

A Latent Profile Analysis of Self-Control and Self-Esteem and the Grouping Effect on Adolescent Quality of Life Across Two Consecutive Years

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Abstract This study explored the holistic configuration of self-control and self-esteem with Latent Profile Analysis and examined the effect of self profiles on five adolescent quality of life indicators, including deviant behavior, friendship, academic achievement, time management and life satisfaction. The sample included 488 Taiwan junior-high students selected from a panel data. Four-group solution is considered optimal across years. At time 1, the “Quality Selves” group (high SC–SE) had consistent best performance in all the adolescent quality of life indicators while the “Disadvantageous Selves” group (low SC–SE) displayed consistent the worst. Given the same level of SC in “Baseline” group and “Self-Esteem” group, higher SE in the “Self-esteem” was related to higher evaluation of life satisfaction while no difference was found in other 4 quality of life indicators. At time 2, “Self-Esteem” became the “SC-Improved” who had the same best quality of life as the “Quality Selves,” while the “Baseline” was renamed as the “Lower Baseline” who performed similarly as the worst adjusted “Disadvantageous Selves” in indicators, except fewer deviant behaviors. Group membership was generally stable and self-profile transitions were more likely upward than downward. Along the adolescent period, findings suggest the level of SC need to be strengthened in order to sustain a good quality of life. Meanwhile, higher SE seems to be a propelling factor for students to gain better SC at a later time. Educational programs solely aim at cherishing self could move beyond for a double-core direction that also enhances adolescent social adaption with self-discipline training.

Keywords Self-control · Self-esteem · Latent profile analysis · Deviant behavior · Friendship · Life satisfaction

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1 Introduction

The study on the “self” has been a focus in social, personality, and developmental psychology. The existence of multiple perspectives and various compositions of self makes individuals differ from one another. Among these “selves,” self-esteem defined as a person’s overall evaluation toward oneself (Rosenberg 1965) has been a widely researched topic in adolescent quality of life, academic adjustment, and interpersonal relationship. Though high self-esteem seems to lead to positive outcomes, Baumeister et al. (2003) critically states that high self-esteem is associated with pleasant feelings toward oneself and enhanced initiatives to present in public; however, negative consequences were found in over-emphasizing unrealistic self-esteem on student outcomes (Baumeister et al. 2003, 1996; Kohn 1994).

Another trait about the self is self-control which can be defined as the capacity to alter or override dominant response tendencies and to regulate behavior, thoughts, and emotions when one conforms to the demands of social standard (Baumeister and Vohs 2007; de Ridder et al. 2011). Individuals vary in the capacity of self-control. Some people are better able than others to hold their tempers, keep their schedule, resist over-drink or over-eat, fulfill their responsibilities, persist at study and so forth. These differences seemingly ought to be associated with greater success and well-being in life. Gottfredson and Hirschi’s (1990) view about self-control claims that the application of self-control in the resistance of temptation has an effect on avoiding criminal and deviant behavior. Self-control allows people to live up to social expectations or values, such as performing well in school, following social norms, entering into and maintaining healthy relationships and coping effectively with stress (Gailliot and Baumeister 2007; Schmeichel et al. 2003; Shoda et al. 1990; Tangney et al. 2004). Compared to self-esteem, self-control is not just the pleasant feeling or positive evaluation toward oneself but a will power to suppress unwise impulses so that the individual can behave in a socially recognized and promoted way (Baumeister and Vohs 2007).

Self-control regarding to as “the interactive aspect between self and environment” and self-esteem regarding to as “the evaluation or attitude toward self” are theoretically distinguishable but the evidences show that they are correlated from modest (e.g., Trumpeter et al. 2006) to medium (de Ridder et al. 2011). This correlation could be accounted for by the assumption that they reflect various adjusted forms of self-functioning (Tangney et al. 2004), especially, when self-esteem is measured by the Rosenberg (1965) self-esteem scale. This scale that we used in this study seems well designed to capture adjustment side of self-acceptance without recording inflated or maladjustment side of the self.

Our attempt was to investigate the interplay of these two traits at once via a person-centered approach because adolescents need to be able to take responsibility for managing their own lives, situate their lives in the broader social context and act autonomously. It is one among the critical competencies that educators try to provide through schooling for a successful individual life and a well-functioning society (e.g., DeSeCo 2005). The person-centered approach is a statistical method that takes the configuration of multiple variables into consideration so that researchers can identify groups that differ quantitatively in the profile level, qualitatively in the profile shape, or both (Marsh et al. 2009). Because self-control and self-esteem is correlated, it is presumed to observe both high and both low (compatible) profiles with sufficient sample size in a national sample of adolescents. What other profile(s) could we observe? Could there be other profiles? Does the profile(s) remain stable or show significant shift across adolescent years when self is under rapid development? How do the self-control/self-esteem interplay profile and cross-year shift inform adolescent well-being? To answer above questions, we used the person-centered approach to investigate the interplay of self-esteem and self-

control. The current study also intended to examine the effect of the self-control and self-esteem profiles on adolescent adaptive indicators, such as deviant behavior, academic achievement, time management, friendship, and life satisfaction which can be studied in terms of evaluation of overall life or specific domains (Seligson et al. 2003).

Specifically, the current study used LPA and configural frequency analysis (CFA) to explore the following research questions.

