstood, an inability to contact others and understand their feelings, and a desire for significant others.

Regarding the behavioral aspect, the individuals may be shy, flinching, unwilling to self-disclose and poor at social interaction. When interacting with others, rather than intermingling, they mostly focus on themselves, seldom respond to questions, and often feel uncomfortable or anxious when interacting.

In sum, loneliness consists of significantly negative emotions and cognitions, which can have disastrous physical and mental effects and additional consequences if they persist for long.

2.3 Measurement of Loneliness

There are two approaches to the measurement of loneliness: single-dimensional and multi-dimensional. The rationales for the two approaches are explained in the following.

The basic hypothesis of the single-dimension approach regards loneliness as a common experience, thus ignoring the specific causes that generate the feeling of desolation. The loneliness level can be determined using a scale-based measurement. The most prominent proponent of this approach is Russell, who contended that the core sentiments of loneliness are indistinguishable by nature. Thus, all lonely individuals understand and experience the feeling in the same way (Russell, 1978). Based on this view, Russell (1978) published the UCLA (University of California, Los Angeles) Loneliness scale, which is the most well-known and applied loneliness-measurement tool and is primarily used for gauging loneliness that results from a lack of social interaction. Paloutzian and Janigian (1987) analyzed the loneliness studies that were published after the 1980s and concluded that 80% of these studies employed the UCLA scale.

The basic hypothesis of the multi-dimension approach considers loneliness to be a multi-faceted experience and feeling that cannot be fully revealed by resorting to single-quantification measurement. Therefore, the multi-dimensional measurement strategy attempts to dissect loneliness into different sub-scales in different scenarios, an approach primarily championed by Weiss. Weiss (1973) thought that different social relations offer different social supplies to satisfy various human social demands. Therefore, the loss of different segments of social relations may result in a deficiency of certain social supplies, thereby triggering distress and loneliness. In his research, Weiss primarily focused on the social supplies of "dependence" and "social integration" and the influences their lack on loneliness. A lack of social integration refers to inadequate social networking or unacceptance by desired groups, which results in social loneliness (Mullins et al., 1987; Cassidy & Asher, 1992; Rotenberg & Bartley, 1997). However, once an individual develops his or her own social networks, the symptoms of such social loneliness generally disappear. Emotional loneliness results from a lack of dependence. That is, an individual lacks a critical figure in daily life who can provide emotional and security supports, which results in emotional loneliness manifested as child-like separation anxiety, panic and emptiness. An individual may experience this type of loneliness if he or she experiences the death of close relatives or is undergoing divorce. Weiss (1973) considered that to a large extent emotional loneliness is an association of the fear of abandonment during childhood. This type of loneliness is often accompanied by excessive sensitivity and anxiety, which cause the individual to be overly sensitive to social cues. Correspondingly, the subject frequently mistakes or exaggerates the passive or positive intents of others, which additionally damages the chance of compensating for hollowness and decreasing loneliness.

Emotional loneliness and social loneliness, as proposed by Weiss, have been studied by other researchers, who compiled scales to reexamine the two types of loneliness. All of these studies have indicated that the two loneliness types are distinct concepts, which reflects Weiss's opinion.

Among these scales, the Social and Emotional Loneliness for Adults Scale (SELSA-S) developed by DiTommaso (2004) not only identifies emotional loneliness and social loneliness but also divides emotional loneliness into romantic and family categories, which coincides with the opinion of Weiss that the primary

figures who affect emotional loneliness are family members and intimate lovers. Table 1 summarizes the existing instruments for analyzing loneliness.

