Validation of a Measurement Model for Psychosocial Developmental Characteristics among Adolescent Students and the Study of Invariance across Age Groups

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Abstract: This study aimed to validate the components of psychosocial development and examined the invariance of psychosocial developmental models among adolescent students of different ages. A sample group of 1,051 upper secondary school students were selected through a two-stage sampling method, and the data was collected using an identity model scale developed from the measures on the psychosocial development scale. Confirmatory factor analysis with the LISREL program was used to analyze the data. The results showed that the components of psychosocial development in upper secondary school students remained consistent across age groups, with a two-dimensional measurement model consisting of positive and negative psychosocial development, each with eight sub-issues. The measurement model was found to be consistent with empirical data, although the parameters differed between age groups. These findings suggest the need for a program to promote positive psychosocial development suitable for teenagers of both age groups. Overall, this study provides important insights into the psychosocial development of adolescent students and highlights the importance of considering age-related differences of developmental models.

Keywords: Psychosocial development characteristics, Adolescent, Well-being

Introduction

Human development is a complex and fascinating subject that seeks to understand the changes individuals undergo as they progress through various stages or ages (Shaffer & Kipp, 2007). These transformative phases encompass a multitude of dimensions, including cognitive, physical, emotional, personality, and social changes, all of which shape the growth of individuals. These developmental milestones not only influence by innate factors, but are also profoundly affected by environmental and social contexts. Among the many theories that aim to elucidate these multifaceted developments, one stands out as a pioneer in comprehensively explaining the interplay between individual and social factors, psychosocial development theory (Green & Piel, 2002; Wattananonsakul, Suttiwan, & Iamsupasit, 2018). Erik Erikson's theory of psychosocial development posits that human growth and development transpires through eight distinct stages. Each stage is characterized by a unique psychosocial crisis that individuals must successfully resolve to attain healthy personality development. The resolution of each stage leads to the development of a particular psychosocial strength or virtue that prepares individuals to cope with future challenges (Green & Piel, 2002). For instance, during the initiative vs. guilt stage of early childhood, children who resolve this crisis develop strength of purpose, while adolescents who resolve the identity vs. role confusion stage develop the strength of fidelity, which is vital for successful navigation through the complexities of adulthood. Moreover, Erikson's theory emphasizes the importance of the successful resolution of each stage in childhood and adolescence, as failure to do so can result in long-term negative effects on mental health and wellbeing. Therefore, it is imperative that parents, educators, and mental health

professionals are aware of the potential challenges children and adolescents face at different stages of development and provide appropriate support and intervention when needed (Batra, 2013).

Extensive research consistently underscores the significance of nurturing positive psychosocial development throughout in adolescence and early adulthood (Erikson, 1959; Rutter, 1999; Wattananonsakul & Tuicomepee, 2014). More specifically, the successful resolution of psychosocial challenges during critical developmental stages can foster the cultivation of essential strengths and virtues that aid individuals in navigating forthcoming challenges (Green & Piel, 2002). Prior studies have emphasized the pivotal role played by a robust sense of self and identity in promoting positive mental health outcomes, including resilience and well-being (Rutter, 1999; Bogaerts et al., 2021; Warunwutthi, Wattananonsakul, & Ekpanyaskul, 2022). Former research has also illustrated that unresolved psychological crises during childhood and adolescence can result in a range of issues, such as stress, anxiety, and psychiatric disorders (Compas et al., 2017; Buajun et al., 2019; Meca et al., 2023). For instance, adolescents who experience identity confusion and role conflict may have an increased risk for depression and substance abuse (Arnett, 2000; Bogaerts et al., 2021; Wattananonsakul & Tuicomepee, 2014). Assessing and evaluating these positive characteristics at each stage of development is valuable in understanding psychosocial functioning and developmental progress, as well as potential areas of vulnerability. For instance, a child who successfully resolves the trust vs. mistrust stage in infancy may develop the positive characteristic of hope, which is associated with better emotional regulation, social competence, and mental health outcomes. Similarly, an adolescent who successfully resolved the identity vs. role confusion stage may develop the positive characteristics of fidelity, which is associated with stronger identity development and self-esteem (Erikson, 1968 cited in Green & Piel, 2002). During adolescence, bodily growth can have a direct impact on sense of self and personal identity (Rutter, 1999; Wattananonsakul & Tuicomepee, 2014). This developmental period marks a crucial time for the complete formation of the concept of self, with late adolescence being the time when it is still being developed. However, the transition to adolescence is a critical developmental period that can pose significant challenges for the formation of a sense of self or the identity of an individual. Previous research has demonstrated that during this period, students may experience heightened levels of stress, fear, anxiety, and psychiatric problems, particularly during middle and late adolescence (Compas et al., 2017). This can be attributed to a range of factors, such as unfamiliar social and academic environment, increased academic and financial responsibilities, and the need to navigate complex social relationships (Eccles & Roeser, 2011)