1. What kinds of self-control and self-esteem profiles can be identified among the junior high school students in Taiwan?
2. How do the profiles change across a school year? What are the typical and untypical profile changes across two time points? Would the self-control and self-esteem profiles be stable across two time points?
3. How do the profiles found in the LPA differ on several adolescent development perspectives, including the time use aspect of self-regulation (time management) and critical quality of life indicators such as achievement, friendship, deviant behaviors and life satisfaction?

2 Review of Literature

We provided a review on the significance of adolescent quality of life indicators and the relationship of self-esteem or self-control on adolescents' quality of life indicators as separate constructs. Though quality of life represents a changing set of meanings, it is essentially what makes a good life for people in a society collectively believe (Erath et al. 2008). Children and adolescent quality of life encompasses multiple dimensions proposed by UNESCO Ben-Arieh (2007), OECD (2009) and UNICEF (2010). It could be subjective or objective (material) with positive or negative indicators. In this study we focused on behavioral (deviant behavior), school (achievement), social (friends) and psychological (time management component in self-regulation and life satisfaction) aspects.

2.1 Behavioral Aspect of Adolescent Quality of Life

Research in adolescent deviant behavior suggested that deviant behavior had a persistent and profound effect in adolescent adjustment. In the general theory of crime (Gottfredson and Hirschi 1990), self-control is the major determinant of deviant behaviors. According to Gottfredson and Hirschi (1994), deviant behavior peaks early in life (at adolescence) and declined with age. Committing one deviant behavior increased the possibility to commit more kinds of deviant behaviors. High involvement in deviant behaviors at one point in life predicts high involvement in subsequent deviant behaviors. Those who continued to have deviant behaviors showed poor adjustment in impulse control, aggression, and future orientation, compared with those who discontinued in deviant behavior in a sample of 1,170 male juvenile offenders from 14 to 22 years old in the U.S. (Monahan et al. 2009).

2.2 School Aspect of Adolescent Quality of Life

Past research has shown that self-esteem is moderately correlated with academic achievement (Wiggins et al. 1994). If an individual's achievement meets his/her expectation, it would support self-esteem of this person. For many students their self-esteem was based on or reinforced by their academic success (Baumeister et al. 2003).

It is assumed that people with high self-control should achieve better grades in the long run, because they have the ability to override or change their responses as well as to interrupt undesired behavioral tendencies. Therefore, they should be better to complete tasks on time, prevent distractive activities or procrastination for delaying works, and using study time effectively. Prior studies have provided some evidence that self-control facilitates school performance. For example, Feldman et al. (1995) found that children with higher self-regulation received better grades in a computer course.

2.3 Social Aspect of Adolescent Quality of Life

Friendship experience has an influential effect on adolescents life adjustments, such as school involvement (Berndt and Keefe 1995), life satisfaction (Sam 2001), and emotional adjustment (Happiness and depression) (Demir and Urberg 2004; Erath et al. 2008). Students reporting higher involvement in school had friends with more positive features while students reporting higher school disruption had friends with more negative features (Berndt and Keefe 1995). Positive unique association was found among friendship support, mutual friendship, school liking, and academic competence (Erath et al. 2008). In a sample of 618 10th to 12th grade European Americans, Demir and Urberg (2004) found perceived positive friendship had a direct effect on emotional adjustment, especially for boys; additionally, the quantitative aspect of friendship such as number of friend and mutual friends had an indirect effect on emotional adjustment through the influence of perceived friendship (Demir and Urberg 2004). The number of friend was the topmost indicator of friendship and was used in the current study.

2.4 Psychological Aspect of Adolescent Quality of Life

Life satisfaction, or global judgments of one's life, is one of the four core dimensions of subjective well-being and is well-established as a predictor of health-related outcomes (Diener 2000; Diener et al. 1985). Life satisfaction in youth is strongly correlated with personal interaction, locus of control, self-esteem, and personal academic beliefs (Huebner 1991; Seligson et al. 2003; Suldo et al. 2008).

Besides, students' time is a limited resource especially during the time with heavy learning loads from junior high school through senior high school period. Time management is the ability to plan, monitor and control how a person spends the hours in his/her day to effectively accomplish goals (Britton and Tesser 1991; Eilam and Aharon 2003; Macan 1994). Poor time management can be related to problems with self-control. In contrast, better time management is related with higher self-control (Britton and Tesser 1991), better grades, and higher self-esteem (Digdon and Howell 2008; Lowenstein 1983; Tangney et al. 2004). Bond and Feather (1988) found that those who reported more purpose and structure to their time also reported psychological well-being, optimism about the future, more efficient study habits, fewer physical symptoms, and less depression and hopelessness, among other positive tendencies.

2.5 Latent Profile Analysis

Latent Profile Analysis (LPA), a person-centered approach, is a probabilistic model for classifying individuals into homogeneous groups in multivariate interval data. LPA is similar to cluster analysis; as a result, individuals in one group are similar to each other but

are different from individuals in other groups (Muthen and Muthen 2000). LPA had several advantages over cluster analysis so that we can freely estimate means, variances, and covariances of the indicators that conform to the reality (Vermunt and Magidson 2002). LPA also provided fit statistics and test statistics to inform appropriate group solutions. The principal assumption of LPA is that variability in a set of continuous observed variables (e.g., self-esteem and self-control) is determined by a latent categorical variable which forms various profiles (Vermunt and Magidson 2002). To do so, each individual's probability of class membership is predicted given different parameter estimates in each distribution so that the individual is classified into a certain class which has the highest probability, namely the most appropriate group for the observation. Researchers in the applied area have used LPAs to investigate academic self-concept profiles (Marsh et al. 2009), and achievement goal profiles (Tuominen-Soini et al. 2011) to complement the variable-centered approaches.