Table 1. Summary of existing instruments for loneliness measurement

Authors	Scale name	Sub-scale
Wittenberg (1986)	Emotional vs. Social Loneliness Scale	Emotional isolation Social isolation
Russell, Cutrona and Rose (1984)	Emotional-Social Loneliness Inventory (ESLI)	Social loneliness and isolation, emotional loneliness and isolation
Vincenzi and Grabosky (1987)	Rasch-type Loneliness Scale	Social loneliness, and emotional loneliness
de Jong Gierveld and Kamphuis (1985)	Social and Emotional Loneliness for Adults (SELSA)	Emotional and social aspects
DiTommaso and Spinner (1993)	The short version of Social and Emotional Loneliness for Adults (SELSA-S)	Emotional (romantic and family) aspect and social aspect

The two previously described approaches to loneliness essentially differ in interpreting loneliness: Are there differences in the nature of loneliness? Or does loneliness assume different forms? To examine whether there are in fact two different forms of loneliness, Russell, Cutrona, Roes and Yurko (1984) investigated the predictive factors, the experience and the influence of emotional loneliness and social loneliness. The authors enlisted a group of college students to assess their consent level on loneliness under two conditions: in the absence of a one-to-one emotional relationship and being left out of a group with shared interest and activities. The results revealed that the predicative factors of the two forms of loneliness were different. Emotional loneliness could be predicted if an individual felt that he or she could not have an intimate relationship with or had no chance of taking care of another person. In contrast, social loneliness could be predicted if an individual felt that his or her talent could not be appreciated by others.

In addition to differences in predictive factors, there are also different correlative patterns between assessment items for social and emotional loneliness and the UCLA scale. Specifically, emotional loneliness is correlated with three items of the UCLA scale that evaluate the feeling of relations with others, whereas social loneliness has no significant correlation with these three items. Conversely, social loneliness is related to three items of the UCLA scale that evaluate the feeling of relations with groups, whereas emotional loneliness has no significant correlation with these three items. However, except for the noted differences with respect to items, the two forms of loneliness are highly correlated with the total score and with most items used in the UCLA scale.

Therefore, Russell argued that there was considerable overlap between the two forms of loneliness for an individual who had experienced both. Based on this view, Russell (1984) did not completely abandon his single-dimensional concept. Although based on subjective experience, the two forms of loneliness appear different by nature, they are both dominated by a substantive core of shared experience. In sum, the single-dimensional approach regards loneliness as an endogenous feeling, whereas the multi-dimensional approach divides it into two types: emotional loneliness and social loneliness. Although the two types of loneliness are not significantly correlated with one another, both are highly correlated with the total measurement of the UCLA scale. Thus, emotional loneliness and social loneliness are both related to the resources of relationships. The former is associated with one-to-one relationships (e.g., romantic relationship), whereas the latter is pertinent to group relationships. In light of the above, the nature of loneliness (single-dimensional or multi-dimensional) remains controversial. This study therefore initially treats loneliness as single-dimensional for the initial scale development and, when necessary, adequately distinguishes multi-dimensionality as it pertains to the collected data.

3. Research Methods

3.1 Preliminary Study

3.3.1 Item Compilation for the Preliminary Scale and Its Content

According to the literature, loneliness is a subjective, unpleasant feeling that is generated when an individual cannot sustain or obtain intimate relationships. There are two views on the nature of loneliness. The first was proposed by Weiss (1979), who proposed that loneliness has differences by nature or type and that the experience of loneliness varies according to the individual's living environment. Based on the different symptoms and the correspondingly different treatments, Weiss divided loneliness into two types: social loneliness and emotional loneliness. The alternative view was presented by Russell et al. (1982), who argued that the core sentiment of loneliness does not differ and that all lonely persons understand and experience the feeling in a same way. To address the social changes and to comprehensively include all of the experiences of loneliness, this study initially integrated the two views and subsequently consulted relevant studies and scales for reference and item compilation.

Following Russell, we primarily referenced a Chinese version of the revised UCLA scale (R-UCLA) (Wu, 1985), which was directly translated from the UCLA scale and yielded a reliability score of 0.89 and therefore perfectly recapitulated the definition of loneliness by Russell et al. (1982). The original scale consisted of 20 items, five of which were removed in this study because of content similarity, which resulted in 15 remaining items. Regard Weiss's opinion, we primarily referenced a Chinese version of the Rasch-type loneliness scale (de Jong Gierveld & Kamphuis, 1985), which was translated and modified by C. L. Lin and Lin (2007). This scale was the result of a direct translation and generated a reliability score of 0.67. The scale consists of two loneliness factors (social and emotional), which is consistent with Weiss's view. The scale has a total of 10 items, three of which were removed because of content similarity, which left seven remaining items. In addition, four items were incorporated after we reviewed the family portion of the SELSA-S scale compiled by DiTommaso et al. (2004). Last, we generated two items according to the connotations of loneliness and added them to the scale, thereby generating a total of 28 items, which we organized and compiled to produce the "Scale of Loneliness for College Students".