Table 1, as provided below, outlines the subcomponents of psychosocial development, their definitions, and the social agents involved in each subcomponent. Psychosocial development refers to the process through which individuals develop and navigate various psychological and social aspects throughout their lives. It encompasses important stages and milestones that contribute to the formation of a personality, values, and social interactions (Zhang, 2015). The subcomponents listed in the table highlighted key areas of psychosocial development, such as trust, autonomy, initiative, industry, identity, intimacy, generativity, and integrity. Each subcomponent represents a distinct developmental phase characterized by specific psychological and social dynamics. Additionally, the table identifies the social agents who play significant roles in shaping and influencing the psychosocial development of individuals in each subcomponent. These social agents include family members, peers, teachers, and cultural norms, depending on the particular subcomponent. Understanding the subcomponents of psychosocial development and the associated social agents is crucial for

educators, counselors, and individuals themselves to effectively support and foster positive personality traits and overall well-being. By recognizing the importance of these subcomponents and social agents, interventions and strategies can be tailored to promote healthy development and positive outcomes across different stages of life.

Developing measurement for the psychosocial developmental characteristics model that helps to understand the formation of a strong sense of self and identity is therefore a critical goal for promoting positive psychosocial development during this period development (Meca et all., 2023). Such positive characteristics can help individuals build the necessary skills and resources to navigate the challenges of childhood and adolescence, academic and financial stressors, and can promote long-term mental health and well-being (Compas et al., 2017; DeMoor et al., 2022). This highlights the importance of promoting positive psychosocial development during adolescence and early adulthood. The developing interventions are followed by a screening test of psychosocial development to see the vulnerability of each stage. The information can contribute to positive mental health outcomes and help individuals navigate the challenges of this developmental period.

In terms of clients and potential therapy, Erik Erikson's eight stages of psychological development offer a comprehensive view that aids in understanding the issues of the clients and potential concerns, thereby leading to more effective therapeutic interventions. The eight-stage model of psychodynamic psychotherapy, inspired by Erikson's theory, serves as a valuable framework for therapists to identify and address developmental issues in their clients (Hawley, 1988). By utilizing this model, therapists gain a deeper understanding of the therapeutic processes of their clients and approach their cases from new perspectives. Previous research has demonstrated the relevance of the eight-stage therapy paradigm in assisting clients with various developmental challenges. It is important to note that the stages of therapy are not always strictly age-based or sequential. Rather, therapy can be seen as a process encompassing both symptom resolution and developmental stage resolution, emphasizing identity development as an ongoing process throughout life (Marcia & Josselson, 2013; Zhang, 2015). Trust is a crucial element at all stages of development, and personal psychological growth and the cultivation of virtues should be integral components of their training programs. In summary, the adoption of the eight-stage model of psychodynamic psychotherapy, rooted in Erikson's theory, provides therapists with a valuable framework for understanding the issues of clients and their potential concerns, leading to more effective therapeutic interventions.

Previous study has shown that the Hawley Scale has good psychometric properties and is a reliable and valid measure of psychosocial development. In a study conducted by Hawley and colleagues, the reliability and validity of the measure were assessed on a sample of 1,316 adolescents from diverse backgrounds. The results showed that the measure had good internal consistency, test-retest reliability, and convergent validity with other measures of psychosocial functioning. Moreover, a study conducted by Hawley aimed to examine the sensitivity measurement in terms of detecting changes in psychosocial functioning over time. The findings revealed that the measure demonstrated the ability to detect significant alterations in psychosocial development over a two-year period. Haight (2006) examination of the psychometric properties of measurements, it was discovered that a substantial 97% of all items exhibited strong agreement with their respective subscales, as evidenced by factors such as total item variance, eigenvalues, scree plots, and the comprehensibility of factor solutions. Furthermore, the research has shown that all eight positive and eight negative scales displayed noteworthy inter-subscale correlations with a significance level of .01. In a separate study conducted by Chen (2021) which focused on the investigation of the impact of psychosocial developmental crises and self-stigma on the mental health of college

students with disabilities, positive feedback was provided concerning the effectiveness of Hawley's Measures of Psychosocial Development.

These results indicated that the Hawley Scale exhibits favorable psychometric properties, including reliability and validity, when assessing psychosocial development in adolescents. The findings of this study demonstrate that the Measures of Psychosocial Development is a reliable and valid instrument for assessing psychosocial development from a life-span perspective. Specifically, the study found that the eight primary positive and negative psychosocial development scales maintain robust item-to-subscale agreement and demonstrate significant inter-subscale correlation. The study recommends reducing the total number of item prompts by 16 and moving towards an overall maturity index approach instead of the bipolar stage approach. Overall, these findings suggested that the Measures of Psychosocial Development can be a valuable tool for understanding and assessing psychosocial development across the lifespan, with potential for improvement through modifications to its structure and administration.