3 Method

3.1 Sample

The participants for this research were selected from a panel database (i.e., Taiwan Student Physical and Mental Development Study; PAMD). Stratified sampling was employed by PAMD to select sample from four districts (i.e., north, south, midland, and eastern/off-shore island) covering 25 counties in Taiwan. Data were collected on 1,332 junior high students (grade 7) sampled in 2007 PAMD. In 2008, one-third of the students (grade 8) sampled in 2007 were randomly selected for data collection to form a panel dataset. For cross-year LPA validation purpose, the current study only used data available for both 2007 and 2008 school years, resulting in a sample of 488 junior high students, with 260 (53 %) boys and 228 (47 %) girls.

3.2 Measures

The study collected seven constructs of student information including two clustering variables for LPA—self-control and self-esteem, as well as five validating variables of clustering membership—deviant behavior, academic achievement, friendship, time management, and life satisfaction. Information of academic achievement was obtained from the student report cards. All the other information was collected with self-reported questionnaires administered at school with teacher guidance. We provided detailed information of each measure regarding its scoring, content, reliability, and validity.

3.2.1 *Self-Control*

Students' self-control (SC) was measured with the self-control scale (Gottfredson and Hirschi 1990), which consisted of 24 items to form six dimensions of impulsivity, risk seeking, preference for simple tasks, preference for physical activities, self-centeredness, and bad temper. Responses were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Coding was reversed so that higher scores represent better self-control. An exploratory factor analysis on the sample of this study revealed that the six factors explained 41.8 % of total variance. The alpha coefficients for

the subscales ranged from .69 to .80 and .83 for the whole scale; the reliability across two assessments was .873. An example item of the “impulsivity” states “I often act on the spur of the moment without stopping to think,” the item for “risk-seeking” “Sometimes I will take a risk just for the fun of it,” the item for “preference for simple tasks” “I absolutely do not like hard tasks that stretch my abilities to the limits,” the item for “preference for physical activities” “I feel better with I am on the move than when I am sitting and thinking,” the items for “self-centeredness” “If I really want something, it does not matter how I get it,” and items for “bad temper” “I lose my temper easily.”

3.2.2 *Self-Esteem*

Self-esteem was evaluated using Rosenberg’s Self-Esteem Scale (Rosenberg 1965) with five items measuring positive self-esteem (PSE) and 5 items measuring negative self-esteem (NSE) on a five-point Likert scale (1 for strongly disagree and five for strongly agree). For this sample, an exploratory factor analysis found that the two factors explained 46.1 % of total variance. The alpha reliability ranged from .811 to .872 for positive self-esteem and negative self-esteem across two school years.

3.2.3 *Deviant Behavior*

Deviant Behavior Scale—Taiwanese Adolescent Version (Hsu 1996) was assessed with 12 items in terms of frequency to break school or parental rules (such as cheating in the examination, breaking school dressing code or bringing prohibited stuffs (e.g., pornography) to school) and conflicts with peers, teachers and family in the past semester. Students answered each question with five possible levels of responses including “none,” “1 to 2 times,” “3 to 5 times,” “6 to 9 times,” and “10 times or more.” Because DB Scale reports behavior frequency, we decided that the factor analysis for construct validity examination is not necessary.

3.2.4 *Academic Achievement*

Academic achievement was obtained at the semester end from the record of overall student grades across all school subjects. The class grade was transformed as t score within each class.

3.2.5 *Friendship*

Friendship was assessed using Friendship Scale (Lin et al. 2007) in terms of the number of friends the respondents think they can turn to when they are in various needs (asking for help while in difficulty, confiding, or having a heart-to-heart talk). The number of peers chosen by the adolescent as friends is the quantitative indicator of friendship. The FS consisted of 5-items on 7 possible levels of responses including “none,” “1 to 2 friends,” “3 to 4 friends,” ... and “more than 10 friends.” The example item states “When you are moody, how many friends are there that you can confide to?” Because FS reports friend number, we decided that it does not need a factor analysis for construct validity examination.

3.2.6 Time Management

Time management was assessed using Time Use and Planning Scale (Lin et al. 2007) which investigated how time was spent among study, maintenance, leisure, etc. and what degree students complete long term (semester/month) and short term (daily-based) activities by planning. We only used the Planning subscale, which was assessed with 3 items on a 5-point Likert scale (1 for strongly disagree and 5 for strongly agree). For this sample, an exploratory factor analysis found that the 2 factors (time use and time management) explained 70.6 % of total variance and the alpha reliability were .84 and .89. The example items of time management are: “I have a set of goals for the entire semester and plan my study time according to the set of goals” and “I plan my day before I start it.”

3.2.7 Life Satisfaction

Life satisfaction was measured using the Satisfaction with Life Scale (SWLS; Diener et al. 1985). SWLS was a global measure of life satisfaction that was the general element of Subject Well-Being. The SWLS consists of 5-items on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An exploratory factor analysis toward our sample found that the single factors explained 51.4 % of total variance and the alpha reliability was .79.