The questionnaire adopts an incremental 6-point grading format in which a individual is asked to determine the accuracy of a statement on a scale of 1 to 6 (1 means barely having such an experience, and 6 means always having such an experience). A higher score in each sub-scale indicates that the individual has a stronger loneliness tolerance.

3.2 Predictive Test Participants

The 125 individuals of the first preliminary test were first-to-fourth-year students taking general courses in a university in Taipei, Taiwan. All of the questionnaires were recovered. The questionnaires that exhibited complete filling regularity and those that were not filled in were removed, which generated 121 effective questionnaires and an effective response rate of 96.8%. The 165 individuals of the second preliminary test were first-to-fourth-year students at two universities in Taichung. All of the questionnaires were recovered and were effective, which yielded an effective response rate of 100%.

3.3 Data Analysis

The tentative scale was individual to two preliminary tests and subsequent item removal. When examining the filling errors of the first-round questionnaires, 121 questionnaires were found to display no such problem. Therefore, no items were removed at this stage. Then, potential outlier problems were examined. All of the items of this scale produced statistically significant results, which indicates that each item displayed discrimination ability. Therefore, no items were removed at this stage. Next, the internal consistency of the scale was analyzed, which consisted of three steps. First, the correlation value with the total score of 0.5 was set as a criterion. A score below the criterion indicated that the item displayed no homogeneity with the scale and was therefore listed as a candidate for removal. Seven items were identified in this step. Second, if the removal of an item resulted in the elevation of the scale's internal consistency, the item was listed as a removal candidate. Our analysis identified four candidates in this step. Third, a factor loading of 0.5 was set as a standard. Because all of the items in the scale had the values greater than 0.5, no item was removed. Following the described protocol, an item was removed if it satisfied one of the preceding criteria. Thus, seven items in the tentative "Scale of Loneliness for College Students" were removed. The result is provided in Table 2.

When we examined the filling errors of the second-round questionnaires, exploratory factors were employed to analyze the factors extracted via the principal axis method. Specifically, the appropriateness of the samples,

measured by the Kaiser-Meyer-Olkin (KMO) test, was 0.916. In addition, Bartlett's spherical test revealed that the samples produced significant results ($\chi^2=1,857.665$; $df=210$; $p=0.000$) and explained 59.56% of the total variance. Thus, our results indicated that the data were suitable for construct validity-based analysis. In fact, when initially designing the items, we included those derived from social loneliness and emotional loneliness, as suggested by Weiss. The results of our exploratory factor analysis (as provided in Table 3) revealed that the design of this scale generated an integral concept of loneliness, which corroborated the opinions of Russell. In addition, all of the items displayed factor loadings of 0.5, which indicated that all of them were representative. Specifically, the connotations of the eight, six, ten and twelve items belonged to descriptions of loneliness associated with family relations. Therefore, these items differed considerably from the integrated concept of loneliness. However, the factor loadings of these items were all greater than 0.5, which indicated that they too were representative. Nevertheless, when including them, the number of items was too large, and the explained variance was relatively low. Therefore, the four items were removed. Thus, the eight, six, ten and twelve items of the tentative scale were removed in this step.

Table 2. The item removal summary of the “the scale for the loneliness of college students” for the preliminary study