Table 1. Subcomponents of Psychosocial Development and Associated Social Agents (Erikson, 1984 cited in Green & Piel, 2002)

Subcomponents	Definitions	Social agents
1. Trust	Trust refers to the developmental period where individuals develop basic social attitudes by learning to trust the surrounding society.	Mother is the key social agent
2. Autonomy	Autonomy represents the developmental phase characterized by the will to lead oneself to success. During this stage, individuals demonstrate independence, decision-making abilities, and the pursuit of personal needs. Parents play a crucial role as the key social agents in fostering autonomy.	Parents are the key social agents.
3. Initiative	Initiative corresponds to the developmental stage focused on purpose and self-development. Individuals aim to develop themselves by planning and striving to become the person they admire. The family acts as the key social agent in this subcomponent.	The family is key social agent.
4. Industry	Industry denotes the period in which individuals acquire various skills, demonstrate curiosity, and have a desire to learn from their surrounding society. Teachers and peers serve as significant social agents, facilitating the acquisition of knowledge, abilities, and a sense of accomplishment.	Significant social agents are teachers and peers.
5. Identity	Identity refers to the rapid development of individuals in various aspects, including physical, mental, intellectual, and social domains. This developmental period involves self-discovery and the exploration of beliefs, ideas, and future goals through life experiences. Peers in society play a pivotal role as social agents in shaping identity.	The key social agent is the society of peers.
6. Intimacy	Intimacy represents a developmental period focused on building close relationships and establishing emotional connections with others in the surrounding society. This includes friendships, romantic relationships, and family life. The ability to integrate one's identity with others without sacrificing the sense of self is a key aspect. Social agents, such as partners, spouses, and close friends contribute to the development of intimacy.	Key social agents are lovers, spouses, and close friends.
7. Generativity	Generativity refers to the developmental period where individuals take on the role of givers and actively contribute to social development. This involves assuming social responsibilities, caring for others, and passing down wisdom, art, and cultural traditions from one generation to another. Significant social agents include spouses, children, and cultural norms.	Significant social agents are the spouse, children, and cultural norms.
8. Integrity	Integrity is a developmental period that emphasizes caring and a forward-looking mindset. It involves focusing on creating meaningful experiences in life rather than dwelling on the past. Social experiences play a crucial role in shaping the outcome of this final life crisis.	Social experiences will determine the outcome of this final life crisis.

This study also aims to extend previous research by validating the characteristic components of psychosocial development among Thai adolescents. Specifically, this study will examine the structure of positive and negative traits through exploratory factor analysis (EFA) of the relevant documents and the social context. Additionally, confirmatory factor analysis (CFA) will be performed to verify the validity of the positive attribute measurement model and investigate potential age differences based on previous developmental studies (Wattananonsakul & Tuicomepee 2014). Ultimately, the results of this study will be used to develop a program aimed at promoting understanding and adaptation among adolescents, or potentially utilized in psychotherapy. The main contribution of this study is the development of a psychosocial development scale that can be used to measure and interpret the results of individual or group counseling in a qualitative manner. This will provide direct benefits to practitioners, as they will have a reliable tool for assessing the psychosocial development of their clients and can tailor their counseling approach accordingly. Consequently, this measure holds utility for researchers, clinicians, and educators, enabling them to evaluate the psychosocial functioning of adolescents effectively. Furthermore, it aids in identifying specific areas where additional support and intervention may be warranted to promote positive developmental outcomes. In addition, the study will provide indirect benefits by contributing to the body of knowledge on psychosocial development in adolescents. Researchers and related parties can use the construct of psychosocial development to promote and develop positive personality traits in adolescents. The findings of this study can also be applied to enhance the developmental characteristics of positive personality traits for the target group, which can lead to positive outcomes in various areas such as education, mental health, and social relationships. Overall, the development and validation of this psychosocial development scale for Thai adolescents contributed to psychological well-being, assessment and counseling in Thailand. The development of this scale provides a measure with evaluation criteria to interpret the results in a qualitative manner for individual or group counseling. Moreover, this study provides researchers and related parties with information to use the construct of psychosocial development for promotion and development in adolescents. The scale can be used to enhance the developmental characteristics of positive personality traits for the target group. Therefore, the present study aims to develop a Thai version of the Psychosocial development Scale for use with Thai adolescents and to examine the psychometric properties. This study will involve adapting the scale to the Thai cultural context, examining the relevance and appropriateness of the developmental tasks and positive characteristics in the Thai context, and validating the measure with a sample of Thai adolescents.

Research methodology

The research methodology utilized in this study was a cross-sectional survey design and the data was collected through self-reported responses to the psychosocial development scale, which was administered to two groups of Thai adolescents: 725 middle adolescent students and 326 late adolescent students. The scale consisted of positive and negative attributes, which were measured on a five-point rating scale. The analysis was conducted in two phases: the first phase involved document analysis to identify the core elements in the measurement model, while the second phase involved an analysis of the quality of the identity measurement tools. Confirmatory factor analysis was used to verify the validity of the positive attribute measurement model and to examine age differences based on previous studies on developmental age differences. The sample size for the study was determined

using Hair et al. (2010) formula, which recommended a minimum sample size of 10-15 sample units per estimation of one parameter to achieve the least discrepancy according to analytical statistical principles.