3.3 Data Analysis

We performed a series of LPAs to identify groups with similar self-control and self-esteem patterns. Factor scores obtained from a confirmatory factor analysis were used in LPAs. Using factor scores for follow-up analysis have the advantages of identifying observations' ranking on the latent factor, modeling measurement at the latent level, and distinguishing the error component from the shared factor variance (Bollen 1989; DiStefano et al. 2009; Grice 2001). The LPA is similar to cluster analysis; however, the strength of LPA is that it allows for the computation of model fit statistics for the determination of the optimal group solution. Separate LPAs with 1-, 2-, 3-, 4-, and 5-group solutions were conducted using Mplus 6.11 (Muthén and Muthén 2010). The optimal group number was determined by both the interpretability of the group and appropriateness of the fit statistic and statistical tests. We used Bayesian Information Criterion (BIC; Schwarz 1978), Vuong-Lo-Mendell-Rubin (VLMR) likelihood ratio test (Lo et al. 2001), and entropy as the statistical criteria. The model with the smallest BIC value is considered to be a better fit model. The VLMR likelihood ratio test provides p value to tell if $k-1$ (H_0) or k - group solution is tenable. A p value $<.05$ indicates k -group is preferred. Entropy ranges from 0 to 1. Higher values of entropy denote higher classification utility given the indicators. We also performed the LPA at Time 2 to check the change in profile and stability of group membership.

In order to test the stability and change of group membership from Time 1 to Time 2, we carried out a Configurational Frequency Analysis (CFA; vonEye 1990). CFA enables the identification of type and antitype of the class transition across time. A type is a transition pattern that is observed more frequently than expected by chance. An antitype is a transition pattern that is observed less frequently than expected by chance. By identifying type and antitype, we are able to answer if individuals tend to stay in a particular group more frequently than would be expected by chance alone or if individuals tend to move across group that cannot be ascribed to random fluctuation.

The latent group categorical variable derived from self-control and self-esteem measures was used as the single factor in ANOVA test to validate the cluster membership in terms of measures of student achievement, life satisfaction, friendship, time management, and deviant behavior.

4 Results

4.1 Self-Control and Self-Esteem Profiles

The LPA revealed that the 4-group solution was better than the 5-group solution, evidenced by the p value of VLMR likelihood ratio test (.5510) in Table 1. The 4-group solution was considered better than the 3-, 2-, and 1-group solutions due to a significant pVLMR (.0001) and smaller BIC values. The 2-group solution, despite having a larger entropy than the 4-group solution, was not statistically different from the 3-group solution according to VLMR likelihood ratio test. The entropy for the 4-group solution (.77) was only slightly lower than the 2-group solution (.79). As a result, we determined the 4-group solution to be the best-fitting model. Group 1 consisted of 83 (21 %) individuals, group 2 $n = 255$ (49 %), group 3 $n = 130$ (26 %) and group 4 $n = 20$ (4 %) individuals. The average posterior probability for observations being classified to class 1, 2, 3, and 4 was .85, .89, .89, and .93.

To interpret each group of time 1 and time 2, the standardized response means of PSE, NSE, and SC for the extracted four profile groups are plotted in Fig. 1 (time 1) and in Fig. 2 (time 2). Standardized scores are z scores measured in terms of units of standard deviations. Standardized scores describe the relatively standing of an observation in the entire distribution (Hinkle et al. 2003) so that we can compare group means on the response variables more accurately. ANOVA tests on the clustering variables (PSE, NSE, and SC) and validating variables (i.e., deviant behavior, achievement, friendship, time management, and life satisfaction) are also exhibited in Fig. 1, 2. We categorized and interpreted the group profiles in terms of their profile shapes and magnitudes in PSE, NSE, and SC. The magnitude of the profiles was classified into low, medium, and high levels. Low scores in standardized PSE, NSE, and SC were those below $-.5$ standard deviations. Medium scores were those within $\pm .5$ standard deviations. High scores were those above

Table 1 Values of Bayesian Information Criteria and Vuong-Lo-Mendell-Rubin Likelihood Ratio Test for different group solutions for LPA at Time 1 and Time 2

	Number of groups	BIC	p_{VLMR}	Entropy
	Time 1			
	1	2,788	–	–
	2	2,569	.0015	.79
	3	2,481	.0301	.74
	4	2,419	.0001	.77
	5	2,424	.5510	.72
	Time 2			
	1	3,289	–	–
	2	3,128	.2400	.60
	3	2,951	.3006	.74
	4	2,846	.0018	.75
	5	2,858	.1106	.75

BIC = Bayesian Information Criterion, p_{VLMR} = Vuong-Lo-Mendell-Rubin Likelihood Ratio Test