	<i>m</i>	<i>s</i>	<i>t</i>	Sig. (2-tailed)	<i>r</i>	Cronbach's Alpha if Item Deleted (Cronbach's Alpha=.897)	Factor loadings
1. I feel in tune with the people around me	2.07	.62	5.67	.00	.574	.894	.545
2. There are people I can talk to	1.97	.87	3.04	.00	.335	.896	.608
3. I feel part of a group of friends	2.02	.76	4.82	.00	.526	.893	.626
4. I feel left out	2.77	.93	7.89	.00	.613	.891	.635
5. I don't like group activities	2.52	1.09	6.06	.00	.546	.895	.677
6. My family really cares about me	1.72	.71	4.21	.00	.551	.895	.687
7. There is always someone I can talk to about my day-to-day problems	1.96	.74	4.14	.00	.521	.895	.573
8. I feel part of my family	1.64	.74	6.05	.00	.518	.893	.663
9. Whenever I need to do so, I can find friends and gain support. I can find companionship when I want it	2.08	.63	4.63	.00	.575	.894	.640
10. There is no one in my family I can depend on for support and encouragement, but I wish there was	1.73	.94	5.21	.00	.458	.894	.728
11. There are people I feel close to	2.33	.78	7.24	.00	.624	.891	.733
12. I feel alone when I am with family	1.89	.95	5.57	.00	.523	.893	.763
13. My social relationships are superficial	2.87	1.2	5.49	.00	.544	.893	.720
14. I often feel rejected	2.45	.86	6.84	.00	.569	.892	.653
15. My interests and ideas are not shared by those around me	2.32	.99	6.10	.00	.614	.891	.686
16. I experience a general sense of emptiness	3.12	1.2	5.80	.00	.583	.892	.630
17. I feel shut out and excluded by others	2.6	1.02	6.64	.00	.663	.890	.725
18. I really hope someone is with me	4.26	1.1	3.12	.00	.230	.901	.584
19. I don't like group or social activities	2.52	1.09	6.06	.00	.436	.895	.719

20. I am no longer close to anyone	1.92	.76	5.45	.00	.435	.893	.768
21. I feel part of a group of friends	2.26	.96	8.45	.00	.746	.888	.768
22. I have a lot in common with people around me	2.79	.88	7.02	.00	.520	.893	.754
23. I am unhappy being so withdrawn	3.28	1.1	3.09	.00	.332	.898	.667
24. I don't think I belong to the group	2.36	.85	7.60	.00	.604	.891	.635
25. There is no one I can turn to	2.54	1.0	6.31	.00	.521	.893	.632
26. I am an outgoing person	3.06	1.0	4.69	.00	.351	.897	.686
27. No one really knows me well	3.84	1.2	3.24	.00	.326	.899	.724
28. I lack companionship	2.24	.90	8.88	.00	.735	.889	.622

Table 3. The EFA result of the “the scale for the loneliness of college students” for the preliminary study

Items	Factor Loadings	
	Factor 1	Factor 2
V3 I feel part of a group of friends	0.824	0.392
V26 I don't think I belong to the group	0.814	0.264
V17 I feel shut out and excluded by others	0.811	0.273
V21 I feel part of a group of friends	0.807	0.381
V15 My interests and ideas are not shared by those around me	0.767	0.311
V28 I lack companionship	0.755	0.318
V4 I feel left out	0.707	0.239
V14 I often feel rejected	0.704	0.374
V25 There is no one I can turn to	0.687	0.481
V7 There is always someone I can talk to about my day-to-day problems	0.683	0.376
V9 I can find companionship when I want it	0.677	0.443
V22 I have a lot in common with people around me	0.662	0.331
V16 I experience a general sense of emptiness	0.648	0.345
V20 I am no longer close to anyone	0.64	0.392
V13 My social relationships are superficial	0.638	0.367
V1 I feel in tune with the people around me	0.607	0.18
V11 There are people I feel close to	0.606	0.356
V10 There is no one in my family I can depend on for support and encouragement, but I wish there was	0.352	0.836
V8 I feel part of my family	0.421	0.823
V12 I feel alone when I am with family	0.38	0.811
V6 My family really cares about me	0.401	0.728
variance explained	44.99%	8.99%
eigenvalue	9.44	1.88
Total variance explained=53.974%		

4. Formal Experiments

4.1 Participants

A total of 140 first- to fourth-year students at a private university in northern Taiwan were sampled. All of the questionnaires were recovered, and those that exhibited complete filling regularity and those that were not filled were removed, which yielded 119 effective questionnaires and an effective response rate of 85%. Among the individuals, 51 were male (42.8%) and 68 female (57.1%).