The study was divided into three phases. In phase one, document analysis was conducted to identify and tabulate the popular elements of the measurement model of psychosocial development. In phase two, the quality of the identity measurement tools was analyzed. Finally, in phase three, the validity of the measurement model was checked using two groups of students: the middle adolescent and late adolescent group. By using appropriate sample sizes and rigorous analytical methods, this study aimed to provide a valid and reliable measure of psychosocial development that could be used in individual or group assessment. Additionally, the findings from this study could be used by researchers and other stakeholders to promote the development of positive personality traits among adolescents and enhance their psychosocial development.

Methods and Materials

This research aimed to develop a Psychosocial Development Scale specifically for Thai adolescents based on Erikson's psychosocial theory. The scale was designed to assess positive and negative attributes related to the eight stages of psychosocial development among students. The measurement tool utilized a five-level rating scale, with scoring criteria ranging from 1 to 5 points. The scale was developed based on the Hawley measures of psychosocial development (Hawley, 1988) and the Erikson scale interpretation of the Psychosocial Development Scale. The internal consistency of the scale was assessed using Cronbach's alpha, and the reliability of the scale was found to be high, with a coefficient of .91 for the positive characteristics factor and .87 for the negative characteristics factor. The development of this scale provides a measure with evaluation criteria to interpret the results in a qualitative manner for individual or group counseling. Moreover, this study provides researchers and related parties with information to use the construct of psychosocial development for promotion and development in adolescents.

Data analysis

The missing data management was performed by replacing missing elements with the average score if the data was missing less than 2% of the time prior to analysis. Descriptive statistics and correlations were calculated for both the demographic characteristics and the variables within the conceptual framework model. In order to test the components of positive and negative psychosocial development, factor analysis was utilized. Maximum likelihood (ML) estimation was employed to estimate the factor loading using LISREL 8.72 (Jöreskog & Sörbom, 1996), with the input of a covariance matrix and related measurement errors. The overall fit of the model was evaluated by considering three criteria: chi-square, root mean square error of approximation (RMSEA) less than .08 (Klimstra & Murrelle, 2007 as cited in Wattananonsakul & Tuicomepee, 2014), and comparative fit index (CFI) greater than .90 (Browne & Cudeck, 1993). In cases where less than 2% of the data was missing, the missing elements were replaced with the average score prior to analysis. Descriptive statistics and correlations were computed for both demographic characteristics and variables in the conceptual framework model.

Invariance analyses were conducted to test whether the measurement model held across different age groups. The first model (Model 1) had an equal number of variables and the same structure of relationships in both groups, with all factor loading paths free to vary

(Base model). The second model (Model 2) tested the invariance of parameters across age, starting from the least restrictive to the most restrictive parameter, using a hierarchical nested hypothesis. In Model 2, paths from latent variables to observed variables were constrained to be invariant across age. The fit of the models was evaluated using various criteria, including chi-square, root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized residuals. A good model fit was also considered to have a relative chi-square ($\chi 2$/df ratio) of 3.00 or less, with CFI and NNFI at 0.90 or higher.

Research results

The statistical analysis confirmed the conceptual frameworks, revealing two distinct components of psychosocial development characteristics: positive and negative. The positive psychosocial characteristics, which included trust, autonomy, initiative, industry, identity, intimacy, generativity, and integrity, were consistent with Erikson's theory of psychosocial development as well as previous research on scale development and quality validation by Hawley. On the other hand, the negative psychosocial characteristics comprised mistrust, shame and doubt, guilt, inferiority, identity diffusion, isolation, stagnation, and despair.

Table 2 presented the demographic characteristics of the participants in the study who volunteered to participate in the survey. A total of 1051 participants were recruited, with 34.53% male and 65.47% female. The average age of the participants was 16.8 years old. The table also shows a breakdown of the age distribution of the participants, with 40.8% of males and 35.5% of females being 16 years old, 30.9% of males and 32.1% of females being 17 years old, and 28.4% of males and 32.4% of females being 18 years old. Overall, the demographic characteristics of the study sample suggest a relatively balanced gender distribution and a representative range of ages within the adolescent population and detailed demographic data for both groups are presented in Table 2.