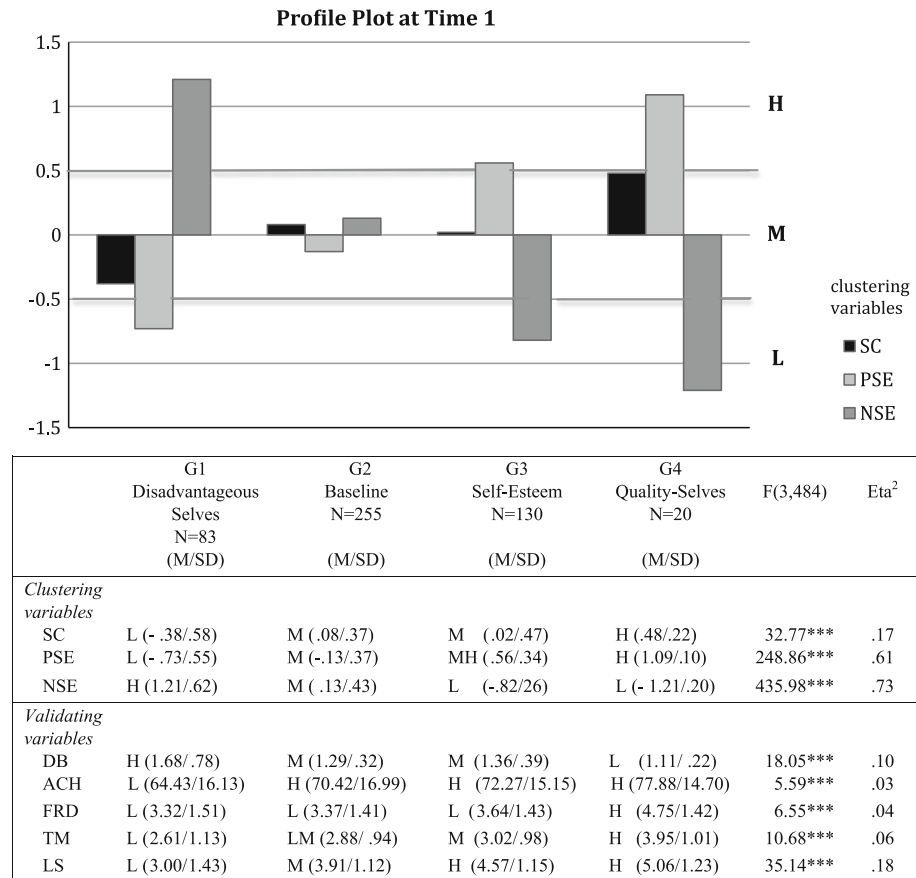


Fig. 1 Time 1 LPA result and ANOVA summary: standardized mean scores and standard deviations of the three clustering variables and validating variables

Note Clustering variables: SC Self-control, PSE Positive self-esteem, NSE Negative self-esteem. Validating indicators: DB Deviant behavior, ACH Achievement, FRD Friend, TM Time management, LS Life satisfaction. Low, medium, high in self-features were determined by the standardized mean scores. Low scores were those <-0.5 standard deviations. Medium scores were those within ±0.5 SDs. High scores were those >0.5 SDs. Means significantly differ from others across groups: H (high) > M (middle) > L (low). MH or LM indicate that the group differences of the variables were not significant between middle to high or low to middle. Games-Howell test was applied for post hoc comparisons due to unequal variances in each cell. ****p* < .001

.5 standard deviations. As shown in Figs. 1, 2, SC and SE display a positive association pattern in four group profiles. SE scores were relatively scattered while SC scores gathered together.

At time 1, four groups extracted from the LPA showed distinct patterns in each of the clustering variables, for SC $F_{(3,484)} = 32.77, p < .001, \text{Eta}^2 = .17$; for PSE $F_{(3,484)} = 248.86, p < .001, \text{Eta}^2 = .61$; for NSE $F_{(3,484)} = 435.98, p < .001, \text{Eta}^2 = .73$ (in Fig. 1). Group 2 had standardized response scores centered around the mean in all the 3 clustering variables ($M_{SC} = .08, M_{PSE} = -.13, M_{NSE} = .13$, see Fig. 1) so it was coined as the “Baseline” group. Compared with the Baseline group, groups 1 and 4 display apparent self profiles shown in the ANOVA results. Group 4 had the congruently most positive self profile, the highest SC, PSE and the lowest NSE ($M_{SC} = .48, M_{PSE} = 1.09$, and $M_{NSE} =$