4.2 Study Tool: "Scale of Loneliness for College Students"

This scale, which was compiled by the authors, contained 17 items and adopted an incremental 6-point grading format whereby an individual was asked to determine the accuracy of a statement on a scale between 1 to 6 (1 meant barely having such an experience, and 6 meant always having such an experience). A higher score in each sub-scale indicated that the individual had stronger loneliness tolerance.

To examine the stability of loneliness, the resulting score and loneliness frequency were subjected to correlation analysis. The results revealed a correlation coefficient of 0.56 ($p < 0.01$), which indicates a significant positive correlation between the loneliness score of the college students who used the scale and their actual level of loneliness. Therefore, our results suggested that loneliness was a stable feeling.

5. Data and Results

5.1 Descriptive Statistics

Table 4 provides descriptive statistics of the research sample. Additionally, Table 5 presents means and standardized deviations of measurement items.

Table 4. Descriptive statistics

	Female (<i>n</i> =68)	Male (<i>n</i> =51)	Freshman (<i>n</i> =1)	Sophomore (<i>n</i> =41)	Junior (<i>n</i> =35)	Senior (<i>n</i> =41)	Total (<i>n</i> =119)
<i>m</i>	47.46	52.55	62	41.02	44.67	41.51	49.56
<i>s</i>	14.33	14.83	0	13.13	14.45	11.34	14.64

Table 5. Means and standardized deviations of measurement items

		<i>n</i>	<i>m</i>	<i>s</i>
L01 I feel in tune with the people around me	Freshman	1	3.00	.
	Sophomore	41	2.07	.608
	Junior	35	2.23	.843
	Senior	41	2.20	.641
	Male	50	2.28	.730
	Female	68	2.09	.663
	Total	118	2.17	.696
L02 I feel left out	Freshman	1	4.00	.
	Sophomore	41	2.76	.994
	Junior	35	2.94	1.083
	Senior	41	2.93	1.104
	Male	50	2.92	1.085
	Female	68	2.85	1.040
	Total	118	2.88	1.055
L03 There is always someone I can talk to about	Freshman	1	1.00	.

my day-to-day problems	Sophomore	41	1.78	1.037
	Junior	35	1.89	.758
	Senior	41	1.88	.812
	Male	50	2.40	1.050
	Female	68	2.00	.946
	Total	118	1.84	.877
	L04 I can find companionship when I want it	Freshman	1	3.00
Sophomore		41	2.10	.860
Junior		35	2.37	1.215
Senior		41	2.05	.947
Male		50	2.38	.830
Female		67	2.00	.816
Total		118	2.17	1.007
L05 There are people I feel close to	Freshman	1	1.00	.
	Sophomore	41	1.49	.637
	Junior	35	1.71	.789
	Senior	41	1.41	.591
	Male	50	2.48	.863
	Female	68	2.32	1.014
	Total	118	1.53	.676
L06 My social relationships are superficial	Freshman	1	3.00	.
	Sophomore	40	2.00	.716
	Junior	35	2.31	1.022
	Senior	41	2.17	.771
	Male	50	3.22	1.250
	Female	68	3.09	1.422
	Total	117	2.16	.840
L07 I often feel rejected	Freshman	1	1.00	.
	Sophomore	41	1.66	1.063
	Junior	35	2.03	1.071
	Senior	41	1.78	1.084
	Male	50	2.82	.896
	Female	68	2.38	.962
	Total	118	1.81	1.072
L08 My interests and ideas are not shared by those around me	Freshman	1	3.00	.
	Sophomore	41	2.29	.929
	Junior	35	2.49	1.040
	Senior	41	2.39	.919
	Male	50	2.64	1.191
	Female	68	2.32	.969
	Total	118	2.39	.952