Table 2. The comparison of demographic data between genders

Demographic data	Male (n=363)	Female (n=688)	Pearson Chi-Square	p-value[1]
Age (years old)				
- 16	148 (40.8%)	244 (35.5%)	3.164	.206
- 17	112 (30.9%)	221 (32.1%)		
- 18	103 (28.3%)	223 (32.4%)		
Mean $\pm$ SD	16.80 $\pm$ 0.82	16.97 $\pm$ 0.82		
Academic year				
Grade 10	188 (51.8%)	319 (46.4%)	2.968	.227
Grade 11	58 (16.0%)	129 (18.7%)		
Grade 12	117 (32.2%)	240 (34.9%)		
Areas				
Northeast	180 (49.6%)	358 (52.0%)	11.385	.003**
Middle	114 (31.4%)	156 (22.7%)		
East	69 (19.0%)	174 (25.3%)		

[1]Asymptotic Significance (2-sided)

Table 3 shows the mean scores, standard deviations, mean differences, t-values, and p-values of the positive and negative psychosocial development components for the middle adolescent group (n=725) and the late adolescent group (n=326). The total positive psychosocial development score of the late adolescent group was significantly higher than

that of the middle adolescent group (t=-2.024, p=.043). However, there were no significant differences in the total negative psychosocial development score between the two age groups (t=.515, p=.606). The mean scores for the eight positive psychosocial development components (P1-P8) were slightly higher for the late adolescent group than for the middle adolescent group, but only the mean scores for P6, P7, and P8, showed significant differences between the two groups. Specifically, late adolescent group scored significantly higher than the middle adolescent group on P6 (t=-2.608, p=.009), P7 (t=-3.087, p=.002), and P8 (t=-2.522, p=.012).

For the negative psychosocial development components (N1-N8), there were no significant differences in mean scores between the two groups. The mean differences were small, ranging from -.099 to .501, and all t-values were less than 1.746, with p-values ranging from .210 to .805. When all components were analyzed, the middle adolescent group had the total score of positive psychosocial development score at 221 ($SD=32.47$) and the late adolescent group with a total score of 225.24 (SD=29.15). There were significant differences of the total positive psychosocial development score between the middle and late adolescent group (t=-2.024, p=.043). However, the total score of negative psychosocial development score between two groups had no difference. (t=.515, p=.606). The detail of mean difference of each component was illustrated in Table 3.

In this study, the principal component method and orthogonal rotation with varimax technique were employed to perform an exploratory factor analysis in order to estimate the factor loadings matrix. Various criteria were utilized to assess the overall adequacy of the factor model. The KMO indices were found to be greater than .05, and Bartlett's test of sphericity was significant at a level of .05, in accordance with the Lewis-Beck's (1989) guidelines. Furthermore, the eigenvalue of factor extraction was greater than 1, and the factor loading of each variable in the factor exceeded .20, in line with the recommendations of Velicer and Jackson (1990). Finally, a confirmatory factor analysis was carried out using the LISREL program to estimate factor loading and relationship.

Table 3. The difference of total positive, negative, and its components of psychosocial development characteristics between middle adolescent and late adolescent groups

Variables	Middle adolescent Group (n=725)		Late adolescent Group (n=326)		Mean difference (95% CI)	t	p-value
	M	SD	M	SD			
Total	221.00	32.47	225.24	29.15	-4.248	-2.024*	.043
Trust (P1)	26.87	4.33	27.36	3.90	-.490	-1.746	.081
Autonomy (P2)	27.27	4.69	27.53	4.76	-.266	-0.846	.398
Initiative (P3)	27.61	4.95	27.75	4.90	-.143	-0.435	.664
Industry (P4)	28.03	4.83	28.34	4.51	-.312	-0.986	.324
Identity (P5)	26.95	4.86	27.34	4.58	-.390	-1.225	.221
Intimacy (P6)	28.61	4.82	29.42	4.27	-.811	-2.608*	.009
Generativity (P7)	27.39	4.84	28.37	4.57	-.980	-3.087*	.002
Integrity (P8)	28.27	5.26	29.12	4.69	-.856	-2.522*	.012
Total	173.96	43.47	172.44	45.00	1.510	.515	.606
Mistrust (N1)	21.62	6.03	21.45	6.57	.171	.414	.679
Shame and doubt (N2)	21.56	6.59	21.45	6.97	.111	.247	.805
Guilt (N3)	21.39	5.69	21.31	5.64	.079	.210	.834
Inferior (N4)	21.68	6.53	21.78	6.65	-.099	-.226	.822
Identity diffusion (N5)	21.17	7.08	20.67	7.25	.501	1.052	.293
Isolation (N6)	22.00	6.49	21.55	6.77	.450	1.025	.306
Stagnation (N7)	21.06	6.61	20.84	6.68	.216	.488	.626
Despair (N8)	23.49	6.39	23.41	6.39	.081	.191	.849

*p<.05

Table 4 presents factor loadings with the rotation component matrix. The table shows two components, positive and negative characteristics, with eight variables each. The factor loadings represent the degree to which each variable is associated with each component. The higher the factor loading, the stronger the association between the variable and the component. For the characteristics of positive components, all variables had high factor loadings ranging from .771 to .894. This suggests that all of the variables (Trust, Autonomy, Initiative, Industry, Identity, Intimacy, Generativity, and Integrity) are strongly associated with the positive characteristics component, and can be considered indicators of positive psychosocial development. For the negative characteristics component, all variables also had high factor loadings ranging from .777 to .889. This suggests that all of the variables (Mistrust, Shame and Doubt, Guilt, Inferiority, Identity Diffusion, Isolation, Stagnation, and Despair) are strongly associated with negative characteristics and can be considered indicators of negative psychosocial development.