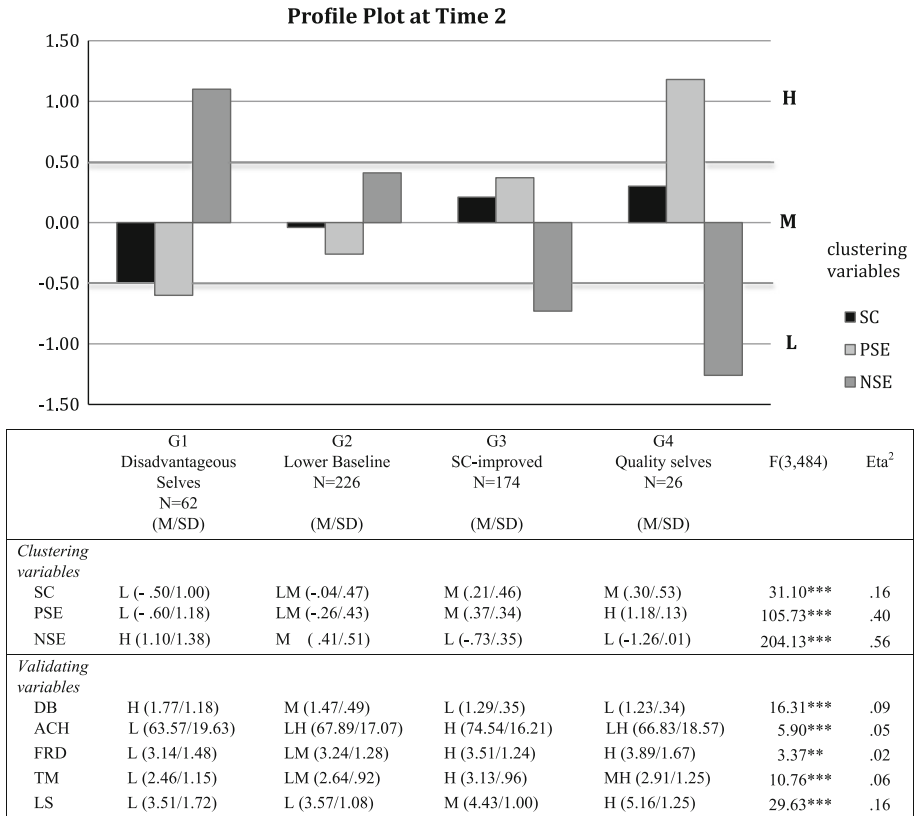


Fig. 2 Time 2 LPA result and ANOVA summary: standardized mean scores and standard deviations of the three clustering variables and validating variables. The names of group 2 and group 3 are different across time 1 and time 2

Note Clustering variables: SC Self-control, PSE Positive self-esteem, NSE Negative self-esteem. Validating indicators: DB Deviant behavior, ACH Achievement, FRD Friend, TM Time management, LS Life satisfaction. Low, medium, high in self-features were determined by the standardized mean scores. Low scores were those < -0.5 standard deviations. Medium scores were those within ±0.5 SDs. High scores were those > 0.5 SDs. Means significantly differ from others across groups: H (high) > M (middle) > L (low). MH or LM indicate that the group differences of the variables were not significant between middle to high or low to middle. Games-Howell test was applied for post hoc comparisons due to unequal variances in each cell. ***p* < .01; ****p* < .001

-1.21), so was coined as the Quality Selves group. Whereas, group 1 showed the congruently poorest self profile, the lowest SC, PSE and the highest NSE ($M_{SC} = -.38$, $M_{PSE} = -.73$, and $M_{NSE} = 1.21$), was named the Disadvantageous Selves. Group 3 demonstrated less evident profile. It had equal level of SC to the Baseline as well as higher PSE and lower NSE than the Baseline. Group 3, decided to name as the “Self-Esteem” group, had medium SC, high PSE, and low NSE scores ($M_{SC} = .02$, $M_{PSE} = .56$, and $M_{NSE} = -.82$).

Based on the same evaluation criteria as in Time 1, the 4-group solution was better than the other solutions (in Table 1). Four groups extracted from the LPA also showed distinct patterns in each of the clustering variables, for SC $F_{(3,484)} = 31.10$, $p < .001$, $Eta^2 = .16$; for PSE $F_{(3,484)} = 105.73$, $p < .001$, $Eta^2 = .40$; for NSE $F_{(3,484)} = 204.13$, $p < .001$, $Eta^2 = .56$ (see Fig. 2). At Time 2, group 1 had the lowest SC, PSE, and highest NSE among the four groups. Group 1 at Time 1 and Time 2 was exactly the same in terms of

Table 2 Cross-time comparison of standardized response means of clustering variables using paired t test

Clustering variables in time 1 and time 2	G1 Disadvantageous selves		G2 Time 1: baseline Time 2: lower baseline		G3 Time 1: self-esteem Time 2: SC-improving		G4 Quality-selves	
	T1/T2	Paired t	T1/T2	Paired t	T1/T2	Paired t	T1/T2	Paired t
SC	-.38/-.50	-	.08/-.04	-3.12*	-.02/.21	3.53***	.48/.30	-
PSE	-.73/-.60	-	-.13/-.26	-3.56**	.56/.37	-4.18***	1.09/1.18	2.56*
NSE	1.21/1.10	-	.13/.41	6.53**	-.82/-.73	2.74**	-1.21/-1.26	-

T1 = Time 1, T2 = Time 2

* $p < .05$; ** $p < .01$; *** $p < .001$

shape and magnitude of the clustering variables (for PSE, NSE, and SC, paired $t = .96$ – 1.14 , $ps > .05$). Group 4 had the highest SC, PSE, and the lowest NSE at Time 2. Group 4 at Time 1 and Time 2 was nearly the same except that the magnitude of PSE is higher at Time 2 (paired $t = 2.56$, $p = .014$, in Table 2). The names of these two groups remained the same at time 2 (Group 1 = the Disadvantageous selves and Group 4 = the Quality Selves).

At time 2, Group 3 had the same level of SC as Group 4, the second highest PSE, and second lowest NSE. Across time, Group 3 had changes in the magnitude of self profile, including increased SC ($M_{SCt1} = .02$, $M_{SCt2} = .21$, paired $t = 3.53$, $p < .001$, Table 2), increased NSE ($M_{NSEt1} = -.82$, $M_{NSEt2} = -.73$, paired $t = 2.74$, $p < .01$), and decreased PSE ($M_{PSEt1} = .56$, $M_{PSEt2} = .37$, paired $t = -4.8$, $p < .001$). Therefore, Group 3 was regarded as the “SC-Improved” group because of the noticeable increase of SC to the same level of the Quality Selves despite the decrease in PSE. At time 2, Group 2 had equal level of SC and PSE to the Disadvantageous Selves and second highest NSE. That is, the general quality of the Baseline was degrading at Time 2. As shown in Table 2, Group 2 had an essential cross-time change in the profile magnitude, such as decreased SC (paired $t = -3.12$, $p < .01$), PSE (paired $t = -3.56$, $p < .001$), and increased NSE (paired $t = 6.53$, $p < .001$), so it was regarded as the lower Baseline at time 2.