L09 I experience a general sense of emptiness	Freshman	1	1.00	.
	Sophomore	41	1.66	.883
	Junior	35	2.23	1.239
	Senior	41	2.12	1.249
	Male	50	3.44	1.402
	Female	68	2.87	1.292
	Total	118	1.98	1.147
L10 I feel shut out and excluded by others	Freshman	1	2.00	.
	Sophomore	41	3.05	1.341
	Junior	35	3.03	1.424
	Senior	41	3.37	1.299
	Male	50	3.14	1.262
	Female	68	2.35	1.182
	Total	118	3.14	1.348
L11 I am no longer close to anyone	Freshman	1	4.00	.
	Sophomore	41	2.56	1.026
	Junior	35	2.63	.942
	Senior	41	2.49	.898
	Male	50	2.32	1.220
	Female	68	1.90	1.095
	Total	118	2.57	.956
L12 I feel part of a group of friends	Freshman	1	2.00	.
	Sophomore	41	2.49	1.227
	Junior	35	2.66	1.083
	Senior	41	2.27	.895
	Male	49	2.49	1.244
	Female	68	2.09	1.181
	Total	118	2.46	1.075
L13 I feel part of a group of friends	Freshman	1	5.00	.
	Sophomore	41	3.02	1.294
	Junior	35	3.20	1.389
	Senior	41	3.07	1.421
	Male	50	2.36	1.045
	Female	68	2.22	.960
	Total	118	3.11	1.364
L14 I have a lot in common with people around me	Freshman	1	3.00	.
	Sophomore	41	2.49	1.247
	Junior	35	2.94	1.282
	Senior	41	2.66	1.296
	Male	50	2.70	.974
	Female	68	2.66	.891

	Total	118	2.69	1.272
L15 I don't think I belong to the group	Freshman	1	2.00	.
	Sophomore	41	1.95	1.024
	Junior	35	2.29	1.178
	Senior	41	2.02	1.294
	Male	50	2.84	.997
	Female	68	3.07	1.027
	Total	118	2.08	1.163
L16 There is no one I can turn to	Freshman	1	5.00	.
	Sophomore	41	2.07	1.212
	Junior	34	2.62	1.231
	Senior	41	2.07	1.104
	Male	50	2.76	1.222
	Female	68	2.25	1.084
	Total	117	2.26	1.219
L17 I lack companionship	Freshman	1	3.00	.
	Sophomore	41	2.10	.889
	Junior	35	2.66	1.211
	Senior	41	2.12	.812
	Male	50	2.34	1.255
	Female	68	1.81	.797
	Total	118	2.28	.995

5.2 Reliability of the "Scale of Loneliness for College Students"

The internal consistency coefficient, Cronbach's α value, of the scale was 0.936, which indicates an excellent internal consistency of the scale.

5.3 Validity of the "Scale of Loneliness for College Students"

In this study, the maximum likelihood (ML) method of the linear structural relations (LISREL) statistical software package was employed to perform parameter estimation and the goodness of fit test, thereby determining the scale's validity.

It has been proposed (Bagozzi & Yi, 1988; Hair et al., 1998) that tests of total model fit can be evaluated by dividing the test into three aspects: measures of absolute fit, measures of incremental fit and measures of parsimonious fit. The internal structural fit of the scale was examined using analysis of the basic fit standard and tests of total model fit.

5.4 Analysis of Basic Fit Standard

Negative errors and variances were not identified in the model estimation results derived from the "Scale of Loneliness for College Students". This outcome was consistent with the evaluation criterion that a theoretical model cannot have negative errors and variances. Second, all errors and variances were statistically significant. In addition, all factor loadings were greater than 0.50 and less than 0.95. Last, the standard errors of the model were between 0.02 and 0.05. Therefore, our results revealed that the model satisfied the evaluation criteria of basic model fit (Tables 6 and 7).

Table 6. Parameter estimates of model construction for the “the scale for the loneliness of college students”