The eigenvalue of 5.661 and cumulative percentage of 70.949 indicated that the two components explained a significant proportion of variance in the data. Overall, the factor analysis suggests that the variables used in this study can be grouped into two distinct components, positive and negative characteristics, and provides support for the validity of the psychosocial development scale.

Tests for invariance across age

To examine the hypothesis about age differences, invariance analyses were conducted in this study. The initial model was tested under the same pattern constraints, and modification indices were used to modify the overall fit model, allowing for correlating error terms. The overall fit of Model 1 yielded a chi-square of 19.25 with 12 degrees of freedom and a p-value of .083, indicating that there were no significant age differences in the model. The root mean square error of approximation was .045, and the adjusted goodness of fit index was .97. To further examine age differences, Model 2 with a matrix of pathways from exogenous variables to endogenous variables (Gamma matrix) constraints was tested. This model also had a good fit to the data with a chi-square of 26.17, 18 degrees of freedom, and a p-value of .096. The chi-square difference test indicated that there were no significant age differences in the Gamma matrix parameter. Finally, Model 3 was tested with constraints of pathways among the endogenous variables matrix (Beta matrix). This model also had a good fit to the data, and the chi-square difference test indicated that there were no significant age differences in the Beta matrix parameter. Taken together, the results of invariance analyses across middle and late adolescent groups suggested that the two group models were equal in parameter estimation. Overall, these findings indicated that there were no significant age differences in the tested models.

Table 4. Factor loadings with rotation component matrix

Characteristics	Components	
	Positive Characteristics	Negative Characteristics
1. Trust	.807	-.169
2. Autonomy	.771	-.064
3. Initiative	.830	-.066
4. Industry	.848	-.111
5. Identity	.894	-.084
6. Intimacy	.842	-.133

Table 4. (continue)

Characteristics	Components	
	Positive Characteristics	Negative Characteristics
7. Generativity	.859	-.042
8. Integrity	.818	-.188
9. Mistrust	-.083	.777
10. Shame and doubt	-.093	.793
11. Guilt	-.019	.847
12. Inferiority	-.139	.861
13. Identity Diffusion	-.177	.889
14. Isolation	-.166	.848
15. Stagnation	-.160	.855
16. Despair	-.033	.788
Eigenvalues=5.661, Cumulative % = 70.949		

Discussion

The development of a psychosocial scale is a crucial task in social science research, as it provides a valid and reliable tool to measure and assess complex constructs in human behavior and experience (Maree, 2022). In this study, a psychosocial scale was developed and tested for its validity and reliability. The exploratory factor analysis conducted in the study yielded a factor structure with 16 items and loaded on two factors: positive and negative characteristics. The positive characteristics factor included items related to trust, autonomy, initiative, industry, identity, intimacy, generativity, and integrity, while the negative characteristics included items related to mistrust, shame and doubt, guilt, inferiority, identity diffusion, isolation, stagnation, and despair. The psychometric properties of the scale were evaluated using various criteria indices. The Kaiser-Meyer-Olkin (KMO) measure showed that the sample size was adequate for factor analysis, and Bartlett's test of sphericity indicated that the correlations between items were significant, supporting the suitability of factor analysis. The factor loadings of each item were greater than .20, indicating that they were meaningful and significant (Velicer & Jackson, 1990). The internal consistency of the scale was assessed using Cronbach's alpha, and the reliability of the scale was found to be high, with a coefficient of .90 for the positive characteristics factor and .86 for the negative characteristics factor. The study also used confirmatory factor analysis to test the goodness of fit statistic between the conceptual model and empirical data. The statistical results in Tables 3 and 4 showed the positive and negative psychosocial development characteristics, respectively. These results help to validate the conceptual model and provide evidence for the importance of these characteristics in psychosocial development theory. Additionally, the study identified key social agents for each characteristic, such as parents for Autonomy, teachers and peers for Industry, and lovers and close friends for Intimacy, highlighting the importance of social interactions in psychosocial development. These findings are consistent with Erikson's theory of psychosocial development and previous research conducted by Hawley on tool development and quality validation. On the other hand, the negative characteristics included mistrust, shame and doubt, guilt, inferiority, identity diffusion, isolation, stagnation, and despair with factor loadings ranging from .777 to .889. The eigenvalues for these components were 5.661, explaining 70.949% of the cumulative variance. The findings of this study support the validity and reliability of the psychosocial scale developed, and it can be used in future

research to measure and assess psychosocial constructs in various populations and contexts. However, the generalizability of the findings may be limited by the sample characteristics and the context in which the study was conducted. Future research should explore the psychometric properties of the scale in different populations and settings to establish its cross-cultural validity and applicability.