4.2 Differences in Indicators of Adolescent Development

4.2.1 Time 1

In order to further describe the characteristics of groups, we examined how members with various self-control and self-esteem profiles differed with respect to five adolescent quality of life indicators. The ANOVA results in Fig. 1 show that the four groups differed significantly in all the five quality of life indicators. Group 4, the Quality Selves, demonstrated the fewest deviant behaviors, best academic achievement (though not statistically different from the Baseline and the Self-Esteem), highest number of friends, best time management perspectives, and highest evaluation of life satisfaction (not statistically different from the Self-Esteem). In contrast, the Disadvantageous Selves had the most deviant behaviors, poorest academic achievement, worst time management perspectives, lowest life satisfaction evaluation, and about the same number of friends as the Baseline and the Self-Esteem. Given equal self-control, the Self-Esteem had higher PSE and lower NSE than the Baseline; however, in the performances of validating variables, the two groups only differed in life satisfaction (the baseline had lower life satisfaction than the Self-Esteem).

4.2.2 Time 2

The result in Fig. 2 shows that the 4 groups differed significantly in all the five adolescent quality of life indicators at time 2. The SC-Improved and the Quality Selves had statistically the lowest deviant behavior, the same highest scores in achievement, time management, number of friends. They differed only in that the Quality Selves had higher sense of life satisfaction than the SC-Improved. The Disadvantageous and the Lower Baseline had statistically the same lowest scores in achievement, number of friends, time management, and life satisfaction. The two groups only differed in deviant behavior, where the Disadvantageous demonstrated more deviant behaviors. Differences were found between

Table 3 Configural frequency analysis on Time 1 and Time 2 groups

Time 1 to Time 2 self profile

Configurations	Obs.	Exp.	χ^2	<i>p</i>	Transition type	Transition comment
G1 _{T1} /G1 _{T2}	30	10.55	46.94	<.001	T	Stable
G1 _{T1} /G2 _{T2}	44	38.44	1.49	.111		Positive
G1 _{T1} /G3 _{T2}	9	29.59	25.50	<.001	A	Positive
G1 _{T1} /G4 _{T2}	0	4.42	4.42	.018		Positive
G2 _{T1} /G1 _{T2}	17	32.40	16.40	<.001	A	Negative
G2 _{T1} /G2 _{T2}	152	118.09	36.78	<.001	T	Stable
G2 _{T1} /G3 _{T2}	81	90.92	3.17	.038		Positive
G2 _{T1} /G4 _{T2}	5	13.59	10.63	<.001	A	Positive
G3 _{T1} /G1 _{T2}	12	16.52	1.52	.109		Negative
G3 _{T1} /G2 _{T2}	28	60.21	42.30	<.001	A	Negative
G3 _{T1} /G3 _{T2}	75	46.35	36.13	<.001	T	Stable
G3 _{T1} /G4 _{T2}	15	6.93	11.90	<.001	T	Positive
G4 _{T1} /G1 _{T2}	3	2.54	.00	.489		Negative
G4 _{T1} /G2 _{T2}	2	9.26	9.57	<.001	A	Negative
G4 _{T1} /G3 _{T2}	9	7.13	.43	.257		Negative
G4 _{T1} /G4 _{T2}	6	1.07	20.29	<.001	T	Stable

Bonferroni-adjusted alpha = .0031250

Self profiles

Time 1 G1 = Disadvantageous selves, G2 = Baseline, G3 = Self-esteem, G4 = Quality selves

Time 2 G1 = Disadvantageous selves, G2 = Lower Baseline, G3 = SC-Improved, G4 = Quality selves

A = Antitype (less frequent than the expected chance), T = Type (more frequent than the expected chance)

the better self groups (groups 3 and 4) and the poor self groups (groups 1 and 2) in all the adolescent quality of life indicators except number of friends.

4.3 Stability and Change of Class Membership

The second main goal of this study was to examine the stability of and changes in the group memberships from Time 1 to Time 2. In the present study, groups at Time 1 and Time 2 provided sixteen possible configurations. The outcome of the configural frequency analysis (CFA) is presented in Table 3. Five types and five antitypes were found through application of CFA. A “type” is a transition pattern that is observed more frequently than expected by chance. An “antitype” is a transition pattern that is observed less frequently than expected by chance. The result in Table 3 shows that individuals belonging to the same group across two measurement points were significant types (four out of the five types: G1_{T1}/G1_{T2} = 30 individuals, G2_{T1}/G2_{T2} = 15 individuals, G3_{T1}/G3_{T2} = 75 individuals, and G4_{T1}/G4_{T2} = 6 individuals). Approximately 54 % of the students remained in the same group cross a year. The remaining type was individuals moving from group 3 at Time 1 to group 4 at Time 2 (G3_{T1}/G4_{T2} = 14 individuals) indicating moving toward a better self profile.