Parameter	Non-standardized Estimate	Standard Error	T-value	Standardized Estimate
δ_1	0.38	0.04	9.15	0.65
δ_2	0.60	0.06	10.45	0.71
δ_3	0.60	0.05	9.28	0.65
δ_4	0.47	0.05	9.77	0.68
δ_5	0.48	0.05	8.99	0.64
δ_6	0.66	0.07	9.18	0.65
δ_7	0.51	0.05	10.52	0.72
δ_8	0.57	0.05	11.50	0.77
δ_9	0.62	0.07	9.31	0.66
δ_{10}	0.77	0.06	12.59	0.81
δ_{11}	0.63	0.06	9.65	0.67
δ_{12}	0.72	0.05	13.50	0.85
δ_{13}	0.52	0.04	14.18	0.88
δ_{14}	0.40	0.04	10.40	0.71
δ_{15}	0.68	0.05	0.66	0.86
δ_{16}	0.66	0.07	9.96	0.69
δ_{17}	0.80	0.07	12.08	0.79
λ_1	0.20	0.02	8.77	0.58
λ_2	0.34	0.04	8.76	0.49
λ_3	0.34	0.04	8.72	0.57
λ_4	0.25	0.03	8.72	0.54
λ_5	0.33	0.04	8.79	0.59
λ_6	0.60	0.07	8.77	0.58
λ_7	0.24	0.03	8.64	0.48
λ_8	0.23	0.03	8.50	0.41
λ_9	0.51	0.06	8.76	0.57
λ_{10}	0.30	0.04	8.28	0.34
λ_{11}	0.47	0.05	8.73	0.55
λ_{12}	0.20	0.02	8.02	0.28
λ_{13}	0.08	0.01	7.74	0.23
λ_{14}	0.15	0.02	8.65	0.49
λ_{15}	0.16	0.02	7.96	0.26
λ_{16}	0.48	0.06	8.70	0.52
λ_{17}	0.38	0.04	8.40	0.37

Table 7. Analytic results of basic fit standards for the “scale of loneliness for college students”

Evaluation Items	Analytic Results	Evaluation Results
Whether negative errors and variances were present	Errors and variances between 0.08 and 0.61.	Yes
Whether errors and variances were statistically significant	All reached the significance level of 0.01.	Yes
Whether the absolute correlation values between parameters were too close to 1	The absolute correlation values between parameters were 0.6.	Yes
Whether the factor loadings were between 0.5 and 0.95	The factor loadings were between 0.65 and 0.88.	Yes
Whether there were no large standard errors	The standard errors were 0.02 to 0.05.	Yes

5.5 Tests of Total Model Fit

The examination results for total model fit are shown in Table 8. Our analysis revealed that the χ^2 value of the scale was 471.8, which was significant, and that χ^2/df was greater than 3. Kline (1998) proposed an χ^2/df value of less than 3 as the fit standard. Although chi-square tests indicated that the statistics were significant, it was reported that the values were vulnerable to the influences of sample size and might exhibit increased sensitivity in response to more samples (Marsh, Balla, & McDonald, 1988). Therefore, simple reliance on chi-square values was not an ideal approach to model evaluation in this study, and other parameters had to be incorporated. According to the results, all of the parameters of total fit attained the criteria, which indicates an ideal overall model fit. That is, the theoretical model and the observation data of the scale fit.

Table 8. Total model fit results

Test Model	Absolute Fit				Parsimonious Fit		Incremental Fit		
	χ^2/df	GFI	SRMR	RMSEA	PNFI	PGFI	NFI	NNFI	CFI
Model	3.96	0.94	0.06	0.04	0.80	0.58	0.92	0.93	0.94
Evaluation Standard	<3	>0.90	<0.08	<0.10	>0.50	>0.50	>0.90	>0.90	>0.90
	Poor fit	fit	fit	fit	fit	fit	fit	fit	fit

Note. $\chi^2=471.8$; $df=119$.

5.6 Internal Structural Fit

The internal structural fit is an intrinsic quality parameter of a model. As shown in Table 9, most of the estimation parameters reached a significance level.

Table 9. Internal structural fit results

Evaluation Item	Test Result Data	Test Result
All estimated parameters reached significance.	Yes	Yes
The reliability values of individual items were greater than 0.50.	Those of the fifth, seventh, ninth and fifth items were less than 0.50.	No
The average variances extracted from the latent variables were greater than 0.50.	Yes	Yes
The composite reliability of the latent variables was greater than 0.60.	Yes	Yes
The modification indices were less than 5.00.	Yes	Yes

6. Conclusions and Suggestions

6.1 Research Conclusions

In this study, we attempted to develop a theoretical framework to integrate the relevant concepts and influencing factors of college student loneliness. To this end, the “Scale of Loneliness for College Students” was compiled to serve as the basis for the theoretical architecture of this study.