Psychosocial development scales can be useful in helping individuals overcome past experiences by providing insight into their current level of development and identifying areas that need need improvement. For example, if an individual scores low on the trust or autonomy subcomponents, they may benefit from working with a therapist to develop skills in these areas. By building trust in others and themselves, and by learning to make decisions based on their own needs and desires, individuals can gain greater control over their lives and reduce the impact of past experiences on their present (Marcia & Josselson, 2013). Similarly, if an individual scores low in the intimacy subcomponent, they may benefit from learning skills such as empathy, communication, and conflict resolution to improve their relationships. This can help form stronger connections with others and reduce feelings of isolation or loneliness that may be related to past experiences. The psychosocial development scale can also be used to identify areas of strength, such as high scores in the industry or generativity subcomponents, that can be leveraged to help individuals overcome past experiences. For example, if an individual is highly industrious, they may benefit from setting goals related to work or learning new skills to improve their confidence and sense of accomplishment.

The findings of the study suggests that age plays a significant role in the development of positive and negative psychosocial characteristics among Thai adolescents. The study found that middle and late adolescents had a similar construction of positive and negative psychosocial development, but there were some differences in factor loading paths across the two age groups. These results imply that interventions and programs aimed at improving psychosocial development in adolescents should take their age and developmental stage into account. For example, programs for parents or other significant individuals in the lives of adolescents could be developed that were tailored to their specific age group. Additionally, preventive programs could be developed that target specific positive and negative psychosocial characteristics were more relevant to certain age groups (Meca et al., 2023).

Erikson recognized that maladaptive and devious tendencies can have their roots in fundamental developmental problems, which can lead to relationship and relational issues. However, he did not directly connect the pathology-development process to his eight stages of psychosocial growth or create a stage-based model of therapy. The findings from the factor loadings in this study have important implications for understanding developmental challenges and strengths in individuals. By identifying the positive and negative characteristics associated with specific factors, researchers and practitioners can gain insights into the factors that contribute to both favorable and unfavorable developmental outcomes.

Firstly, the identification of negative characteristics with high factor loadings on the negative factor provides information about potential developmental challenges that individuals may face. These characteristics, such as mistrust, shame and doubt, guilt, and isolation, signify areas of vulnerability and potential obstacles in psychosocial development. Understanding these challenges can help professionals tailor interventions and support strategies to address and overcome them. Conversely, the positive characteristics exhibiting high factor loadings on the positive factors indicated areas of strength and resilience in psychosocial development. Characteristics such as trust, autonomy, initiative, and integrity reflect positive qualities that promote healthy development and adaptive functioning.

Recognizing these strengths can guide practitioners in capitalizing on them and fostering further growth and well-being.

Furthermore, the factor loadings shed light on the interplay between characteristics and factors in developmental processes. The presence of high factor loadings suggests that certain characteristics are closely tied to specific developmental factors. This understanding enables researchers and practitioners to explore the underlying mechanisms and dynamics that contribute to the manifestation of these characteristics, offering valuable insights into the complexities of psychosocial development.

By comprehensively examining the range of characteristics and their association with positive and negative factors, a more nuanced understanding of developmental challenges and strengths can be achieved. This knowledge can inform the design of interventions, support systems, and preventive measures to address challenges and cultivate strengths in individuals across various developmental stages. Moreover, understanding developmental challenges and strengths can foster a holistic approach to individual well-being. By recognizing and addressing the challenges individuals may encounter, while simultaneously nurturing their strengths, practitioners can promote resilience, positive adaptation, and overall psychosocial development. This comprehensive understanding enhances the ability to provide targeted and tailored interventions that address the specific needs of individuals and facilitate optimal developmental outcomes.

The present study is subject to certain limitations, the foremost being the small sample size observed in the male sample group. This constraint potentially hinders ability to generalize the study findings when conducting separate analyses. It should be noted that the small sample size restricts the generalizability of the results of the study to other populations of adolescent males or different age groups. Therefore, to address this limitation and ensure greater representativeness, further research is warranted, specifically by equalizing the male and female populations in future studies. Increasing the sample size of both genders would provide a more comprehensive understanding of the phenomenon under investigation. Another important consideration is that the results of this study were obtained from a general population of adolescent students, and therefore, caution should be exercised when attempting to extrapolate these findings to clinical applications, as suggested by the Measure Psychosocial Development (MPD). While the study provides valuable insights into the general adolescent population, the applicability of the results to individuals with specific clinical conditions may be limited. Consequently, further research involving clinical samples and rigorous validation procedures is necessary to determine the suitability and effectiveness of applying these findings in clinical settings, as recommended by the MPD. The scale employed in this study does serve as a comprehensive tool for predicting or addressing future conflicts in well-adjusted individuals. It assesses positive and negative attitudes as well as conflict resolution stages of psychosocial development. Therefore, the results obtained from this scale can provide valuable insights for interpreting personal history and constructing a comprehensive profile that can be used in personal counseling. However, it is important to note that while this scale offers a valuable contribution, additional research and the integration of other assessment methods and counseling approaches are still necessary to develop a more holistic framework that further enhances the anticipation and resolution of future conflicts in individuals.