Group 1 members at Time 1 were unlikely to move to group 3 at Time 2 (Antitypes: $G1_{T1}/G3_{T2}$, in Table 3). It is unlikely that group 2 members at Time 1 moved to group 1 or 4 at Time 2 (Antitypes: $G2_{T1}/G1_{T2}$, $G2_{T1}/G4_{T2}$). Students of group 3 at Time 1 were unlikely to move to group 2 at Time 2 ($G3_{T1}/G2_{T2}$). Similarly, group 4 students at Time 1 were unlikely to move to group 2 at Time 2 ($G4_{T1}/G2_{T2}$). Approximately 13 % of the transitions were categorized as untypical. Except for the types and antitypes, 33 % membership transitions were more frequently between adjacent groups and were more likely to be positive ($G1_{T1}/G2_{T2} = 44$ students, $G2_{T1}/G3_{T2} = 81$ students) than negative ($G3_{T1}/G1_{T2} = 12$ students, $G4_{T1}/G1_{T2} = 3$ students, $G4_{T1}/G3_{T2} = 9$ students).

5 Discussion and Conclusion

The primary goal of the current study was to identify a topology of self perspectives including self-control (the interactive aspect between self and environment) and self-esteem (the evaluation or attitude toward self) among adolescents in Taiwan and how the topology was related to adolescents' quality of life indicators. We extracted groups using Latent Profile Analyses at two time points (across school year of 7th–8th grade, 12–14 year-old) and tested the cross-year stability of the group membership and change in the profile shape.

First of all, across two school years the current study found four similar self profiles that represent the junior high school students with different magnitudes in the clustering variables. At time 1, group 4 “Quality Selves,” having both highest self-esteem and self-control had consistent best performance in all the relevant adolescent quality of life indicators while group 1, “Disadvantageous,” having both lowest self-esteem and self-control displayed consistent worst performance in all the life adjustment perspectives. Given the same level of self-control in group 2 (“Baseline”) and group 3 (“Self-Esteem”), the Self-Esteem group had higher evaluation of life satisfaction while no difference was found in other 4 quality of life indicators.

Secondly, approximately 54 % of the students remained in the same group cross a year and in general the cross-year self-profile transitions were more likely positive (upward to better self-profiles) than negative. Group 2 at time 2 were renamed as the Lower Baseline and Group 3 at time 2 the SC-Improved because of self-profile transitions. Differences were found between the better self groups (groups 3 and 4) and the poor self groups (groups 1 and 2) in all the adolescent quality of life indicators except number of friends.

Thirdly, previous research has shown that self-control and self-esteem are two correlated constructs (e.g., Trumpeter et al. 2006; de Ridder et al. 2011). Higher scores in one construct were assumed to correspond to higher scores in another. This assumption was most evident for the “Quality Selves” and the “Disadvantageous” at both time 1 and time 2. The transition patterns of the “Self-esteem” at time 1 to “SC-Improved” at time 2 provided valuable information regarding adolescent development. Through cross-year analysis, we found higher SE seemed to be a propelling factor or a catalyst for students to gain better SC at a later time. The Self-Esteem at time 1 who performed middle level in most Quality of Life indicators became the SC-Improved at time 2 who had the same best Quality of Life as the Quality Selves.

On the other hand, the significance of self-control was evident in the wellbeing outcomes of the “Baseline” group across two consecutive years. At time 1, they had better quality of life than the “Disadvantageous Selves” with fewer deviant behaviors, better school achievement, and higher life satisfaction. However, over one-year transition, the

Baseline students became the Lower Baseline who performed similarly as the worst adjusted “Disadvantageous Selves” in all quality of life indicators, except fewer deviant behaviors than the “Disadvantageous.” For a group without notable self traits, medium self-control is enough to sustain a certain quality of life at the first year. However, self-control is considered as a self-strength to resist temptations or engage in desirable behaviors (Baumeister et al. 1998); the exerting of self-control reduces the strength in a common, limited resource. The reservoir of self-control needs constant investment and the level enough to sustain life quality earlier may not be enough to hold the same level of life quality at the consecutive year. Therefore, we suggest that along the adolescent period, the level of self-control needs to be strengthened in order to avoid the loss of life quality.

By observing the substantial changes in SC and SE across two consecutive years, our understanding of the relative importance of SC and SE in students’ wellbeing is getting clear. SE, though is not an elixir to all positive life outcomes, is likely a propelling factor so that students believe the goodness in themselves, move toward a self-enhancing direction, and are more likely to improve their SC. On the other hand, SC needs constant investment or supplement that may keep adolescents away from the damages occurred in environmental challenges in their transitional period. For students to improve their academic, social, behavioral and general life outcomes, we are in line with suggestion of Baumeister (2005) to invest in SC. While we would like to add that to boost SC in students, a good self-esteem is a catalyst. Educational programs solely aim at cherishing self could move beyond for a double-core direction that also enhances adolescent social adaption with self-discipline training.

Results of the current study, however, should be interpreted in light of limitations. The current sample focused on junior high school students in Taiwan. To generalize the results to other samples, future research can be conducted with culturally and ethnically diverse groups in an international context and extended to test self-control and self-esteem profiles in different age groups. Additionally, the current study used Rosenberg’s self-esteem scale, which measures the positive side of self-esteem, and may not be able to address issues related with the dark side of over self-esteem.

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