Two preliminary tests were performed to finalize the trialed version of the “Scale of Loneliness for College Students”. In these tests, item analysis and exploratory factor analysis were conducted to preliminarily establish the scale of loneliness in college students. The formal scale had 17 items. The exploratory factor analysis revealed that loneliness was an integrated concept and that its connotation reflected the views of Russell et al. (1982). Russell proposed that the core feeling of loneliness remained essentially the same. Therefore, all lonely individuals shared the same core feeling in understanding and experiencing loneliness. Adopting this view, we developed a scale with a single-dimension form. All items had factor loadings greater than 0.60 and could explain 45% of total variance, which suggested that all of the items were representative.

The test of internal consistency revealed that the “Scale of Loneliness for College Students” displayed a Cronbach’s α value of 0.936, which was indicative of internal consistency. This outcome demonstrated that the scale manifested excellent internal consistency.

Regarding validity, the LISREL software package was used to examine the scale’s construction validity. Bagozzi and Yi (1988) suggested that a scale’s validity should be investigated in three aspects: the basic fit standard, overall model fit and internal structural fit. Regarding the basic fit standard, the model estimates of the scale displayed the follow properties: i) no negative errors and variances, ii) factor loadings all greater than 0.50 and less than 0.95, iii) errors and variances all reached significance level and iv) the absolute correlation values between estimated parameters were too close to 1. Therefore, all of the results satisfied the evaluation criteria of basic model fit, which indicated that the scale displayed excellent basic model fit. Regarding total model fit, except that the χ^2 value was relatively high, all of the remaining indicators satisfied ideal fit criteria. Overall, our analyses revealed that the research data and the theoretical model displayed very good overall fit. Regarding internal structural fit, all of the estimated parameters reached significance level as follows: i) the average variances extracted from the latent variables were all greater than 0.50, ii) the composite reliability values of the latent variables were all greater than 0.60, iii) the reliability values of the individual items were mostly greater than 0.50 and iv) the modification indices were all less than 5.00. These results indicate that the scale’s measurement and structural modes possess ideal internal quality.

In sum, the fit tests of the “Scale of Loneliness for College Students” revealed that except for a small number of indicators that did not satisfy the criteria, the scale was supported by the actual data of the overall and individual measurements and the structural mode.

6.2 Research Suggestions

6.2.1 To Reexamine the Reliability of the “Scale of Loneliness for College Students” Using a Follow-up Test

A one-dimensional vs. multi-dimensional dichotomy appears in previous studies on loneliness and its most important traits. These studies have often overlooked the question whether loneliness is trait-based or situational. Therefore, when developing our scale, we added an item that questioned the frequency of loneliness to elucidate the nature of the loneliness connotation. Our analyses revealed that the loneliness frequency displayed a strong positive correlation with the total score of the “Scale of Loneliness for College Students”, which indicated that the loneliness measured by the scale was skewed toward trait-based and would not exhibit dramatic differences according to environment. However, stability of this understanding of loneliness will be more convincing if future studies can perform measurements at multiple time points. Thus, the reliability of the scale-based understanding of loneliness can be repeatedly investigated.

6.2.2 To Reexamine the Stability of the Validity of the “Scale of Loneliness for College Students” Using a Follow-Up Test

In this study, the validity of the “Scale of Loneliness for College Students” was examined in detail, which revealed that the scale exhibits substantial internal and external validity. However, because this scale is a newly developed measurement tool, we suggest that its validity be subjected to on-going interrogation. For example, melancholy is a primary emotional feature of loneliness (Rokach, 1990; Rokach & Brock, 1997; Rubenstein & Shaver, 1982). Thus, in future, the scale could be used to study individuals suffering from melancholy to test

whether their scale scores are significantly higher than those of normal individuals. Low self-esteem is another cognitive characteristic of loneliness (McWhirter, 1997; Nurmi et al., 1997; Olmstead et al., 1991; Rubenstein, 1992). Therefore, the “Scale of Loneliness for College Students” and a self-esteem scale could be subjected to correlation analysis to reveal the presence of a negative correlation. Last, the scale could also be used to test poorly adapted students and thereby investigate whether the scale can identify well-adapted students.

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