Conclusion

The results obtained from the factor loadings in this study have significant implications and potential applications within the field of developmental psychology. Firstly, these findings can serve as valuable tools for assessment and screening purposes. Professionals in the field can utilize the identified positive and negative factors, along with their corresponding characteristics, to assess and evaluate the psychosocial development of individuals. This information can aid in identifying strengths and areas of concern, informing intervention strategies, and guiding treatment planning. Secondly, the factor loadings provide guidance for intervention and treatment planning. Individuals exhibiting negative characteristics with high factor loadings on the negative factor may require targeted interventions to address specific developmental tasks associated with those characteristics. By identifying the specific areas of concern, practitioners can design and implement tailored interventions to promote positive development and address any obstacles or challenges individuals may be facing. Furthermore, the results have implications for research and theory development in the field of developmental psychology. The identified factor loadings contribute to the existing body of knowledge and can serve as a foundation for further research. Researchers can build upon these findings to explore the relationships between these characteristics and other factors, investigate their implications across diverse populations, and examine their long-term impact on the psychosocial well-being of individuals. These results open up avenues for future studies to delve deeper into the complexities of psychosocial development and expand theoretical frameworks. One application is at the high school level, where it can be used to assess academic preparedness and identify risky behaviors that might lead to academic difficulties. Students scoring lower on negative items could potentially benefit from counseling and leading to an improved academic experience. It is important to note that MPD is not intended to diagnose pathology but rather to promote psychosocial well-being. In conclusion, the implications of the factor loadings in this study for understanding developmental challenges and substantial strengths. The identification of negative characteristics highlights the potential obstacles individuals face, while recognizing positive characteristics illuminates areas of strength and resilience. This knowledge enhances our understanding of the interplay between characteristics and factors, informing the development of interventions and support systems to address challenges and foster positive development. By adopting a holistic approach to understanding developmental challenges and strengths, practitioners can facilitate optimal psychosocial development in individuals across various stages of life.

Table 5 provides a framework for connecting Erikson's developmental phases to stages of therapy. For example, Erikson's second stage of psychosocial development, which contrasts autonomy with shame and doubt, is related to the second stage of therapy, which balances the opposing poles of letting go and holding on. Both stages focus on the transformation of the psychological process of anal control into a hub of initiative, and the testing of free will in the context of societal authority and constraints.

Table 5. Activities to Support Positive Personality Traits in Psychosocial Development Subcomponents

Subcomponent	Straight Personality	Activities to Support Positive Personality Traits
1. Trust	The virtue of Hope	• Encourage open and honest communication with family members and friends. • Engage in trust-building exercises and group activities that promote teamwork and cooperation. • Provide a supportive and nurturing environment that foster a sense of security and trust.
2. Autonomy	The virtue of Will	• Encourage individuals to make decisions and take responsibility for their actions. • Provide opportunities for individuals to set and achieve personal goals. • Foster independence and self-reliance through age-appropriate tasks and responsibilities.
3. Initiative	The virtue of Purpose	• Support individuals in exploring their interests and passions. • Encourage them to take the lead in planning and organizing activities. • Provide guidance and resources to help individuals develop and pursue their personal aspirations.
4. Industry	The virtue of competence	• Offer opportunities for individuals to learn new skills and engage in hands-on activities. • Recognize and celebrate individual achievements and progress. • Create a positive and motivating learning environment that encourages curiosity and a desire for knowledge.
5. Identity	The virtue of Fidelity	• Promote self-reflection and encourage individuals to explore their values, beliefs, and interests. • Provide platforms for individuals to express their unique identities, such as through art, writing, or presentations. • Foster a culture of acceptance and inclusivity that allows individuals to embrace their individuality.
6. Intimacy	The virtue of Love	• Facilitate opportunities for individuals to build and maintain meaningful relationships. • Promote empathy and active listening skills through communication exercises and role-playing activities. • Encourage individuals to share experiences, feelings, and perspectives with trusted individuals.
7. Generativity	The virtue of Care	• Encourage individuals to engage in acts of kindness and volunteerism. • Provide opportunities for individuals to contribute to their communities and make a positive impact. • Foster a sense of social responsibility and the importance of giving back to society.
8. Integrity	The virtue of Wisdom	• Promote ethical behavior and values such as honesty, integrity, and responsibility. • Engage in discussions and activities that explore personal values and ethical dilemmas. • Encourage individuals to reflect on their actions and align them with their values and principles.

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